

# **EnviroSwift**

Where nature meets development



**Detailed Freshwater Ecological Assessment:**

## **Proposed development of portions of Stikland Hospital, Erf 6300, City of Cape Town, Western Cape**

Prepared for:

**Infinity Environmental**

Prepared by:

**Nick Steytler**

SACNASP Reg. no. 400029/02

**Date: 29.08.2024**

# Executive Summary

## Background

The Western Cape Department of Infrastructure proposes a mixed use development on the vacant portions of Stikland Hospital, South Precinct (Remainder Erf 6300 Stikland), City of Cape Town. After undertaking site visits in September 2023, EnviroSwift confirmed the presence of several wetlands on the proposed site. As a result, a detailed ecological assessment of the potentially affected wetlands was undertaken in order to determine the level of risk posed by the proposed development and accordingly determine the required level of authorisation in terms of the National Water Act, Act 36 of 1998 (NWA)<sup>1</sup>.

In terms of the NEMA EIA Regulations (2014, as amended), if following the application of the national web-based screening tool the proposed site is determined to have a *Medium* sensitivity or greater for the aquatic biodiversity theme then a specialist assessment must be conducted in accordance with the gazetted Protocol of Aquatic Biodiversity Assessment. Given the presence of wetlands on the proposed site, the site has been determined to have a *High* sensitivity for aquatic biodiversity and accordingly it is necessary to comply with the Protocol.

Identifying wetlands on the proposed site was considered difficult given that the site is mowed regularly which reduces the efficacy of using vegetation, a key determinant in wetland identification, as an informant. Accordingly, EnviroSwift recommended that a geotechnical survey be performed as a deeper intrusive investigation would confirm whether an impermeable subsurface layer was causing perched conditions and also assist with identifying hydromorphic soils and ultimately confirm the delineations indicated in the EnviroSwift Screening Report (EnviroSwift, 2023). GEOSS was then appointed by ARG Design to undertake a wetland delineation study to verify the findings of the EnviroSwift Screening Study. Toward this end, GEOSS commissioned a hydrogeological study and wetland verification and delineation study which were undertaken in 2024 by DSA and the Freshwater Consulting Group (FCG), respectively. The study confirmed that perching of the water table was a key hydrological driver of the wetlands on the site and also that the wetland delineations presented by EnviroSwift (2023) were largely accurate. The wetland delineation presented by the FCG is considered the most accurate given that it is based on a hydrogeological study and is accordingly used as a basis for the detailed ecological assessment.

## Desktop Assessment

The study area lies in the Southwestern Coastal Belt ecoregion (Kleynhans *et al*, 2005), and is furthermore within the Berg Water Management Area (WMA), the Greater Cape Town sub-Water Management Area (sub-WMA) and the G22C and G22E quaternary catchments (NFEPA, 2011 and Kleynhans *et al*, 2005).

According to Mucina and Rutherford (2006, updated 2012 & 2018), the proposed site is located within Cape Flats Sand Fynbos which is listed as Critically Endangered (CR) according to the Government Gazette No. 47526 of November 2022. The NFEPA wetland vegetation database (2011) identifies the applicable wetland vegetation type to be Southwest Sand Fynbos within which all vegetation types are Critically Endangered (CR) with the exception of depressions and seeps which are listed as Vulnerable (VU).

According to the NGI Rivers database (Cape Farm Mapper, 2023) and the National Wetlands Map Version 5 (CSIR, 2018) there are no rivers, drainage lines or wetlands within the site (see Figure 7). The proposed site does however fall within the regulated zone (500m) of a hillslope seep which is located approximately 20m north of the north-western boundary of the site. The City of Cape Town Wetlands Layer (BioNet, updated 2018) however indicates that the proposed site lies within the regulated zone of a second wetland, an endorheic depression, located approximately 420m north of the north-western property boundary (see Figure 8). Both wetlands occur upslope of the proposed site and

---

<sup>1</sup> If the level of risk for all development-related activities are determined to be LOW then a General Authorisation (GA) would apply. If any of the activities are determined to have a level of risk greater than LOW (i.e. MODERATE or HIGH) then a Water Use Licence Application (WULA) would be required.

on the far side of Old Paarl Road and as such are not at any risk of being impacted by the future development on the site.

According to the BioNet (updated 2018), neither the proposed site nor the surrounding areas are identified as having any conservation importance.

#### *Watercourse Classification and Delineation*

The vacant parts of the South Precinct of Stikland Hospital were divided into 5 portions (A – E) for project planning purposes. EnviroSwift in collaboration with GEOSS identified the following wetlands, per portion of the proposed site:

- Portion A:
  - **Wetland 1:** A natural seasonal depression wetland (1.51 ha) located along the western boundary of Erf 6300. It is believed that this wetland is a remnant of a larger wetland system that historically extended beyond the current western boundary of the site.
- Portion B:
  - **Wetland 2:** A small natural hillslope seep (0.08 ha) located west of wetland 3. Mottling within the upper 50.00 cm of soils indicates seasonal subsurface water movement, which is indicative of a seasonally saturated wetland. It is believed that this wetland is fed by rainfall accumulating on the underlying clayey soils.
  - **Wetland 3:** A natural, elongated hillslope seep (1.415 ha) which extends from the northern boundary of the site in a south westerly direction. Mottling within the upper 50.00 cm of soils indicates seasonal subsurface water movement which is indicative of a seasonally saturated wetland. It is believed that this wetland is fed by rainfall accumulating on the underlying clayey soils.
  - **Wetland 4:** A natural depression wetland (0.39 ha) with gleyed soils in the upper 50.00 cm of soils. The presence of gleyed soils indicate permanent saturated conditions. The wetland is present within a concave portion of the site and appears to experience saturation for longer periods of time than wetland 3.
- Portion E:
  - **Wetland 5:** A natural depression wetland (0.08 ha) on the southern border of the property. It is believed that this wetland experiences slightly unnaturally wet conditions due to the nearby railway creating a barrier. The presence of mottles within the upper 50.00 cm of soils are indicative of seasonal water movement and it is believed that a shallow clay layer (~40.00 cm depth) has resulted in a perched wetland system.

#### *Freshwater Assessment Results*

The results of the detailed ecological assessment of the 5 on-site wetlands are summarised in Table A below. While the wetlands are all relatively similar insofar as the ecological services that they deliver and their respective EIS, they do differ in terms of their PES with Wetlands 2 & 3 being the least impacted and having a PES of Category C and wetlands 4 & 5 being the most impacted and having a PES of Category E.

**Table A: EIS Summary of the Detailed Freshwater Ecological Assessment of the five on-site wetlands.**

Wetland Number	Classification	Key Ecological Services	Present Ecological State (PES)	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Condition (REC)
1	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control Carbon Storage	"D"	Low/marginal	"D"
2 & 3	Hillslope Seep	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"C"	Low/marginal	"C"
4	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"E"	Low/marginal	"D"
5	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"E"	Low/marginal	"D"

### Impact Assessment

The proposed development entails the development of a mixture of land uses with residential being the predominant use. Four of the five identified and delineated wetlands on the site will be retained within the development with the very small and ecologically isolated wetland 5 being infilled and lost as a result of the proposed development. Three of the site's wetlands (wetlands 1, 2 and 3) will be accommodated in a large urban park between Old Paarl Road to the north and the existing Stikland Hospital to the south and wetland 4 will be accommodated on the western edge, alongside de la Haye Road.

Given the nature of the likely development/construction phase activities, which entail relatively large-scale site preparation (vegetation clearing and infilling/excavations to create levelled building platforms) and the construction of buildings and the installation of services) in close proximity to wetlands, the identified development/construction phase impacts include wetland habitat loss, wetland habitat disturbance, alteration of flow regime, erosion and sedimentation and biota loss.

For the operational phase it is the primary land use, residential, that is the main cause of impacts on the retained wetlands including habitat disturbance, altered flow regime and water quality impairment. Due to the fact that the biodiversity associated with the site's wetlands is suppressed by the regular mowing of the wetlands and their surrounding vacant terrestrial areas, by only ceasing to mow, the biota would benefit from improved habitat condition and biodiversity would increase. This amounts to a gain for aquatic biota and therefore the operational phase is associated with a benefit.

Practicable mitigation measures have been recommended to minimise and manage all the identified potential impacts to ensure that all impacts are reduced to either LOW or VERY LOW (-ve) significance ratings. The only exception to this is the development/construction phase-related impact of wetland habitat loss which cannot be mitigated and remains LOW (-ve). Also, with the recommended

establishment of suitable indigenous wetland vegetation within the retained wetlands and the establishment of suitable indigenous terrestrial vegetation in the buffer zones the gains for aquatic biota would be enhanced to a MEDIUM (+ve) benefit.

A summary of the impact significance ratings for the identified potentially significant impacts associated with the proposed development (throughout the project life-cycle) is provided in the table below.

**Table B: Summary of the impact significance ratings for the identified potentially significant freshwater ecological impacts.**

Impacts	Extent	Duration	Intensity	Probability of impact occurring	Significance
<b>Development/Construction phase impacts:</b>					
<b>Loss of wetland habitat</b>					
Without mitigation	LOCAL	LONG TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	Mitigation not possible				
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	MEDIUM TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	VERY LOW (-ve)
<b>Increased erosion and sedimentation</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Biota loss</b>					
Without mitigation	LOCAL	SHORT TERM	MEDIUM	DEFINITE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	LOW (-ve)
<b>Operational phase impacts</b>					
<b>Wetland habitat disturbance</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	IMPROBABLE	VERY LOW (-ve)
<b>Gains in biota</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (+ve)
With mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (+ve)

It is understood that DWS applies a No Net Loss policy to wetland loss and ordinarily the loss in wetland habitat and function of the smallest (0,08 ha) and most ecologically isolated wetlands (wetland 5) would need to be offset with the adequacy of the proposed offset being determined through application of the Wetland Offset Calculator (Macfarlane *et al.*, 2014). When the calculator was applied the size of the wetland was found to be too small to allow for a calculation of wetland loss in Hectare Equivalents (HE). Despite this, the specialist is of the opinion that the gains achieved by ceasing to mow the retained wetlands, planting suitable indigenous wetland vegetation within the wetlands and the establishment of 20m vegetated buffers around each of the retained wetlands adequately offsets the loss of wetland habitat and function associated with the loss of wetland 5.

#### No Go alternative

Should no development take place, then ongoing degradation of the site's wetlands would continue due to the regular mowing which has a significant impact on the species composition and reproductive success of the naturally occurring indigenous vegetation. Also, given that the proposed development presents an opportunity to improve the condition of the site's retained wetlands there would also be a

lost opportunity cost associated with the No-Go alternative. The No-Go alternative was rated to comprise a negative impact of LOW significance.

### *Conclusion & Recommendations*

Given that a number of practicable mitigation measures can be enforced and that these would render most of the potential impacts to have a VERY LOW (-ve) impact significance with only two of the identified impacts being rated to have a LOW (-ve) impact significance, the proposed development is supported on condition that the recommended mitigation measures are implemented.

While it is recognised that wetland habitat loss would occur as a result of the requirement to infill wetland 5, the fact that the wetland is too small to allow for a calculation of loss in terms of HE when using the Wetland Offsets Calculator and is furthermore severely degraded (PES category "E") and ecologically isolated, its loss is more than adequately offset by the recommended planting of suitable wetland plants and buffer establishment (20m wide) for each of the retained wetlands.

### *Risk Assessment*

The revised Risk Assessment Matrix (RAM) was used to determine the quantum of risk posed by the proposed development on the identified on-site wetlands. All of the activities potentially generating negative impacts were found to be associated with a LOW risk class including the loss of wetland 5. Given that all of the activities is associated with a LOW risk rating the proposed development qualifies for a GA as far as the Section 21 (c) and (i) water uses are concerned.

## Contents

Executive Summary .....	ii
Contents .....	vii
List of Figures .....	viii
List of Tables .....	ix
Disclaimer .....	xi
Glossary .....	xi
Acronyms .....	xii
Specialist Details and Experience .....	xiii
1 Introduction .....	1
1.1 Project Background .....	1
1.2 Scope of Work .....	2
1.3 Limitations and Assumptions .....	3
1.4 Overview of Applicable Legislation .....	3
1.4.1 National Water Act (Act 36 of 1998) .....	3
1.4.2 National Environmental Management Act (107 of 1998) .....	4
2 Method of Assessment .....	8
2.1 Overview .....	8
2.2 Desktop Assessment .....	9
2.3 Watercourse Identification and Delineation .....	11
2.4 Freshwater Feature Classification .....	12
2.5 Ecological Assessment Methodology for Wetlands .....	13
2.5.1 Ecosystem Services .....	13
2.5.2 Present Ecological State (PES) .....	13
2.5.3 Ecological Importance and Sensitivity (EIS) .....	14
2.5.4 Recommended Ecological Category (REC) .....	14
2.5.5 Buffer Requirements .....	14
2.6 Impact Assessment .....	14
3 Results .....	15
3.1 Desktop Assessment .....	15
3.1.1 Ecological Setting .....	15
3.1.2 Watercourses within the Study Area and within the Regulated Zone .....	18
3.2 Site Investigation .....	19
3.2.1 Site Description .....	19
3.2.2 Watercourse Delineation .....	25
3.3 Watercourse Classification .....	26
3.4 Ecological Assessment of the Depression Wetland 1 .....	26
3.4.1 Ecosystem Services .....	26
3.4.2 Present Ecological State .....	28
3.4.3 Ecological Importance and Sensitivity .....	29
3.4.4 Recommended Ecological Category .....	31
3.5 Ecological Assessment of the Hillslope Seep Wetlands 2 & 3 .....	31

3.5.1	Ecosystem Services .....	31
3.5.2	Present Ecological State .....	33
3.5.3	Ecological Importance and Sensitivity.....	33
3.5.4	Recommended Ecological Category.....	35
3.6	Ecological Assessment of Depression Wetland 4.....	35
3.6.1	Ecosystem Services .....	35
3.6.2	Present Ecological State .....	37
3.6.3	Ecological Importance and Sensitivity.....	38
3.6.4	Recommended Ecological Category.....	40
3.7	Ecological Assessment of Depression Wetland 5.....	40
3.7.1	Ecosystem Services .....	40
3.7.2	Present Ecological State .....	42
3.7.3	Ecological Importance and Sensitivity.....	42
3.7.4	Recommended Ecological Category.....	44
4	Assessment of Impacts .....	44
4.1	Activity Description & Impact Identification .....	44
4.1.1	Description of the Proposed Development .....	44
4.1.2	Alternatives under Assessment.....	44
4.1.3	Identification of potential freshwater ecological impacts associated with the proposed development.....	46
4.2	Potential Direct Impacts associated with the proposed mixed use development .....	47
4.2.1	Development/Construction Phase.....	47
4.2.2	Operational Phase.....	53
4.3	'No-Go' Scenario .....	57
4.4	Indirect Impacts .....	58
4.5	Cumulative Impacts.....	58
5	Key Findings and Recommendations .....	59
5.1	Key Findings.....	59
5.2	Authorisation Opinion.....	61
5.3	Conclusion and Recommendations .....	62
	Risk Assessment.....	64
6	References .....	65
	Appendix 1 – Impact Assessment Methodology .....	67
	Impact Rating Methodology .....	67
	Appendix 2 – CV of the Specialist.....	1
	Appendix 3 – Declaration of Independence.....	1
	Appendix 4 – Risk Assessment Matrix.....	1
	END OF REPORT .....	1

## List of Figures

Figure 1: Location of the proposed site and the vacant areas (A-E) proposed for development. ....	1
Figure 2: Cross section through a wetland (after DWAF, 2005).....	12

Figure 3: Classification System for wetlands and other aquatic ecosystems in South Africa. ....	13
Figure 4: Terrestrial vegetation type of the proposed site (Mucina & Rutherford, 2006, updated 2018). The site boundary is indicated as a yellow line. ....	16
Figure 5: Wetland Vegetation Type according to NFEPA (2011). The brown polygon indicates the extent of West Coast Shale Renosterveld and purple indicates the extent of Southwest Sand Fynbos. The yellow line indicates the site boundary. ....	17
Figure 6: Slope expressed as a percentage of the vertical, such that horizontal is 0% and vertical is 100%. The slope of the proposed site is between 0 and 10% (Cape Farm Mapper, 20224. The site boundary is indicated by a yellow line. ....	17
Figure 7: NGI Rivers and the National Wetlands Map Vers. 5 (CSIR, 2018). The yellow polygon indicates the proposed site and the red stippled line the NWA regulated area for wetlands (i.e. 500m from the site boundary). ....	18
Figure 8: City of Cape Town Wetlands Layer (BioNet, updated 2018). The wetland features identified to the north west (indicated as green and purple polygons) of the site and within the regulated zone are upslope of the site (i.e. the proposed development poses no risk to these feature). The remaining features are beyond the regulated zone. ....	19
Figure 9: Photos of standing water in the central part of Portion A. The photo on the left shows the most prominent feature with a stand of <i>Juncus kraussii</i> in the centre and the photo on the right is taken at the western boundary of the site with drainage from the site reaching De la Haye Road. ....	20
Figure 10: Photo of the <i>Typha capensis</i> dominated pond adjacent to the northern boundary of the site and Old Paarl Road immediately beyond the fence. ....	21
Figure 11: Photo of an area of ponding water to the east of the Typha-dominated depression. ....	22
Figure 12: Photo showing the auger sample taken within the area of ponding water shown in Figure 11. Note the dark colour and rich organic content characteristic of the wetland permanently saturated zone. ....	22
Figure 13: Area of dense kikuyu grass in Portion E indicative of elevated levels of soil saturation. ....	23
Figure 14: <i>Zantedeschia aethiopica</i> (left) and a white flowering aquatic plant, possibly <i>Pauridia aquatica</i> (right), present in the endorheic depression wetland in the extreme south western part of Portion E. ....	24
Figure 15: Ponding visible in the area near the overflowing stormwater manhole. ....	24
Figure 16: Wetland Delineation Map for portions A – E of Erf 6300 Stikland. Five natural wetlands are indicated by white arrows. ....	25
Figure 17: WET-EcoServices results for Wetland 1. ....	27
Figure 18: WET-EcoServices results for Wetlands 2 & 3. ....	31
Figure 19: WET-EcoServices results for Wetland 4. ....	36
Figure 20: WET-EcoServices results for Wetland 5. ....	40
Figure 21: Conceptual layout of the proposed development. ....	45

## List of Tables

Table 1: Compliance with the reporting requirements as per the Protocol for Aquatic Biodiversity Assessments. ....	6
Table 2: WCBSP category definitions and management objectives. ....	10
Table 3: Vegetation characteristics used in the delineation of wetlands (after DWA, 2005). ....	12
Table 4: PES categories as defined in WET-Health (Macfarlane, 2007). ....	14
Table 5: Overview of the South Western Coastal Belt Ecoregion (adapted from Kleynhans et al, 2005) ....	16
Table 6: Local climate, topography and soil conditions (adapted from Cape Farm Mapper, 2024) ....	16
Table 7: Level 3, 4, 5 and 6 of the wetland and aquatic ecosystem classification for the depression wetlands 1, 4 & 5. ....	26
Table 8: Level 3, 4, 5 and 6 of the wetland and aquatic ecosystem classification for the hillslope seep wetlands 2 & 3. ....	26
Table 9: WET-EcoServices results for Wetland 1. ....	27
Table 10: WET-EcoServices categories. ....	28
Table 11: WET-health assessment results for Wetland 1 (depression wetland). ....	28
Table 12: EIS Results for Wetland 1. ....	30
Table 13: EIS Category definitions. ....	31
Table 14: WET-EcoServices results for Wetlands 2 & 3. ....	32
Table 15: WET-EcoServices categories. ....	32
Table 16: WET-health assessment results for Wetlands 2 & 3. ....	33

Table 17: EIS Results for Wetlands 2 & 3.....	34
Table 18: EIS Category definitions. ....	35
Table 19: WET-EcoServices results for Wetland 4.....	36
Table 20: WET-EcoServices categories. ....	37
Table 21: WET-health assessment results for Wetland 4.....	37
Table 22: EIS Results for Wetland 1 (depression).....	39
Table 23: EIS Category definitions. ....	40
Table 24: WET-EcoServices results for Wetland 5.....	41
Table 25: WET-EcoServices categories. ....	41
Table 26: WET-health assessment results for Wetland 5.....	42
Table 27: EIS Results for Wetland 5.....	43
Table 28: EIS Category definitions. ....	44
Table 29: Impact significance rating for the loss of wetland habitat (development phase). ....	47
Table 30: Impact significance rating for the alteration of the natural flow regime (development phase). ....	48
Table 31: Impact significance rating for erosion and sedimentation (development phase).....	49
Table 32: Impact significance rating for water quality impairment (development phase). ....	51
Table 33: Impact significance rating for loss of biota (development phase). ....	52
Table 34: Summary of development phase impacts.....	53
Table 35: Impact significance rating for wetland habitat disturbance (operational phase).....	54
Table 36: Impact significance rating for alteration of flow regime (operational phase).....	55
Table 37: Impact significance rating for water quality impairment (operational phase).....	56
Table 38: Impact significance rating for gains for biota (operational phase). ....	57
Table 39: Summary of impact assessment results for the operational phase.....	57
Table 40: Impact significance rating for all impacts associated with the No-Go alternative.....	58
Table 41: EIS Summary of the Detailed Freshwater Ecological Assessment of the five on-site wetlands. ....	60
Table 42: Summary of the impact significance ratings for the identified potentially significant freshwater ecological impacts. ....	61

## List of Appendices:

Appendix 1: Impact Assessment Methodology

Appendix 2: CV of the specialist

Appendix 3: Declaration of Independence

Appendix 4: Risk Assessment Matrix

## Disclaimer

EnviroSwift Western Cape has exercised all due care in the reviewing of all available information and the delineation of the watercourse boundaries. The accuracy of the results and conclusions from the assessment are entirely reliant on the accuracy and completeness of available desktop information, site conditions at the time of the assessment and professional judgment. EnviroSwift Western Cape does not accept responsibility for any errors or omissions in the assessment and therefore does not accept any consequential liability arising from commercial decisions made, which are based on the information contained in this report. Opinions presented in this report apply to conditions/site conditions applicable at time of review and those conditions which are reasonably foreseeable.

## Glossary<sup>2</sup>

<b>Alluvial soil:</b>	A deposit of sand, mud, etc. formed by flowing water, or the sedimentary matter deposited thus within recent times, especially in the valleys of large drainage lines.
<b>Biodiversity:</b>	The number and variety of living organisms on earth, the millions of plants, animals and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
<b>Buffer:</b>	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
<b>Catchment:</b>	The area contributing to runoff at a particular point in a drainage line system.
<b>Chroma:</b>	The relative purity of the spectral colour which decreases with increasing greyness.
<b>Critical Biodiversity Areas:</b>	Areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services.
<b>Delineation (of a wetland):</b>	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
<b>Ecoregion:</b>	A recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region.
<b>Non-perennial stream:</b>	A stream that has transitory or short-lived flow.
<b>Groundwater:</b>	Subsurface water in the saturated zone below the water table.
<b>Habitat:</b>	The natural home of species of plants or animals.
<b>Hue (of colour):</b>	The dominant spectral colour.
<b>Hydromorphic soil:</b>	A soil that, in its undrained condition, is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).
<b>Hydrology:</b>	The study of the occurrence, distribution and movement of water over, on and under the land surface.
<b>Hydrophytes:</b>	Also called obligate wetland plants - plants that are physiologically bound to water where at least part of the generative cycle takes place in the water or on the surface.
<b>Halophytes:</b>	Salt tolerant plants.
<b>Helophytes:</b>	Also called facultative wetland plants - essentially terrestrial plants of which the photosynthetically active parts tolerate long periods of submergence or floating on water.
<b>Indicator species:</b>	A species whose presence in an ecosystem is indicative of particular conditions (such as saline soils or acidic waters).
<b>Intermittent flow:</b>	Flows only for short periods.
<b>Macrophyte:</b>	A large plant - in wetland studies usually a large plant growing in shallow water or waterlogged soils.

---

<sup>2</sup> As provided by DWA (2005) and WRC Report No. TT 434/09.

<b>Perennial:</b>	Permanent - persisting from year to year.
<b>Riparian area delineation:</b>	The determination and marking of the boundary of the riparian area.
<b>Riparian habitat:</b>	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils (deposited by the current drainage line system) and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.
<b>Shrub:</b>	A shrub is a small to medium-sized woody plant.
<b>Temporary zone:</b>	The zone that is alternately inundated and exposed.
<b>Terrain unit morphological classes:</b>	Areas of the land surface with homogenous form and slope.
<b>Watercourse (NWA):</b>	(a) A drainage line or spring; (b) A natural channel in which water flows regularly or intermediately; (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.
<b>Water table:</b>	The upper surface of groundwater or that level below which the soil is saturated with water. The water table feeds base flow to the drainage line channel network when the drainage line channel is in contact with the water table.
<b>Wetland:</b>	An area of marsh, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed ten metres.

## Acronyms

<b>BMP</b>	Best Management Practice
<b>CCT</b>	City of Cape Town
<b>CBA</b>	Critical Biodiversity Area
<b>CSIR</b>	Council for Scientific and Industrial Research
<b>DWA</b>	Department of Water Affairs
<b>DWAF</b>	Department of Water Affairs and Forestry
<b>DWS</b>	Department of Water and Sanitation
<b>EIA</b>	Environmental Impact Assessment
<b>EIS</b>	Ecological Importance and Sensitivity
<b>FEPA</b>	Freshwater Ecological Support Area
<b>GPS</b>	Global Positioning System
<b>HGM</b>	Hydrogeomorphic
<b>IHI</b>	Index of Habitat Integrity
<b>IHIA</b>	Intermediate Habitat Integrity Assessment
<b>MAP</b>	Mean Annual Participation
<b>NEMA</b>	National Environmental Management Act
<b>NFEPA</b>	National Freshwater Ecosystem Priority Areas
<b>NWA</b>	National Water Act
<b>OESA</b>	Other Ecological Support Area
<b>PES</b>	Present Ecological State
<b>REC</b>	Recommended Ecological Category
<b>SANBI</b>	South African National Biodiversity Institute

<b>Sub-WMA</b>	Sub - Water Management Area
<b>SUDS</b>	Sustainable Urban Drainage Systems
<b>WCBF</b>	Western Cape Biodiversity Framework
<b>WMA</b>	Water Management Area
<b>WUL</b>	Water Use Licence
<b>WWTW</b>	Wastewater Treatment Works

## Specialist Details and Experience

### Nick Steytler (Pr.Sci.Nat. 400029)

Nick Steytler is a registered Professional Natural Scientist (Pr.Sci.Nat.) with the South African Council for Natural Scientific Professions (SACNASP) and is also a certified Environmental Assessment Practitioner (EAP) with over 20 years' experience in the field of environmental management. He holds a Masters of Science (MSc.) degree in the field of Entomology (University of KwaZulu-Natal, Pietermaritzburg campus). His employment record includes several years with the Institute of Natural Resources in KwaZulu-Natal where he worked within their Natural Resource Management Programme and then with SRK Consulting in Cape Town where he worked as an Environmental Scientist in the field of environmental management (i.e. undertaking Environmental Impact Assessment [EIA] and the like). After leaving SRK in 2007, Nick founded KHULA Environmental Consultants which has been consulting for over 15 years in environmental management sector in the Western Cape. In developing his expertise as a freshwater specialist, he initially worked in the capacity of an associate to EnviroSwift Western Cape (WC) and then took over the company in 2020. He now undertakes all wetland specialist work in the Western, Southern, Eastern and Northern Cape and is supported by Louise Santanna, Director of EnviroSwift KwaZulu-Natal.

# 1 Introduction

## 1.1 Project Background

The Western Cape Department of Infrastructure proposes a mixed use development on the vacant portions of Stikland Hospital South Precinct (Remainder Erf 6300 Stikland), City of Cape Town (see Figure 1). ARG Design (ARG) was appointed as the lead consultant responsible for conceptualising the development proposal and securing the required approvals including but not limited to any environmental authorisations in terms of the National Water Act (NWA, Act 36 of 1998) and the NEMA EIA Regulations (2014, as amended).



**Figure 1: Location of the proposed site and the vacant areas (A-E) proposed for development.**

Accordingly, ARG appointed EnviroSwift Western Cape (EnviroSwift) to conduct an aquatic biodiversity screening study of the proposed site to determine if there are any aquatic biodiversity constraints which need to be taken into consideration in planning the development. Additionally, any authorisation requirements in terms of the NEMA EIA Regulations (2014, as amended) and the NWA relating to the

presence of aquatic habitat, need to be confirmed. In order to provide this input EnviroSwift conducted site visits in September 2023 and also undertook a desktop review of available information including the National Geospatial Information (NGI) Rivers database (available on Cape Farm Mapper), the National Wetlands Map (CSIR, 2018), City of Cape Town wetlands layer (BioNet, updated 2018) and the Western Cape Biodiversity Spatial Plan, 2017). The screening level study confirmed the presence of wetlands and the strong likelihood that the proposed development would pose a level of risk to the site's wetlands thereby triggering the requirement for a Water Use Authorisation in terms of the NWA.

As a result, a detailed ecological assessment of the potentially affected wetlands is required in order to determine the level of risk posed by the proposed development and accordingly determine the required level of authorisation in terms of the National Water Act, Act 36 of 1998 (NWA)<sup>3</sup>. This report presents the methods used and results of the detailed ecological assessment including an assessment of the risk posed to the directly affected wetlands.

In terms of the NEMA EIA Regulations (2014, as amended), if following the application of the national web-based screening tool the proposed site is determined to have a Medium sensitivity or greater for the aquatic biodiversity theme then a specialist assessment must be conducted in accordance with the gazetted Protocol of Aquatic Biodiversity Assessment. Given the presence of wetlands on the proposed site, the site has been determined to have a High sensitivity for aquatic biodiversity and accordingly it is necessary to comply with the Protocol.

## 1.2 Scope of Work

The scope of work for a detailed freshwater ecological study is as follows:

- Assessment of relevant background information including the National Freshwater Ecological Database (NFEPA, 2011), the National Wetlands Map Version 5 (CSIR, 2018), the Western Cape Biodiversity Spatial Plan (WCBSP, 2017), the City of Cape Town BioNet (updated 2018), the National Geospatial Information (NGI) Service topographical maps and vector data, and pertinent academic resources;
- A site assessment including identification of on-site wetlands and the delineation of the wetland temporary boundaries in accordance with best practice methods (refer to methods section);
- Assessment of the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the directly affected wetlands (refer to methods section);
- Identification of the Section 21 (c) and (i) activities;
- Assessment of the significance of the identified potentially significant impacts and identification of practicable mitigation measures;
- Completion of the Department of Water & Sanitation (DWS) Risk Assessment Matrix to determine the level of risk posed to the directly affected watercourses and the relevant level of Water Use application;

---

<sup>3</sup> If the level of risk for all development-related activities are determine to be LOW then a General Authorisation (GA) would apply. If any of the activities are determined to have a level of risk greater than LOW (i.e. MODERATE or HIGH) then a Water Use Licence Application (WULA) would be required.

## 1.3 Limitations and Assumptions

The following limitations apply to this study:

- Two site visits were conducted on 18 and 22 September 2023, respectively (i.e. late in the wet season) which allowed for a conclusive determination of hydrology and seasonality.
- During the site assessments the proposed site and its immediate surrounds were searched for signs of natural drainage, elevated levels of soil saturation and aquatic habitat (hydrophytic vegetation). Aquatic habitat in the greater area was identified based on the available online databases, viz-a-viz the National Wetlands Map Version 5 (CSIR, 2018) and the City of Cape Town Wetlands Layer (BioNet, updated 2018).
- In determining the presence of any wetlands on-site, the methods used were
- The study area is considered a difficult case for wetland delineation due to the history of disturbance, having being cultivated since the mid-1900s, and due to ongoing, regular mowing of the vacant areas. As a result, reliance on vegetation to determine wetland habitat is limited and other methods including the use of historical aerial imagery available on Google Earth Pro were used by EnviroSwift, in combination with soil characteristics. The soil characteristics were identified using methods limited to the upper 50cm of soil in accordance with the Updated Manual for Identification and Delineation of Wetland and Riparian Areas (Department of Water Affairs and Forestry - DWAF, 2008) and the Application of the DWAF (2008) Method to Wetland Soils of Western Cape (Job *et. al.* 2009).
- Given these difficulties EnviroSwift recommended that a geotechnical survey be performed as a deeper intrusive investigation would confirm whether an impermeable subsurface layer was causing perched conditions and also assist with identifying hydromorphic soils and ultimately confirm the delineations indicated in the EnviroSwift Screening Report (EnviroSwift, 2023). GEOSS was then appointed by ARG Design to undertake a wetland delineation study to verify the findings of the EnviroSwift Screening Study. Toward this end, GEOSS commissioned a hydrogeological study and wetland verification and delineation study which were undertaken in 2024 by DSA and the Freshwater Consulting Group (FCG), respectively. The study confirmed that perching of the water table was a key hydrological driver of the wetlands on the site and also that the wetland delineations presented by EnviroSwift (2023) were largely accurate. The wetland delineation presented by the FCG is considered the most accurate given that it is based on a hydrogeological study and is accordingly used as a basis for the detailed ecological assessment.

## 1.4 Overview of Applicable Legislation

### 1.4.1 National Water Act (Act 36 of 1998)

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors -

- (g) protecting aquatic and associated ecosystems and their biological diversity; and
- (h) reducing and preventing pollution and degradation of water resources.

In order to understand and interpret the Act correctly, the following definitions are applicable to this project:

**“pollution”** means the direct or indirect alteration of the physical, chemical or biological properties of a water resource;

**“protection”**, in relation to a water resource, means -

- (a) maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way;
- (b) prevention of the degradation of the water resource; and
- (c) the rehabilitation of the water resource;

**“resource quality”** means the quality of all the aspects of a water resource including -

- (a) the quantity, pattern, timing, water level and assurance of instream flow;
- (b) the water quality, including the physical, chemical and biological characteristics of the water;
- (c) the character and condition of the instream and riparian habitat; and
- (d) the characteristics, condition and distribution of the aquatic biota;

**“watercourse”** means -

- (a) a drainage line 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; and
- “**water resource**” includes a watercourse, surface water, estuary, or aquifer.

The NWA deals with pollution prevention, and in particular the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources. The measures may include measures to -

- (a) cease, modify or control any act or process causing the pollution;
- (b) comply with any prescribed waste standard or management practice;
- (c) contain or prevent the movement of pollutants;
- (d) eliminate any source of the pollution;
- (e) remedy the effects of the pollution; and
- (f) remedy the effects of any disturbance to the bed and banks of a watercourse.

Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence.

Notice No. 4167 of Government Gazette No. 49833 (December 2023) promulgated in terms of the NWA makes allowance for a regulated area around all watercourses within which the risk of an activity in terms of water uses (c) and (i) under section 21 of the Act must be assessed. The stipulated regulated areas include everything within 500m of the boundary of wetland, and everything within 100m or the 1:100 year flood-line (whichever is the greater distance) of a river, stream or drainage line.

The Department of Water and Sanitation (DWS) has developed a Risk Assessment Matrix (RAM) for the purpose of determining the level of risk posed by Section 21 (c) and (i) activities. If the risk to the watercourse(s) is determined to be LOW then the proposed development would qualify for a General Authorisation (GA). If the level of risk is determined to be MODERATE or greater then the proposed development would qualify for a Water Use Licence (WUL).

The DWS applies a “no net loss” policy to wetlands. Therefore, should the proposed development result in the loss of any wetland habitat or function, the loss must be compensated by means of an offset scheme in order to secure the required water use licence. Significant loss of riparian habitat may also require compensation by means of an offset in order for the application to be successful. An offset scheme may entail rehabilitation and management of another portion of wetland or riparian habitat within the applicable property; or if this is not feasible or adequate, it may entail purchase, rehabilitation and management (in perpetuity) of another wetland or riparian property. Rehabilitation, purchase of an additional property (if necessary) and management of the offset may be costly processes. While the brief to the consultant team is to maximise the development potential of the site, 4 out of the 5 wetlands will be retained and 20 m wide buffers established around each of the retained wetlands. The wetland that will be lost is the smallest and most isolated wetland and due to its small size does not allow for a calculation of loss when using the Wetland Offset Calculator (Macfarlane, *et al.* 2014). Given that 4 wetlands will be retained and protected within the proposed mixed use development, the specialist is of the opinion that the loss of the smallest and most ecologically isolated wetland will be adequately offset.

#### **1.4.2 National Environmental Management Act (107 of 1998)**

The NEMA states the following:

“Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot

reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

The Act also makes special mention of the importance of the protection of wetlands:

“Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.”

Environmental Impact Assessment (EIA) Regulations have been promulgated under NEMA since 2006<sup>4</sup> which list activities that may be detrimental to the environment and that require prior Environmental Authorisation. The Regulations specify the level of EIA (either a Basic Assessment or a full Scoping and EIA process) that needs to be undertaken in order to obtain the required Environmental Authorisation. The appointed Environmental Assessment Practitioner (EAP), Infinity Environmental, has confirmed that the proposed development does require prior environmental authorisation in terms of the NEMA EIA Regulations (2014, as amended) as listed activities are applicable.

In accordance with the *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*<sup>5</sup> when the site sensitivities are VERY HIGH, HIGH or MODERATE for any particular specialist theme then the applicable protocol for specialist assessment must be applied. In terms of NEMA, wetlands and drainage lines fall under the identified theme of Aquatic Biodiversity. In this case the Screening Tool identified the site as having a HIGH sensitivity for the aquatic biodiversity theme and accordingly the current study must meet the minimum reporting criteria as per the gazetted protocol for Aquatic Biodiversity Assessment. In undertaking this detailed Freshwater Ecological Assessment, EnviroSwift has addressed the minimum reporting criteria that are applicable as indicated in Table 1.

---

<sup>4</sup> The Regulations were amended in 2010 and in 2014, and again in 2017.

<sup>5</sup> Gazetted on 20 March 2020 (GN No. R320) and which came into effect in May 2020

**Table 1: Compliance with the reporting requirements as per the Protocol for Aquatic Biodiversity Assessments**

No.	Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments	Compliance of current report
1	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
1.1	a description of the aquatic biodiversity and ecosystems on the site, including;	See Section 3.
	(a) aquatic ecosystem types; and	See Section 3.
	(b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns	See Section 3.
1.2	the threat status of the ecosystem and species as identified by the Screening Tool	Ecosystem threat status is presented in Section 3.1.1. No aquatic species were identified as requiring assessment by the Screening Tool.
1.3	an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area)	See Section 3.1. where the lack of CBAs and ESAs on and adjacent to the proposed site are indicated.
1.4	a description of the Ecological Importance and Sensitivity (EIS) of the aquatic ecosystem including:	See Sections 3.4 – 3.7 where the EIS method based on the assessment tool developed by Rountree <i>et. al.</i> (2013) is applied to site's wetlands.
	(a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and	See Sections 3.4 – 3.7 where the WET-Health method (Macfarlane, 2007) and findings are presented for the site's wetlands.
	(b) the historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in- stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater).	The pre-development PES is assessed using the WET-Health method (Macfarlane, 2007) and is presented in Sections 3.4 – 3.7.
2	The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	No alternative scheme is being assessed.
3	Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:	See Section 4 for Impact Assessment.
3.1	Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	See Section 5 for key findings and recommendations.
3.2	Is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present?	No resource quality objectives have been established for the aquatic ecosystems under assessment.
3.3	How will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include:	
	(a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);	Impacts on flood regime are addressed in Section 4.2.
	(b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns);	Erosion and sedimentation are addressed in Section 4.2.
	(c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream	See Section 4 where the potential impacts of the proposed development are assessed.

No.	Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments	Compliance of current report
	portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and	
	(d) to what extent will the risks associated with water uses and related activities change	See Section 6 for Risk Assessment.
3.4	How will the proposed development impact on the functioning of the aquatic feature? This must include:	
	(a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system);	See Section 4.2.
	(b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over -abstraction or instream or off stream impoundment of a wetland or river);	See Section 4.2.
	(c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley- bottom wetland to a channelled valley -bottom wetland); (d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);	See Section 4.2.
	(e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	Wetland fragmentation will not occur as a result of the proposed development. Also, only wetlands 2, 3 and 4 are ecologically connected. The remaining wetlands, 1 and 5 are ecologically isolated. In planning the proposed development the ecological connectivity between wetlands 2, 3 and 4 have been intentionally maintained and if not enhanced (see Section 4.2).
	(f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.);	N/A as no such unique or important features present on the site.
3.5	How will the proposed development impact on key ecosystems regulating and supporting services especially:	See Section 4.
	(a) flood attenuation;	
	(b) streamflow regulation;	
	(c) sediment trapping;	
	(d) phosphate assimilation;	
	(e) nitrate assimilation;	
	(f) toxicant assimilation;	
	(g) erosion control; and	
	(h) carbon storage?	
3.6	How will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator - prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	
		Given the transformed state of the site's wetlands and their urban context no noteworthy faunal and vegetational communities are expected to inhabit the wetlands (i.e. all species are common, widespread, ubiquitous species) As such it is not considered necessary to assess this impact. Loss of wetland biota as a result of wetland loss and disturbance has been assessed in Section 4.2.
No.	<b>Minimum information requirements for an Aquatic Biodiversity Specialist Assessment Report</b>	
1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae	Contact details, SACNASP registration number and field of expertise provided in cover pages and preface of the report. CV provided as Appendix 2.

No.	Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments	Compliance of current report
2	a signed statement of independence by the specialist	Statement of Independence provided as Appendix 3.
3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	See Section 1.3.
4	the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant	See Section 1.3 and Section 2.
5	a description of the assumptions made, any uncertainties or gaps in knowledge or data	See Section 1.3.
6	the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant	Wetlands 1 – 4 and 20 m wide buffer zones around each of the wetlands have been identified as No-Go areas for the duration of the construction phase.
7	additional environmental impacts expected from the proposed development	See Section 4.2
8	any direct, indirect and cumulative impacts of the proposed development on site	See Sections 4.2, 4.4 and 4.5, respectively.
9	the degree to which impacts and risks can be mitigated, reversed and can cause loss of irreplaceable resources	See Section 4.2
10	a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies	The wetlands that will be set aside and incorporated in the development have been given extensive buffers (20m wide) that also assist with ecological connectivity insofar as the buffers result in land being set aside between 2 or more wetlands (see Section 4.2).
11	proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr)	See Section 4.2 and Section 5
12	a motivation must be provided if there were development footprints identified as per requirement No. 2 above that were identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate	N/A
13	a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not	See Section 5.
14	any conditions to which this statement is subjected	See Section 5.

## 2 Method of Assessment

### 2.1 Overview

The methods used in this freshwater specialist study entailed the following:

1. A desktop assessment to determine the conservation importance of the affected wetlands;
2. Site assessment to identify the site's wetlands and delineate their current extent;
3. An assessment of the current ecological status and value of the site's wetlands using recognised classification systems and indices based on the information collected during the desktop assessment and site assessment;
4. An impact assessment where the potential impacts (and benefits) caused by the proposed development are identified based on the desktop assessment and the site assessment, assessed in terms of their significance and the identification of mitigation and/or management measures to minimise the potentially significant negative impacts and enhance potential benefits; and

5. A Risk Assessment as required in terms of Notice No. 4167 of Government Gazette 49833 of December 2023.

These methods are discussed in more detail in the following sections.

## **2.2 Desktop Assessment**

The scope of work includes a desktop assessment using available national and provincial databases including the National Wetlands Map 5 (CSIR, 2018), the NFEPA (2011), the City of Cape Town's BioNet (updated 2018), the Western Cape Biodiversity Spatial Plan (WCBSP, 2017) and maps and vector data from the National Geospatial Information (NGI) directorate.

The WCBSP categorises natural features into Protected Areas (PAs), Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), and Other Natural Areas (ONAs), which are defined in the plan as follows (see Table 2):

Table 2: WCBSP category definitions and management objectives.

MAP CATEGORY	DEFINITION	DESIRED MANAGEMENT OBJECTIVE	SUB-CATEGORY
Protected Area	Areas that are proclaimed as protected areas under national or provincial legislation.	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.	n/a
Critical Biodiversity Area 1	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 habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	CBA: River
			CBA: Estuary
			CBA: Wetland
			CBA: Forest
			CBA: Terrestrial
Critical Biodiversity Area 2	Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a functional, natural or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.	CBA: Degraded
Ecological Support Area 1	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services.	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	ESA: Foredune
			ESA: Forest
			ESA: Climate Adaptation Corridor
			ESA: Coastal Resource Protection
			ESA: Endangered Ecosystem
			ESA: River
			ESA: Estuary
			ESA: Wetland
			ESA: Watercourse Protection
			ESA: Water Source Protection
ESA: Water Recharge Protection			
Ecological Support Area 2	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services.	Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.	ESA: Restore from NN
ONA: Natural to Near-Natural	Areas that have not been identified as a priority in the current systematic biodiversity plan, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high-impact land uses.	ONA: Natural to Near-Natural
			ONA: Degraded
No Natural Remaining	Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action.	Manage in a biodiversity-sensitive manner; aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high-impact land uses.	No Natural Remaining

## 2.3 Watercourse Identification and Delineation

For the purpose of the identification of water resources, the definition as provided by the NWA (Act 36 of 1998) was used to guide the site assessment. The NWA defines a water resource as a watercourse, surface water, estuary or aquifer, of which the latter two are not applicable to this assessment due to the following:

- An estuary is associated with the sea and are therefore excluded from freshwater assessments; and
- Given that wetland and riparian assessments only include the assessment of hydrology in the first 50 cm from the soil surface, aquifers, being significantly deeper, are excluded.

In addition, reference to a watercourse as provided above includes, where relevant, its bed and banks.

In order to establish if the watercourses at risk of being impacted can be classified as 'wetland habitat' or 'drainage line or riparian habitat', the definitions as drafted by the NWA (Act No. 36, 1998)<sup>6</sup> were taken into consideration:

- A 'wetland' is land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil; and
- 'Riparian' habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.

Freshwater habitat was identified with the use of the definitions provided above and the delineation took place according to the method supplied by DWAF (2005, updated 2008). Several indicators are prescribed in the wetland delineation guideline to facilitate the delineation of the temporary wetland zone.

Indicators used to determine the boundary of the wetland temporary zone include:

- 1) The position in the landscape;
- 2) The type of soil form;
- 3) The presence of wetland vegetation species; and
- 4) The presence of redoximorphic soil features, which are morphological signatures that appear in soils with prolonged periods of saturation.

---

<sup>6</sup> The definitions as provided by the NWA (Act No. 36 of 1998) are the only legislated definitions of wetlands in South Africa.

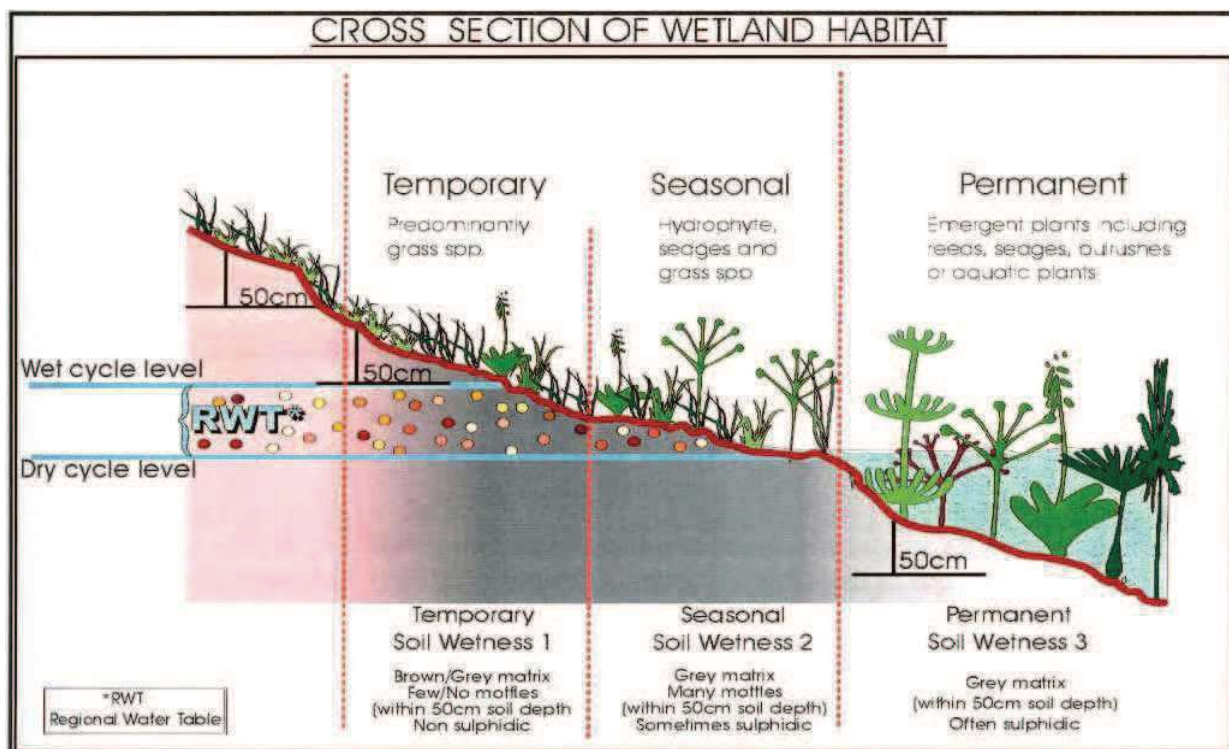


Figure 2: Cross section through a wetland (after DWAF, 2005).

Table 3: Vegetation characteristics used in the delineation of wetlands (after DWAF, 2005).

Terrestrial / Non wetland	Temporary	Seasonal	Permanent / Semi-permanent
Dominated by plant species which occur extensively in non-wetland areas; hydrophytic <sup>7</sup> species may be present in very low abundance	Predominantly grass species; mixture of species which occur extensively in non-wetland areas and hydrophytic plant species which are restricted largely to wetland areas	Hydrophytic sedge and grass species which are restricted to wetland areas	Dominated by emergent plants, including reeds, sedges and bulrushes or floating or submerged aquatic plants

## 2.4 Freshwater Feature Classification

Ecosystems included within the 'Classification System for Wetlands and other Aquatic Ecosystems in South Africa' (hereafter referred to as 'the Classification System') developed by Ollis *et. al.*, (2013) encompass those that the Ramsar Convention defines, rather broadly, as 'wetlands', namely areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (cited by Ramsar Convention Secretariat, 2011). The inland component of the Classification System has a six-tiered structure presented in Figure 3 below.

<sup>7</sup> Plants that are physiologically bound to water where at least part of the generative cycle takes place in the water or on the surface.

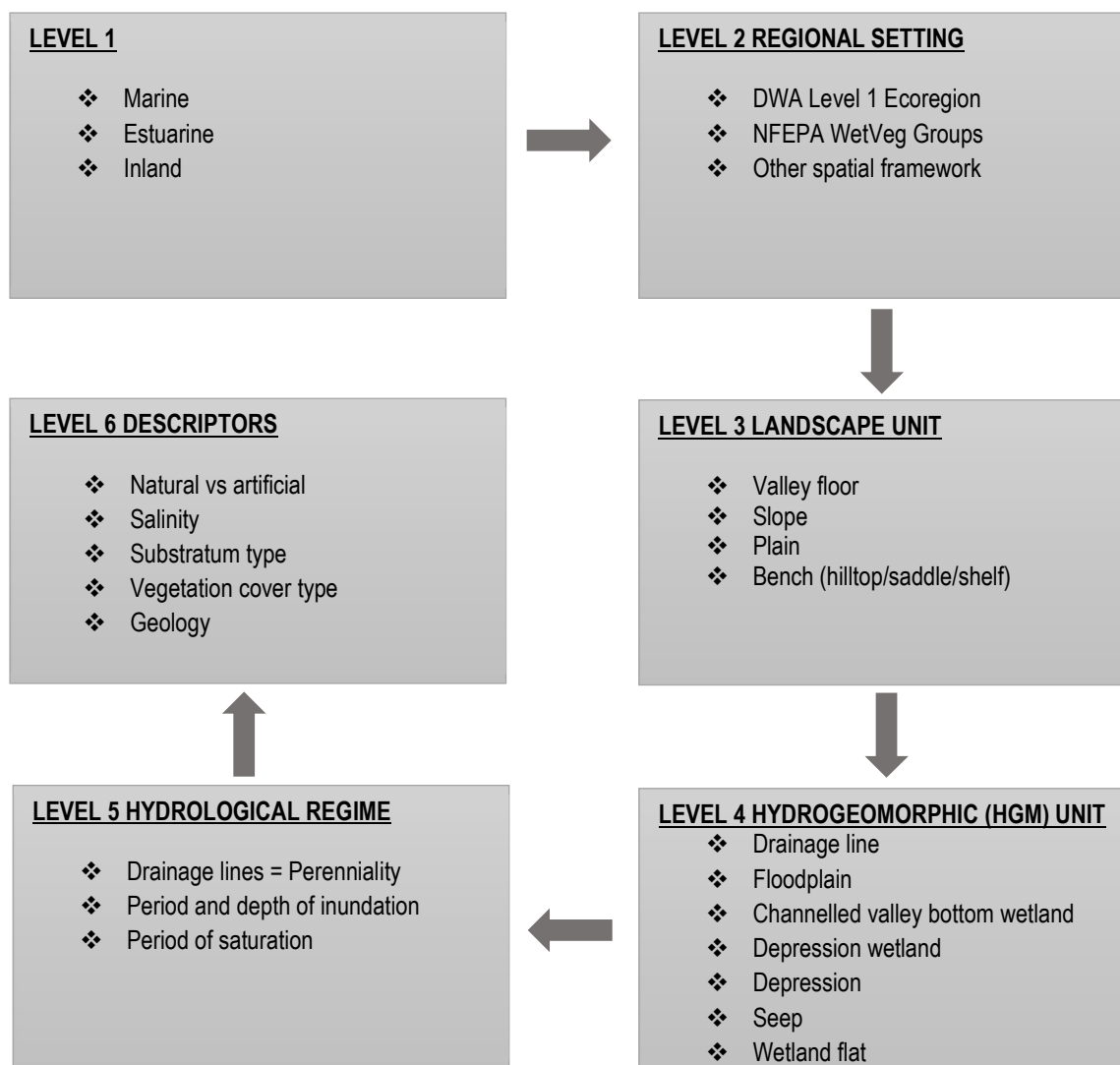


Figure 3: Classification System for wetlands and other aquatic ecosystems in South Africa.

## 2.5 Ecological Assessment Methodology for Wetlands

### 2.5.1 Ecosystem Services

WET-EcoServices (Kotze *et. al.* 2007) was designed for inland palustrine wetlands and has been developed to help assess 15 key goods and services that individual wetlands provide in order to allow for more informed planning and decision making. Central to WET-EcoServices is the characterisation of Hydrogeomorphic (HGM) units by which the wetland can be divided into units of a similar character. The rationale behind characterising the HGM units of a wetland is that areas belonging to the same HGM type and falling within a similar geological and climatic setting are likely to have a similar structure and exhibit similar processes.

### 2.5.2 Present Ecological State (PES)

WET-Health (Macfarlane, 2007) is a tool designed to assess the health or integrity of a wetland (see Table 4). Wetland health is defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition. This technique attempts to assess hydrological, geomorphological and vegetation health in three separate modules. The modules may then be combined to determine the overall Present Ecological State (PES) of the wetland. A Level 1 WET-Health assessment was undertaken as part of this assessment.

**Table 4: PES categories as defined in WET-Health (Macfarlane, 2007).**

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F

### 2.5.3 Ecological Importance and Sensitivity (EIS)

The EIS method applied to wetlands is based on the assessment tool developed by Rountree *et al.* (2014) and was used to determine the ecological importance and sensitivity of wetlands, incorporating the traditionally examined criteria used in EIS assessments of other water resources by the Department of Water Affairs (DWA) and thus enabling consistent assessment approaches across water resource types.

Hydro-functional importance and basic human needs have been assessed as part of the WET-EcoServices and were therefore excluded. In the method a series of determinants are assessed on a scale of 0 to 4, where “0” indicates no importance and “4” indicates very high importance.

### 2.5.4 Recommended Ecological Category (REC)

The Recommended Ecological Category (REC) is determined by the PES score as well as importance and/or sensitivity. Water resources which have a PES falling within an E or F ecological category are deemed unsustainable. In such cases the REC must automatically be increased to a D. Where the PES is determined to be within an A, B, C or D ecological category, the EIS components must be evaluated to determine if any of the aspects of importance and sensitivity are high or very high. If this is the case, the feasibility of increasing the PES (particularly if the PES is in a low C or D category) should be evaluated and either set at the same ecological category or higher depending on feasibility. This is recommended to enable important and/or sensitive water resources to maintain their functionality and continue to provide the goods and services for the environment and society.

### 2.5.5 Buffer Requirements

The buffer zone tool for the determination of the minimum effective wetland buffer (Macfarlane *et al.*, 2014) is typically used to calculate the minimum buffer. The tool requires various inputs including the PES. As such the tool can only be applied after a detailed ecological assessment of the watercourses in question have been undertaken. In this case, due to the extensive terrestrial areas surrounding and adjoining wetlands (particularly wetlands 2, 3 and 4) which allows for buffers of 20m which exceeds the recommended buffer width for mixed land uses of 15m (see Annexure 7 of the Buffer Zone Guidelines, Macfarlane *et al.*, 2014). It has therefore not been necessary to apply the buffer zone tool.

## 2.6 Impact Assessment

A summary of the method of assessment is provided overpage; the detailed method is provided in Appendix 1. The following criteria were taken into consideration when determining the significance of potential impacts associated with the proposed development:

- The nature of the potential impact i.e. positive, negative, direct, indirect;

- The extent and location of the potential impact;
- The duration of the potential impact i.e. short term, medium term, permanent;
- The intensity (or magnitude) of the potential impact i.e. low, medium, high; and
- The likelihood or probability of the potential impact having occurred.

Mitigation measures were subsequently identified and recommended for the identified potential impacts with the purpose of reducing the overall impact significance to an acceptable level, where and if possible (the resultant impact significance is determined and provided in the impact rating tables). Mitigation measures were aimed to ensure that:

- Alternative and more environmentally sound designs / layouts / technologies, etc., are implemented, if feasible;
- Environmental benefits of the proposed development are enhanced;
- Negative impacts are avoided, minimised or remedied; and
- Residual negative impacts are kept within acceptable levels.

This method of assessment was applied to the proposed development (only the preferred alignment as provided by the EAP) and the No-Go alternative in accordance with accepted best-practise methods.

## 3 Results

### 3.1 Desktop Assessment

#### 3.1.1 Ecological Setting

The study area lies in the Southwestern Coastal Belt ecoregion (Kleynhans *et al*, 2005), the main features of which are summarised in Table 5 which is adapted from Cape Farm Mapper website (<https://gis.elsenburg.com/apps/cfm/>). Local climatic, topographic and soil conditions for the study area are shown in Table 6, which is also adapted from the Cape Farm Mapper website. The study area is furthermore within the Berg Water Management Area (WMA), the Greater Cape Town sub-Water Management Area (sub-WMA) and the G22C and G22E quaternary catchments (NFEPA, 2011 and Kleynhans *et al*, 2005).

According to Mucina and Rutherford (2006, updated 2012 & 2018), the proposed site is located within Cape Flats Sand Fynbos (see Figure 4) which is listed as Critically Endangered (CR) according to the Government Gazette No. 47526 of November 2022. The NFEPA wetland vegetation database (2011) identifies the applicable wetland vegetation type to be Southwest Sand Fynbos (see Figure 5) within which all vegetation types are Critically Endangered (CR) with the exception of depressions and seeps which are listed as Vulnerable (VU).

The underlying geology of the area comprises mainly quaternary quartz sand of the Springfontein Formation with occasional calcareous coastal dune sand of the Witzand Formation. Soils are of a sandy texture, leached and with subsurface accumulation of organic matter, iron and aluminium oxides, either deep or on hard or weathering rock (Cape Farm Mapper, 2024). According to GEOSS (2024) and on the basis of a hydropedological investigation, the soils in the developable portions have limited vertical drainage due in some areas due to a prismactanic (clay) horizon. This indicates that wetlands originate in areas with high water accumulation. The prismacutanic horizon restricts vertical drainage, causing rainwater to pond and then discharge in a lateral direction. In concave areas, water will accumulate, thereby causing the wetland conditions. In areas where the Lamotte soils occur the clay layer is considerably deeper with the result that the lateral flow still occurs but considerably deeper. In the lowest part of the slope, water will accumulate and result in long periods of near-surface saturation. The lateral flow path is typically associated with rain events, but where it accumulates, saturated anaerobic conditions will continue for long periods thereby also causing wetland conditions to occur.

Table 5: Overview of the South Western Coastal Belt Ecoregion (adapted from Kleynhans et al, 2005)

Main Attributes	South Western Coastal Belt Ecoregion
Geology	Granite, quartzitic sandstone, quartzite, conglomerate, slate
Vegetation	Sand Plain Fynbos; Mountain Fynbos; West Coast Renosterveld; Dune Thicket; Strandveld Succulent Karoo
Landscape	Closed hills; mountains; moderate and high relief
Mean altitude	300-900m AMSL

Table 6: Local climate, topography and soil conditions (adapted from Cape Farm Mapper, 2024)

Parameters	Local Conditions
Mean annual precipitation (mm)	493 mm
Mean annual runoff (mm/annum)	57.31 mm/annum
Mean annual temperature (°C)	16.9°C
Elevation (m above mean sea level)	75 – 94 m
Slope classification (%)	0 – 10 %
Soil characteristics	Soils are of a sandy texture, leached and with subsurface accumulation of organic matter, iron and aluminium oxides, either deep or on hard or weathering rock.
Soil depth (mm)	>750 mm
Soil clay content (%)	< 15%

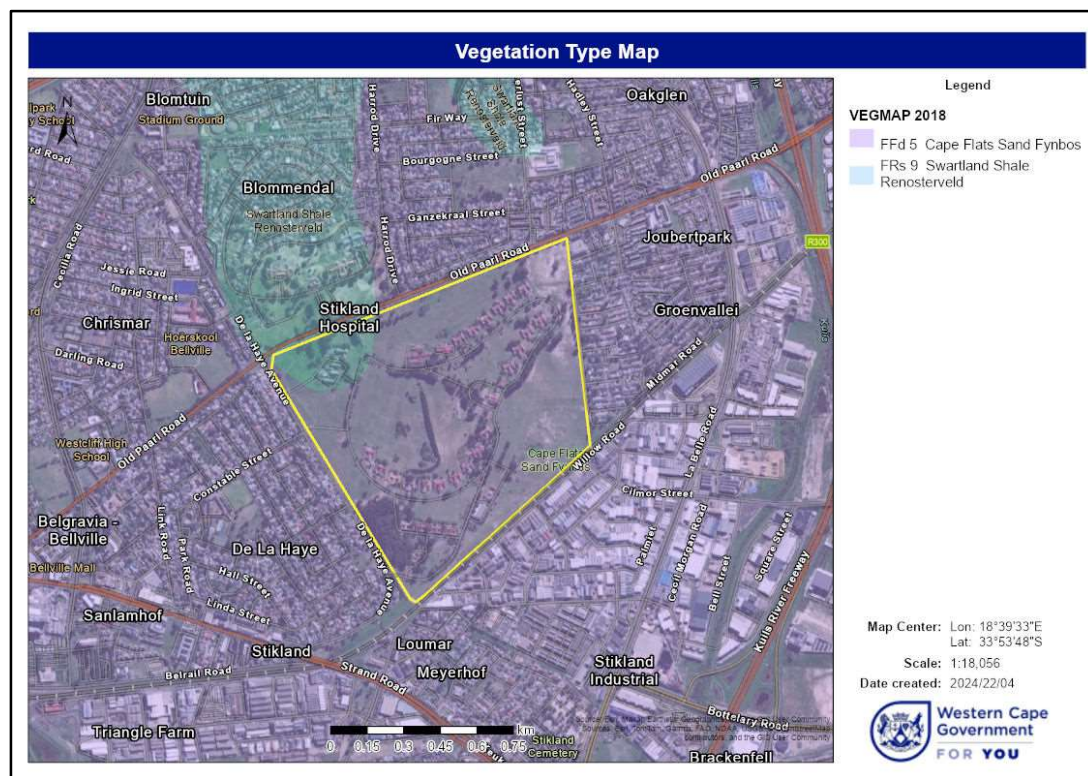


Figure 4: Terrestrial vegetation type of the proposed site (Mucina & Rutherford, 2006, updated 2018). The site boundary is indicated as a yellow line.

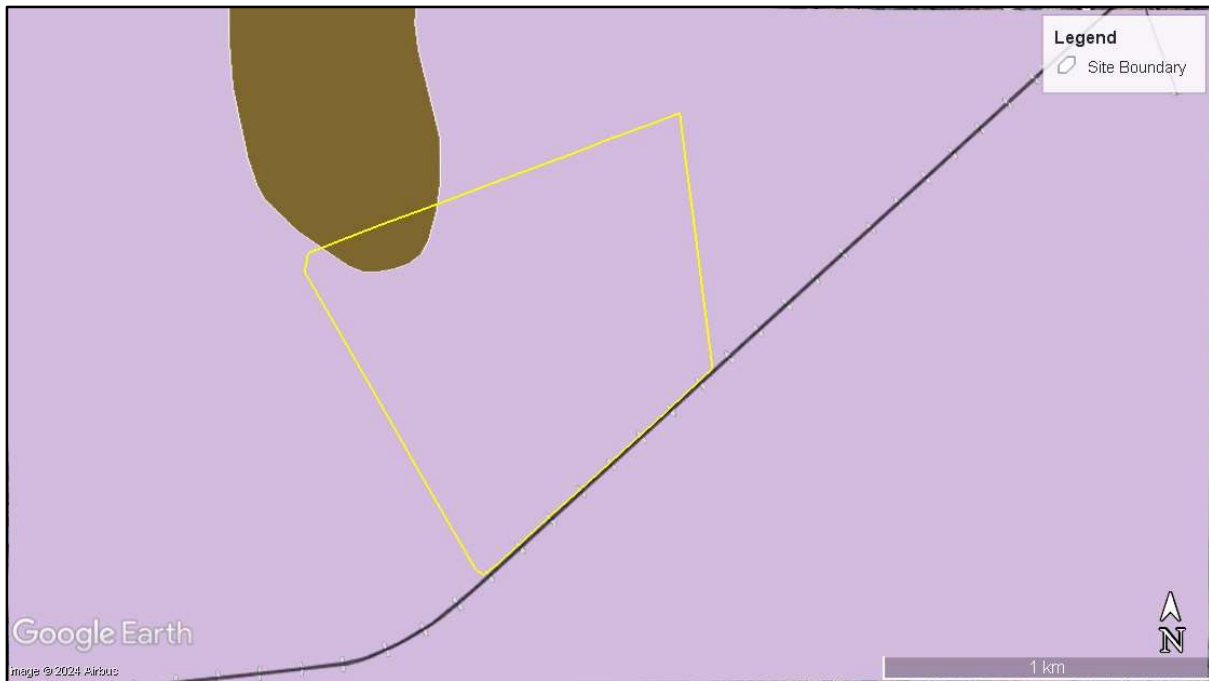


Figure 5: Wetland Vegetation Type according to NFEPA (2011). The brown polygon indicates the extent of West Coast Shale Renosterveld and purple indicates the extent of Southwest Sand Fynbos. The yellow line indicates the site boundary.

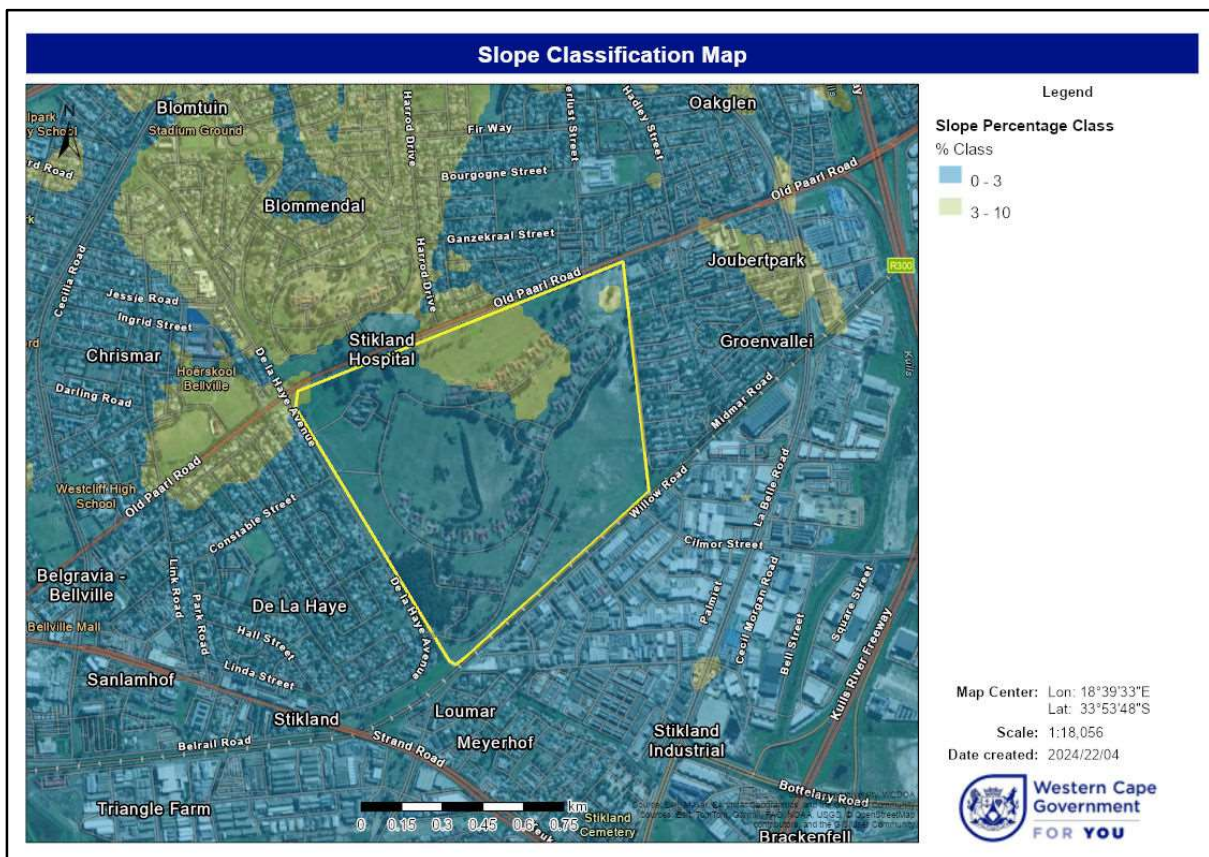


Figure 6: Slope expressed as a percentage of the vertical, such that horizontal is 0% and vertical is 100%. The slope of the proposed site is between 0 and 10% (Cape Farm Mapper, 20224. The site boundary is indicated by a yellow line.

### 3.1.2 Watercourses within the Study Area and within the Regulated Zone

The National Geospatial Information (NGI) Service (Cape Farm Mapper, 2022) and the National Wetlands Map 5 (CSIR, 2018) were consulted to determine the presence of watercourses within 500m of the proposed site, in accordance with the regulated zone for wetlands as defined by the NWA (1998).

According to the NGI Rivers database (Cape Farm Mapper, 2023) and the National Wetlands Map Version 5 (CSIR, 2018) there are no rivers, drainage lines or wetlands within the site (see Figure 7). The proposed site does however fall within the regulated zone (500m) of a hillslope seep which is located approximately 20m north of the north-western boundary of the site. The City of Cape Town Wetlands Layer (BioNet, updated 2018) however indicates that the proposed site lies within the regulated zone of a second wetland, an endorheic depression, located approximately 420m north of the north-western property boundary (see Figure 8). Both wetlands occur upslope of the proposed site and on the far side of Old Paarl Road and as such are not at any risk of being impacted by the future development on the site. A groundtruthing exercise conducted by Dr Toni Belcher (Blue Science, 2020) for the site known as Stikland North (Erf 32103) confirmed that the mapped hillslope seep approximately 20m north of the northern site boundary is artificial and associated with a leaking water pipe or possibly the sewer pipe on the property.

The BioNet (updated 2018) was also consulted to determine whether the site or any nearby land is identified as having any biodiversity conservation significance (i.e. presence of Protected Areas, Critical Biodiversity Areas and Ecological Support Areas). According to the BioNet, neither the proposed site nor the surrounding areas are identified as having any conservation importance.

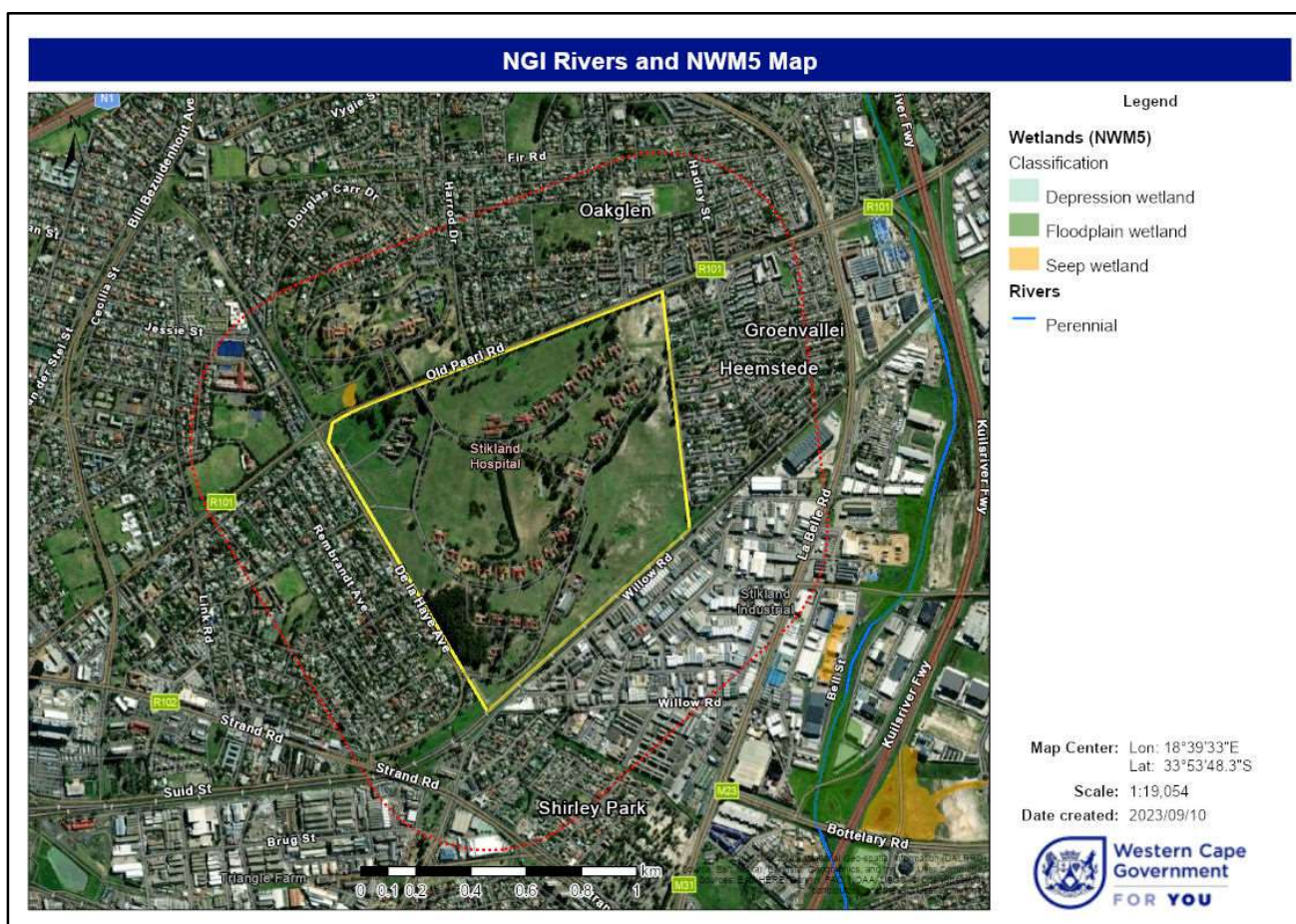


Figure 7: NGI Rivers and the National Wetlands Map Vers. 5 (CSIR, 2018). The yellow polygon indicates the proposed site and the red stippled line the NWA regulated area for wetlands (i.e. 500m from the site boundary).



**Figure 8: City of Cape Town Wetlands Layer (BioNet, updated 2018).** The wetland features identified to the north west (indicated as green and purple polygons) of the site and within the regulated zone are upslope of the site (i.e. the proposed development poses no risk to these feature). The remaining features are beyond the regulated zone.

The BioNet (updated 2018) does not identify any areas of conservation significance within and surrounding the proposed site.

## 3.2 Site Investigation

### 3.2.1 Site Description

EnviroSwift visited the site on 18 and 22 September 2023 in order to confirm whether any watercourses, as defined in terms of the NWA, are present within or immediately adjacent to the site. The site visit focussed on the vacant areas where future development opportunities are being considered *viz-a-viz* portions A – E as indicated in Figure 1 and in particular an area in portion C identified by the appointed Environmental Assessment Practitioners (EAPs), Infinity Environmental, as containing *Typha capensis*, a known indicator of wetland permanent zones (Infinity, 2023). The findings of the site investigations are presented below according to the portion of site.

#### **Portion A:**

At the time of both site visits standing water was evident in a band running through the central part of Portion A with surface and sub-surface flow direction determined to be in a south westerly direction towards De la Haye Avenue (see Figure 9). The presence of *Juncus kraussii*, a wetland obligate, in the larger wetland feature confirms the presence of a wetland in this area. This wetland is also visible on historical aerial imagery during the wet season but disappears during the dry season confirming the non-perennial nature of the wetland.



**Figure 9: Photos of standing water in the central part of Portion A. The photo on the left shows the most prominent feature with a stand of *Juncus kraussii* in the centre and the photo on the right is taken at the western boundary of the site with drainage from the site reaching De la Haye Road.**

#### **Portion B:**

There were no indicators of wetland habitat in Portion B.

#### **Portion C:**

The area of interest identified by Infinity Environmental as containing *Typha capensis* was located and the presence of *T. capensis* as well as ponding water was confirmed (see Figure 10). The feature is located in a deep depression of unknown origins but assumed to be artificial as the surrounding areas are flat and there are no natural forces that could result in a depression of this form. Infinity (2023) presumed the feature to be artificial insofar as its hydrology appears, at least in part, to be driven by run-off from Old Paarl Road which lies immediately adjacent to the north of the feature. The fact that the feature contains *T. capensis* would suggest more natural source of flow as *T. capensis* typically indicates permanent levels of soil saturation and road-run-off would only sustain wet season flow. The lack of any road-side culverts discharging directly into the feature also suggests that flow is part sustained by run-off and part by groundwater ingress and on the evidence available would suggest that the feature comprises a depression wetland.



**Figure 10: Photo of the *Typha capensis* dominated pond adjacent to the northern boundary of the site and Old Paarl Road immediately beyond the fence.**

Another area to the east of the *Typha*-dominated depression was observed as comprising ponding water (see Figure 11). An auger sample taken within the area of ponding water (see Figure 12) revealed wetland soil characteristics typical of the wetland permanent zone (dark, sludgy soil rich in organic material). While vegetation was evident within and surrounding the pond, the species were not possible to identify due to the plants not being in flower with the exception of the numerous white flowering plants which were widespread across much of the Portion C as well as other portions of Erf 6300. The species was identified as *Sparaxis bulbifera* which, while not being regarded as a wetland obligate, is known to be associated with sandy, seasonally waterlogged lower slopes and flats and occasionally wet clay soils (<http://redlist.sanbi.org/species.php?species=1536-1>).

Based on the soils and a review of historical aerial imagery (Google Earth Pro) the ponding area is most likely a depression wetland. Another band of soils occurring between the *Typha*-dominated depression and the depression further to the east in Portion C was identified on Google Earth Pro has indications of above-normal green colouration during parts of the dry season suggesting the presence of a temporary / seasonal wetland.



Figure 11: Photo of an area of ponding water to the east of the Typha-dominated depression.

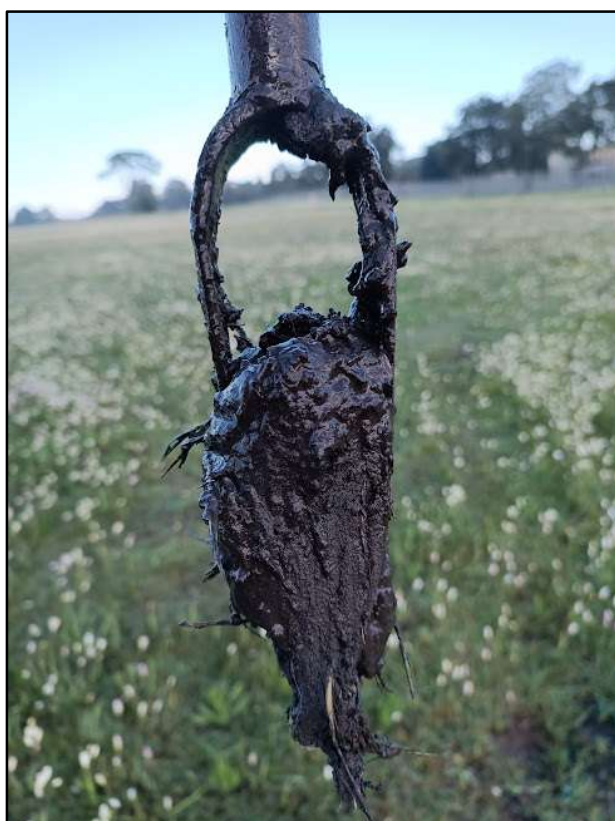


Figure 12: Photo showing the auger sample taken within the area of ponding water shown in Figure 11. Note the dark colour and rich organic content characteristic of the wetland permanently saturated zone.

**Portion D:**

There were no indicators of wetland habitat in Portion D.

**Portion E:**

At the eastern-most part of the site in Portion E an area of dense kikuyu grass (*Pennisetum clandestinum*) was observed that was also evident in historical aerial imagery during the dry season which suggests elevated levels of soil saturation (see Figure 13). Other mention-worthy features, albeit not natural, observed in this area was a concrete-lined stormwater canal which ran along the eastern boundary of the site and discharged into a culvert immediately downslope and east of the kikuyu-dominated area.



**Figure 13: Area of dense kikuyu grass in Portion E indicative of elevated levels of soil saturation.**

At the south-western end of Portion E two additional areas of ponding water were evident during the two September 2023 site visits. The feature at the extreme south-western end was deemed to comprise an endorheic depression wetland on the basis of the presence of obligate wetland vegetation including Arum lily (*Zantedeschia aethiopica*) and a white flowering aquatic plant, possibly *Pauridia aquatica* (see Figure 14). The other feature to the north east of the depression (see Figure 15) was deemed to be entirely artificial as strong flow was evident from a manhole which showed signs of pollution in the form of odour and grey colouration on vegetation. According to the estate manager of some 20 years the manhole is for a stormwater pipeline so the source of contamination is unknown.



Figure 14: *Zantedeschia aethiopica* (left) and a white flowering aquatic plant, possibly *Pauridia aquatica* (right), present in the endorheic depression wetland in the extreme south western part of Portion E.



Figure 15: Ponding visible in the area near the overflowing stormwater manhole.

### 3.2.2 Watercourse Delineation

On the basis of site investigations carried out by EnviroSwift in September 2023 and the GEOSS (2024), 5 wetlands were confirmed to be present within the portions of Remainder Erf 6300 Stikland that are under consideration for future development. The wetland delineation map is presented in Figure 16.



**Figure 16: Wetland Delineation Map for portions A – E of Erf 6300 Stikland. Five natural wetlands are indicated by white arrows.**

A brief description of each wetland follows:

- **Wetland 1:** A natural seasonal depression wetland (1.51 ha) located along the western boundary of Erf 6300. It is believed that this wetland is a remnant of a larger wetland system that historically extended beyond the current western boundary of the site.
- **Wetland 2:** A small natural hillslope seep (0.08 ha) located west of wetland 3. Mottling within the upper 50.00 cm of soils indicates seasonal subsurface water movement, which is indicative of a seasonally saturated wetland. It is believed that this wetland is fed by rainfall accumulating on the underlying clayey soils.
- **Wetland 3:** A natural, elongated hillslope seep (1.415 ha) which extends from the northern boundary of the site in a south westerly direction. Mottling within the upper 50.00 cm of soils indicates seasonal subsurface water movement which is indicative of a seasonally saturated wetland. It is believed that this wetland is fed by rainfall accumulating on the underlying clayey soils.
- **Wetland 4:** A natural depression wetland (0.39 ha) with gleyed soils in the upper 50.00 cm of soils. The presence of gleyed soils indicate permanent saturated conditions. The wetland is present within a concave portion of the site and appears to experience saturation for longer periods of time than wetland 3.
- **Wetland 5:** A natural depression wetland (0.08 ha) on the southern border of the property. It is believed that this wetland experiences slightly unnaturally wet conditions due to the nearby railway creating a barrier. The presence of mottles within the upper 50.00 cm of soils are indicative of seasonal water movement and it is believed that a shallow clay layer (~40.00 cm depth) has resulted in a perched wetland system.

Note that GEOSS (2024) refers to two additional areas exhibiting potential wetland characteristics as follows:

- The Typha-dominated pond in the far north of the site as shown in Figure 10; and
- The area associated with an overflowing manhole in the far southern part of the site as shown in Figure 15.

Both areas have been proven to be of artificial origins (GEOSS, 2024) and are therefore are not included in this assessment as they do not meet the definition of “watercourse” as provided for in the NEMA EIA Regulations (2014, as amended) and the NWA.

### 3.3 Watercourse Classification

In terms of wetland and aquatic ecosystem classification user manual (Ollis *et. al.* 2013) the delineated wetlands are classified as follows:

- Wetlands 1, 4 & 5: Depression wetlands; and
- Wetland 2 & 3: Hillslope seep wetlands.

Tables 8 and 9 summarises the results from **Level 3** through to **Level 6** of the wetland and aquatic ecosystem classification user manual (Ollis *et. al.* 2013) as applied to the wetlands.

**Table 7: Level 3, 4, 5 and 6 of the wetland and aquatic ecosystem classification for the depression wetlands 1, 4 & 5.**

<b>Level 3 (Landscape Setting)</b>	<b>Plain:</b> an extensive area of low relief. These areas are generally characterised by relatively level, gently undulating or uniformly sloping land with a very gentle gradient that is not located within a valley. Gradient is typically less than 0.01 or 1:100.
<b>Level 4 (Hydrogeomorphic unit)</b>	<b>Depression Wetland:</b> a wetland or aquatic ecosystem with closed (or near-closed) elevation contours, which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates.
<b>Level 5 (Hydrological regime)</b>	<b>Non-perennial:</b> does not contain surface water continuously throughout the year, although pools may persist.
<b>Level 6 (Descriptors)</b>	<b>Natural:</b> may be impacted, or even realigned, but of natural origins.

**Table 8: Level 3, 4, 5 and 6 of the wetland and aquatic ecosystem classification for the hillslope seep wetlands 2 & 3.**

<b>Level 3 (Landscape Setting)</b>	<b>Slope:</b> an inclined stretch of ground typically located on the side of a mountain, hill or valley, not forming part of a valley floor. Includes scarp slopes, mid-slopes and foot-slopes.
<b>Level 4 (Hydrogeomorphic unit)</b>	<b>Hillslope seep:</b> a wetland area located on gently to steeply sloping land and dominated by colluvial (i.e. gravity-driven), unidirectional movement of water and material down-slope.
<b>Level 5 (Hydrological regime)</b>	<b>Non-perennial:</b> does not contain surface water continuously throughout the year, although pools may persist.
<b>Level 6 (Descriptors)</b>	<b>Natural:</b> may be impacted, or even realigned, but of natural origins.

## 3.4 Ecological Assessment of the Depression Wetland 1

### 3.4.1 Ecosystem Services

The WET-Ecoservices tool was applied to the depression wetland at the far western end of the proposed site as shown in Figure 16 and comprised the assessment of 15 Ecosystem Services (see Figure 17). The rating of the ecosystem services provided by the wetland was calculated to be 0,9 which means that it was found to be in the **Moderately Low** category overall (see Tables 9 & 10).

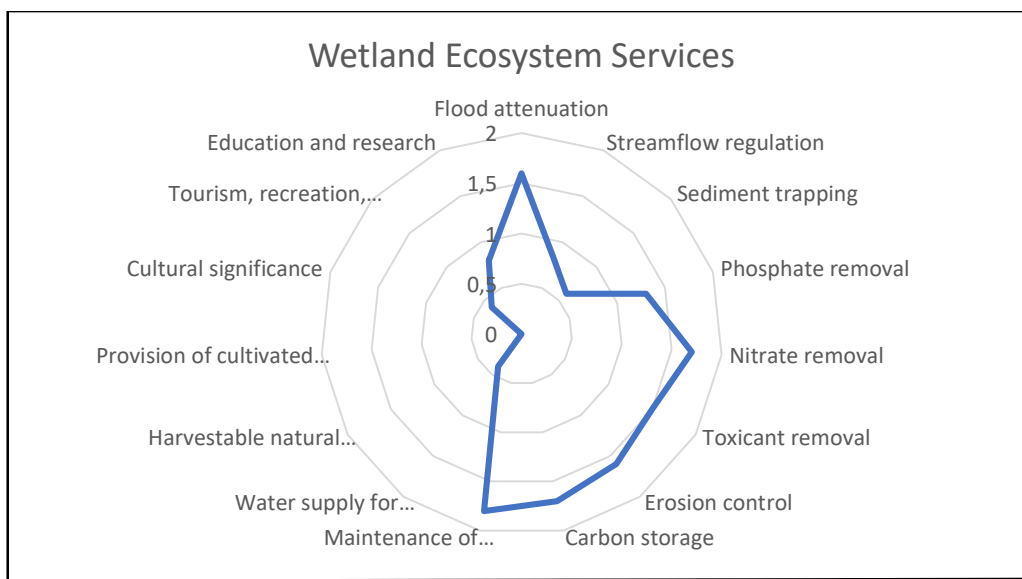


Figure 17: WET-EcoServices results for Wetland 1.

Table 9: WET-EcoServices results for Wetland 1.

Wetland Ecosystem Services		Current	
<b>Indirect Benefits</b>	Flood attenuation	1,6	
	Streamflow regulation	0,8	
	Sediment trapping	0,6	
	Phosphate removal	1,3	
	Nitrate removal	1,7	
	Toxicant removal	1,5	
	Erosion control	1,6	
	Carbon storage	1,7	
	<b>Direct Benefits</b>	Maintenance of biodiversity	1,8
		Water supply for direct human use	0,4
	Harvestable natural resources	0	
	Provision of cultivated foods	0	
	Cultural significance	0	
	Tourism, recreation, scenic value	0,4	
	Education and research	0,8	
	Total	14,2	
	Average	0,9	

Table 10: WET-EcoServices categories.

Score (range 0 – 4)	<0.5	0.5-1.2	1.3-2.0	2.1-2.8	>2.8
Rating of the likely extent to which a benefit is being supplied	Low	Moderately Low	Intermediate	Moderately High	High

The most noteworthy findings are as follows:

- Of the 15 Ecosystem Services assessed, seven were in the Intermediate category, three were in the Moderately Low category and five were in the Low category which reflects the fact that the wetland does not provide any significant ecological services which can be mostly attributed to its relatively small size, ecological and hydrological isolation, level of disturbance and type (depression wetland).
- The depression wetland was found to be most effective in providing the direct service of maintenance of biodiversity, albeit only at an intermediate (moderate) level. While being dominated by pioneer species and subjected to regular mowing, the score was elevated by the rarity of the wetland type (noting that most wetland types are rare in the Western Cape due to urban development and agriculture which has caused a high level of cumulative loss in the region) and also the fact that the surrounding terrestrial land is largely undeveloped and that the wetland is largely unaltered in terms of its sediment and water quality regimes.
- In terms of the indirect services, the wetland also scored similarly for flood attenuation, nutrient (phosphates and nitrates) and toxicant assimilation, erosion control and carbon storage. This was primarily as a result of the lack of any permanently saturated zone and the pattern of low flows throughout the wetland which are very diffuse (i.e. no channels to concentrate flow) which is attributable to the wetland type. Erosion control can be attributed to the lack of any evidence of erosion which is not surprising as the wetland type is inwardly draining and therefore not prone to erosion and also due to the high erosivity of the soils.
- The wetland scored poorly for streamflow regulation, primarily due to its lack of connectivity to any stream network which is often characteristic of the wetland type which is typically inwardly draining (endorheic).
- The wetland serves virtually no direct socio-economic and cultural benefits, but has potential value as a water supply for human use and for education and research, albeit minor.

### 3.4.2 Present Ecological State

Table 11 presents the impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for Wetland 1.

Table 11: WET-health assessment results for Wetland 1 (depression wetland).

	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Depression	1,437	100	7	-1,0	3,5	-1,0	4,3	-1,0
PES Category			<b>E</b>	↓	<b>C</b>	↓	<b>D</b>	↓

The overall PES for the depression wetland was calculated to be 5,2 which falls within a **Category D** (“**Largely modified**”). This means that a large change in ecosystem processes and loss of natural

habitat and biota has occurred. The key aspects to note from the PES assessment are as follows:

- The net effect on hydrology as result of changes to water input characteristics from the catchment is negligible as there is no on-site water usage and reduced catchment roughness, while being notable does not result in significantly increased flood peaks due to the wetland type (wetlands associated with channels would be more prone to this impact).
- In terms of water distribution and retention patterns within the wetland, the wetland has been modified as a result of frequent mowing and some total clearing of vegetation. The presence of a tarred road through the wetland has also had a notable impact on the water distribution patterns in the wetland.
- The geomorphic state of the wetland is largely intact with only the tarred road, occupying an estimated 10% of the wetland extent, having impacted on the geomorphic state.
- In terms of vegetation, aside from the tarred road which comprises infrastructure and infilling, both of an estimated 10% of the wetland area, approximately 50% of the wetland has been dominated by pioneer/alien species as a result of the frequent mowing.
- Hydrology, geomorphology and vegetation are predicted to continue on a downward trajectory (i.e. an increasingly impacted condition in the future) as the catchment continues to become transformed and the indigenous vegetation occurring within the wetland continues to become out-competed by the pioneer/alien species while frequent mowing continues.

### 3.4.3 Ecological Importance and Sensitivity

The EIS method applied to Wetland 1 is based on the assessment tool developed by Rountree *et. al.* (2013). Overall, the wetland was found to be of **low/marginal** EIS. The key aspects considered during the EIS assessment of the on-site wetland are presented in Table 12 and are as summarised as follows:

- The wetland is assessed as being of low/marginal importance for biodiversity support for the following reasons:
  - The wetland is not known nor is it likely to support any endangered or rare biota or populations of unique species, despite falling within the historical distribution of an Endangered (E) terrestrial vegetation type (Cape Flats Sand Fynbos).
  - It is not known nor is it likely to be an important site for species migration, breeding and/or feeding and no such species were observed utilising the site in these ways during the site inspection.
  - The wetland is not recognised in the WCBSP (2017) as being of any importance from an aquatic biodiversity conservation perspective.
  - At the landscape scale the wetland has no protection status, has a PES of D (Largely modified), is not considered to be a wetland of any significant size or rarity and there are no known important wetlands further downstream.
- In terms of sensitivity the wetland is regarded as being moderately sensitive to changes in floods and changes in low-flow, owing primarily to its classification as a depression wetland, and is also sensitive to changes in water quality due to the low nutrient levels in the general area's freshwater systems (in their unimpacted, reference condition).

**Table 12: EIS Results for Wetland 1.**

<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>			
Presence of Red Data species: Endangered or rare Red Data species present	1	3	Unlikely despite Critically Endangered terrestrial vegetation type. Fact that depressions and seeps are listed as being VU in the NFEPA (2017) would confirm the unlikeliness.
Populations of unique species: Uncommonly large populations of wetland species	1	3	Limited possibility of unique species / large populations occurring.
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	1	4	Seasonal wetland, transformed catchment therefore unlikely to be important site with no ecological connectivity.
<b>Landscape scale</b>			
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5	Not protected and not identified as being of any aquatic biodiversity importance.
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	3	5	Cape Dune Sand Fynbos is CR therefore assumed to be poorly protected.
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	1	5	PES D (largely modified) and no regional utilisation.
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	4	Small wetland and moderate rarity depressions and seeps listed as VU.
Diversity of habitat types: Assessment of the variety of wetland types present within a site	2	4	Limited diversity of habitat types. Ponding and presence of Juncus elevate status marginally.
<b>Sensitivity of the wetland</b>			
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or 3; pans and seeps 0 or 1	1	4	Depression
Sensitivity to changes in low flows/dry season: (Unchannelled VBW's probably most sensitive)	1	4	Depression
Sensitivity to changes in water quality: Esp. natural low nutrient waters – lower nutrients likely to be more sensitive	3	4	Regions waters are nutrient poor therefore likely to be relatively sensitive.
<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Median value	<b>1</b>	

The EIS assessment determined that the EIS of the wetland was **Low/marginal**. This rating for the wetland means that the wetland is not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines (see Table 15).

Table 13: EIS Category definitions.

EIS Category definitions	Range of EIS score
<b>Very high:</b> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major drainage lines	>3 and <=4
<b>High:</b> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major drainage lines.	>2 and <=3
<b>Moderate:</b> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major drainage lines.	>1 and <=2
<b>Low/marginal:</b> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines.	>0 and <=1

### 3.4.4 Recommended Ecological Category

The EIS category of the wetland was determined to be **Low/marginal**. This EIS category means that the wetland is not ecologically important at any scale. The current PES of the wetland is a **Category D** (see Section 3.4.2) and given the low/marginal EIS the REC for the wetland remains a Category D. Therefore, it is not considered acceptable for any future development to cause any further deterioration in the PES.

## 3.5 Ecological Assessment of the Hillslope Seep Wetlands 2 & 3

### 3.5.1 Ecosystem Services

The WET-Ecoservices tool was applied to the two hillslope seep wetlands at the northern portion of the proposed site as shown in Figure 16 and comprised the assessment of 15 Ecosystem Services (see Figure 18). The rating of the ecosystem services provided by the wetland was calculated to be 0,9 which means that it was found to be in the **Moderately Low** category (see Tables 14 & 15).

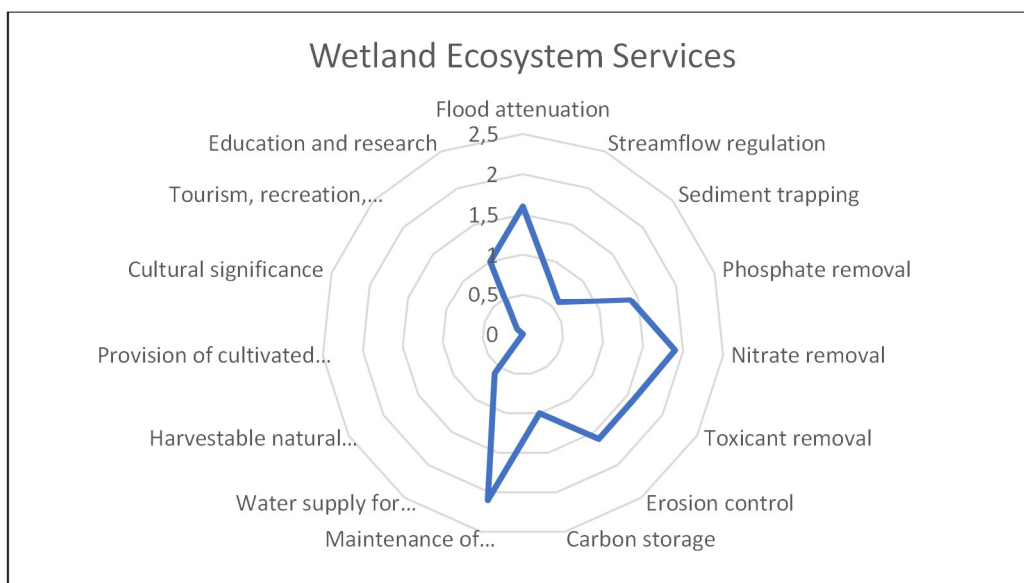


Figure 18: WET-EcoServices results for Wetlands 2 & 3.

Table 14: WET-EcoServices results for Wetlands 2 &amp; 3.

Wetland Ecosystem Services		
		Current
<b>Indirect Benefits</b>	Flood attenuation	1,6
	Streamflow regulation	0,8
	Sediment trapping	0,6
	Phosphate removal	1,4
	Nitrate removal	1,9
	Toxicant removal	1,6
	Erosion control	1,6
	Carbon storage	1
	<b>Direct Benefits</b>	Maintenance of biodiversity
Water supply for direct human use		0,6
Harvestable natural resources		0
Provision of cultivated foods		0
Cultural significance		0
Tourism, recreation, scenic value		0,1
Education and research		1
	Total	14,3
	Average	1,0

Table 15: WET-EcoServices categories.

Score (range 0 – 4)	<0.5	0.5-1.2	1.3-2.0	2.1-2.8	>2.8
Rating of the likely extent to which a benefit is being supplied	Low	Moderately Low	Intermediate	Moderately High	High

The most noteworthy findings are as follows:

- Of the 15 Ecosystem Services assessed for the two adjacent hillslope seeps, one was in the Moderately High category, five were in the Intermediate category, five were in the Moderately Low category and four were in the Low category which reflects the fact that the wetland does not provide any significant ecological services.
- The two adjacent hillslope seep wetlands were found to be most effective in providing the direct service of Maintenance of Biodiversity which can be mostly attributed to the extent of buffers, their ecological connectivity between other wetlands on the site and extent of vegetation cover, albeit impacted by regular mowing which has led to a predominance by pioneer species.
- The wetlands also provide an intermediate (i.e. moderate) level of service for the indirect services of nutrient and toxicant assimilation, flood attenuation and erosion control all attributed to the extent to which both wetlands are vegetated and because of the hydrological regime comprising only temporary/seasonal zones).
- The wetland also achieved Intermediate scores for flood attenuation, nutrient assimilation and toxicant removal, primarily as a result of the pattern of low flows throughout the wetland which are very diffuse (i.e. no channels to concentrate flow) which is attributable to the wetland type.

- The wetlands scored poorly for streamflow regulation and sediment trapping, primarily due to their lack of connectivity to any stream network beyond the site boundary which otherwise would benefit from these services.
- The wetland serves virtually no direct socio-economic and cultural benefits, but has potential value as a water supply for human use and for education and research, albeit minor.

### 3.5.2 Present Ecological State

Table 16 presents the combined impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for Wetlands 2 & 3 combined.

**Table 16: WET-health assessment results for Wetlands 2 & 3.**

	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Hillslope Seeps	1,5	100	6	-1,0	2	-1,0	2,5	-1,0
PES Category			<b>E</b>	↓	<b>C</b>	↓	<b>C</b>	↓

The overall PES for the two adjacent hillslope seep wetlands (Wetlands 2 & 3) was calculated to be 3,9 which falls within a **Category C** (“moderately modified”), albeit at the threshold of achieving a PES of Category D. This means that a moderate change in ecosystem processes and loss of natural habitats have taken place but the natural habitat remains predominantly intact. The key aspects to note from the PES assessment are as follows:

- Of the three determinants of wetland health, it is the hydrology of the two seeps that has been most impacted. This is primarily as a result of the water distribution and retention patterns of the two wetlands which has been impacted by the reduced roughness within the wetlands as a result of the frequent mowing as the change in water input characteristics from the wetland’s catchment are negligible.
- The geomorphic state of the wetland is largely intact with only the effect of regular mowing on run-off that has impacted the geomorphic state of the two wetlands.
- In terms of vegetation approximately 50% of the two wetlands has been dominated by pioneer/alien species as a result of the frequent mowing.
- Hydrology, geomorphology and vegetation are predicted to continue on a downward trajectory (i.e. an increasingly impacted condition in the future) as the catchment continues to become transformed and the indigenous vegetation occurring within the wetland continues to become out-competed by the pioneer/alien species while frequent mowing continues.

### 3.5.3 Ecological Importance and Sensitivity

The EIS method applied to Wetlands 2 & 3 combined is based on the assessment tool developed by Rountree *et. al.* (2013). Overall, the wetland was found to be of **low/marginal** EIS. The key aspects considered during the EIS assessment of the two hillslope seep wetlands are presented in Table 17 and are as summarised as follows:

- The wetlands are assessed as being of low/marginal importance for biodiversity support for the following reasons:
  - The wetlands are not known nor are they likely to support any endangered or rare biota or populations of unique species, despite falling within the historical distribution of a Critically Endangered (CE) terrestrial vegetation type (Cape Flats Sand Fynbos).
  - They are not known nor are they likely to be important sites for species migration, breeding and/or feeding due to their small sizes and lack of wetland permanent zones and no such species were observed utilising the wetlands in these ways during the site inspections.

- The wetland is not recognised in the WCBSP (2017) as being of any importance from an aquatic biodiversity conservation perspective.
- At the landscape scale the wetlands have no protection status, have a PES of C (Moderately modified), are not considered to be a wetland of any significant size or rarity and there are no known important wetlands further downstream.
- In terms of sensitivity the wetlands are regarded as not being sensitive to changes in floods and changes in low-flow, owing primarily to their classification as hillslope seep wetlands, but are considered sensitive to changes in water quality due to the low nutrient levels in the general area's freshwater systems (in their unimpacted, reference condition).

**Table 17: EIS Results for Wetlands 2 & 3.**

ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>			
Presence of Red Data species: Endangered or rare Red Data species present	1	3	Unlikely despite Critically Endangered terrestrial vegetation type. Fact that depressions and seeps are listed as being VU in the NFEPA (2017) would confirm the unlikelihood.
Populations of unique species: Uncommonly large populations of wetland species	1	3	Limited possibility of unique species / large populations occurring.
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	1	4	Seasonal/temporary wetlands, transformed catchment therefore unlikely to be important site with no ecological connectivity beyond the site boundary.
<b>Landscape scale</b>			
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5	Not protected and not identified as being of any aquatic biodiversity importance.
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	3	5	Cape Dune Sand Fynbos is CR therefore assumed to be poorly protected.
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	1	5	PES C (largely modified) and no regional utilisation.
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	4	Small wetlands and moderate rarity depressions and seeps listed as VU.
Diversity of habitat types: Assessment of the variety of wetland types present within a site	2	4	Limited diversity of habitat types.
<b>Sensitivity of the wetland</b>			
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or 3; pans and seeps 0 or 1	1	4	Hillslope Seep
Sensitivity to changes in low flows/dry season: (Unchannelled VBW's probably most sensitive)	1	4	Hillslope Seep
Sensitivity to changes in water quality: Esp. natural low nutrient waters – lower nutrients likely to be more sensitive	3	4	Regions waters are nutrient poor therefore likely to be relatively sensitive.
<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Median value	<b>1</b>	

The EIS assessment determined that the EIS of the two hillslope seeps was **Low/marginal**. This rating for the wetland means that the wetland is not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines (see Table 18).

**Table 18: EIS Category definitions.**

EIS Category definitions	Range of EIS score
<b>Very high:</b> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major drainage lines	>3 and <=4
<b>High:</b> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major drainage lines.	>2 and <=3
<b>Moderate:</b> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major drainage lines.	>1 and <=2
<b>Low/marginal:</b> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines.	>0 and <=1

### 3.5.4 Recommended Ecological Category

The EIS category of the wetlands was determined to be **Low/marginal**. This EIS category means that the wetlands are not ecologically important at any scale. The current PES of the wetlands is a **Category C** (see Section 3.5.2) and given the low/marginal EIS the REC for the wetland remains a **Category C**. Therefore, it is not considered acceptable for any future development to cause any further deterioration in the PES.

## 3.6 Ecological Assessment of Depression Wetland 4

### 3.6.1 Ecosystem Services

The WET-Ecoservices tool was applied to the depression wetland (Wetland 4) located at the far northern edge of the proposed site as shown in Figure 16 and comprised the assessment of 15 Ecosystem Services (see Figure 19). The rating of the ecosystem services provided by the wetland was calculated to be 0,9 which means that it was found to be in the **Moderately Low** category (see Tables 19 & 20).

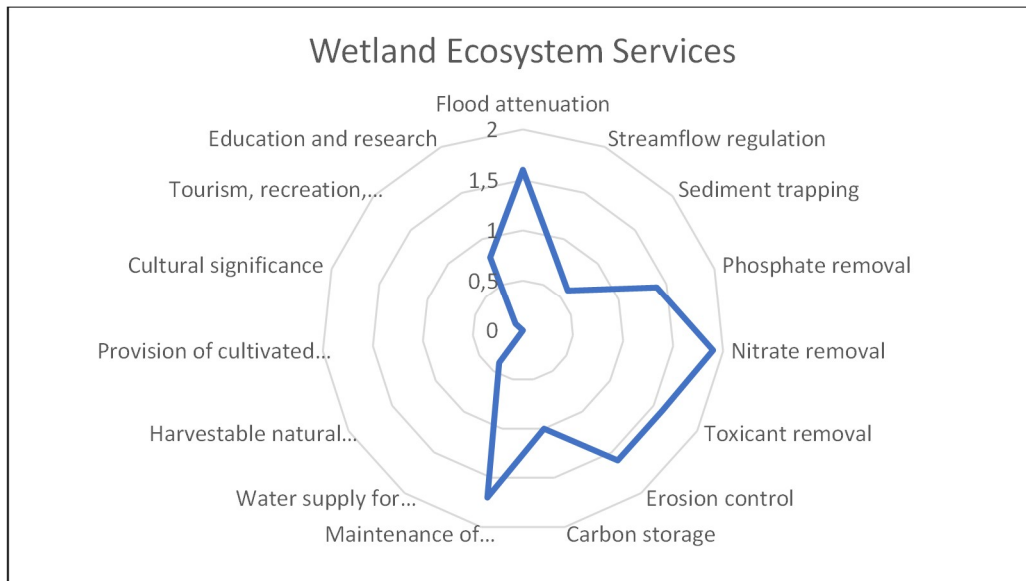


Figure 19: WET-EcoServices results for Wetland 4.

Table 19: WET-EcoServices results for Wetland 4.

Wetland Ecosystem Services		
		Current
<b>Indirect Benefits</b>	Flood attenuation	1,6
	Streamflow regulation	0,8
	Sediment trapping	0,6
	Phosphate removal	1,4
	Nitrate removal	1,9
	Toxicant removal	1,6
	Erosion control	1,6
	Carbon storage	1
	<b>Direct Benefits</b>	Maintenance of biodiversity
	Water supply for direct human use	0,4
	Harvestable natural resources	0
	Provision of cultivated foods	0
	Cultural significance	0
	Tourism, recreation, scenic value	0,1
	Education and research	0,8
	Total	13,5
	Average	0,9

**Table 20: WET-EcoServices categories.**

Score (range 0 – 4)	<0.5	0.5-1.2	1.3-2.0	2.1-2.8	>2.8
Rating of the likely extent to which a benefit is being supplied	Low	Moderately Low	Intermediate	Moderately High	High

The most noteworthy findings are as follows:

- Of the 15 Ecosystem Services assessed, six were in the Intermediate category, four were in the Moderately Low category and five were in the Low category which reflects the fact that the wetland does not provide any significant ecological services which can be mostly attributed to its relatively small size, ecological and hydrological isolation, level of disturbance and type (depression wetland).
- The depression wetland was found to be most effective in providing the indirect service of erosion control and scored similarly, albeit slightly lower for flood attenuation and nutrient and toxicant assimilation. This was primarily as a result of the lack of any permanently saturated zone and the pattern of low flows throughout the wetland which are very diffuse (i.e. no channels to concentrate flow) which is attributable to the wetland type. Erosion control can be attributed to the lack of any evidence of erosion which is not surprising as the wetland type is inwardly draining and therefore not prone to erosion and also due to the high erosivity of the soils.
- In terms of the direct services, the depression wetland was found to be most effective in providing the direct service of maintenance of biodiversity, albeit only at an intermediate (moderate) level. While being dominated by pioneer species and subjected to regular mowing, the score was elevated by the rarity of the wetland type (noting that most wetland types are rare in the Western Cape due to urban development and agriculture which has caused a high level of cumulative loss in the region) and also because the wetland is largely unaltered in terms of its sediment and water quality regimes.
- The wetland scored poorly for streamflow regulation, sediment trapping and carbon storage with the former two services primarily due to its lack of connectivity to any stream network which is often characteristic of the wetland type which is typically inwardly draining (endorheic). The poor score for carbon storage can be attributed to the lack of peat and any evidence of disturbance of the soil within the wetland.
- The wetland serves virtually no direct socio-economic and cultural benefits, but has potential value as a water supply for human use and also for education and research, albeit minor.

### 3.6.2 Present Ecological State

Table 21 presents the impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for Wetland 4.

**Table 21: WET-health assessment results for Wetland 4.**

	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Depression	14,37	100	9	-1,0	1,2	-1,0	8,7	-1,0
<b>PES Category</b>			<b>F</b>	↓	<b>B</b>	↓	<b>F</b>	↓

The overall PES for the depression wetland was calculated to be 6,7 which falls within a **Category E**

(“**Severely modified**”). This means that the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable. The key aspects to note from the PES assessment are as follows:

- While flood peaks would have increased slightly due to reduced catchment roughness it is the effect of Old Paarl Road on water distribution and retention patterns in the wetland that has resulted in a significantly impacted hydrology.
- The geomorphic state of the wetland is largely intact with only Old Paarl Road, estimated to have caused a loss of approximately 40% of the original wetland extent, having impacted on the geomorphic state.
- In terms of vegetation, aside from Old Paarl which comprises both infrastructure and infilling within the wetland, both of an estimated 40% of the wetland area, approximately 50% of the remaining 60% of the wetland has been dominated by pioneer/alien species as a result of the frequent mowing.
- Hydrology, geomorphology and vegetation are predicted to continue on a downward trajectory (i.e. an increasingly impacted condition in the future) as the catchment continues to become transformed and the indigenous vegetation occurring within the wetland continues to become out-competed by the pioneer/alien species while frequent mowing continues.

### 3.6.3 Ecological Importance and Sensitivity

The EIS method applied to Wetland 4 is based on the assessment tool developed by Rountree *et. al.* (2013). Overall, the wetland was found to be of **low/marginal** EIS. The key aspects considered during the EIS assessment of the on-site wetland are presented in Table 22 and are as summarised as follows:

- The wetland is assessed as being of low/marginal importance for biodiversity support for the following reasons:
  - The wetland is not known nor is it likely to support any endangered or rare biota or populations of unique species, despite falling within the historical distribution of a Critically Endangered (CR) terrestrial vegetation type (Cape Flats Sand Fynbos).
  - It is not known nor is it likely to be an important site for species migration, breeding and/or feeding and no such species were observed utilising the site in these ways during the site inspection.
  - The wetland is not recognised in the WCBSP (2017) as being of any importance from an aquatic biodiversity conservation perspective.
  - At the landscape scale the wetland has no protection status, has a PES of D (Largely modified), is not considered to be a wetland of any significant size or rarity and there are no known important wetlands further downstream.
- In terms of sensitivity the wetland is regarded as being moderately sensitive to changes in floods and changes in low-flow, owing primarily to its classification as a depression wetland, and is also sensitive to changes in water quality due to the low nutrient levels in the general area's freshwater systems (in their unimpacted, reference condition).

**Table 22: EIS Results for Wetland 1 (depression).**

ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>			
Presence of Red Data species: Endangered or rare Red Data species present	1	3	Unlikely despite Critically Endangered terrestrial vegetation type. Fact that depressions and seeps are listed as being VU in the NFEPA (2017) would confirm the unlikeliness.
Populations of unique species: Uncommonly large populations of wetland species	1	3	Limited possibility of unique species / large populations occurring.
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	1	4	Seasonal wetland, transformed catchment therefore unlikely to be important site with no ecological connectivity.
<b>Landscape scale</b>			
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5	Not protected and not identified as being of any aquatic biodiversity importance.
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	3	5	Cape Dune Sand Fynbos is CR therefore poorly protected.
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	1	5	PES E (severely modified) and no regional utilisation.
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	4	Small wetland and moderate rarity because depressions and seeps listed as VU.
Diversity of habitat types: Assessment of the variety of wetland types present within a site	1	4	Minimal diversity of habitat types due to seasonal nature and frequent mowing.
<b>Sensitivity of the wetland</b>			
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or 3; pans and seeps 0 or 1	1	4	Depression
Sensitivity to changes in low flows/dry season: (Unchannelled VBW's probably most sensitive)	1	4	Depression
Sensitivity to changes in water quality: Esp. natural low nutrient waters – lower nutrients likely to be more sensitive	3	4	Regions waters are nutrient poor therefore likely to be relatively sensitive.
<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Median value	<b>1</b>	

The EIS assessment determined that the EIS of Wetland 4 was **Low/marginal**. This rating for the wetland means that the wetland is not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines (see Table 23).

**Table 23: EIS Category definitions.**

EIS Category definitions	Range of EIS score
<b>Very high:</b> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major drainage lines	>3 and <=4
<b>High:</b> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major drainage lines.	>2 and <=3
<b>Moderate:</b> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major drainage lines.	>1 and <=2
<b>Low/marginal:</b> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines.	>0 and <=1

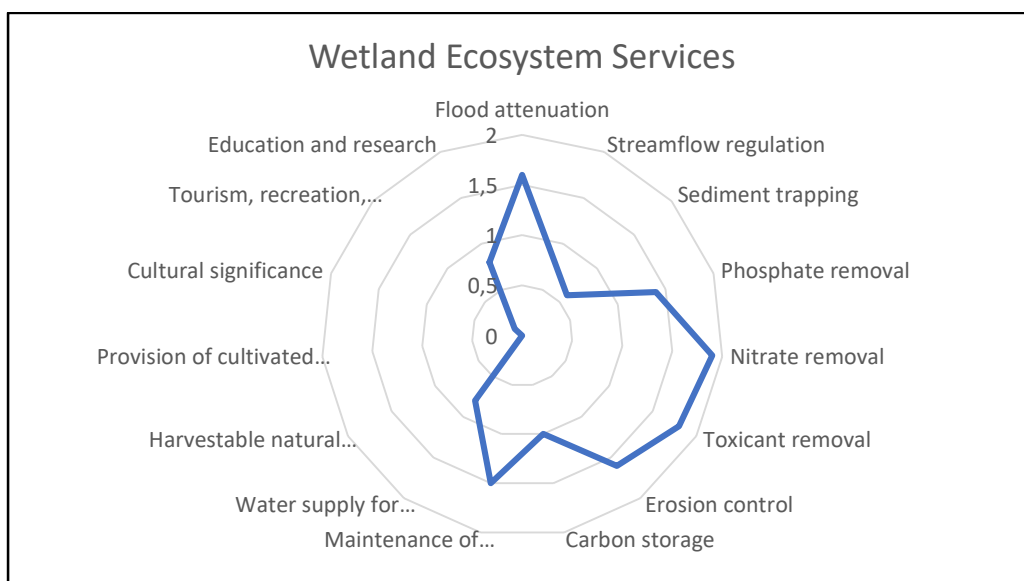
### 3.6.4 Recommended Ecological Category

The EIS category of the wetland was determined to be **Low/marginal**. This EIS category means that the wetland is not ecologically important at any scale. The current PES of the wetland is a **Category E** (see Section 3.6.2) and given the low/marginal EIS the REC for the wetland would be to increase the PES to a **Category D**. Therefore, it is not considered acceptable for any future development to cause any further deterioration in the PES.

## 3.7 Ecological Assessment of Depression Wetland 5

### 3.7.1 Ecosystem Services

The WET-Ecoservices tool was applied to Wetland 5 (depression) located at the far southern edge of the proposed site as shown in Figure 16 and comprised the assessment of 15 Ecosystem Services (see Figure 20). The rating of the ecosystem services provided by the wetland was calculated to be 0,9 which means that it was found to be in the **Moderately Low** category (see Tables 24 & 25).



**Figure 20: WET-EcoServices results for Wetland 5.**

Table 24: WET-EcoServices results for Wetland 5.

Wetland Ecosystem Services		Current
<b>Indirect Benefits</b>	Flood attenuation	1,6
	Streamflow regulation	0,8
	Sediment trapping	0,6
	Phosphate removal	1,4
	Nitrate removal	1,9
	Toxicant removal	1,8
	Erosion control	1,6
	Carbon storage	1
	<b>Direct Benefits</b>	Maintenance of biodiversity
Water supply for direct human use		0,8
Harvestable natural resources		0
Provision of cultivated foods		0
Cultural significance		0
Tourism, recreation, scenic value		0,1
Education and research		0,8
	Total	13,9
	Average	0,9

Table 25: WET-EcoServices categories.

Score (range 0 – 4)	<0.5	0.5-1.2	1.3-2.0	2.1-2.8	>2.8
Rating of the likely extent to which a benefit is being supplied	Low	Moderately Low	Intermediate	Moderately High	High

The most noteworthy findings are as follows:

- Of the 15 Ecosystem Services assessed, six were in the Intermediate category, five were in the Moderately Low category and four were in the Low category which reflects the fact that the wetland does not provide any significant ecological services which can be mostly attributed to its small size, ecological and hydrological isolation, level of transformation and type (depression wetland).
- Depression wetland 5 was found to be most effective, albeit only in the intermediate range, in providing the indirect services of nutrient and toxicant assimilation primarily as a result of the pattern of low flows throughout the wetland which are very diffuse (i.e. no channels to concentrate flow) which is attributable to the wetland type.
- It also scored similarly for the indirect services of flood attenuation and erosion control, primarily as a result of the lack of any permanently saturated zones and vegetation cover, albeit in an impacted state as a result of regular mowing. Erosion control achieved this score primarily as a result of the lack of any evidence of erosion which is not surprising as the wetland type is inwardly draining and therefore not prone to erosion and also due to the high erosivity of the soils.

- In terms of direct services, the depression wetland was found to be most effective, also only in the Intermediate level, in providing the service of Maintenance of Biodiversity. While the vegetation has been impacted by regular mowing which has caused a dominance by pioneer species, Maintenance of Biodiversity score was elevated by the rarity of the wetland type (noting that most wetland types are rare in the Western Cape due to urban development and agriculture which has caused a high level of cumulative loss in the region) and also the largely unaltered sediment and water quality regimes.
- The wetland scored poorly for streamflow regulation and sediment trapping, primarily due to its lack of connectivity to any drainage network as depressions are commonly inwardly draining (endorheic).
- The wetland serves virtually no direct socio-economic and cultural benefits, but has potential value as a water supply for human use and for education and research, albeit minor.

### 3.7.2 Present Ecological State

Table 26 presents the impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for Wetland 5.

**Table 26: WET-health assessment results for Wetland 5.**

	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Depression	0,08	100	9	-1,0	3,6	-1,0	5,6	-1,0
<b>PES Category</b>			<b>F</b>	↓	<b>C</b>	↓	<b>D</b>	↓

The overall PES for the depression wetland was calculated to be 6,5 which falls within a **Category E** (“**Severely modified**”). This means that the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable. The key aspects to note from the PES assessment are as follows:

- While flood peaks would have increased slightly due to reduced catchment roughness it is the effect of the railway line on water distribution and retention patterns in the wetland that has resulted in a significantly impacted hydrology.
- The geomorphic state of the wetland is largely intact with only the railway line, estimated to have caused a loss of approximately 20% of the original wetland extent, having impacted on the geomorphic state.
- In terms of vegetation, aside from the railway line which comprises both infrastructure and infilling within the wetland, both of an estimated 20% of the wetland area, approximately 50% of the remaining 80% of the wetland has been dominated by pioneer/alien species as a result of the frequent mowing.
- Hydrology, geomorphology and vegetation are predicted to continue on a downward trajectory (i.e. an increasingly impacted condition in the future) as the catchment continues to become transformed and the indigenous vegetation occurring within the wetland continues to become out-competed by the pioneer/alien species while frequent mowing continues.

### 3.7.3 Ecological Importance and Sensitivity

The EIS method applied to Wetland 5 is based on the assessment tool developed by Rountree *et. al.* (2013). Overall, the wetland was found to be of **low/marginal** EIS. The key aspects considered during the EIS assessment of the on-site wetland are presented in Table 27 and are as summarised as follows:

- The wetland is assessed as being of low/marginal importance for biodiversity support for the following reasons:
  - The wetland is not known nor is it likely to support any endangered or rare biota or

- populations of unique species, despite falling within the historical distribution of a Critically Endangered (CR) terrestrial vegetation type (Cape Flats Sand Fynbos).
- It is not known nor is it likely to be an important site for species migration, breeding and/or feeding.
- The wetland is not recognised in the WCBSP (2017) as being of any importance from an aquatic biodiversity conservation perspective.
- At the landscape scale the wetland has no protection status, has a PES of E (Severely modified), is not considered to be a wetland of any significant size or rarity and there are no known important wetlands further downstream.
- In terms of sensitivity the wetland is regarded as being insensitive to changes in floods and changes in low-flow, owing primarily to its classification as a depression wetland, but is considered sensitive to changes in water quality due to the low nutrient levels in the general area's freshwater systems (in their unimpacted, reference condition).

**Table 27: EIS Results for Wetland 5.**

<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Score (0-4)	Confidence (1-5)	Motivation
<b>Biodiversity support</b>			
Presence of Red Data species: Endangered or rare Red Data species present	1	3	Unlikely despite Critically Endangered terrestrial vegetation type. Fact that depressions and seeps are listed as being VU in the NFEPA (2017) would confirm the unlikeliness.
Populations of unique species: Uncommonly large populations of wetland species	1	3	Limited possibility of unique species / large populations occurring.
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	1	4	Seasonal wetland, transformed catchment therefore unlikely to be important site with no ecological connectivity.
<b>Landscape scale</b>			
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5	Not protected and not identified as being of any aquatic biodiversity importance.
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	3	5	Cape Dune Sand Fynbos is CR therefore poorly protected.
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	1	5	PES E (severely modified) and no regional utilisation.
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	4	Very small wetland and moderate rarity because depressions and seeps listed as VU.
Diversity of habitat types: Assessment of the variety of wetland types present within a site	1	4	Minimal diversity of habitat types due to seasonal nature and frequent mowing.
<b>Sensitivity of the wetland</b>			
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or 3; pans and seeps 0 or 1	1	4	Depression
Sensitivity to changes in low flows/dry season: (Unchannelled VBW's probably most sensitive)	1	4	Depression
Sensitivity to changes in water quality: Esp. natural low nutrient waters – lower nutrients likely to be more sensitive	3	4	Region's waters are nutrient poor therefore likely to be relatively sensitive.
<b>ECOLOGICAL IMPORTANCE AND SENSITIVITY</b>	Median value	<b>1</b>	

The EIS assessment determined that the EIS of Wetland 5 was **Low/marginal**. This rating for the wetland means that the wetland is not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines (see Table 28).

**Table 28: EIS Category definitions.**

EIS Category definitions	Range of EIS score
<b>Very high:</b> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major drainage lines	>3 and <=4
<b>High:</b> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major drainage lines.	>2 and <=3
<b>Moderate:</b> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major drainage lines.	>1 and <=2
<b>Low/marginal:</b> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major drainage lines.	>0 and <=1

### 3.7.4 Recommended Ecological Category

The EIS category of the wetland was determined to be **Low/marginal**. This EIS category means that the wetland is not ecologically important at any scale. The current PES of the wetland is a **Category E** (see Section 3.4.2) and given the low/marginal EIS the REC for the wetland remains a Category D. Therefore, it is not considered acceptable for any future development to cause any further deterioration in the PES.

## 4 Assessment of Impacts

### 4.1 Activity Description & Impact Identification

#### 4.1.1 Description of the Proposed Development

A series of wetlands will be accommodated in a large urban park between Old Paarl Road and the Stikland Hospital and one on the western edge, alongside de la Haye Road. The remaining edge of Old Paarl Road will be developed with between 4 and 8 storey buildings of a residential and mixed use. Provision is being made for affordable and Social Housing, supported by schools and community facilities, primarily in the south eastern precinct. The western edge alongside de la Haye Street is being seen as a possible District Hospital and new Main Entrance to Stikland Hospital. A new connector road between Voortrekker and Old Paarl Road will run along the southern railway boundary and up to Old Paarl Road. Three new intersections onto Old Paarl Road are planned; at the entrance to Stikland North, Harrod Drive and Meerlust Street.

The proposed layout of the development is shown in Figure 24.

#### 4.1.2 Alternatives under Assessment

No alternatives are being assessed other than the 'No-Go' alternative (see Section 4.3).



Figure 21: Conceptual layout of the proposed development.

### 4.1.3 Identification of potential freshwater ecological impacts associated with the proposed development

Based on the project description provided in Sections 4.1.1 and 4.1.2, the following potentially significant, direct freshwater ecological impacts have been identified per phase of the proposed development:

#### *Planning, design and development/construction phase*

- **Wetland habitat loss:** While wetlands 1 – 4 will be retained within the proposed development, depression wetland 5 will be infilled and lost;
- **Wetland habitat disturbance:** Given that wetlands 1 – 4 will be retained and that construction activities will take place within relatively close proximity to these wetlands, habitat disturbance of the retained wetlands is likely;
- **Alteration of flow regime:** Reduced catchment roughness resulting from the clearing of vegetation causes an increase in run-off and an increase in flood peaks in receiving wetlands;
- **Increased erosion and sedimentation:** The exposure of soils to erosion associated with site clearing, excavations and/or infilling would increase the erosive potential and, if coupled with rainfall, would result in sediment being deposited into the receiving wetlands;
- **Water quality impairment:** The possible release of contaminants such as cement and other building materials / chemicals into the receiving watercourses would impair water quality. In addition, potential accidental spills of chemicals and fuel may also result in contamination of the receiving wetlands; and
- **Biota loss:** The indiscriminate driving of vehicles and construction machinery through and near wetlands as well as the inappropriate placement of materials can lead to wetland biota loss. Similarly, should contaminants such as cement, fuel and other chemicals used in construction enter the site's wetlands then biota that are sensitive to water quality impacts may either move away or in extreme circumstances may suffer mortalities.

#### *Operational phase*

Potential freshwater ecological impacts associated with the operational phase are associated with the land uses proposed for the site, particularly those in close proximity to the site's retained wetlands. Given that the predominant land use occurring near and in the immediate catchment of the site's retained wetlands is residential, the following impacts are likely:

- **Disturbance of wetland habitat:** Wetland habitat would potentially be subject to ongoing disturbance associated with the edge effects of residential land use including the dumping of garden refuse and litter within the site's retained wetlands and uncontrolled access to the wetland area by pets and people.
- **Alteration of flow regime:** Flow velocity and flood peaks would increase and infiltration would be reduced as a result of the increase in the extent of hard impermeable surfaces brought about by the proposed development which includes roofed buildings, roads and paved areas; and
- **Water quality impairment:** Residential use of the proposed site could contribute to nutrient loading of the site's wetlands via stormwater run-off. Contaminants present within the site could be mobilised and transported by run-off and then discharged into the receiving wetlands. Also, given that new sewerage infrastructure is proposed upslope and within the regulated area of some of the site's retained wetlands, there is also a possibility that should the infrastructure fail or leak as a result of being damaged, then water quality impairment of the receiving wetlands would occur.
- **Biota gains:** Aquatic biota would benefit from the cessation of mowing of wetland and surrounding terrestrial vegetation and should the habitat condition of the site's retained wetlands improve as a result of selective planting then additional gains for wetland biota would occur.

## 4.2 Potential Direct Impacts associated with the proposed mixed use development

### 4.2.1 Development/Construction Phase

#### **Impact 1 — Loss of wetland habitat**

Only depression wetland 5 would be lost as a result of the proposed development. The extent of this wetland was determined to be 0.08 ha (the smallest wetland delineated within the proposed site), its overall PES was determined to be a Category “E” (“Severely Modified”) and the EIS was determined to be “Low/marginal” (see Section 3.7). The wetland is also ecologically isolated and given the projected ongoing decline in habitat condition due to the continued mowing of the vegetation in the near the wetland, it could well be the case that the wetland habitat would have decreased in PES to a Category “F” within the foreseeable future. For this reason, the impact intensity is rated LOW (i.e. had the wetland presented a higher PES, was ecologically connected and determined to have a MODERATE or greater EIS then the intensity would have been greater). The duration of the impact was rated LONG TERM and the probability of the impact occurring is rated DEFINITE and the extent LOCAL.

While the DWS applies a No Net Loss policy for wetlands, the size of the wetland, its ecological isolation and state of degradation provides some motivation for the acceptability of this loss. Another important factor is that the wetland is too small for the Wetlands Offset Calculator (Macfarlane *et al.*, 2014) to register the loss (i.e. the calculator could not be applied). While it is not regarded possible to mitigate habitat loss, the improvement to the retained wetlands as a result of the cessation of the mowing of the vegetation within and surrounding the wetlands and the introduction of suitable indigenous plants within the wetlands and their associated buffer zones (see Section 4.2.2 – Impact 4 – Biota Gains) would adequately offset the loss of wetland 5.

**Table 29: Impact significance rating for the loss of wetland habitat (development phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	<i>Habitat loss cannot be mitigated</i>
Duration of impact	LONG TERM	
Consequence of impact or risk:	NEGATIVE	
Intensity	MEDIUM	
Probability of occurrence:	DEFINITE	
Indirect impacts:	N/A	
Cumulative impacts	HIGH	
Significance rating of impact	LOW (-ve)	
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	IRREVERSIBLE	
Degree to which the impact can be avoided:	N/A	
Degree to which the impact can be managed:	N/A	
Degree to which the impact can be mitigated:	N/A	
Residual impacts:	LOW (-ve)	

#### **Impact 2 — Alteration of Flow Regime**

Vegetation cover performs flood attenuation functions by slowing down run-off and promoting infiltration. This has the effect of reducing flow velocity and flood peaks into and within the receiving wetlands. While most of the proposed site comprises mowed grass-dominated fields which has a

relatively low catchment roughness, the construction phase will entail site preparation which will result in the complete removal of all vegetation within the construction areas. Accordingly, the intensity of this potential impact is rated LOW. Ordinarily flow regime impacts extend beyond the site (i.e. would be rated to have a REGIONAL extent) but in this case it is the specialist's opinion that due to the lack of connectivity of the site's wetlands to downstream aquatic systems the potential impact is rated to be limited to the proposed site (i.e. the extent would be LOCAL).

The impact significance for the alteration of the natural flow regime, primarily as a result of the LOW intensity rating and LOCAL extent is rated as LOW (-ve) unmitigated. The alteration of flow caused by site clearing can be largely avoided if site clearing is undertaken during the summer, low rainfall season. Also, the inclusion of a suitable buffer around the wetlands would provide some mitigatory effect as the buffers would remain vegetated for the duration of the construction phase. This would reduce the impact significance rating to VERY LOW (-ve).

**Table 30: Impact significance rating for the alteration of the natural flow regime (development phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	MEDIUM TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	LOW	LOW
Probability of occurrence:	DEFINITE	PROBABLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	LOW (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	IRREVERSIBLE	
Degree to which the impact can be avoided:	HIGH	
Degree to which the impact can be managed:	HIGH	
Degree to which the impact can be mitigated:	HIGH	
Residual impacts:	VERY LOW (-ve)	

**Essential mitigation measures:**

- Avoid the impact as far as is practically possible by undertaking site preparation (vegetation clearing and levelling through excavations and/or infilling) during the dry summer season, where possible.
- If site preparation cannot be undertaken prior to the onset of the winter rainy season then the Environmental Control Officer (ECO) must advise on measures to ensure that run-off from cleared areas is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Prior to site preparation designate the outer buffer boundary (20m from the outer wetland edge) with a suitable boundary marker and declare the area as a No-Go area for the duration of the construction phase.
- Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

### Impact 3 – Increased erosion and sedimentation

The exposure of soils resulting from site clearing and/or excavations and/or infilling immediately upslope of wetlands would increase the rates of erosion and sedimentation (the deposition of sediment into the wetlands). During vegetation clearing and/or excavations, soils would be destabilised thereby becoming more prone to erosion. Ameliorating the likelihood of the potential impact is the relatively flat topography of the site (i.e. steep sites are more prone to erosion and sedimentation via stormwater run-off as run-off is accelerated).

Erosion and sedimentation are accordingly rated to be PROBABLE during the rainy season when areas cleared of vegetation and the excavations and/or infilling (including soil stockpiles) would be most prone to erosion. While the moderate to high run-off intensity increases the likelihood of the potential impact, the low erodibility of the site's soils decreases the likelihood of the impact. Similar to the impact on flow regime, it is the specialist's opinion that due to the lack of connectivity of the site's wetlands to downstream aquatic systems, the extent of the potential impact is rated to be LOCAL. The intensity is rated to be MEDIUM given the relatively large scale of the development proposal. Overall, the impact significance of erosion and sedimentation was rated to be LOW (-ve) without mitigation and VERY LOW (-ve) if the proposed mitigation measures, which include stormwater, erosion and sediment control measures, are implemented.

**Table 31: Impact significance rating for erosion and sedimentation (development phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	MEDIUM TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	MEDIUM	LOW
Probability of occurrence:	PROBABLE	POSSIBLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	LOW (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	REVERSIBLE (sediment can be removed from the system and eroded areas stabilised)	
Degree to which the impact can be avoided:	MEDIUM (undertaking site preparation and construction in the dry summer months would largely avoid the impact but this is not practicable given the scale of the project)	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

#### Essential mitigation measures:

- Avoid the impact as far as is practically possible by undertaking the construction phase during the dry summer season, where possible.
- For all construction activities that take place during the winter rainy season, the ECO must advise on measures to ensure that run-off from cleared areas and stockpiles located upslope of the wetlands is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Formulate and implement a Development/Construction phase EMP which includes the following specifications:
  - No stockpiles may be located within 30m of any wetland;
  - The ECO shall designate the site for stockpiling (note this should preferably take place at the Construction Camp but alternative sites can be identified but no closer than 30m from any wetland, in consultation with the ECO);

- Protect soil stockpiles during the winter rainy season from erosion using a tarp or erosion blankets;
  - Implement erosion control measures in order to prevent erosion and sedimentation of the receiving wetlands as required by the ECO. For example. strategically place straw bales or sediment fences/traps, to divert stormwater away from areas susceptible to erosion etc.);
  - Any sediment contaminated runoff should be contained and allowed to settle before being discharged. The settled-out sediment collected in this manner should be cleared manually as needed and removed from site;
  - The ECO shall, for the duration of the winter rainy season, check erosion control measures weekly to ensure these are still intact (and cleared of sediment in accordance with the recommendations above) as needed;
  - The ECO shall check the site for erosion damage and sedimentation after heavy rainfall events. Should erosion or sedimentation be noted, immediate corrective measures must be undertaken; and
  - Ensure that any area within the wetlands and associated buffer areas that is damaged as a result of construction activities is suitably and timeously rehabilitated to the satisfaction of the ECO. The ECO may, at their discretion, consult the services of a freshwater specialist with prior experience in wetland rehabilitation. The costs for the consultation of the specialist shall be borne by the Contractor.
- Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

#### **Impact 4 – Water quality impairment**

There is a high probability that unmanaged the site's retained wetlands would become contaminated as a result of the use of construction materials including cement, paints and solvents which would enter the wetlands via run-off from construction areas located upslope of the wetlands. In addition, the operation of vehicles and machinery might present unchecked and accidental leaks and spillages which in turn would also lead to wetland contamination. Discharge of any wash-water from construction areas into the surrounding environment would also contaminate run-off which in turn would enter and contaminate the receiving wetlands.

The slight slope of the site (0 – 10%) means that run-off velocities during rainfall events are reduced therefore limiting the extent of the potential impact. This fact, coupled with the lack of any aquatic habitat downslope of the proposed site, results in a LOCAL extent rating. The relatively large scale of the proposed development results in a MEDIUM intensity rating which elevates the impact significance rating to MEDIUM (-ve) without mitigation. With management and mitigation that would have the effect of reducing the probability of the impact occurring and the intensity of the impact, the impact significance would be reduced to VERY LOW (-ve).

**Table 32: Impact significance rating for water quality impairment (development phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	MEDIUM TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	MEDIUM	LOW
Probability of occurrence:	PROBABLE	POSSIBLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	LOW (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	IRREVERSIBLE	
Degree to which the impact can be avoided:	MEDIUM	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

**Essential mitigation measures:**

- Formulate and implement an EMP for the development/construction phase which includes the following specifications:
  - Where cement is mixed in a cement mixer ensure that the cement mixer operates at all times within a bunded area with an impermeable base;
  - Where cement is mixed by hand, ensure that the cement is mixed at all times in impermeable containers or in a bunded area with an impermeable base;
  - All wet and dry cement deposits outside the contained areas are to be removed at the end of each day and disposed of off-site as rubble;
  - Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage and to be located at least 100m from any wetland;
  - Inspect all storage facilities and vehicles daily for the early detection of deterioration or leaks;
  - Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately;
  - Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these waste materials into any wetland and associated buffer is strictly prohibited;
  - Dispose of concrete and cement-related mortars in an environmental sensitive manner (as this can be toxic to aquatic life). Washout may not be discharged into any wetland and associated buffer;
  - Provide an adequate number of portable toilets where work is being undertaken. These toilets must be located at least 30m from the watercourse and must be serviced regularly in order to prevent leakage/spillage;
  - All contaminated soil removed from the site by excavator or hand is to be immediately placed in a skip (i.e. no stockpiling of contaminated soil on-site);
  - All skips containing waste shall be immediately transported to landfill for disposal when the skip becomes full;
  - Any skips containing solid waste at the end of the day shall be covered to prevent wind from blowing the waste away; and
  - Receipts for the safe disposal of solid waste shall be kept on record by the Contractor.

### Impact 5 – Loss of Biota

Infilling of wetlands and construction activities within and/or in close proximity to wetlands inevitably cause biota loss, primarily biota mortality as a result of being crushed by vehicles or through the indiscriminate placement of machinery and/or construction materials (including fill when infilling wetlands). In the event that spilled fuels and chemicals, oil leaks from construction machinery and cement from batching operations contaminate the receiving watercourses then biota loss may also take place or in the very least biota sensitive to water quality changes would be displaced.

Given the relatively large scale of the construction project, it is PROBABLE that localised and limited (i.e. LOW impact intensity) biota loss may take place. However, the region's watercourses are known to be naturally low in nutrients and therefore the biota inhabiting these systems are regarded to be sensitive to changes in water quality. This factor increases the intensity rating of biota loss to MEDIUM.

Accordingly, the impact is rated to be of LOW (-ve) significance without mitigation. While biota loss associated with infilling of wetland 5 cannot be mitigated, biota loss in the retained wetlands can be mitigated by restricting construction vehicles and machinery to designated areas and through ensuring that no construction materials are stored within 30m of the on-site wetlands. With the implementation of the recommended mitigation measures the impact significance rating is reduced to LOW (-ve).

### Results

**Table 33: Impact significance rating for loss of biota (development phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	SHORT TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	MEDIUM	LOW
Probability of occurrence:	DEFINITE	PROBABLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	MEDIUM (-ve)	LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	IRREVERSIBLE	
Degree to which the impact can be avoided:	MEDIUM	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

#### Essential mitigation measures:

- Clearly demarcate the outer edge of the wetland buffer zones prior to commencement of the construction phase and declare the area a No-Go area for the duration of the construction phase (note this only applies to wetlands 1 – 4 as wetland 5 will be infilled and lost);
- Any activities within the wetland No-Go areas must be authorised by the ECO (e.g. for the planting of vegetation and/or repair of damaged areas); and
- Construction material stockpiles should be kept at least 30m from the outer wetland edge.

**Table 34: Summary of development phase impacts.**

Impacts	Extent	Duration	Intensity	Probability of impact occurring	Significance
<b>Loss of wetland habitat</b>					
Without mitigation	LOCAL	LONG TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	<i>Mitigation not possible</i>				
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	MEDIUM TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	VERY LOW (-ve)
<b>Increased erosion and sedimentation</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Biota loss</b>					
Without mitigation	LOCAL	SHORT TERM	MEDIUM	DEFINITE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	LOW (-ve)

## 4.2.2 Operational Phase

### **Impact 1 – Disturbance of Wetland Habitat**

Disturbance of the retained wetland habitat as a result of the edge effects associated with the predominant land use (residential) such as deposition of windblown litter and garden and domestic waste, uncontrolled access (human and pets) to wetland areas and introduction and spread of invasive alien plants would be PROBABLE given the proximity of the retained wetlands to the various residential buildings. The intensity of the potential impact is rated LOW given the nature of the predominant land use adjacent to the site's retained wetlands, residential, which while potentially impacting the wetlands would do so with limited intensity. Given that the potential impact is associated with the operational phase the duration of the impact is assessed to be LONG TERM.

Therefore, without mitigation the disturbance of the remaining wetland habitat during the operational phase is rated to be LOW (-ve) which can be reduced to VERY LOW (-ve) with the implementation of the recommended mitigation measures.

**Table 35: Impact significance rating for wetland habitat disturbance (operational phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	LONG TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	LOW	LOW
Probability of occurrence:	PROBABLE	POSSIBLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	LOW (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	REVERSIBLE	
Degree to which the impact can be avoided:	LOW	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

**Essential mitigation measures:**

- Establish and maintain a 20m buffer around each of the retained wetlands;
- Prohibit human and pet access to the retained wetlands. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- Prohibit the dumping of any form of waste into the retained wetland areas. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- Orientate the buildings so that they front onto the retained wetland areas;
- Inspect the retained wetland areas and associated buffers for the presence of litter and invasive alien plants and remove with immediate effect. For effective best practise methods for invasive alien vegetation removal consult Martens *et al.* (2021).

**Impact 2 – Alteration of flow regime**

The extent of hard impermeable surfaces that will be created as a result of the proposed development (comprising numerous buildings and other structures with impermeable surfaces such as parking areas and roads) will increase stormwater run-off across the proposed site which would result in increased flow velocity and an increase in flood peaks within the receiving wetlands. However, given the CCT policy for managing urban stormwater impacts (2009) which makes it mandatory for sites that exceed 4000 m<sup>2</sup> that post-development stormwater flows should not exceed pre-development flows and that infiltration is encouraged in accordance with SUDS principles, it can be assumed that the intensity of the impact would be LOW (i.e. mitigation is mandatory).

Any persistent leaks from any of the pipelines (potable water supply or sewerage) would increase water inputs into the retained wetlands. This could have significant secondary impacts associated with the possibility of transformation of non-perennial systems to perennial systems with associated changes in biota assemblages.

Overall, the intensity of the impact is rated as MEDIUM due to the relatively large scale of the proposed development. The extent would ordinarily be REGIONAL however the lack of any receiving aquatic ecosystems downslope of the site reduces the extent to LOCAL. The impact significance for the alteration of flow regime is, therefore, rated as MEDIUM (-ve) without mitigation. Mitigation, aside from the mandatory compliance with the CCT Policy for managing urban stormwater impacts (2009) would be in the form of ensuring that the proposed pipelines do not leak. This can be achieved through the insertion of a Kevlar sleeve for the portions of all water supply and sewerage pipelines that occur

upslope and within the regulated area for wetlands and through routine inspection and maintenance. This would result in the impact significance being reduced to VERY LOW (-ve).

**Table 36: Impact significance rating for alteration of flow regime (operational phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	LONG TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	MEDIUM	LOW
Probability of occurrence:	PROBABLE	POSSIBLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	MEDIUM (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	REVERSIBLE	
Degree to which the impact can be avoided:	LOW (catchment hardening is an unavoidable consequence of urban development)	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

**Essential mitigation measures:**

- Compile a Stormwater Management Plan for the proposed development that complies with the CCT Policy (2009) for managing urban stormwater impacts;
- Ensure that all pipelines upslope and within the regulated area for wetlands (500m) are lined with an internal Kevlar or similar sleeve;
- Inspect the water supply and sewerage pipelines upslope and within the regulated area for wetlands (500m) annually and repair / address leaks timeously.

**Impact 3 – Water Quality Impairment**

Given that sewerage pipelines would be installed upslope and within the regulated area of the site's wetlands there is a risk that raw effluent would be discharged into the receiving wetland(s) in the event that the pipeline is damaged and/or due to lack of maintenance, leaks. Any raw sewage leaked into any of the site's wetlands would only affect the on-site wetlands as there are no off-site, downstream aquatic ecosystems potentially at risk as receiving aquatic ecosystems. Accordingly, the extent of the potential impact is rated as LOCAL. The intensity is rated to be MEDIUM given the effect that raw sewage has on aquatic biodiversity and the likelihood would be POSSIBLE (taking into account the PROBABILITY that if a leak occurred contamination of the watercourse would take place and the IMPROBABILITY of the pipeline being damaged and leaking in the first place). Accordingly, the potential impact of water quality impairment during the operational phase would have a significance rating of MEDIUM (-ve) unmitigated.

In mitigation of the operational phase impact of water quality impairment is the requirement for routine monitoring the sewerage infrastructure for early leak detection and repair. A further measure would be to ensure that the pipeline is lined with Kevlar or similar material to maximise its strength. With mitigation, the impact significance rating would be reduced to VERY LOW (-ve).

**Table 37: Impact significance rating for water quality impairment (operational phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	LONG TERM	SHORT TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	MEDIUM	LOW
Probability of occurrence:	PROBABLE	POSSIBLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	MEDIUM (-ve)	VERY LOW (-ve)
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	IRREVERSIBLE (once contamination has occurred the effects of contamination cannot be reversed)	
Degree to which the impact can be avoided:	LOW	
Degree to which the impact can be managed:	MEDIUM	
Degree to which the impact can be mitigated:	MEDIUM	
Residual impacts:	VERY LOW (-ve)	

**Essential mitigation measures:**

- Ensure that all new sewerage pipelines within the 1:50 year floodline of the Sand River are lined with an internal Kevlar or similar sleeve;
- Inspect all sewerage infrastructure within the 1:50 year floodline annually and repair / address leaks timeously.

**Impact 4 – Biota gains**

The site's wetlands are currently impacted by regular mowing which can cause mortalities of immobile species, temporary and permanent displacement of mobile species and limits species diversity (i.e. robust species which can tolerate mowing would proliferate and disturbance sensitive species would be out-competed by the species that can tolerate the disturbance. By ceasing to mow the vegetation within the site's retained wetlands and associated buffer zones, mortalities caused by mowing would cease and the *in situ* vegetation would be allowed to grow and reproduce in an uninhibited manner which alone would amount to a gain in biota. In addition, species which are sensitive to the disturbance caused by mowing would also inhabit the wetlands for longer periods and overall species diversity would increase thereby increasing the habitat available for aquatic species to inhabit. Should the 20m wide buffer zones be planted with suitable indigenous vegetation then the buffers would provide improved habitat which too would amount to a gain for biota, albeit for predominantly terrestrial species.

The benefit is PROBABLE given the fact that by simply ceasing to mow an improvement in habitat would almost definitely occur. The extent of the impact would be LOCAL although the improvement in habitat brought about by ceasing mowing would help to mitigate the highly significant and regional cumulative impact associated with the inappropriate or lack of management of wetlands in the region's urban areas. The intensity rating would be LOW which could be increased through introducing suitable terrestrial indigenous vegetation into the buffer zones and suitable wetland vegetation (adapted to temporary and seasonal wetlands). The overall significance rating for the benefit to biota brought about by ceasing to mow the wetland areas and associated buffer zones, based on the aforementioned criteria ratings is therefore LOW (+ve) and with the implementation of the recommendations to improve habitat diversity the rating would be MEDIUM (+ve).

**Table 38: Impact significance rating for gains for biota (operational phase).**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	LOCAL
Duration of impact	LONG TERM	LONG TERM
Consequence of impact or risk:	NEGATIVE	NEGATIVE
Intensity	LOW	MEDIUM
Probability of occurrence:	PROBABLE	PROBABLE
Indirect impacts:	N/A	N/A
Cumulative impacts	HIGH	HIGH
Significance rating of impact	LOW (+ve)	MEDIUM (+ve)
Degree to which the impact may cause irreplaceable loss of resources:	N/A	
Degree to which the impact can be reversed:	N/A (the impact is a benefit)	
Degree to which the impact can be avoided:	N/A (the impact is a benefit)	
Degree to which the impact can be managed:	N/A (the impact is a benefit)	
Degree to which the impact can be mitigated:	N/A (the impact is a benefit)	
Residual impacts:	N/A (the impact is a benefit)	

**Essential mitigation measures:**

- Ensure that in future no part of the retained wetland areas and their associated buffer zones is mowed;
- The only cutting-back that may be undertaken is the periodic cutting-back of *Typha capensis* (bullrush) which is known to inhabit wetlands with longer hydroperiods and proliferate to such an extent that they outcompete sensitive endemic species;
- Prepare a Landscaping Plan for the retained wetlands and their associated buffers that proposes the planting of suitable indigenous plants; and
- Monitor the retained wetlands and their associated buffers for alien invasive plants and remove any identified plants in accordance with accepted best-practise methods with immediate effect.

**Table 39: Summary of impact assessment results for the operational phase.**

Impacts	Extent	Duration	Intensity	Probability of impact occurring	Significance
<b>Wetland habitat disturbance</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	IMPROBABLE	VERY LOW (-ve)
<b>Gains in biota</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (+ve)
With mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (+ve)

### 4.3 'No-Go' Scenario

The 'No-Go' alternative implies that no development would take place and therefore the current use of the site would persist. All the site's wetlands were assessed to have PES categories ranging from "C" to "E" with projected downward trajectories meaning that without any management intervention each of

the site's wetlands would continue to degrade. A key factor causing this trajectory of degradation is the regular mowing of the vegetation across the proposed site including the wetland areas. This mowing would continue unabated as there is no legislation preventing the mowing of vacant urban sites that contain wetlands and unmaintained would result in an eyesore and potentially promote for anti-social behaviour (crime, vagrancy and land invasion).

Accordingly, the long-term prognosis for the site's wetlands is that they would eventually deteriorate to reach a lower PES Category within the foreseeable future. Given that the site's wetlands were all assessed to be of Low/marginal EIS and that no wetlands of conservation importance are situated downstream of the site's wetlands, this deterioration in the condition of the wetlands has limited regional significance. Overall, taking the above into consideration the "No-Go" alternative is rated to be associated with a LOW (-ve) impact significance rating (see Table 28).

**Table 40: Impact significance rating for all impacts associated with the No-Go alternative.**

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent of impact:	LOCAL	N/A to the No-Go alternative
Duration of impact	LONG TERM	
Consequence of impact or risk:	NEGATIVE	
Intensity	LOW	
Probability of occurrence:	PROBABLE	
Indirect impacts:	N/A	
Cumulative impacts	HIGH	
Significance rating of impact	LOW (-ve)	
Degree to which the impact may cause irreplaceable loss of resources:	LOW	
Degree to which the impact can be reversed:	REVERSIBLE (habitat degradation can be reversed through rehabilitation)	
Degree to which the impact can be avoided:	LOW (continued environmental degradation is an inevitable trend for biodiversity in urban areas due primarily to significant edge effects)	
Degree to which the impact can be managed:	MEDIUM (while landowners could voluntarily undertake measures to manage ongoing degradation this has rarely occurred, presumably due to costs)	
Degree to which the impact can be mitigated:	MEDIUM (while landowners could voluntarily undertake measures to mitigate ongoing degradation this has not occurred, presumably due to costs)	
Residual impacts:	LOW (-ve)	

## 4.4 Indirect Impacts

No indirect impacts were identified or considered probable, provided the suggested mitigation measures of the direct impacts are implemented and adhered to.

## 4.5 Cumulative Impacts

Cumulative impacts result from the incremental impact of an activity on freshwater ecosystems within a greater catchment, ecoregion and vegetation group when added to the impacts of other past, present or reasonably foreseeable future activities.

Loss of wetland habitat in the Southwestern Coastal Belt Ecoregion as a result of urban development has been extensive and can be regarded as a highly significant cumulative impact. This is evident from the NFEPA (2011) which has assigned a Critically Endangered (CR) and Endangered (E) threat statuses to the majority of wetland types in the Ecoregion's various wetland vegetation types. Given that the proposed development would entail loss of wetland habitat, albeit only a very small wetland (0.08 ha), the proposed development would contribute to this highly significant cumulative impact, albeit in only a small way. Also, through implementing the recommended development/construction phase mitigation measures that aim to ensure that the flow regime, water quality impairment (chemical

contamination and sediment loading) and biota loss is minimised, as well as the recommendations to improve wetland habitat and thereby generate gains for aquatic biota, the negative effect of this minor loss in wetland habitat would be eliminated resulting in a negligible cumulative effect.

## 5 Key Findings and Recommendations

### 5.1 Key Findings

The Western Cape Department of Infrastructure proposes a mixed use development on the vacant portions Erf 6300 (Stikland Hospital South Precinct), Stikland, City of Cape Town. Implementation of the National web-based Screening Tool by the EAP, Infinity Environmental, indicated that the site has a HIGH sensitivity for the Aquatic Biodiversity Theme which suggests that the site contains aquatic biodiversity features and if present would result in the requirement for a specialist assessment that is compliant with the gazetted Protocol for Aquatic Biodiversity Assessment. Also, if the proposed development lies within the NWA regulated area for wetlands and rivers/streams then a Risk Assessment is required in terms of Notice No. 4167 of Government Gazette No. 49833 (December 2023) promulgated under the NWA.

EnviroSwift conducted site investigations in September 2023 to identify and delineate aquatic habitat within the vacant portions of the site proposed for development. The site investigation identified several wetlands within the vacant areas proposed for development. Follow-up investigations by GEOSS were commissioned by the developer in 2024 which included a hydro-pedological study and wetland verification and delineation study which were undertaken in 2024 by DSA and the Freshwater Consulting Group (FCG), respectively. These studies confirmed the presence of 5 wetlands on the site and the delineations presented by FCG and EnviroSwift were largely aligned.

The available online databases do not map any watercourses on the proposed site but do map wetlands to the north west and south east of the site. These wetlands are either not hydrologically coupled with the proposed site or are located beyond 500m from the site's boundaries. The proposed development therefore lies beyond the NWA regulated area for the wetlands beyond 500m and therefore none of these wetlands are considered at risk of being impacted. Also, according to the BioNet (updated 2018) the site is not mapped to comprise any areas of biodiversity conservation importance as no ESAs or CBAs are mapped on or near the proposed site.

The results of the detailed ecological assessment of the 5 on-site wetlands are summarised in Table 28. While the wetlands are all relatively similar insofar as the ecological services that they deliver and their respective EIS, they do differ in terms of their PES with Wetlands 2 & 3 being the least impacted and having a PES of Category C and wetlands 4 & 5 being the most impacted and having a PES of Category E.

**Table 41: EIS Summary of the Detailed Freshwater Ecological Assessment of the five on-site wetlands.**

Wetland Number	Classification	Key Ecological Services	Present Ecological State (PES)	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Condition (REC)
1	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control Carbon Storage	"D"	Low/marginal	"D"
2 & 3	Hillslope Seep	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"C"	Low/marginal	"C"
4	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"E"	Low/marginal	"D"
5	Depression	Maintenance of biodiversity Flood attenuation Nutrient and toxicant assimilation Erosion control	"E"	Low/marginal	"D"

The proposed development entails the development of a mixture of land uses with residential being the predominant use. Four of the five identified and delineated wetlands on the site will be retained within the development with the very small and ecologically isolated wetland 5 being infilled and lost as a result of the proposed development. Three of the site's wetlands (wetlands 1, 2 and 3) will be accommodated in a large urban park between Old Paarl Road to the north and the existing Stikland Hospital to the south and wetland 4 will be accommodated on the western edge, alongside de la Haye Road.

Given the nature of the development/construction phase activities, which entail relatively large-scale site preparation (vegetation clearing and infilling/excavations to create levelled building platforms) and the construction of buildings and the installation of services) in close proximity to wetlands, the identified development/construction phase impacts include wetland habitat loss, wetland habitat disturbance, alteration of flow regime, erosion and sedimentation and biota loss.

For the operational phase it is the primary land use, residential, that is the main cause of impacts on the retained wetlands including habitat disturbance, altered flow regime and water quality impairment. Due to the fact that the biodiversity associated with the site's wetlands is suppressed by the regular mowing of the wetlands and their surrounding vacant terrestrial areas, by only ceasing to mow, the biota would benefit from improved habitat condition and biodiversity would increase. This amounts to a gain for aquatic biota and therefore the operational phase is associated with a benefit.

Practicable mitigation measures have been recommended to minimise and manage all the identified potential impacts to ensure that all impacts are reduced to either LOW or VERY LOW (-ve) significance ratings. The only exception to this is the development/construction phase-related impact of wetland habitat loss which cannot be mitigated and remains LOW (-ve). Also, with the recommended establishment of suitable indigenous wetland vegetation within the retained wetlands and the establishment of suitable indigenous terrestrial vegetation in the buffer zones the gains for aquatic biota would be enhanced to a MEDIUM (+ve) benefit.

A summary of the impact significance ratings for the identified potentially significant impacts associated with the proposed development (throughout the project life-cycle) is provided in the table below.

**Table 42: Summary of the impact significance ratings for the identified potentially significant freshwater ecological impacts.**

Impacts	Extent	Duration	Intensity	Probability of impact occurring	Significance
<b>Development/Construction phase impacts:</b>					
<b>Loss of wetland habitat</b>					
Without mitigation	LOCAL	LONG TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	Mitigation not possible				
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	MEDIUM TERM	LOW	DEFINITE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	VERY LOW (-ve)
<b>Increased erosion and sedimentation</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-VE)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	MEDIUM TERM	MEDIUM	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Biota loss</b>					
Without mitigation	LOCAL	SHORT TERM	MEDIUM	DEFINITE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	PROBABLE	LOW (-ve)
<b>Operational phase impacts</b>					
<b>Wetland habitat disturbance</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Alteration of natural flow regime</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	POSSIBLE	VERY LOW (-ve)
<b>Water quality impairment</b>					
Without mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (-ve)
With mitigation	LOCAL	SHORT TERM	LOW	IMPROBABLE	VERY LOW (-ve)
<b>Gains in biota</b>					
Without mitigation	LOCAL	LONG TERM	LOW	PROBABLE	LOW (+ve)
With mitigation	LOCAL	LONG TERM	MEDIUM	PROBABLE	MEDIUM (+ve)

It is understood that DWS applies a No Net Loss policy to wetland loss and ordinarily the loss in wetland habitat and function due to the loss of one of the smallest (0,08 ha) and most ecologically isolated wetlands (wetland 5) would need to be offset with the adequacy of the proposed offset being determined through application of the Wetland Offset Calculator (Macfarlane *et al.*, 2014). When the calculator was applied the size of the wetland was found to be too small to allow for a calculation of wetland loss in Hectare Equivalents (HE). Despite this, the specialist is of the opinion that the gains achieved by creating to mow the retained wetlands, planting suitable indigenous wetland vegetation within the wetlands and the establishment of 20m vegetated buffers around each of the retained wetlands adequately offsets the loss of wetland habitat and function associated with the loss of wetland 5.

## 5.2 Authorisation Opinion

The proposed development is found to be associated with a number of potentially significant freshwater ecological impacts that unmitigated would result in the proposed development not being supported from a freshwater ecological perspective. However, given that a number of practicable mitigation measures can be enforced and that these would render most of the potential impacts to have a VERY LOW (-ve) impact significance with only two of the identified impacts (construction phase wetland loss and biota loss) being unmitigable in the case of the former and mitigable in the case of the latter and both rated to have a LOW (-ve) impact significance, the proposed development is supported. The reason why the

loss of wetland 5 is considered acceptable is because the wetland is severely degraded (PES Category "E"), is ecologically isolated and is very small and the incorporation of the remaining on-site wetlands within the proposed development with adequate buffers, planting of suitable indigenous vegetation and the ceasing of mowing more than offsets the loss. This would be conditional on the recommended mitigation measures listed in Section 5.3 being implemented.

Should no development take place, then ongoing degradation of the site's wetlands would continue due to the regular mowing which has a significant impact on the species composition and reproductive success of the naturally occurring indigenous vegetation. Also, given that the proposed development presents an opportunity to improve the condition of the site's retained wetlands there would also be a lost opportunity cost associated with the No-Go alternative.

### 5.3 Conclusion and Recommendations

The vacant portions of the Stikland Hospital Southern Precinct (the proposed site) have been confirmed to contain 5 wetlands (3 depression wetlands and 2 hillslope seep wetlands). Four of the wetlands will be accommodated in the proposed development and buffer zones of 20m will be established around each of the retained wetlands. All of the identified potential freshwater ecological impacts have been rated to be of either a LOW (-ve) or a VERY LOW (-ve) significance on condition that the recommended mitigation measures are implemented. The only exceptions are the construction phase impacts of wetland habitat loss and biota loss which have been rated as LOW (-ve). While the Wetland Offset Calculator (Macfarlane *et al.* 2014) could not be applied due to the small size of the wetland, it is the specialist's opinion that this loss is adequately offset by ceasing the mowing of the wetland vegetation, establishing 20m wide buffers and planting additional indigenous wetland plants within the 4 retained wetlands.

The following practicable mitigation measures have been recommended to avoid, minimise and manage the identified mitigable potential impacts are as follows:

#### *Essential mitigation measures to address alteration of flow regime during the development/construction phase:*

- Avoid the impact as far as is practically possible by undertaking site preparation (vegetation clearing and levelling through excavations and/or infilling) during the dry summer season, where possible.
- If site preparation cannot be undertaken prior to the onset of the winter rainy season then the Environmental Control Officer (ECO) must advise on measures to ensure that run-off from cleared areas is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Prior to site preparation designate the outer buffer boundary (20m from the outer wetland edge) with a suitable boundary marker and declare the area as a No-Go area for the duration of the construction phase.
- Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

#### *Essential mitigation measures to address the development/construction phase impact of erosion and sedimentation:*

- Avoid the impact as far as is practically possible by undertaking the construction phase during the dry summer season, where possible.
- For all construction activities that take place during the winter rainy season, the ECO must advise on measures to ensure that run-off from cleared areas and stockpiles located upslope of the wetlands is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Formulate and implement a Development/Construction phase EMP which includes the following specifications:
  - No stockpiles may be located within 30m of any wetland;
  - The ECO shall designate the site for stockpiling (note this should preferably take place at the Construction Camp but alternative sites can be identified but no closer than 30m from any wetland, in consultation with the ECO);
  - Protect soil stockpiles during the winter rainy season from erosion using a tarp or erosion blankets;

- Implement erosion control measures in order to prevent erosion and sedimentation of the receiving wetlands as required by the ECO. For example. strategically place straw bales or sediment fences/traps, to divert stormwater away from areas susceptible to erosion etc.);
- Any sediment contaminated runoff should be contained and allowed to settle before being discharged. The settled-out sediment collected in this manner should be cleared manually as needed and removed from site;
- The ECO shall, for the duration of the winter rainy season, check erosion control measures weekly to ensure these are still intact (and cleared of sediment in accordance with the recommendations above) as needed;
- The ECO shall check the site for erosion damage and sedimentation after heavy rainfall events. Should erosion or sedimentation be noted, immediate corrective measures must be undertaken; and
- Ensure that any area within the wetlands and associated buffer areas that is damaged as a result of construction activities is suitably and timeously rehabilitated to the satisfaction of the ECO. The ECO may, at their discretion, consult the services of a freshwater specialist with prior experience in wetland rehabilitation. The costs for the consultation of the specialist shall be borne by the Contractor.
- Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

*Essential mitigation measures to reduce water quality impairment associated with construction activities:*

- Formulate and implement an EMP for the development/construction phase which includes the following specifications:
  - Where cement is mixed in a cement mixer ensure that the cement mixer operates at all times within a bunded area with an impermeable base;
  - Where cement is mixed by hand, ensure that the cement is mixed at all times in impermeable containers or in a bunded area with an impermeable base;
  - All wet and dry cement deposits outside the contained areas are to be removed at the end of each day and disposed of off-site as rubble;
  - Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage and to be located at least 100m from any wetland;
  - Inspect all storage facilities and vehicles daily for the early detection of deterioration or leaks;
  - Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately;
  - Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these waste materials into any wetland and associated buffer is strictly prohibited;
  - Dispose of concrete and cement-related mortars in an environmental sensitive manner (as this can be toxic to aquatic life). Washout may not be discharged into any wetland and associated buffer;
  - Provide an adequate number of portable toilets where work is being undertaken. These toilets must be located at least 30m from the watercourse and must be serviced regularly in order to prevent leakage/spillage;
  - All contaminated soil removed from the site by excavator or hand is to be immediately placed in a skip (i.e. no stockpiling of contaminated soil on-site);
  - All skips containing waste shall be immediately transported to landfill for disposal when the skip becomes full;
  - Any skips containing solid waste at the end of the day shall be covered to prevent wind from blowing the waste away; and
  - Receipts for the safe disposal of solid waste shall be kept on record by the Contractor.

*Essential mitigation measures to minimise biota loss associated with the development/construction phase:*

- Clearly demarcate the outer edge of the wetland buffer zones prior to commencement of the construction phase and declare the area a No-Go area for the duration of the construction phase (note this only applies to wetlands 1 – 4 as wetland 5 will be infilled and lost);

- Any activities within the wetland No-Go areas must be authorised by the ECO (e.g. for the planting of vegetation and/or repair of damaged areas); and
- Construction material stockpiles should be kept at least 30m from the outer wetland edge.

*Essential mitigation measures to address the disturbance of wetland habitat during the operational phase:*

- Establish and maintain a 20m buffer around each of the retained wetlands;
- Prohibit human and pet access to the retained wetlands. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- Prohibit the dumping of any form of waste into the retained wetland areas. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- Orientate the buildings so that they front onto the retained wetland areas;
- Inspect the retained wetland areas and associated buffers for the presence of litter and invasive alien plants and remove with immediate effect. For effective best practise methods for invasive alien vegetation removal consult Martens *et al.* (2021)..

*Essential mitigation measures to address alteration of flow regime during the operational phase:*

- Compile a Stormwater Management Plan for the proposed development that complies with the CCT Policy (2009) for managing urban stormwater impacts;
- Ensure that all pipelines upslope and within the regulated area for wetlands (500m) are lined with an internal Kevlar or similar sleeve;
- Inspect the water supply and sewerage pipelines upslope and within the regulated area for wetlands (500m) annually and repair / address leaks timeously.

*Essential mitigation measures to address water quality impairment during the operational phase:*

- Ensure that all new sewerage pipelines within the 1:50 year floodline of the Sand River are lined with an internal Kevlar or similar sleeve;
- Inspect all sewerage infrastructure within the 1:50 year floodline annually and repair / address leaks timeously.

*Essential mitigation measures to improve wetland habitat and generate gains for aquatic biota during the operational phase:*

- Ensure that in future no part of the retained wetland areas and their associated buffer zones is mowed;
- The only cutting-back that may be undertaken is the periodic cutting-back of *Typha capensis* (bullrush) which is known to inhabit wetlands with longer hydroperiods and proliferate to such an extent that they outcompete sensitive endemic species;
- Prepare a Landscaping Plan for the retained wetlands and their associated buffers that proposes the planting of suitable indigenous plants; and
- Monitor the retained wetlands and their associated buffers for alien invasive plants and remove any identified plants in accordance with accepted best-practise methods with immediate effect.

On the basis of the assessment of the potentially significant freshwater ecological impacts associated with the proposed development, the proposed development is supported from a freshwater ecological perspective.

## 6 Risk Assessment

The approach taken in completing the Risk Assessment Matrix is summarised below:

- The assessment is based on the assumption that the recommended mitigation measures will be effectively implemented and as such the risk assessment reflects the "with mitigation" scenario.
- All of the activities potentially generating negative impacts were found to be associated with a LOW risk class including the loss of wetland 5. This low risk rating for wetland loss was attributed to the fact that the wetland was very small (0.08 ha), severely degraded (PES "E") and ecologically isolated (seep wetland with no hydrological connectivity to other freshwater ecosystems. The positive impact (benefit) of gains for aquatic biota, assuming that suitable indigenous wetland plants will be introduced into the retained and buffered wetlands is rated to be associated with a

MODERATE benefit rating.

- All of the identified negative impacts are limited to the impact site or are site-specific due to the fact that there are no off-site, downstream aquatic systems.
- All the identified construction phase-related impacts have been rated as having a short term duration with the exception of wetland habitat loss which is rated to be LONG TERM. The identified operational phase negative impacts have been rated as having a MEDIUM TERM duration assuming the recommended mitigation measures are implemented. The projects only beneficial outcomes for aquatic biota are the gains for biota as a result of retaining 4 of the 5 on-site wetlands, introducing 20m wide buffers around each wetland and the planting of additional suitable wetland plants are rated to be effective for the LONG TERM.
- Most of the identified construction phase-related impacts have been rated as having a probability of 60% or less of occurring with the exception of wetland loss (loss of wetland 5) which is rated to have a 100% chance of occurring. erosion and sedimentation and water quality impairment which is rated as having a 60% chance of occurring. All the identified operational phase-related impacts are rated as having a probability of 40% or less of occurring with the exception of biota gains (benefit) which is rated as having a probability of 80% of occurring assuming the planting of indigenous plants within the wetlands.
- The confidence rating for the risk assessment is mostly MEDIUM for the identified impacts with the exception of the confidence rating for wetland loss due to the loss of wetland 5 and biota gains as a result of retaining, buffering and introducing indigenous wetland vegetation, both of which have a HIGH confidence.

Given that all of the activities is associated with a LOW risk rating the proposed development qualifies for a GA as far as the Section 21 (c) and (i) water uses are concerned.

Please refer to the Risk Assessment Matrix provided in Appendix 4 for further detail.

## 7 References

- Council for Scientific and Industrial Research. 2018 National Wetland Map 5 and Confidence Map [Vector] 2018. Available from the Biodiversity GIS website.
- Department of Water Affairs and Forestry 2005. A practical field procedure of identification and delineation of wetlands and riparian areas. DWA, Pretoria, RSA.
- Department of Water Affairs and Forestry. 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.
- Job, N. 2009. Application of the Department of Water Affairs and Forestry (DWAF) wetland delineation method to wetland soils of the Western Cape.
- Kleynhans, C.J., 1999. Resource Directed Measures for the Protection of Water Resources: River Ecosystems. Department of Water Affairs
- Kleynhans, C.J., Thirion, C. and Moolman, J. 2005. A Level I Drainage line Ecoregion Classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa.
- Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.S., and Collins, N.B., 2007. Wet-EcoServices: A technique for rapidly assessing ecosystem services supplied by wetlands. WRC Report No TT 339/09, Water Research Commission, Pretoria.
- Macfarlane, D.M. and Bredin, I.P. 2016. Buffer zone guidelines for drainage lines, wetlands and estuaries. Part 1: Technical Manual. WRC Report No (tbc), Water Research Commission, Pretoria.
- Macfarlane, D.M. and Bredin, I.P. 2016. Buffer zone guidelines for drainage lines, wetlands and estuaries. Part 2: Practical Guide. WRC Report No (tbc), Water Research Commission, Pretoria.

- Macfarlane, D., Holness, S.D., von Hase, A., Brownlie, S. & Dini, J., 2014. Wetland offsets: a best-practice guideline for South Africa. South African National Biodiversity Institute and the Department of Water Affairs. Pretoria. 69 pages.
- Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. and Goge, C. 2007. WET-Health: A technique for rapidly assessing wetland health. WRC Report No TT 340/09, Water Research Commission, Pretoria.
- Martens, C., Deacon, G., Ferreira, D., Auret, W., Dorse, C., Stuart, H., Impson, F., Barnes, G. and C. Molteno. 2021. A practical guide to managing invasive alien plants: A concise handbook for land users in the Cape Floral Region. WWF South Africa, Cape Town, South Africa.
- Mucina, L. and Rutherford, M.C. (EDS.). 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria, South Africa.
- Nel, J.L., Driver, A., Strydom W.F., Maherry, A., Petersen, C., Hill, L., Roux, D.J, Nienaber, S., Van Deventer, H., Swartz, E. & Smith-Adao, L.B. 2011a. Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. Water Research Commission Report No. TT 500/11, Water Research Commission, Pretoria, RSA.
- Ollis, D.J., Snaddon, C.D., Job, N.M. and Mbona, N. 2013 Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.
- Kemper, N. 1999. Intermediate Habitat Integrity assessment for use in rapid and intermediate assessments. RDM Manual version 1.0.
- Rountree, M.W., Malan, H.L., Weston, B.C. 2013. Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0). WRC Report No. 1788/1/12.
- South African National Biodiversity Institute (SANBI). 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. Pp. 1-214.
- UDS Africa. 2023. Portion 28 of Farm 468, Lynedoch, within the Stellenbosch Municipal Area, Western Cape - Engineering services report. November 2023.
- Van Ginkel, et. al., 2011. Easy Identification of Some South African Wetland Plants. Water Research Commission report no. TT479/10.
- WCBSP. 2017. Western Cape Biodiversity Spatial Plan. Department of Environmental Affairs and Development Planning. Cape Town.

## Appendix 1 – Impact Assessment Methodology<sup>8</sup>

### Impact Rating Methodology

The methodology used in this EIA process to assess and rate the significance of potential impacts is outlined in this section.

The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur.

The criteria used to determine impact consequence are presented in Table 1 below.

**Table 1: Criteria used to determine the Consequence of the Impact**

Rating	Definition of Rating	Score
<b>A. Extent– the area over which the impact will be experienced</b>		
None		0
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
<b>B. Intensity– the magnitude of the impact in relation to the sensitivity of the receiving environment</b>		
None		0
Low	Natural and/or social functions and processes are negligibly altered	1
Medium	Natural and/or social functions and processes continue albeit in a modified way	2
High	Natural and/or social functions or processes are severely altered	3
<b>C. Duration– the time frame for which the impact will be experienced</b>		
None		0
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years	3

The combined score of these three criteria corresponds to a Consequence Rating, as set out in Table 2:

**Table 2: Method used to determine the Consequence Score**

Combined Score (A+B+C)	0 – 2	3 – 4	5	6	7	8 – 9
Consequence Rating	Not significant	Very low	Low	Medium	High	Very high

Once the consequence is derived, the probability of the impact occurring will be considered, using the probability classifications presented in Table 3.

<sup>8</sup> Adapted from SRK Impact assessment methodology

**Table 3: Probability Classification**

Probability of impact – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall significance of the individual impacts will be determined by considering consequence and probability using the rating system prescribed in Table 4.

**Table 4: Impact Significance Ratings**

Significance Rating	Consequence		Probability
Insignificant	Very Low	&	Improbable
	Very Low	&	Possible
Very Low	Very Low	&	Probable
	Very Low	&	Definite
	Low	&	Improbable
	Low	&	Possible
Low	Low	&	Probable
	Low	&	Definite
	Medium	&	Improbable
	Medium	&	Possible
Medium	Medium	&	Probable
	Medium	&	Definite
	High	&	Improbable
	High	&	Possible
High	High	&	Probable
	High	&	Definite
	Very High	&	Improbable
	Very High	&	Possible
Very High	Very High	&	Probable
	Very High	&	Definite

Finally, the impacts will also be considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in Table 5.

Table 5: Impact status and confidence classification

Status of impact	
Indication whether the impact is adverse (negative) or beneficial (positive).	+ ve (positive – a 'benefit')
	– ve (negative – a 'cost')
	Neutral
Confidence of assessment	
The degree of confidence in predictions based on available information, EAP's judgment and/or specialist knowledge.	Low
	Medium
	High

The impact significance rating should be considered by the authority in their decision-making process based on the implications of ratings described below:

- **Insignificant:** the potential impact is negligible and will not have an influence on the decision regarding the proposed activity/development.
- **Very Low:** the potential impact should not have any meaningful influence on the decision regarding the proposed activity/development.
- **Low:** the potential impact may not have any meaningful influence on the decision regarding the proposed activity/development.
- **Medium:** the potential impact should influence the decision regarding the proposed activity/development.
- **High:** the potential impact will affect the decision regarding the proposed activity/development.
- **Very High:** The proposed activity should only be approved under special circumstances.

In the EIA practicable mitigation measures will be recommended and impacts rated in the prescribed way both without and with the assumed effective implementation of mitigation measures.

## **Appendix 2 – CV of the Specialist**

**Curriculum Vitae**  
of  
**NICHOLAS STEYTLER**  
Director – EnviroSwift Western Cape

**CONTACT DETAILS**

Address	32 Rameron Road, Imhoffs Gift, Kommetjie 7975
Email	Nick@enviroswift.co.za
Cell	082-322 4074

**PERSONAL INFO**

Full Names	Nicholas Sean Steytler
Date of Birth	28 March 1970
Nationality	South African
Languages	English, Afrikaans, isiZulu (fair)
Identity Number	7003285202088

**ACADEMIC QUALIFICATIONS**

BSc	University of Natal (Pmb)	1990
BSc Honours (Zoology & Entomology) <i>Cum Laude</i>	University of Natal (Pmb)	1991
MSc (Entomology)	University of Natal (Pmb)	1994

**PUBLICATIONS**

- Steytler, NS and Samways, 1995. MJ. Biotope selection by adult male dragonflies (Odonata) at an artificial lake created for insect conservation in South Africa. Biological Conservation Volume 72 Issue 3, December 1995, Pages 381 – 386.
- Samways, MJ and Steytler, NS. 1996. Dragonfly (Odonata) distribution patterns in urban and forest landscapes, and recommendations for riparian management. Biological Conservation Volume 78 Issue 3, December 1996, Pages 279 – 288.

**MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS**

- Registered Environmental Scientist (Pr Sci Nat 400029/02)
- Member of IAIA SA

**FIELDS OF EXPERTISE**

	<b><u>Years experience</u></b>
Integrated Environmental Management	25 years +
Natural Resource Management Planning	25 years +
Freshwater Ecological Specialist Studies	5 years +

<b>EMPLOYMENT HISTORY</b>
2019 – present: EnviroSwift Western Cape. Director / owner
2007 – present: KHULA Environmental Consultants. Director / owner
2005 – 2009: DJ Environmental Consultants. Associate Consultant.
2000 – 2005: SRK Consulting, Cape Town, Environmental Department. Senior Environmental Scientist.
1996 – 2000: Institute of Natural Resources, Pietermaritzburg. Associate Researcher: Natural Resources Management Programme.
<b>WORK EXPERIENCE (note IEM and Public Participation experience not listed below)</b>
<b><i>Freshwater ecological specialist studies:</i></b>
Freshwater screening study for the proposed development of Erf 1472 Hout Bay, City of Cape Town (2024)
Freshwater screening study for the proposed expansion of the Montana Seed Processing Facility, Joostenbergvlakte, City of Cape Town (2024)
Freshwater screening study for the German School, Kloof Neck, City of Cape Town (2024)
Freshwater screening study for the proposed telecommunications mast on Portion 6 of the Farm Harkerville No 423, Knysna Road, Plettenberg Bay (2024)
Freshwater screening study for the proposed residential development of Erven 3233 and 3234 Hout Bay, City of Cape Town (2024)
Freshwater screening study for the proposed residential development of Portion 3 of Farm 1643, Franschoek, Drakenstein Municipality (2024)
Freshwater screening study for the proposed new in-stream dam on the Remaining extent of Farm Sevilla No. 135, Clanwilliam (2024)
Freshwater screening study for the proposed Morning Star affordable housing scheme, Durbanville, City of Cape Town (2024)
Freshwater screening study for the proposed temporary staging facility for the proposed Wynberg IRT bus depot, City of Cape Town (2024)
Freshwater screening study for the proposed subdivision of Erf 4795 Noordhoek, City of Cape Town (2024)
Freshwater screening study for the proposed single residential development of Erf 88844 Clovelly, City of Cape Town (2023)
Wetland delineation at the proposed Eagles Rest Private Nature Reserve, Cape Point (2024)
Freshwater ecological impact assessment for external services for Welmoed Urban Node, Stellenbosch (2024)
Freshwater screening study for proposed solar PV facilities on the Remainder of Portion 5 of the Farm Rietvallei No. 167, Montagu (2023)
Amendments to freshwater specialist reports submitted in support of the applications for environmental approval for the Calcutta Cemetery, Farm 29 Stellenbosch (2023)
Freshwater screening study for the proposed development of Erf 325 Atlantis, City of Cape Town (2023)
Freshwater screening study for the proposed development of solar PV facilities on Farms 788-6 and 792-RE, Philippi, City of Cape Town (2023)
Freshwater screening study for the Proposed development of solar PV facilities on Erven 551 and 553, Schaapkraal, City of Cape Town (2023)
Freshwater ecological impact assessment for the proposed expansion of the Rusty Gate Mountain Retreat, Greyton (2023)
Freshwater screening study of the proposed redevelopment of portions of Stikland Hospital, Erf 6300 Stikland, Bellville (2023)
Freshwater ecological specialist review & assessment for the proposed amendment to the scope of the authorised extension of Erica Drive, Belhar, City of Cape Town (2023)
Freshwater Screening study for the proposed telecommunications base station on Portion 20 of the Farm Matroosberge No. 57, De Doorns (2023)
Freshwater ecological impact assessment for the proposed subdivision of Erf 10546 Hout Bay (2023)
Freshwater screening study for the proposed expansion of Louwville township, Vredenburg (2023)
Freshwater ecological impact assessment for the residential development of Erf 178092 Newlands, City of Cape Town (2023)
Freshwater screening study for Erf 2068 Somerset West, City of Cape Town (2023)
Freshwater screening study for Portion 3 of Farm 1025 Wemmershoek, Stellenbosch Municipality (2023)
Freshwater ecological impact assessment for a new Wastewater Treatment Works for Matjiesfontein, Laingsburg Municipality (2023)
Freshwater ecological impact assessment for the development of tourism accommodation facilities at the Farm Hemelrand, Hemel en Aarde Valley, Overstrand Municipality (2023)
Freshwater screening study for residential development at Oude Bosch, Hermanus Lagoon, Overstrand Municipality (2022)
Freshwater ecological impact assessment for a proposed shopping centre at Erf 666 Hout Bay, City of Cape Town (2022)
Freshwater screening study for the proposed formalisation of the Valhalla Park informal settlement, Cape Flats, City of Cape Town (2022)

Freshwater screening study for a proposed telecommunications mast, Overhex, Breede Valley Winelands Municipality (2022)
Freshwater ecological impact assessment for the proposed expansion of the Leopard Rock residential estate, Onrusrivier, Overstrand Municipality (2022)
Freshwater screening study for the proposed low cost housing development at Wolwerivier, City of Cape Town (2022)
Freshwater ecological impact assessment for the proposed low cost housing development of Erf 148 Philadelphia, City of Cape Town (2022)
Freshwater screening study of Erf 10932 Constantia, City of Cape Town (2022)
Freshwater screening study of Erf 49 Faure, City of Cape Town (2021)
Freshwater screening study for a proposed concrete factory on the Remainder of the Farm Bultfontyn 128, near Middelburg in the Eastern Cape (2021)
Freshwater ecological impact assessment for the proposed expansion of vineyards at Mountain Rose Farm, Hemel en Aarde Valley, Overstrand Municipality (2022)
Freshwater ecological impact assessment for unlawful agricultural expansion at Plennegy Farm, Oudtshoorn, Western Cape (2021)
Freshwater screening study for the development of erven 41 and 59, Knole Park, City of Cape Town (2021)
Freshwater ecological impact assessment for proposed truck stop on Portion of Erf 10229, Beaufort West, Western Cape (2021)
Freshwater screening study for the proposed redevelopment of the Mowbray Golf Course, Pinelands, City of Cape Town (2021)
Provision of rehabilitation specifications for the unlawful excavation of a trench in a non-perennial drainage line at the Farm Vergelegen, Robertson, Western Cape (2021)
Freshwater ecological impact assessment for unlawful agricultural expansion at Samber Farms, Riversdale, Western Cape (2021)
Freshwater ecological impact assessment for proposed expansion of an in-stream irrigation dam at Farm Hartebeest Kuil, George, Western Cape (2021)
Freshwater screening study for the proposed residential development of Erf 208 Bishopscourt, City of Cape Town (2021)
Freshwater screening study for the proposed agricultural processing facility, Maqinqi communal area, Port St. Johns Municipality, Eastern Cape (2021)
Freshwater ecological impact assessment for the proposed agricultural expansion at the Farm Vergelegen, Robertson, Western Cape (2021)
Freshwater ecological impact assessment for a proposed residential development in Plattekloof, City of Cape Town (2021)
Freshwater ecological screening study for the proposed sewerage pipeline for Schulz Vlei development, Philippi, City of Cape Town (2021)
Freshwater ecological impact assessment for the proposed development of an agro-industrial facility, Wemmershoek, Western Cape (2021)
Freshwater ecological screening study for a proposed filling station in Eerste River, City of Cape Town (2020)
Freshwater ecological impact assessment for an unlawfully constructed tourist accommodation facility, Tulbagh, Western Cape (2020)
Freshwater ecological screening study and risk assessment for additions and alterations to an existing residential dwelling, Breede River, Western Cape (2020)
Freshwater ecological screening study for a proposed truck depot and filling station, Paarl, Western Cape (2020)
Freshwater ecological screening study for a proposed phosphate mine, Saldanha, Western Cape (2020)
Freshwater ecological screening study for a single residential development at Oppi Berg, Ceres, Western Cape (2020)
Freshwater ecological screening study for a proposed industrial area expansion, Bredasdorp, Overberg, Western Cape (2020)
Freshwater ecological impact assessment for proposed Canola plant at Erf 15711 Wellington, Drakenstein Municipality (2020)
Freshwater ecological impact assessment for single residential development of Ptn 13 of Farm 563 Kleinmond (2020)
Freshwater ecological impact assessment for new IRT bus depot, Wynberg, City of Cape Town (2019)
Freshwater ecological screening study for Blackheath Printers, Blackheath, City of Cape Town (2019)
Freshwater ecological screening study for La Motte residential extension, Franschoek (2019)
Freshwater ecological impact assessment for Vloedbos Resort, Overberg (2019)
Freshwater ecological screening study for Erf 3660 Hout Bay, City of Cape Town (2019)
Freshwater ecological screening study for Erf 2145 Constantia, City of Cape Town (2019)
Freshwater ecological impact assessment for low-cost housing development in Khayelitsha (2019)
Freshwater ecological impact assessment for Kommetjie Vineyards Estate, City of Cape Town (2018)
Freshwater ecological screening study for Remainder Erf 177887 Ottery, City of Cape Town (2018)

<b>Environmental Planning and Natural Resources Management:</b>
Preparation of an Invasive Alien Plant Clearing Plan for Erf 6289 Hout Bay, City of Cape Town (2021)
Preparation of an Invasive Alien Plant Clearing Plan for Shamballah Tea House, Cape Point, City of Cape Town (2019)
Preparation of an Invasive Alien Plant Clearing Plan for Imhoff Farm, Southern Peninsula, City of Cape Town (2018)
Preparation of a River Maintenance Management Plan for the Jakkals River, Elgin, Theewaterskloof Municipality (2018)
Preparation of a River Maintenance Management Plan for wetlands associated with the Bottelary River, Hazendal Wine Farm, Stellenbosch (2017)
Preparation of an Alien Plant Clearing Plan for the Farm Wildschutsbrand, Cape Point (2017).
Preparation of an Alien Plant Clearing Plan for Lalapanzi Farm, Cape Point (2017).
Preparation of a River Maintenance Management Plan for the Dawidskraal River, Bettys Bay, Overstrand (2016)
Preparation of a Site Rehabilitation and Management Plan for wetlands at Kraaifontein Shooting club, Northern Cape Metro (2015)
Preparation of a Wetland Maintenance and Management Plan for De Goede Hoop Estate, Noordhoek, South Peninsula (2014)
Application for Off-Road Vehicle Regulations licence for boat launching facility, Oceana Power Boat Club slipway, V&A Waterfront (2014)
Preparation of a Maintenance Management Plan for the Silvermine River, Clovelly Country Club, South Peninsula (2014)
Preparation of a Maintenance Management Plan for the rehabilitation and maintenance of an unnamed stream and associated infrastructure, Klein Constantia Winefarm, Cape Metropole (2014)
Environmental Screening for the proposed redevelopment of the Tygerberg Hospital, Northern Cape Metropole (2014)
Establishment of a Permanent Coastal Development Setback Line for the V&A Waterfront, City of Cape Town (2014)
Preparation of a Maintenance Management Plan for the ongoing maintenance of the access road to the West Coast Rock Lobster holding facility, Witsand Island, Scarborough, City of Cape Town (2013)
Preparation of a Maintenance Management Plan for the Kromboom River, Erf 117459 Lansdowne, Cape Metropole (2013)
Preparation of a Rehabilitation Plan for the remediation of unlawful infilling of a wetland at Lalapanzi Farm, Cape Point (2012)
Preparation of a Rehabilitation Plan for the remediation of unlawful construction of a parking area at Erf 935 Noordhoek Farm Village, City of Cape Town (2012)
Preparation of a rehabilitation plan for the closure of the Retreat Filling Station, City of Cape Town (2012)
Khayeltisha Wetlands Park – Park Delineation and Management Review, City of Cape Town (2010)
Preparation of the Coast & Estuaries Theme for the 1 <sup>st</sup> review of Eastern Cape State of the Environment Report (2009)
Preparation of 2010 FIFA World Cup Greening Business Plan for Polokwane, Limpopo Province (2008)
Preparation of 2010 FIFA World Cup Greening Business Plan for Rustenburg, North West Province (2008)
Revision of the Table Mountain National Park Conservation Development Framework, City of Cape Town (2006)
Comparative Evaluation of alternative venues for the 2010 FIFA World Cup Stadium, City of Cape Town (2006)
Preparation of a Strategic Management Framework for the Kogelberg Biosphere Reserve, Overberg (2005 – 2006)
Preparation of concept document and proposal to undertake a SADC regional market survey of the indigenous fibre trade, SADC Region (2006)
Strategic Planning of Cemeteries in the Drakenstein Municipality (2006)
Environmental assessment of overnight sites for the Hoerikwaggo Trails, Table Mountain National Park, Western Cape (2005)
Preparation of the Year 1 State of the Environment Report for the Western Cape (2005)
Preparation of a Water Resources Management Strategy for Mozambique (2004)
Due Diligence Study for the proposed Mozaq Limitada Prawn Farm, Mozambique (2003)
Preparation of the Culemborg Development Framework, City of Cape Town (2001)
Restoration Planning of the Bokramspruit River, Kommetjie, City of Cape Town (2001)
Management and Maintenance Planning of the Dwars River, Ceres (2001)
Preparation of the Garden Route Spatial Development Framework, Southern Cape (2001)
Strategic Planning of the information needs of a Medicinal Plants Network in the SADC region (1999)
Research to determine potential commercial products from the Wild - Medicinal Plants component, South Africa (1999)
Economic Evaluation of the Cultivation of Nine Species of Medicinal Plants Indigenous to South Africa (1998)
Faunal specialist assessment for the proposed N2 by-pass, Natal Drakensberg, KwaZulu-Natal (1997).
Freshwater specialist assessment for the proposed construction of a bridge over the Msunduzi River, Voortrekker Highschool, Pietermaritzburg (1997)
Strategic Planning of a proposed community based indigenous forest management project, Eastern Cape (1998)
Preparation of a decision support manual for community-based urban riparian systems management (RIPARI-MAN) (1998)
Preparation of an Integrated Catchment Management Plan for the Msunduzi River Catchment, Pietermaritzburg (1997)
Development of Flood Response Strategies for the Msunduzi River Catchment, Pietermaritzburg (1997)
Evaluating community-based wildlife management projects in the SADC region as part of the international project by IIED / IUCN called "Evaluating Eden" (1996)

## Appendix 3 – Declaration of Independence

I, Nick Steytler, as the appointed independent specialist, in terms of the 2014 EIA Regulations (as amended), hereby declare that:

I act as the independent specialist in this application;

I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific environmental management Act;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity; I have no vested interest in the proposed activity proceeding;

I undertake to disclose to the applicant and the competent authority 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 the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;

I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;

All the particulars furnished by me in this specialist input/study are true and correct; and I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:



Name of Specialist: Nick Steytler

Date: 29/08/2024

# Appendix 4 – Risk Assessment Matrix

**PROJECT:** Stikland Hospital South - Remainder Erf 6300 Stikland

**RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1.1**

**Name of Assessor:** Nick Steytler  
**SACNASP Registration Number:** 400029/02  
**Date of assessment:** 20-Aug-24

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Site preparation including infilling and excavations	Wetland habitat loss	24	L	High
		Alteration of natural flow regime	10,8	L	Medium
		Alteration of natural flow regime	10,8	L	Medium
		Alteration of natural flow regime	10,8	L	Medium
		Alteration of natural flow regime	10,8	L	Medium
		Increased erosion and sedimentation	8,4	L	Medium
		Increased erosion and sedimentation	8,4	L	Medium
		Increased erosion and sedimentation	8,4	L	Medium
		Water quality impairment	8,4	L	Medium
		Water quality impairment	8,4	L	Medium
		Water quality impairment	8,4	L	Medium
		Water quality impairment	8,4	L	Medium
		Biota loss	7,2	L	Medium
		Biota loss	7,2	L	Medium
	Biota loss	7,2	L	Medium	
	Biota loss	19,2	L	Medium	
	Driving of construction vehicles and storage of construction materials	Increased erosion and sedimentation	7,2	L	Medium
		Increased erosion and sedimentation	7,2	L	Medium
		Increased erosion and sedimentation	7,2	L	Medium
		Water quality impairment	5,6	L	Medium
Water quality impairment		5,6	L	Medium	
Water quality impairment		5,6	L	Medium	
Biota loss		8,8	L	Medium	
Biota loss		8,8	L	Medium	
Biota loss		8,8	L	Medium	
Biota loss		8,8	L	Medium	
OPERATIONAL	Residential Land Use	Disturbance of wetland habitat	6,4	L	Medium
		Disturbance of wetland habitat	6,4	L	Medium
		Disturbance of wetland habitat	6,4	L	Medium
		Alteration of natural flow regime	6,4	L	Medium
		Alteration of natural flow regime	6,4	L	Medium
		Alteration of natural flow regime	6,4	L	Medium
		Water quality impairment	6,4	L	Medium
		Water quality impairment	6,4	L	Medium
		Water quality impairment	6,4	L	Medium
		Water quality impairment	6,4	L	Medium
	Damage and/or failure of sewerage infrastructure	Biota loss	4	L	Medium
		Biota loss	4	L	Medium
		Biota loss	4	L	Medium
	Wetland Rehabilitation	Biota and habitat gains	-17,6	+	High
		Biota and habitat gains	-17,6	+	High
Biota and habitat gains		-17,6	+	High	

**END OF REPORT**