Aquatic Biodiversity Assessment:

Proposed single residential development of Portion 126 of Farm 599 Bettys Bay and development of an access road to Portion 125 of Farm 599 Bettys Bay, Overstrand Municipality, Western Cape

Prepared for:

Lornay Environmental Consulting

Prepared by:

Nick Steytler
SACNASP Reg. no. 400029/02

Date: 04.03.2025

KHULA Environmental Consultants
T/A EnviroSwift Western Cape

Executive Summary

Background

The owner of Portions 125 and 126 of Farm 599 Bettys Bay, located between Bettys Bay and Kleinmond in the Overstrand Municipality, proposes to develop a residential dwelling on Portion 126 and also construct an access road via a to-be registered servitude over Municipal land (Remainder Farm 562) to access the site from the main road. In addition, the owner proposes to develop a dedicated access to the adjacent Portion 125 of Farm 599 from the proposed access road to Portion 126. Both Portions 125 & 126 do not currently have any access.

The proposed development requires environmental authorisation in terms of the NEMA EIA Regulations (2014, as amended) and as such a Basic Assessment process is being undertaken by the appointed EAP, Lornay Environmental Consulting. Following a screening level assessment by EnviroSwift, the presence of wetlands and the strong likelihood that due to the proximity of wetlands to the proposed access routes, a suite of potential freshwater ecological impacts were identified (i.e. the wetlands were exposed to a quantum of risk as a result of the proposed development).

As such a detailed freshwater ecological assessment is required that addresses the following two legislative requirements:

- The gazetted Protocol for Aquatic Biodiversity Assessment, given that a Basic Assessment is being undertaken and the site has been determined to have a HIGH aquatic biodiversity sensitivity; and
- A risk assessment using the Department of Water and Sanitation's (DWS's) Risk Assessment Matrix (RAM) to determine the level of risk to the site's wetlands and accordingly determine the required level of water use authorisation as required in terms of the National Water Act, Act 36 of 1998.

The assessment and reporting conducted by EnviroSwift addresses both legislative requirements.

Desktop Assessment

The proposed site is situated within the Southern Coastal Belt Ecoregion, within the Breede-Olifants Water Management Area (WMA), the Overberg West Sub-WMA and the G40B and G40D quaternary catchments (NFEPA, 2011 and Kleynhans et al, 2005).

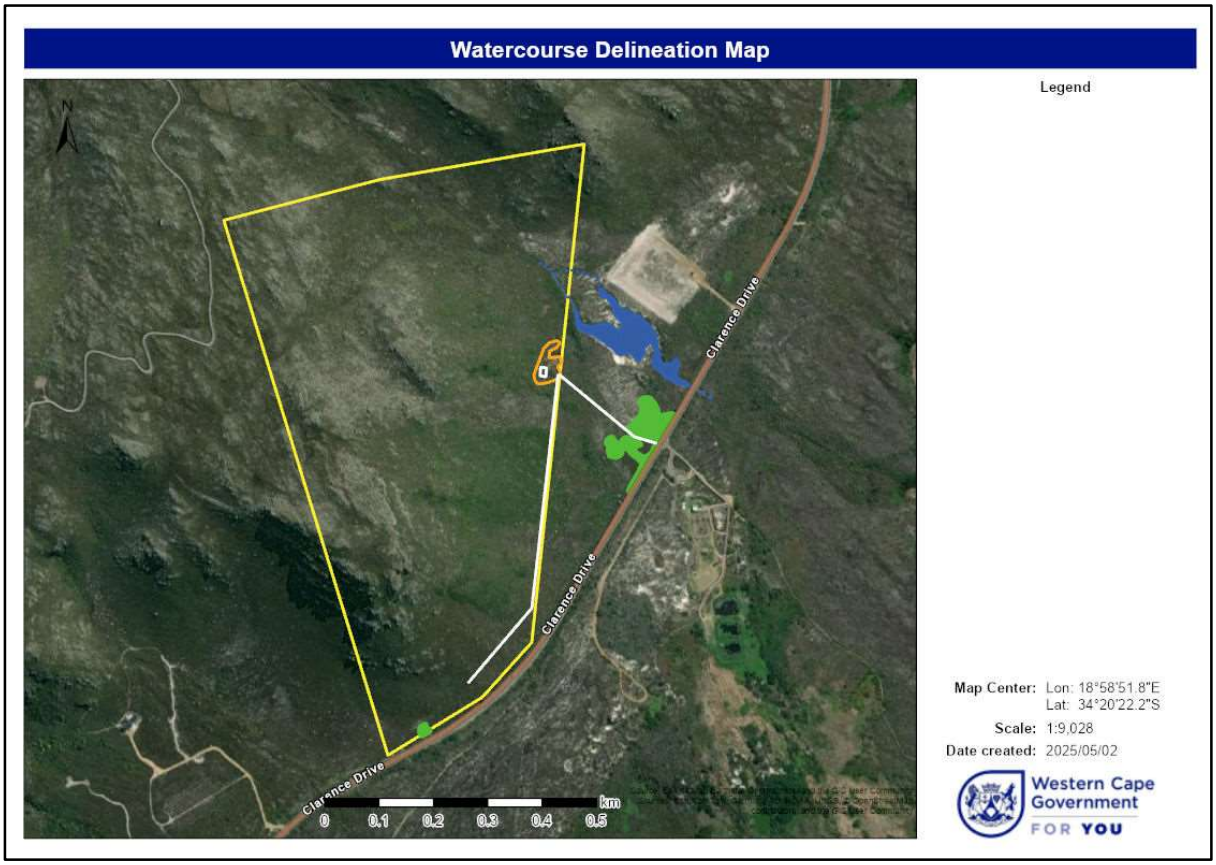
According to the NGI Rivers database only the northern part of the site is traversed by two 1st order non-perennial drainage lines which confluence in the north-eastern corner of the site. According to the National Wetlands Map Version 5 (MWM5) the upper portion of an expansive hillslope seep (mapped extent of approximately 6.4 ha) occurs within the site boundary. This wetland is both within the regulated zone and is at direct risk of being impacted, primarily by the construction of the access road. The NWM5 also indicates an expansive floodplain wetland (approximately 60 ha in extent) within the NWA Regulated Zone and to the south of Clarence Drive and approximately 100m to the south east of property boundary at its nearest point. Due to the very limited footprint and scale of the proposed development (limited to an access road to Portion 125) and the presence of Clarence Drive and the roadside channel, this wetland is not at any risk of being impacted.

According to the Western Cape Biodiversity Spatial Plan (WCBSP, 2017), the entire site comprises a terrestrial CBA and the greater area surrounding the site comprises Protected Areas in the form of Mountain Catchment Areas and local nature reserves (see Figure 9). Of particular interest is the designation of a significant part of the floodplain wetland mapped to occur to the south of Clarence Drive yet within the NWA Regulated Zone for wetlands as an Aquatic CBA.

Site Assessment and Ground-truthing

Based primarily on vegetation, location in the landscape and to some extent soils, the ground-truthing confirmed the presence of the mapped features but the extent of the hillslope to the south-east of the site in the vicinity of the proposed access route from Clarence Drive to the historic quarry was determined to be less than mapped and also the portion of the mapped hillslope seep immediately east

of the graveyard was determined to comprise a channelled valley bottom wetland. Hillslope seeps were also identified either side of the existing access road to the graveyard but these were not delineated as these are not at any risk of being impacted as a result of the proposed development.



Watercourse Delineation Map showing the on-site and off-site watercourses at risk of being directly impacted. The blue polygon indicates the current extent of a channelled valley bottom wetland and the green polygons indicate the current extent of hillslope seep wetlands. The white lines indicate the preferred access routes to the proposed dwelling on Ptn 126 (indicated as a white polygon) and to Ptn 125. The orange polygon indicates the disturbance footprint of the historic quarry.

Detailed Ecological Assessment of the directly affected wetlands

The results of the detailed ecological assessment of the hillslope seep wetland and the channelled valley bottom wetland, the only watercourses at risk of being directly impacted as a result of the proposed development, are summarised in the table below.

Table presenting the results of the freshwater ecological assessments.

Indice	Overall Result	Key reasons:
Hillslope seep wetland		
WET-Ecoservices	Intermediate	• The most important ecosystem services provided by the hillslope seep wetland are erosion control and maintenance of biodiversity, both of which were rate in the **High** category. • The services of sediment trapping, phosphate, nitrate and toxicant removal were all assessed to be **Moderately High** and the services of flood attenuation and streamflow regulation were assessed to be **Intermediate**.
PES	Category "D"	• **Hydrology:** While the changes to water inputs from the catchment are negligible, the fact that Clarence Drive acts as a significant barrier to flow through the wetland (some deeper subsurface flow will be uninterrupted) results in a significant impact score for hydrology. • **Geomorphology:** The geomorphology of the wetland is almost intact with only the

Indice	Overall Result	Key reasons:
		historical infilling of approximately 20% of the original extent of the wetland having occurred as a result of the construction of Clarence Drive. • **Vegetation:** While approximately 80% of the hillslope seep is in a pristine condition the remaining 20% is transformed and comprises a main road. While a few alien invasive species were identified, their low abundance has not influenced the vegetation score.
EIS	Moderate	• The wetland is likely to support endangered or rare biota or populations of unique species and falls within a Critically Endangered terrestrial vegetation type (Kogelberg Sandstone Fynbos) and contains an Endangered wetland vegetation type (Southwest Sandstone Fynbos); • While the wetland is relatively large (±0.5 ha), it is not considered to be of a rare type (hillslope seeps are common in the steeper sloping terrain in areas where the underlying geology is sandstone); • The wetland can be regarded as being insensitive to changes in hydrology due to it being a seep wetland which is largely driven by subsurface water inputs but on the contrary, it is regarded as being sensitive to changes in water quality due to the water driving the wetland system being acidic and low in nutrients.
REC	Category "C"	• Since the EIS has been determined to be Moderate the REC would be a Category C. Accordingly feasible opportunities to improve the PES to a Category C should be evaluated. In this case the only way the PES could be improved significantly would be to decommission Clarence Drive and re-instate the historical extent of the wetland which is not feasible.
Channelled valley bottom wetland		
WET-Ecoservices	Intermediate	• The most important ecosystem services provided by the channelled valley bottom wetland are erosion control and maintenance of biodiversity both of which scored **High and can be attributed to the extent of indigenous vegetation cover.** • The services of sediment trapping, phosphate, nitrate and toxicant removal were all assessed to be **Moderate**. In all cases this can be attributed to the presence of important wetlands downstream, the extent of vegetation cover.
PES	Category "C"	• **Hydrology:** While changes in the water inputs due to activities in the wetland's catchment have been negligible, the reduced roughness brought about by sheet erosion and concomitant reduction in vegetation cover, albeit limited, within the wetland has impacted on the water distribution and retention characteristics within the wetland. • **Geomorphology:** The geomorphology of the wetland is almost intact with only slight increases in run-off due to areas which have reduced vegetation cover within and immediately upslope of the wetland and evidence sedimentation within the wetland. • **Vegetation:** The changes in vegetation composition have been brought about by sheet erosion and sedimentation. The result is that approximately 70% of the wetland remains untransformed.
EIS	Moderate	• The wetland is likely to support endangered or rare biota or populations of unique species and falls within a Critically Endangered terrestrial vegetation type (Kogelberg Sandstone Fynbos) and contains an Endangered wetland vegetation type (Southwest Sandstone Fynbos). • While the wetland is relatively small large (±0.8 ha), it is not considered to be of a rare type (channelled valley bottom wetlands are common in the regions valley bottoms). • The wetland can be regarded as being sensitive to changes in hydrology due to it being a channelled valley bottom wetland and also as being sensitive to changes in water quality due to the water driving the wetland system being acidic and low in nutrients
REC	Category "C"	• The PES has been calculated as falling within a Category C. Since the EIS has been determined to be Moderate the REC remains at a Category C. This means that no impacts on the wetland that decrease the PES should be permitted.

Impact Assessment

Planning, design and development/construction phase Impacts

Based on the project description provided by the EAP the following potential impacts were identified as affecting the downstream receiving watercourses (*viz-a-viz* the delineated hillslope seep wetlands between the site and Clarence Drive and the channelled valley bottom wetland between the proposed access road and the cemetery):

- **Disturbance of wetland habitat:** The groundtruthed wetlands may be disturbed as a result of construction activity (driving of construction vehicles and storage of construction materials and spoil).
- **Loss of biota:** Mortality and displacement of organisms may occur as a result of site clearing, stockpiling of soils and construction materials within or near the wetlands, as well as the operation of machinery and the driving of vehicles within or near the wetlands.
- **Alteration of flow regime**: Reduced catchment roughness as a result of the clearing of vegetation would cause an increase in stormwater run-off as well as an increase in flood peaks in the receiving watercourses.
- **Increased erosion and sedimentation**: The exposure of soils to erosion associated with site clearing, excavations and/or infilling would increase erosivity and, if coupled with rainfall, may result bank and channel erosion and sediment loading of receiving watercourses.
- **Water quality impairment:** Water quality impairment may arise as a result of the release of contaminants such as cement and other building materials / chemicals into the downstream receiving watercourses via stormwater run-off. In addition, potential accidental spills of chemicals and fuel may also result in contamination of stormwater and ultimately contaminate the receiving watercourse.

Operational phase Impacts

- **Alteration of natural flow regime**: Flow and flood peaks would increase as a result of the increased extent of hard surfaces and reduced infiltration brought about by the proposed development which includes a roofed building and new access roads with limited to zero permeability.
- **Water quality impairment:** In the event that the proposed sewerage treatment and disposal system fails or is damaged, or the conservancy tank is not emptied timeously, then contamination of the receiving watercourses is highly likely.
- **Biota loss:** If the receiving watercourses receive contaminants, particularly in the form of raw sewage from a failed, damaged and/or poorly maintained sewerage treatment and disposal system then it is likely that biota loss will take place, owing to the high sensitivity of the aquatic ecosystems in the region to water quality changes.

All of the identified construction phase impacts were rated to be **Low (-ve)** significance, with the only exception being the construction phase impact of alteration of flow regime which unmitigated was rated to be **Very low (-ve)** which is mostly attributed to the very limited disturbance footprints of the access road. Implementation of the recommended mitigation measures, which in the case of the construction phase-related impacts would be mostly achieved through well-managed construction methods, would reduce all the identified construction phase-related impacts to a **Very Low (-ve)** significance.

The operational phase is associated with two potential impacts of **Medium (-ve)** significance unmitigated (alteration of flow regime and water quality impairment) and two impacts of **Low (-ve)** significance. All the operational phase-related impacts can be effectively mitigated with the result that all the identified impacts would have a **Very low (-ve)** impact significance rating.

Summary of the impact significance ratings.

Impact*	Without mitigation	With mitigation
Construction phase:		
Disturbance of wetland habitat	**Low**	**Very low**
Alteration of Flow Regime	**Very low**	*N/A*
Erosion and sedimentation	**Low**	**Very low**
Water quality impairment	**Low**	**Very low**
Loss of Biota	**Low**	**Very low**
Operational phase:		
Alteration of flow regime	**Medium**	**Very low**
Erosion and sedimentation	**Low**	**Very low**
Water quality impairment	**Medium**	**Very low**
Loss of Biota	**Low**	**Very low**

*note: all impacts are negative unless indicated as a benefit.

Conclusion

It is accordingly the specialist's reasoned opinion that provided the recommended mitigation measures are implemented, the proposed residential development should be supported from a freshwater ecological perspective. This extends to the access routes under consideration as both access routes are acceptable provided the recommended mitigation measures are implemented.

When comparing the Municipality's preferred access route with the alternative of using the Municipal cemetery route, the alternative route (i.e. the route via the cemetery) is the most preferred route from an aquatic biodiversity perspective. This is primarily due to the fact that the alternative route is sufficiently set-back from wetlands and only crosses two narrow channels of non-perennial drainage lines which allows for a bridge structure that spans the channels and thereby minimising instream habitat disturbance. Should the Municipality accept the alternative access route via the Municipal cemetery and this receive environmental authorisation then the following measure should be implemented as mitigation of habitat disturbance during the construction phase:

- When designing the crossings of the two non-perennial drainage lines, ensure that the bridge structure spans the channels of the drainage lines and that no footings or stabilisation structures are placed within either channel.

Risk Assessment and authorisation requirements in terms of the NWA

All of the development-related activities that cause Section 21 c and i water uses have been determined to be associated with a LOW risk rating. As such the proposed development qualifies for a General Authorisation (GA) as far as the Section 21 (c) and (i) water uses are concerned. This is based on the assumption that all the recommended mitigation measures will be implemented.

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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[1]

Alluvial soil: 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.

Biodiversity: 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.

Buffer: 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.

Catchment: The area contributing to runoff at a particular point in a drainage line system.

Chroma: The relative purity of the spectral colour which decreases with increasing greyness.

Critical Biodiversity Areas: 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.

Delineation (of a wetland): To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.

Ecoregion: A recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region.

Non-perennial stream: A stream that has transitory or short-lived flow.

Groundwater: Subsurface water in the saturated zone below the water table.

Habitat: The natural home of species of plants or animals.

Hue (of colour): The dominant spectral colour.

Hydromorphic soil: 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).

Hydrology: The study of the occurrence, distribution and movement of water over, on and under the land surface.

Hydrophytes: 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.

Halophytes: Salt tolerant plants.

Helophytes: Also called facultative wetland plants - essentially terrestrial plants of which the photosynthetically active parts tolerate long periods of submergence or floating on water.

[1] As provided by DWA (2005) and WRC Report No. TT 434/09.

Indicator species: A species whose presence in an ecosystem is indicative of particular conditions (such as saline soils or acidic waters).

Intermittent flow: Flows only for short periods.

Macrophyte: A large plant - in wetland studies usually a large plant growing in shallow water or waterlogged soils.

Perennial: Permanent - persisting from year to year.

Riparian area delineation: The determination and marking of the boundary of the riparian area.

Riparian habitat: 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.

Shrub: A shrub is a small to medium-sized woody plant.

Temporary zone: The zone that is alternately inundated and exposed.

Terrain unit morphological classes: Areas of the land surface with homogenous form and slope.

Watercourse (NWA):

(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.

Water table: 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.

Wetland: 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

CCT	City of Cape Town
CBA	Critical Biodiversity Area
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EIS	Ecological Importance and Sensitivity
FEPA	Freshwater Ecological Support Area
GPS	Global Positioning System
HGM	Hydrogeomorphic
IHI	Index of Habitat Integrity
IHIA	Intermediate Habitat Integrity Assessment
MAP	Mean Annual Participation
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
OESA	Other Ecological Support Area
PES	Present Ecological State
QDS	Quarter Degree Square
REC	Recommended Ecological Category

SANBI South African National Biodiversity Institute
Sub-WMA Sub - Water Management Area
TMNP Table Mountain National Park
VEGRAI Riparian Vegetation Response Assessment Index
WCBF Western Cape Biodiversity Framework
WMA Water Management Area
WUL Water Use Licence
WWTW 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 (M.Sc.) 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 in their Natural Resource Management Programme and 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, Nick founded KHULA Environmental Consultants and holds the position of Director. In developing his expertise as a freshwater specialist, he initially worked in the capacity of an associate to EnviroSwift Western Cape (WC) but took over the company in 2019 and now undertakes all wetland specialist work in the Western, Southern, Eastern and Northern Cape. Nick is partnered by Louise Santana who is the owner/director of EnviroSwift KZN. Nick Steytler's CV is attached as Appendix 1.

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1 Introduction

1.1 Project Background

The owner of Portions 125 and 126 of Farm 599 Bettys Bay, located between Bettys Bay and Kleinmond in the Overstrand Municipality (see Figure 1), proposes to develop a residential dwelling on Portion 126 and also construct an access road via a to-be registered servitude over Municipal land (Remainder Farm 562) to access the site from the main road. In addition, the owner proposes to develop a dedicated access to the adjacent Portion 125 of Farm 599 from the proposed access road to Portion 126. Both Portions 125 & 126 do not currently have any access.

Given the requirement for prior environmental authorisation in terms of the NEMA EIA Regulations (2014, as amended), the owner appointed Lornay Environmental Consulting ("Lornay") as the Environmental Assessment Practitioner (EAP) to undertake the application for environmental authorisation in terms of the NEMA EIA Regulations (2014, as amended). Given the likely presence of wetlands and drainage lines across the site, Lornay in turn 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 National Water Act, Act 36 of 1998 (NWA) relating to the presence of aquatic habitat, needed to be confirmed.

In order to provide this input EnviroSwift conducted site visits on 18 November 2024, 20 December 2024 and 23 January 2025 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) and the Western Cape Biodiversity Spatial Plan (WCBSP, 2017). The screening level study confirmed the presence of wetlands and the strong likelihood that due to the proximity of wetlands to the proposed access routes, that the proposed development would pose a level of risk to the site's wetlands. 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 NWA)[2].

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. Given the requirement for environmental authorisation In terms of the NEMA EIA Regulations (2014, as amended), the detailed ecological assessment needs to comply with the Gazetted Protocol for Aquatic Biodiversity Assessments (GN No. 320 of March 2020).

[2] 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. However it must be noted that this is subject to agreement by the Department of Water & Sanitation (DWS).

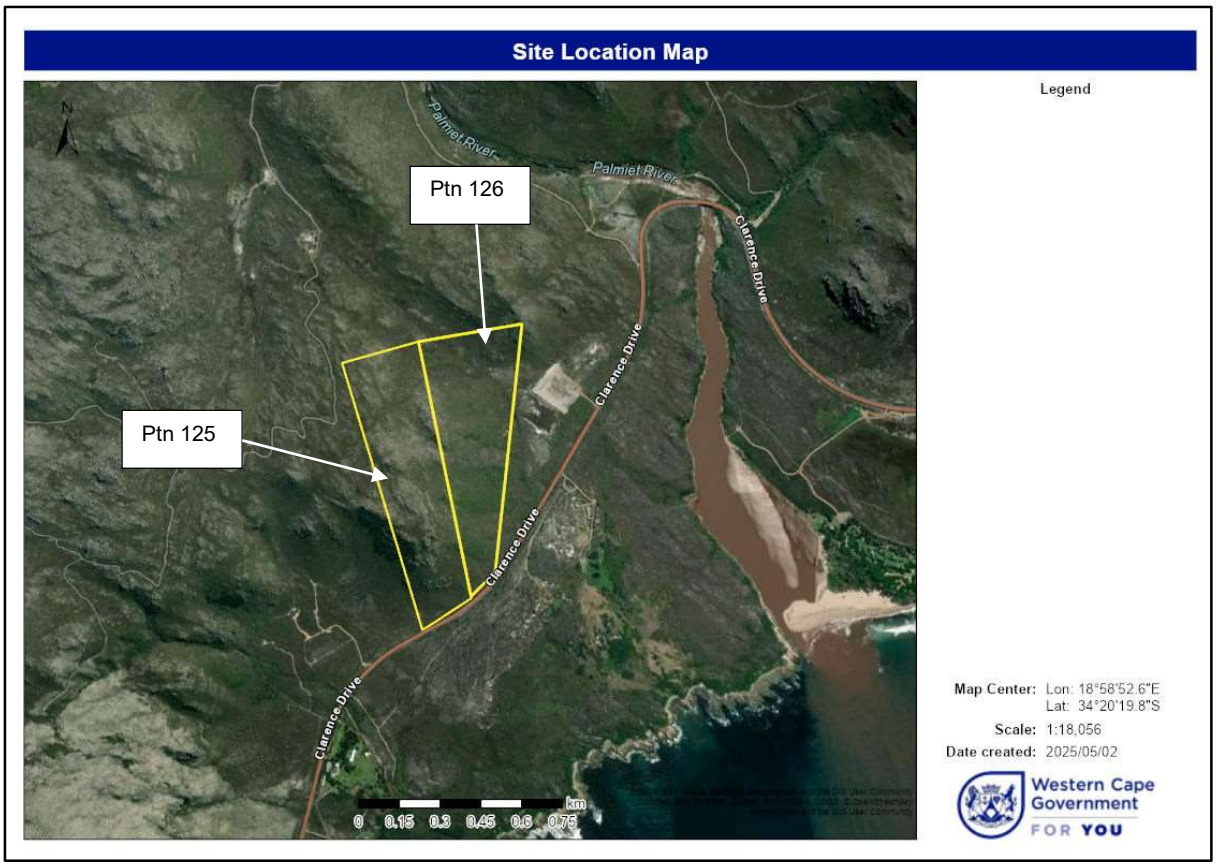

Figure 1: The location of Portions 125 and 126 of Farm 599 Bettys Bay indicated by the yellow polygons. Portion 125 is located to the west of Portion 126.

1.2 Scope of Work

The scope of work which informed this assessment includes:

- Assessment of relevant background information including the National Wetlands Map Version 5 (CSIR, 2018), the Western Cape Biodiversity Spatial Plan (WCBSP, 2017), the National Geospatial Information (NGI) Service topographical maps and vector data, and pertinent academic resources;
- A site assessment including identification of wetlands and drainage lines and the delineation of the wetland temporary boundary and any riparian zones associated with any drainage lines in accordance with best practice methods (refer to methods section);
- Assessment of the Present Ecological State (PES), Ecological Importance and Sensitivity (EIS) and wetland ecosystem services for the directly affected on-site wetlands and the Intermediate Habitat Integrity Assessment (IHIA) method for any directly affected on-site drainage lines according to best practice methods (refer to methods section);
- Identification of the Section 21 (c) and (i) activities;
- Assessment of potentially significant impacts and identification of practicable mitigation measures including determination of the appropriate buffer width in terms of the Macfarlane *et al*. (2015) buffer zone guidelines;
- 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;

1.3 Limitations and Assumptions

The following limitations apply to this study:

- The current extent of the site's wetlands and alignment of drainage lines have been delineated using a Garmin Etrex 20 with an expected accuracy of 3 to 5 metres. It is however the opinion of the specialist that this limitation is of no material significance and that the legislative requirements and freshwater-related impacts have been adequately identified.
- In determining the current extent of the wetlands the methods used were 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).
- A site assessment was conducted in the dry season. While this is not the ideal time to determine wetland hydrology and wetland seasonality, it is the opinion of the specialist that this does not pose a material limitation to the study. This is because the site is in a largely pristine condition and vegetation and soil characteristics could be used to delineate the outer wetland seasonal/temporary zone. Non-perennial drainage lines can also be identified as concentrated flow pathways largely devoid of vegetation, often with evidence of erosion and sedimentation, during periods of no flow.

1.4 Overview of Applicable Legislation

1.4.1 National Water 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.

In terms Section 21 of the NWA "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. Of particular relevance to this study are the following Section 21 water uses:

- Section 21 (c): Impeding or diverting the flow in a watercourse; and
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse.

Notice Number 4167 of the Government Gazette 49833 dated 8 December 2023 promulgated in terms of the NWA makes allowance for a regulated area around all watercourses within which the risk of Section 21 (c) and (i) activities 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 following is applicable for any development within the regulated zone:

- Should a freshwater ecologist consider the proposed development to be of zero to negligible risk to freshwater resources then a letter may be provided to this effect and the requirement for a WUA would be waivered (W. Roets, pers. comm.).
- In all other cases, a risk assessment in terms of the revised General Authorisation (GA) for 21(c) and (i) water uses must be undertaken to determine the quantum of risk posed to the watercourse by the proposed development.
- Should the development pose a LOW risk, registration of the water use under the General Authorisation (GA) would be required.
- Should the development pose a MEDIUM risk, application for a Water Use License (WUL) would be required.
- HIGH risk developments also require a WUL but are not readily approved.

The Department of Water & Sanitation (DWS) holds competency in terms of the NWA and as such either authorises or rejects Water Use Applications (WUAs). The DWS exercises a no net loss of wetlands policy. Accordingly, should a development result in loss of wetland habitat then there would be a requirement for offsetting wetland loss. Offsets could either be in the form of rehabilitation and protection in perpetuity of any remaining on-site wetland habitat or purchase, rehabilitation and protection of an off-site wetland of similar type in a similar ecological context.

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[3] which list activities that may be detrimental to the environment and that require prior Environmental

[3] Regulations were promulgated in 2006, 2010 and 2014 and amended in 2017.

Authorisation. The appointed EAP, Lornay, 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*[4] when the site sensitivities are VERY HIGH or HIGH 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. Before the requirement for compliance with the applicable protocol can be enforced, the site sensitivities need to be groundtruthed via a Site Sensitivity Verification (SSV). This is usually undertaken by the EAP, but in instances where the EAP does not have the requisite expertise then the SSV can be informed by specialist ground-truthing. The SSV confirmed that the site does have a HIGH sensitivity for the Aquatic Biodiversity theme.

In terms of these mandatory procedures for specialist assessment and reporting, the current study must meet the minimum reporting criteria for an Aquatic Biodiversity Specialist study. In undertaking this Specialist Freshwater Ecological Assessment, EnviroSwift will address the minimum reporting criteria that are applicable as indicated in Table 1.

[4] 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 presence of CBAs and PAs are described as identified in the WCBSP (2017).
1.4	a description of the Ecological Importance and Sensitivity (EIS) of the aquatic ecosystem including:	See Section 3.4 where the EIS method based on the assessment tool developed by Rountree *et. al.* (2013) is applied to the hillslope seep and Section 3.5 where it is applied to the channelled valley bottom wetland.
	(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 Section 3.4 where the WET-Health method (Macfarlane, 2007) is presented and where the pre-development PES is determined for the hillslope seep and Section 3.5 for the channelled valley bottom wetland.
	(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 Section 3.4.2 for the hillslope seep and 3.5.2 for the channelled valley bottom wetland.
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 areas of low sensitivity occur within or near the sites. However an alternative access route is under consideration (see Section 4.3).
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 present.
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.

No.	**Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments**	**Compliance of current report**
	(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 portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and	See Section 4 where the potential impacts of the proposed development are assessed.
	(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	While a new access road is required, the low impact nature and materials proposed for surfacing mean that wetland fragmentation would be negligible.
	(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?	Impacts on biota are assessed in Section 4.2.
No.	**Minimum information requirements for an Aquatic Biodiversity Specialist Assessment Report**	
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 1.
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.

No.	**Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments**	**Compliance of current report**
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 3.
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	All areas beyond the construction footprint of the access road and the quarry site are to be declared 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	See Sections 3.4.5 and 3.5.5.
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 watercourses (wetlands and drainage lines);
2. Site assessment to identify and delineated the site's wetlands;
3. An assessment of the current ecological status and value of the wetlands using recognised classification systems and indices based on the information collected during the desktop assessment and site assessment;
4. A buffer determination based on the applicable guidelines (Macfarlane and Bredin, 2017);
5. An impact assessment where the impacts caused by the proposed development are identified based on the desktop and site assessments, assessed and mitigation and/or management measures are recommended to minimise the potentially significant negative impacts and enhance potential benefits; and
6. A risk assessment using the revised Risk Assessment Matrix (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 Western Cape Biodiversity Spatial Plan (WCBSP, 2017), the National Wetlands Map Version 5 (CSIR, 2018) and maps and vector data form the National Geospatial Information (NGI) directorate.

The WCBSP (2017) 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 indicated in 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 was used to guide the site assessment. The NWA defines a water resource as a watercourse, surface water, estuary, or aquifer. In the context of this study, it is only the former two that are the focus of the assessment. Aquifers are excluded because wetland and riparian assessments, in line with best practise guidelines, only include the assessment of the first 50 cm from the soil surface. In addition, reference to a watercourse as provided above includes, where relevant, its bed and banks.

In order to establish if the watercourses in question can be classified as 'wetland habitat' or 'riparian habitat', the definitions as drafted by the NWA[5] 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 watercourse delineation guideline to facilitate the delineation of either the temporary wetland zone or the drainage lines riparian 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.

Indicators used to determine the boundary of the riparian zone include:

1) Landscape position;
2) Alluvial soils and recently deposited material;
3) Topography associated with riparian areas; and
4) Vegetation associated with riparian areas.

Site visits were conducted in November and December of 2024 and again in January of 2025. Wetlands were identified and delineated using the methods defined in the Updated Manual for Identification and Delineation of Wetlands (DWAF, 2008) and the Application of the DWAF 2008 method to wetland soils of Western Cape (Job, 2009). Delineation was undertaken by means of a handheld GPS.

The proposed site has quartzitic sands with low clay content which do not readily exhibit typical wetland soil indicators and mottling is frequently absent due to a lack of iron in the soil. Terrestrial quarzitic sands tend to be of a low chroma falling within the 'gley' colour group, so 'gleying' cannot be used as a wetland indicator. Job (2009) identifies a high organic soil content (permanent zone), and dark, high carbon surface layers over low chroma sand (temporary zone) as alternative indicators, used in conjunction with the presence of wetland vegetation, as an alternative method for identification of the presence of wetland habitat in the quarzitic sands.

[5] The definitions as provided by the NWA (Act No. 36 of 1998) are the only legislated definitions of wetlands in South Africa.

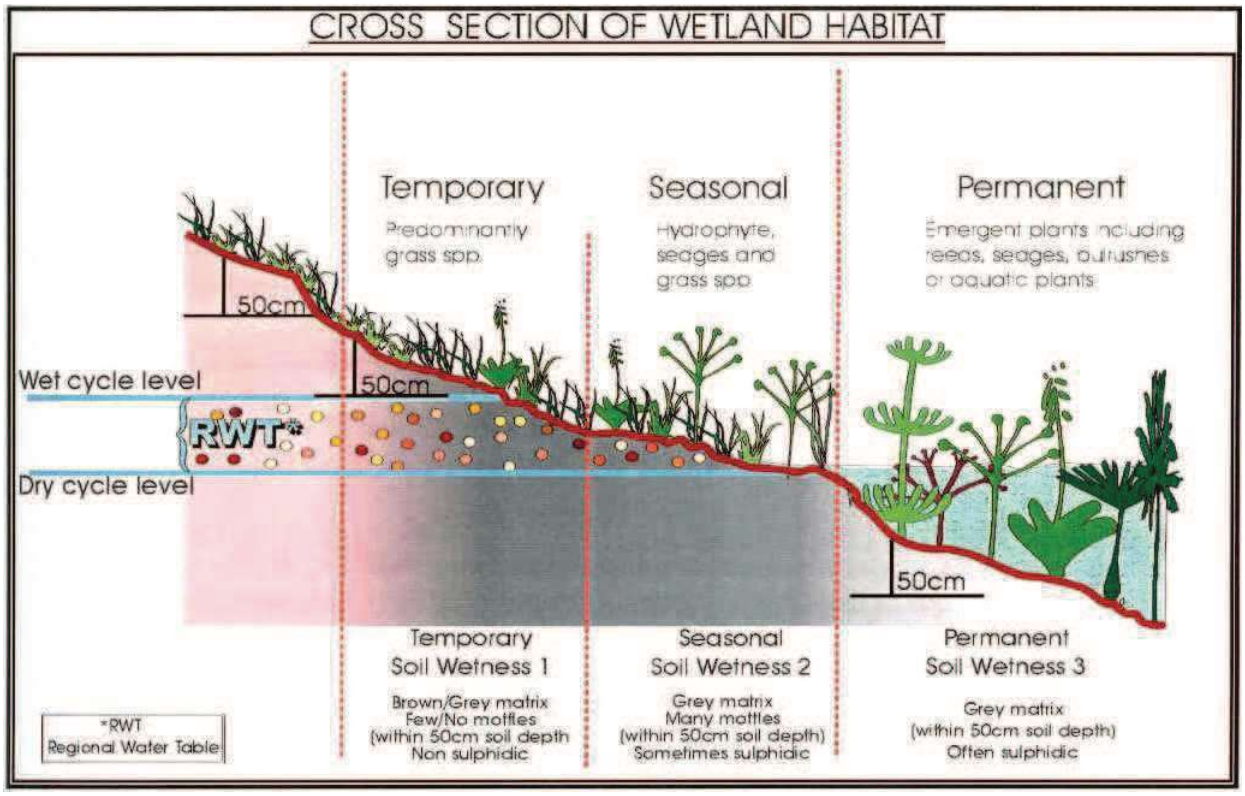

Figure 2: Cross section through a wetland (after DWAF, 2005).

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[6] 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 the figure overpage.

[6] Plants that are physiologically bound to water where at least part of the generative cycle takes place in the water or on the surface.

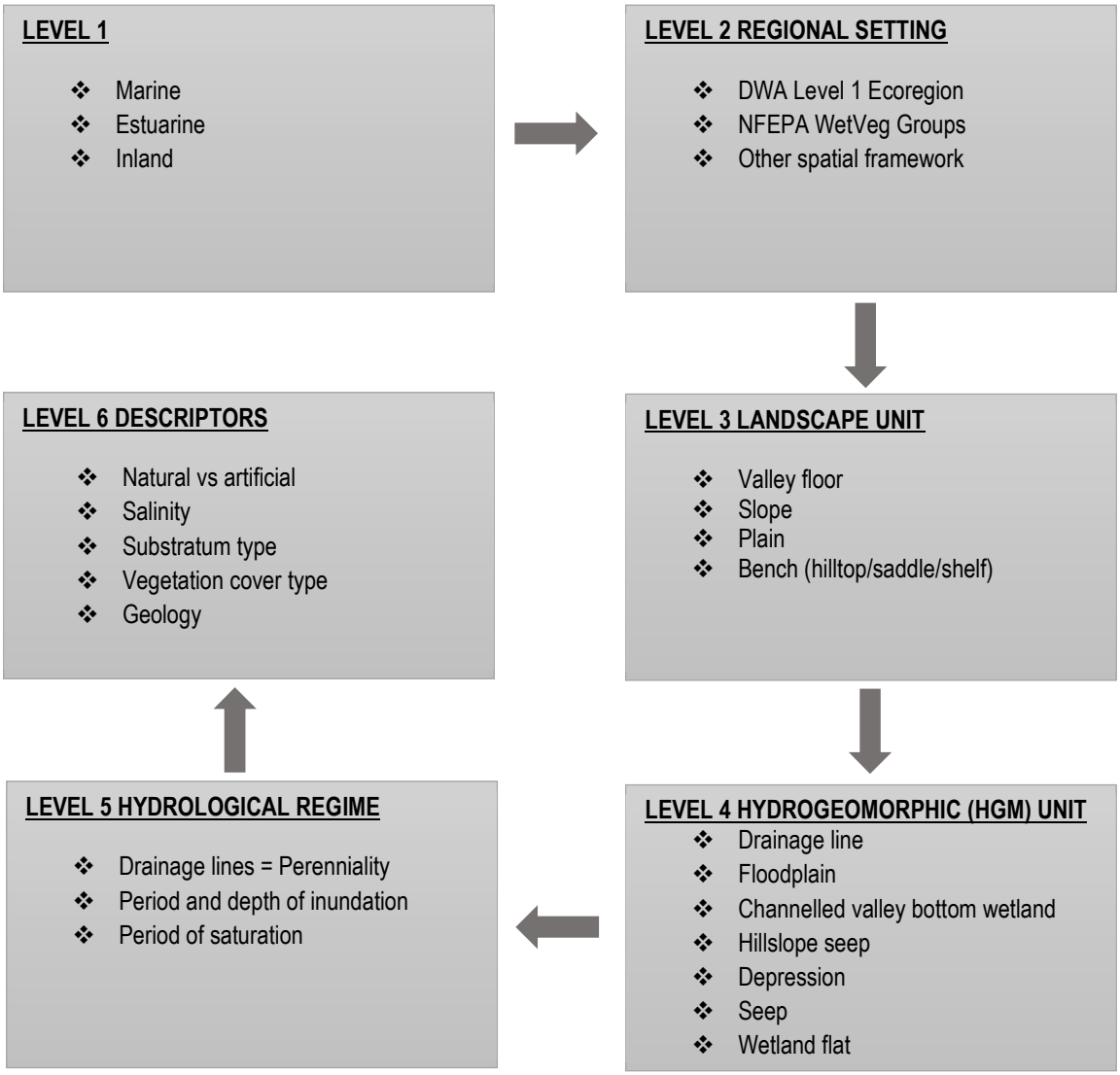

Figure 3: Classification System for wetlands and other aquatic ecosystems in South Africa.

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.

In addition, WET-EcoServices allows for the assessment of potential and actual ecosystem service outcomes of rehabilitation projects by applying the assessment to 'with rehabilitation' and 'without rehabilitation' situations and comparing the difference between the two.

2.5.2 Present Ecological State (PES)

WET-Health (Macfarlane, 2007) is a tool designed to assess the health or integrity of a wetland. 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.

2.6 Buffer Determination

While a buffer determination using the method described in the Buffer Zone Guidelines for Rivers, Wetlands and Estuaries (Macfarlane and Bredin, 2017) was not undertaken, the guidelines for minimum buffers for various land uses as presented in Annexure 16 of the Guidelines was used to recommend the buffers. The applicable land-uses are residential low impact/residential only and paved trails/unpaved tracks and trails, both of which apply to the proposed development. For these land-use categories a 10m minimum buffer width is recommended. Such a buffer would require a commitment

to manage the buffer zones to ensure that these areas function optimally and also assume that the mitigation measures recommended in this study to mitigate key threats to the water resource will be implemented.

2.7 Impact Assessment

A summary of the method of assessment is provided below; the detailed method is provided in Appendix 2.

The following criteria were taken into consideration when determining the impact of the proposed activities:

- The nature of the impact i.e. positive, negative, direct, indirect;
- The extent and location of the impact;
- The duration of the impact i.e. short term, long term, intermittent or continuous;
- The magnitude/intensity of the impact i.e. high, medium, low; and
- The likelihood or probability of the impact occurring.

Mitigation measures were subsequently identified and recommended for all impacts to reduce the overall impact significance to an acceptable level, where and if possible. Mitigation measures were aimed to ensure that:

- More environmentally sound designs / layouts / technologies, etc., are investigated and implemented, if feasible;
- Environmental benefits of a proposed activity are enhanced;
- Negative impacts are avoided, minimised or remedied; and
- Residual negative impacts are within acceptable levels.

3 Results

3.1 Desktop Assessment

3.1.1 Regional Setting

The proposed site is situated within the Southern Coastal Belt Ecoregion, the main attributes of which are listed in Table 5 below. It is furthermore within the Breede-Olifants Water Management Area (WMA), the Overberg West Sub-WMA and the G40B and G40D quaternary catchments (NFEPA, 2011 and Kleynhans et al, 2005).

Table 5: Main attributes of the Southern Coastal Belt Ecoregion (Kleynhans *et. al*., 2005).

Main Attributes	Southern Coastal Belt Ecoregion
Terrain Morphology: Broad division (dominant types in bold) (Primary)	Plains; Low Relief; Plains Moderate Relief; Open Hills; Lowlands; Mountains; Moderate to High Relief; Closed Hills; Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Secondary)	South and South West Coast Renosterveld; Central Mountain Renosterveld; Limestone fynbos; Mountain Fynbos; Laterite Fynbos (limited); Dune Thicket; Patches Afromontane Forest
Altitude (m a.m.s.l) (Primary)	0-700; 700-1500 (limited)
Mean annual precipitation (mm)	300 to 1000
Coefficient of Variation (% of annual precipitation)	<20 to 40
Rainfall concentration index	<15 to 50
Rainfall seasonality	Winter to all year
Mean annual temp. (°C)	10 to 20
Mean daily max. temp. (°C): February	22 to 30
Mean daily max. temp. (°C): July	12 to 20
Mean daily min. temp. (°C): February	10 to 18
Mean daily min temp. (°C): July	4 to 10
Median annual simulated runoff (mm) for quaternary catchment	10 to >250

3.1.2 Local Setting & Land Use

The proposed site comprises two adjacent farm portions (Portions 125 and 126 of Farm 599 Betty's Bay) which are elongated portions that run in a north-south alignment with their southern boundaries being at Clarence Drive, the main road between Bettys Bay and Kleinmond. Both portions are covered by indigenous fynbos vegetation with the only signs of disturbance being a historic quarry on Portion 126 which is the location of the proposed residential dwelling on this portion (note no dwelling or similar structure is currently proposed on Portion 125). As such the site comprises an undeveloped, vacant site dominated by indigenous fynbos.

Nearest Clarence Drive the site terrain can best be described as comprising the lower end of a foothill with of slope of roughly 10% (see Figure 4). The greater remainder the site comprises mountainous terrain with a slope of greater than 30%. It exhibits moderate temperature and rainfall conditions that are typical of the Southern Coastal Belt Ecoregion. The main attributes of the proposed site are presented in Table 6 below and in the figures that follow.

Table 6: Main attributes applicable to the proposed site according to Cape Farm Mapper (2023).

Main Attributes	Ptns 125 and 126 of Farm 599 Bettys Bay
Terrain:	Slope of between 3 and 40% but predominantly greater than 30%. Refer to Figure 3.
Geology:	Quartzitic sandstone of the Table Mountain Group, partially covered by Quaternary calcareous coastal dune sand of the Witzand Formation, gritty sand and scree.
Soils:	Rocky areas with minimal soils Depth: <450mm Clay: <15% Erodibility: High (0.68).
Vegetation types:	Kogelberg Sandstone Fynbos (Critically Endangered) and minimal Hangklip Sand Fynbos (Critically Endangered). Refer to Figure 5.
Wetland vegetation type:	Southwest Sandstone Fynbos (Endangered) and minimal Southwest Sand Fynbos (Critically Endangered). Refer to Figure 6.
Altitude:	40 to 190 m a.s.l.
Mean annual precipitation:	988 mm
Mean annual temp:	16°C
Mean daily max. temp: February	25.9°C
Mean daily max. temp: July	16.6°C
Mean daily min. temp: February	14.6°C
Mean daily min temp: July	7.5°C
Mean annual runoff	482.61 mm

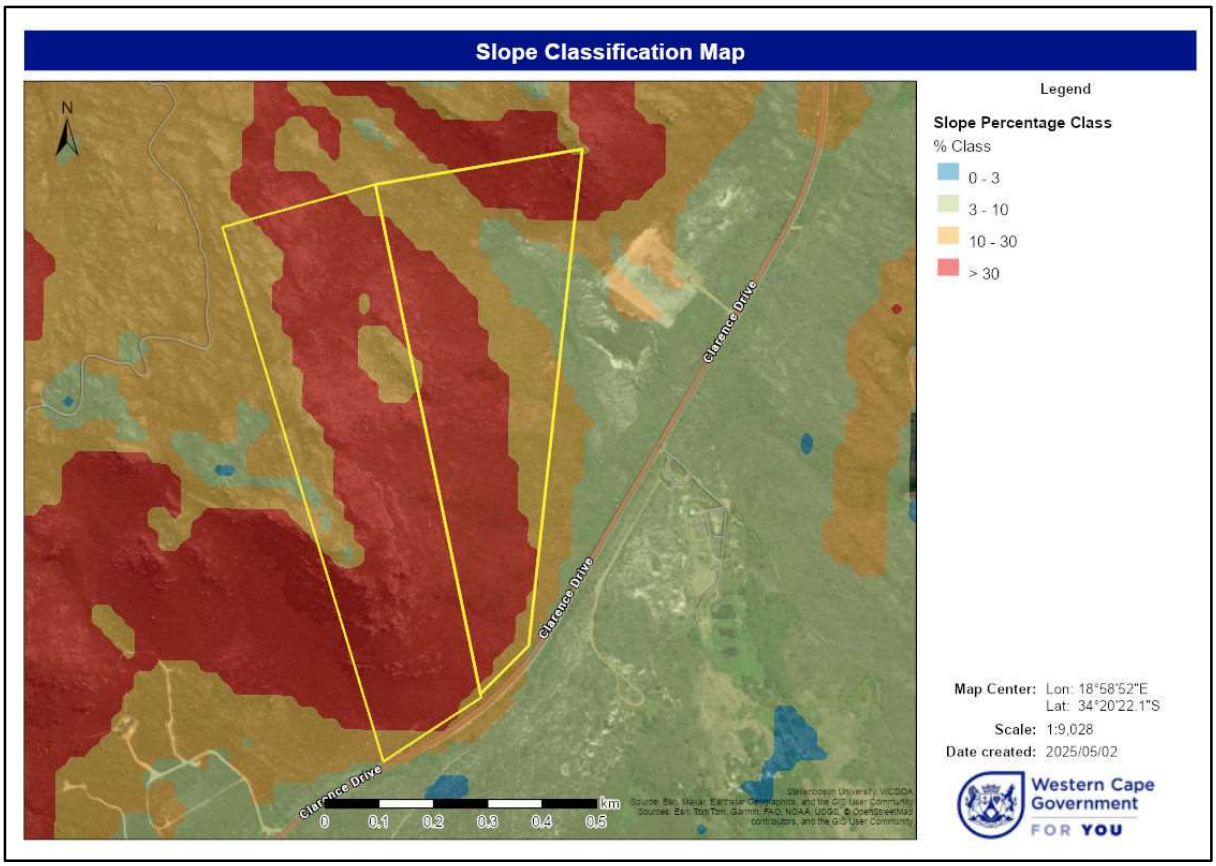

Figure 4: Slope Classification Map of Portions 125 & 126 of Farm 599 Bettys Bay (Cape Farm Mapper, 2025).

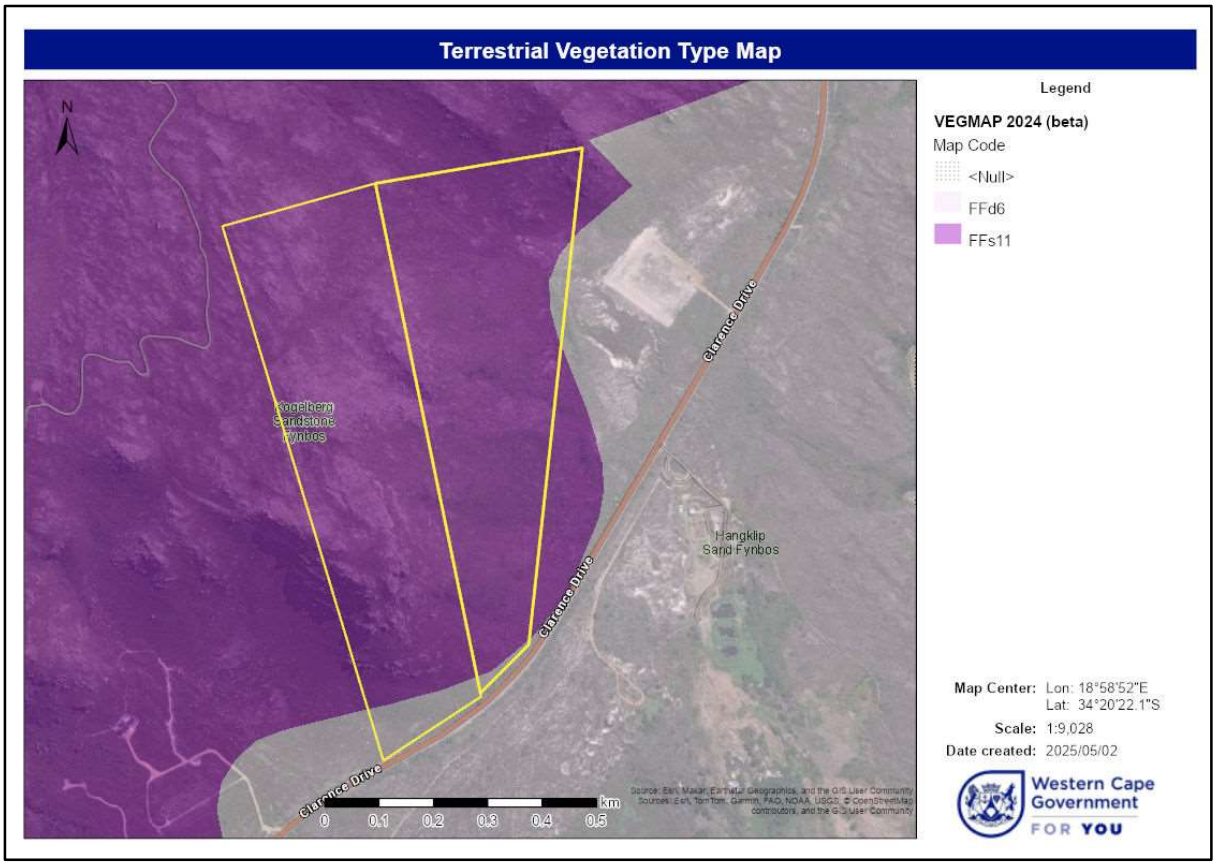

Figure 5: Vegetation Type Map (2018).

Figure 6: Wetland Vegetation Type Map (NFEPA, 2011). The dominant type is Southwest Sandstone Fynbos (purple) and the secondary type is Southwest Sand Fynbos (blue).

3.1.3 Watercourses within the proposed site and within the regulated zone

According to the NGI Rivers database (Cape Farm Mapper, 2025) only the northern part of the site is traversed by two 1st order non-perennial drainage lines which confluence in the north-eastern corner of the site. The 2nd order non-perennial drainage line is mapped to flow from within the site in a south-easterly direction towards and beneath Clarence Drive and then on towards the Palmiet Estuary approximately 750m south east of the eastern property boundary.

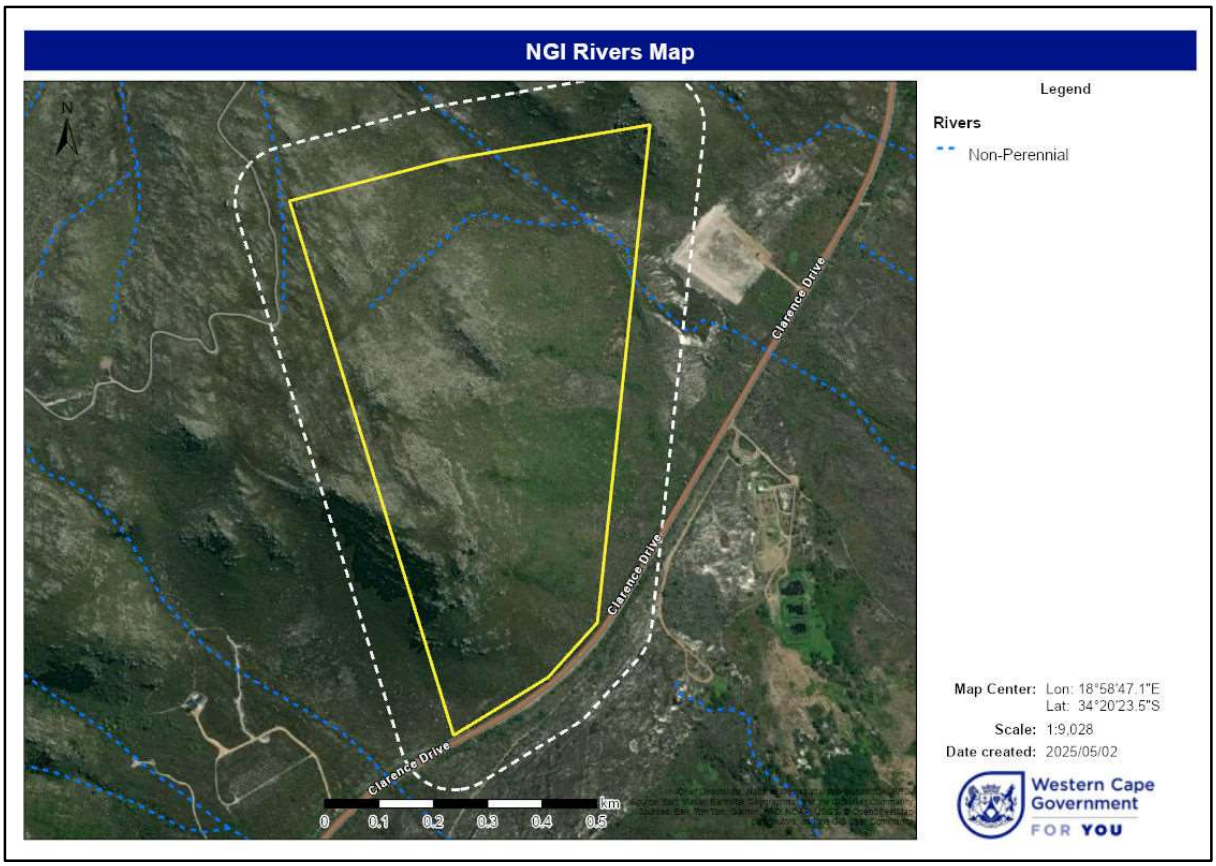

Figure 7: NGI Rivers Map (Cape Farm Mapper, 2025). The yellow polygon indicates the proposed site.

According to the National Wetlands Map Version 5 (NWM5 - CSIR, 2018) the upper portion of an expansive hillslope seep (mapped extent of approximately 6.4 ha) occurs within the site boundary (see Figure 8). Most of the mapped extent of this wetland lies within the NWA Regulated Zone for wetlands (i.e. within 500m of the site boundary) and is hydrologically linked to the proposed development due to the fact that run-off and groundwater flow would be in a south easterly direction.

The NWM5 also indicates an expansive floodplain wetland (approximately 60 ha in extent) within the NWA Regulated Zone and to the south of Clarence Drive and approximately 100m to the south east of property boundary at its nearest point. While this wetland is potentially at risk due to it being located downslope of the proposed site, the presence of Clarence Drive and an associated roadside drainage channel which captures run-off from the north directs run-off in a north-easterly direction until it reaches a box culvert which then discharges the flow to the south of Clarence Drive upslope of the northern end of the mapped wetland. Due to the very limited footprint and scale of the proposed development (limited to an access road to Portion 125) and the presence of Clarence Drive and the roadside channel, this wetland is not at any risk of being impacted.

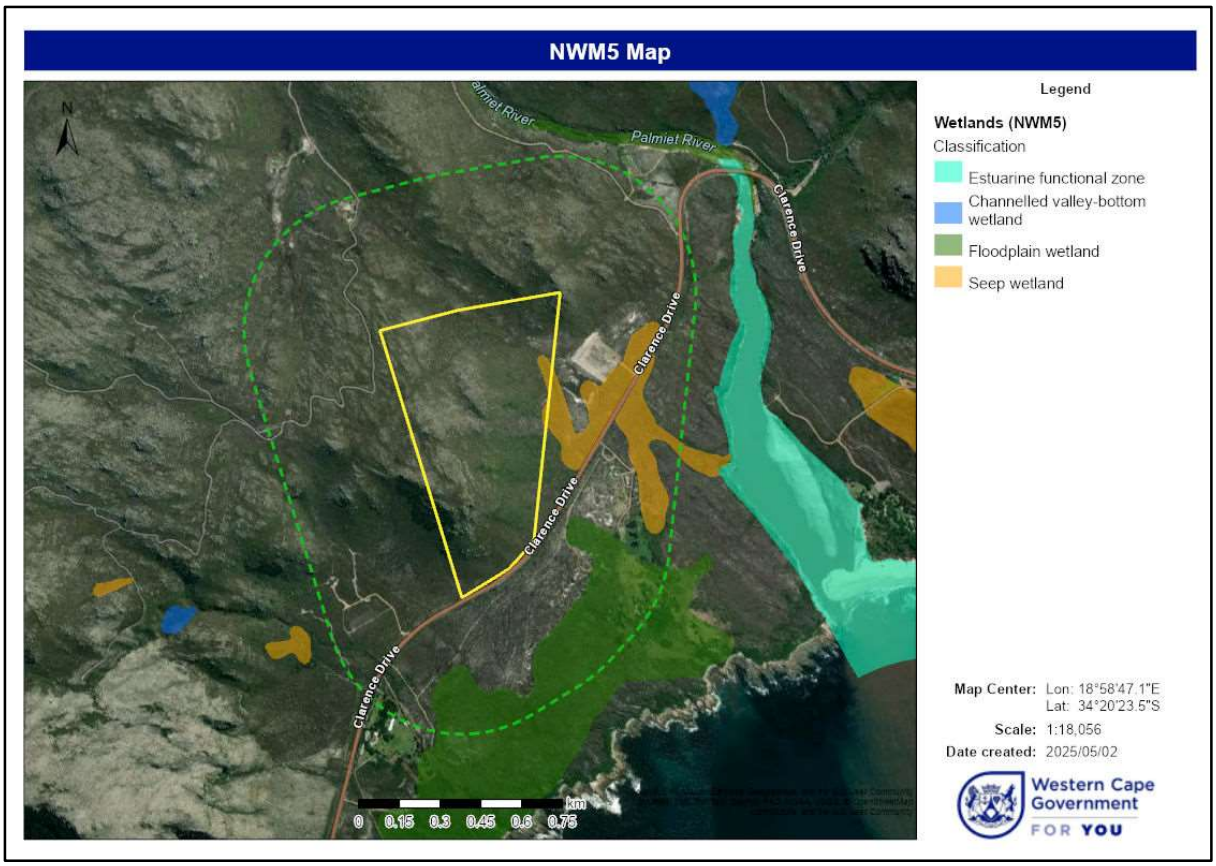

Figure 8: NGI Rivers and the National Wetlands Map Vers. 5 (CSIR, 2018). The yellow polygon indicates the proposed site.

The WCBSP (2017) was also consulted to determine whether the site or any nearby land or aquatic feature is identified as having any biodiversity conservation significance (i.e. presence of Protected Areas, CBAs and ESAs). According to the WCBSP, the entire site comprises a terrestrial CBA and the greater area surrounding the site comprises Protected Areas in the form of Mountain Catchment Areas and local nature reserves (see Figure 9). Of particular interest is the designation of a significant part of the floodplain wetland mapped to occur to the south of Clarence Drive yet within the NWA Regulated Zone for wetlands as an Aquatic CBA.

The Palmiet estuary and environs are mapped to comprise both Aquatic and Estuarine CBAs and the terrestrial areas on the western side of the estuary and the verges of Clarence Drive immediately south of the site are mapped as Restorable CBAs. There are no noteworthy ESAs within or near the proposed site. Overall, the terrestrial components of the site and immediate surrounds comprise either Protected Areas or CBAs with some of the aquatic components being identified as CBAs. The wetlands mapped to occur within the site boundary are not recognised as having any aquatic biodiversity conservation value.

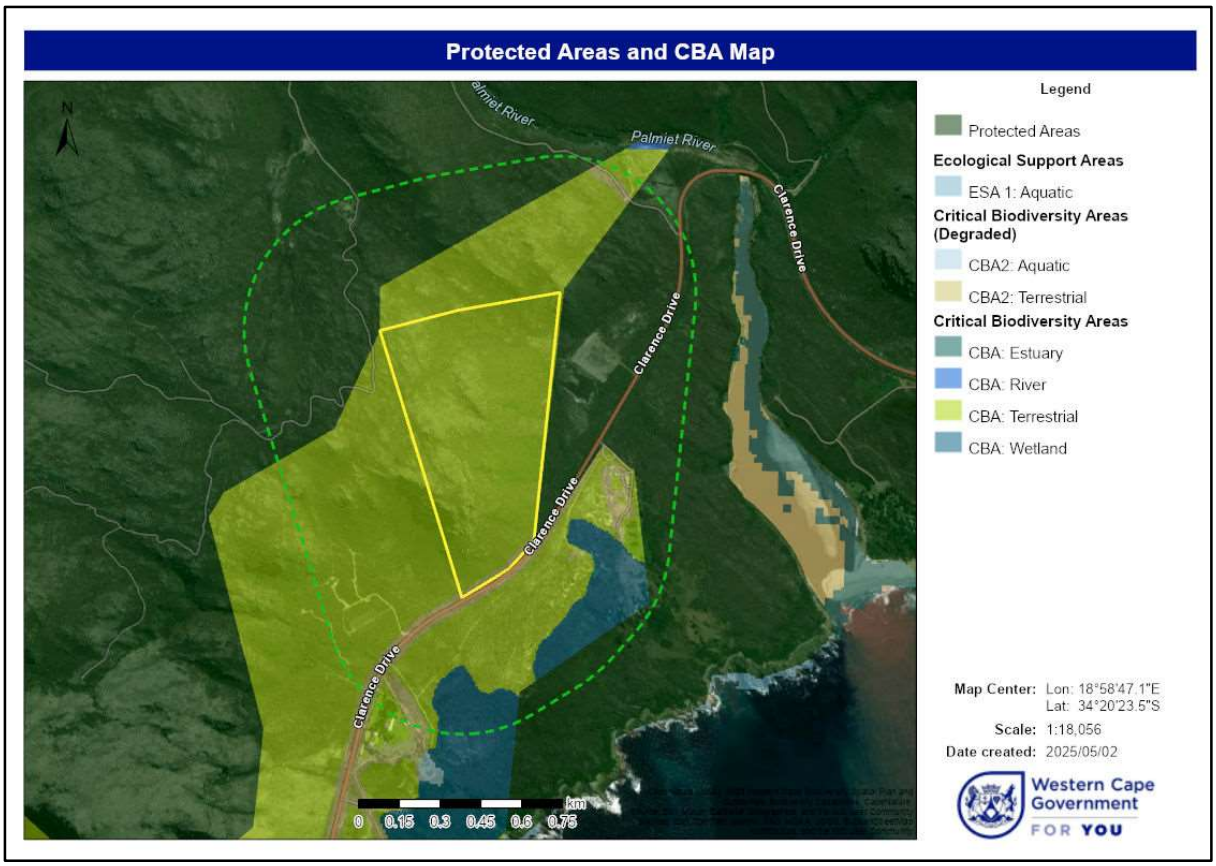

Figure 9: Conservation Importance Map (WCBSP, 2024).

3.2 Description and Delineation of Watercourses

3.2.1 Ground-truthing and Site Description

EnviroSwift visited the site in November and December 2024 and again in January 2025 in order to confirm whether any watercourses, as defined in terms of the NWA, are present within the site or in the vicinity of the proposed access routes. The proposed new access road to the quarry site on Ptn 126 (the proposed site of the new residential dwelling) is aligned opposite the turn-off to the municipal WWTW (see Figure 10). Immediately adjacent and running along the northern side of Clarence Drive is an earthen channel which conveys surface run-off from the upslope areas to the north of Clarence to a culvert approximately 50m to the east from the turn-off. Present in this channel was *Pennisetum macrourum* (feather grass) which is indicative of temporary / seasonal wetland conditions.

From the roadside and for a distance of approximately 50m in the direction of the quarry site, the land rises moderately until it reaches a relatively flat plateau (see Figures 11 & 12). This sloped portion contains a variety of terrestrial macrophytes including *Tarconanthus camphoratus* (camphor bush), *Osteospermum moniliferum* (bitou bush) and *Searsia lucida* (blinktaaibos) and several species of Proteaceae (*Protea* sp. and *Leucodendron* sp.). Also occurring in this area are a number of hydrophytic species including *Berzelia lanuginosa* (common button bush); *Watsonia* sp. and *Pteridium aquilinum* (bracken) which suggest the presence of wetland conditions. From the edge of the plateau and all the way to the quarry site (see Figures 13 & 14), the vegetation comprises only terrestrial species. Isolated alien invasives in the form of *Acacia saligna* (Port Jackson) occur in proximity to the proposed new access road to Portion 126 and alongside Clarence Drive.

The vegetation occurring in the vicinity of the proposed access to Portion 125 comprises only terrestrial species (see Figure 15). Approximately 100m south-west of the end point of the proposed access road lies a small area dominated by similar vegetation as occurring on the 50m wide slope in the vicinity of the proposed access road to the Portion 126 (i.e. contains indigenous terrestrial macrophytes and

hydrophytic vegetation – see Figure 16). At the roadside adjacent to this area runs a paved channel which receives flow from this area which was evident during the site investigation in late January 2025 (see Figure 17). This channel conveys flow to a culvert approximately 350m east of the spring which then discharges flow beneath Clarence Drive. While present on Portion 125, this spring is not at any risk of being impacted as a result of the construction of the proposed access road to Portion 125.

Evidence of wetland conditions were also observed to the south-west of the cemetery and north-east of the proposed access route to the quarry site. The area exhibited a broad swathe of Berzelia-dominated wetland (see Figure 18) which is fed by two drainage lines emanating from the north-west and discharges via a culvert beneath Clarence Drive. Hydrology was observed in the form of flow in the culvert beneath Clarence Drive suggesting perennial flow, given that this was observed in the dry season. Also, the dominance by *B. lanuginosa* supports this notion given the species is a known indicator of the wetland permanent zone.

While the presence of hydrophytic vegetation indicated the strong likelihood that wetland conditions occur on the municipal land which would be traversed to reach Portion 126 and ultimately the quarry site, augering was necessary to confirm the presence of wetland conditions. Auger samples taken within the 50m-wide sloped area to the north of Clarence Drive revealed soils with dark, high carbon surface layers over low chroma sand indicative of wetland conditions (Job, 2009) as shown in Figure 18.

Figure 10: View towards the proposed access road from the turn-off from Clarence Drive to the Wastewater Treatment Works. The approximate footprint is indicated as a white stippled polygon.

Figure 11: Vegetation occurring adjacent and to the north-west of Clarence Drive in the vicinity of the proposed access road.

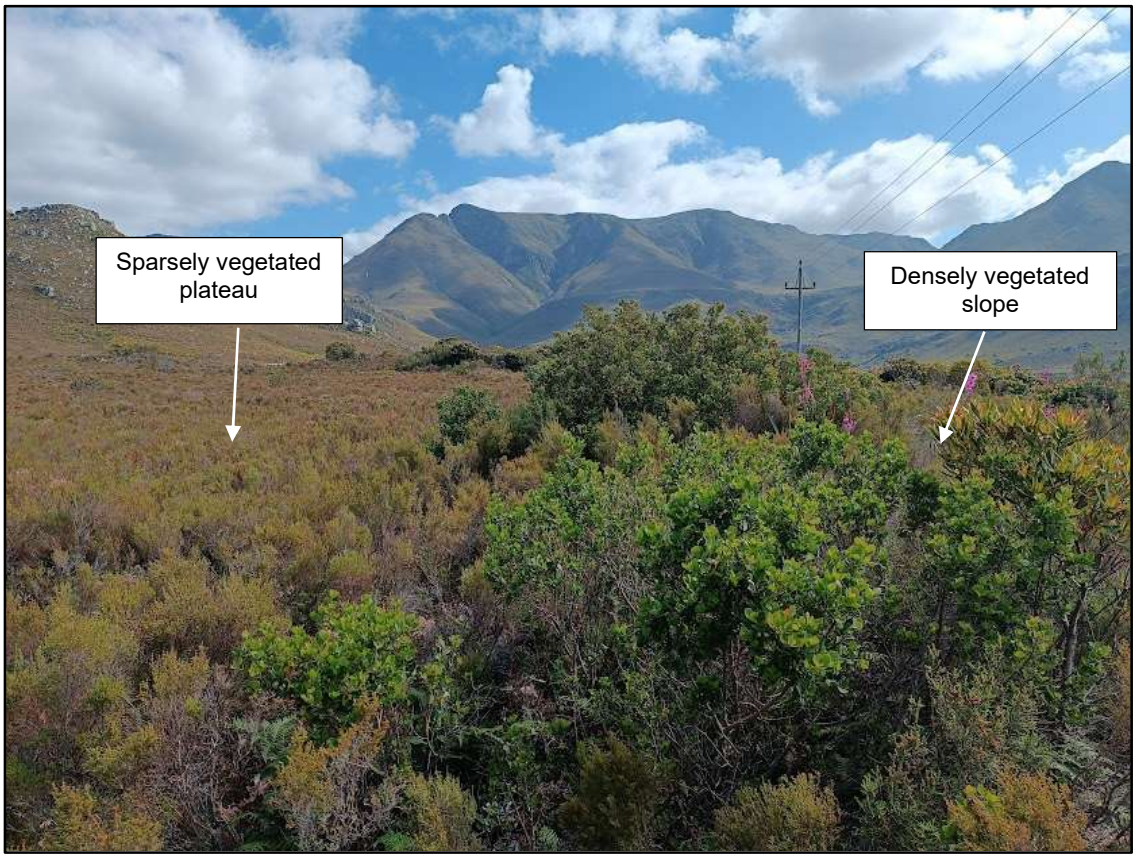

Figure 12: Photograph showing the edge of the sloped portion of densely vegetation land and the more sparsely vegetation plateau.

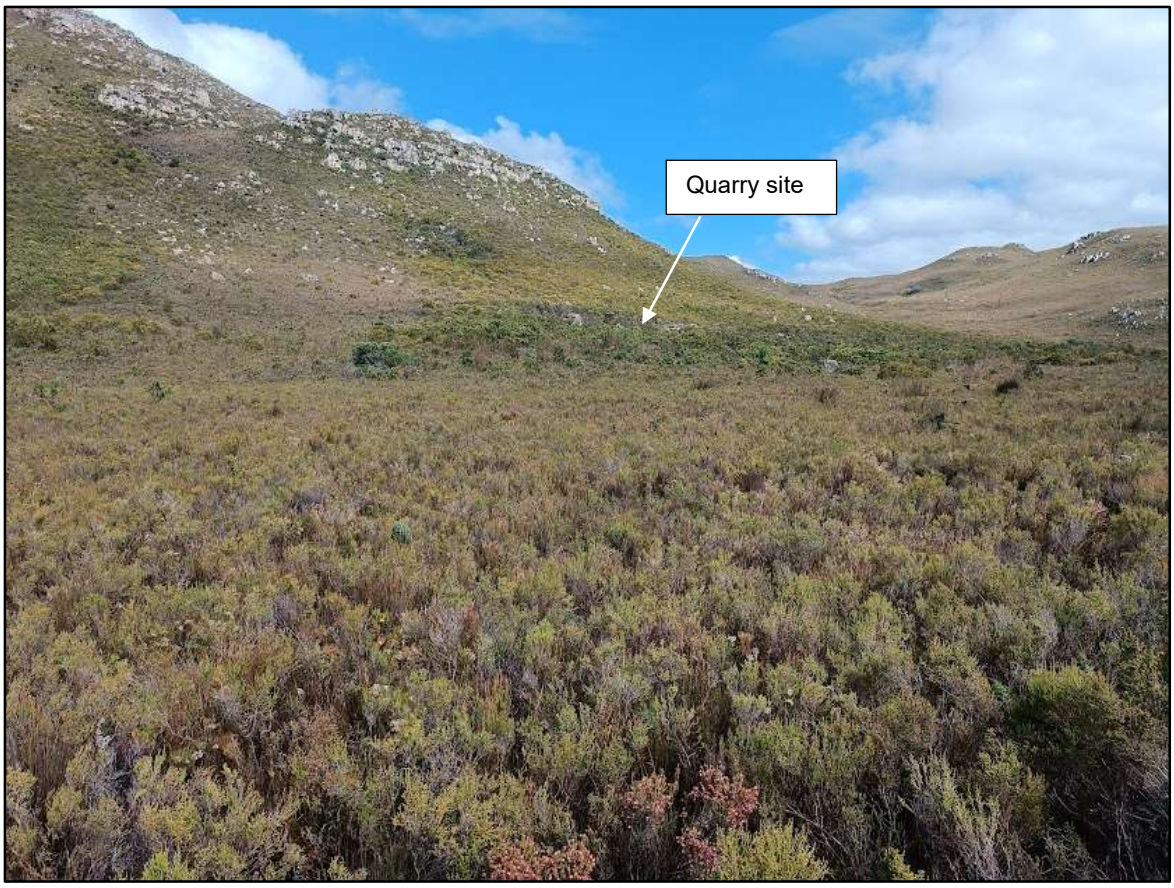

Figure 13: View across the sparsely vegetated plateau towards the quarry site.

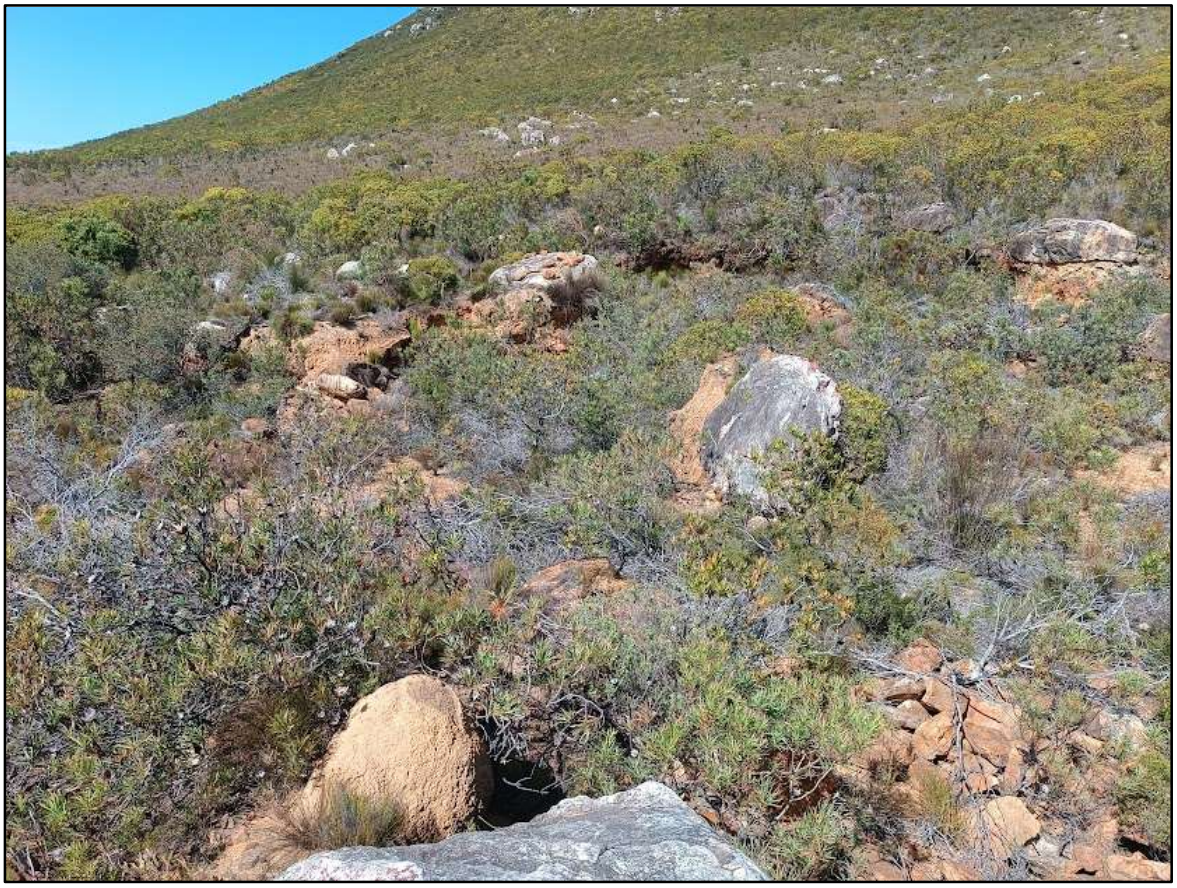

Figure 14: The historic quarry which is the proposed site of the new residential dwelling.

Figure 15: View across an expansive swathe of Berzelia-dominated wetland.

Figure 16: View of the hillside across which the new access road to Portion 125 is proposed.

Figure 17: Photograph showing the vegetation occurring in the vicinity of a suspected spring (indicated by the denser, higher vegetation in the foreground) identified approximately 100m south west of the end-point of the proposed access road to Ptn 125.

Figure 18: Photograph showing the paved roadside channel conveying flow in January 2025 emanating from the spring immediately upslope of the channel.

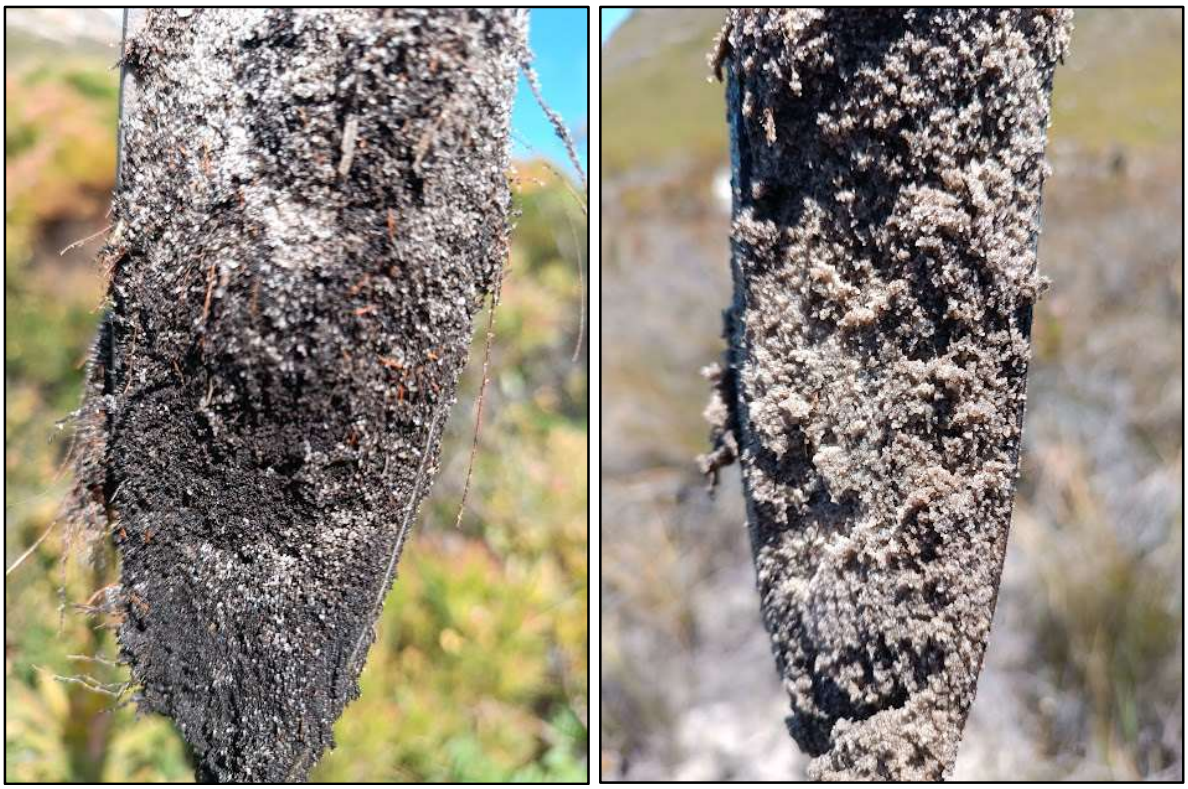

Figure 19: Soil auger samples taken from within the suspected hillslope seep comprising most of the 50m-wide densely-vegetated area in the vicinity of the proposed access road to the quarry site (left) and within the Berzelia-dominated wetland (right). The dark, high carbon surface layers over low chroma sand is characteristic of wetland soils in quarzitic sands.

3.2.2 Watercourse Delineation

Based primarily on vegetation, location in the landscape and to some extent soils, the ground-truthing confirmed the presence of the mapped features but the extent of the hillslope to the south-east of the site in the vicinity of the proposed access route from Clarence Drive to the historic quarry was determined to be less than mapped and also the portion of the mapped hillslope seep immediately east of the graveyard was determined to comprise a channelled valley bottom wetland. Hillslope seeps were also identified either side of the existing access road to the graveyard but these were not delineated as these are not at any risk of being impacted as a result of the proposed development.

While wetlands are likely to occur in the parts of the site upslope of the proposed development footprint (i.e. to the north / north-west of the development footprint), these areas were not groundtruthed as any aquatic features upslope of the development footprint would not be at risk of being impacted. Also, the upper portions of the site's non-perennial drainage lines were not groundtruthed and delineated for the same reason.

The watercourse delineation map presented as Figure 20 indicates only the drainage lines and wetlands at risk of being directly impacted by the proposed development. Only one small hillslope seep is indicated to occur within the site, however the wetlands between the site's eastern boundary and Clarence Drive are considered to be at risk of being impacted. No wetlands to the south of Clarence Drive are considered to be at risk of being directly impacted but impacts that would occur to the wetlands to the north of Clarence Drive could be transferred to the wetlands to the south (i.e. these wetlands could be secondarily impacted). The focus of the detailed ecological assessment only applies to the wetlands at risk of being directly impacted but the impact and risk assessments take cognisance of any secondary impacts to off-site wetlands.

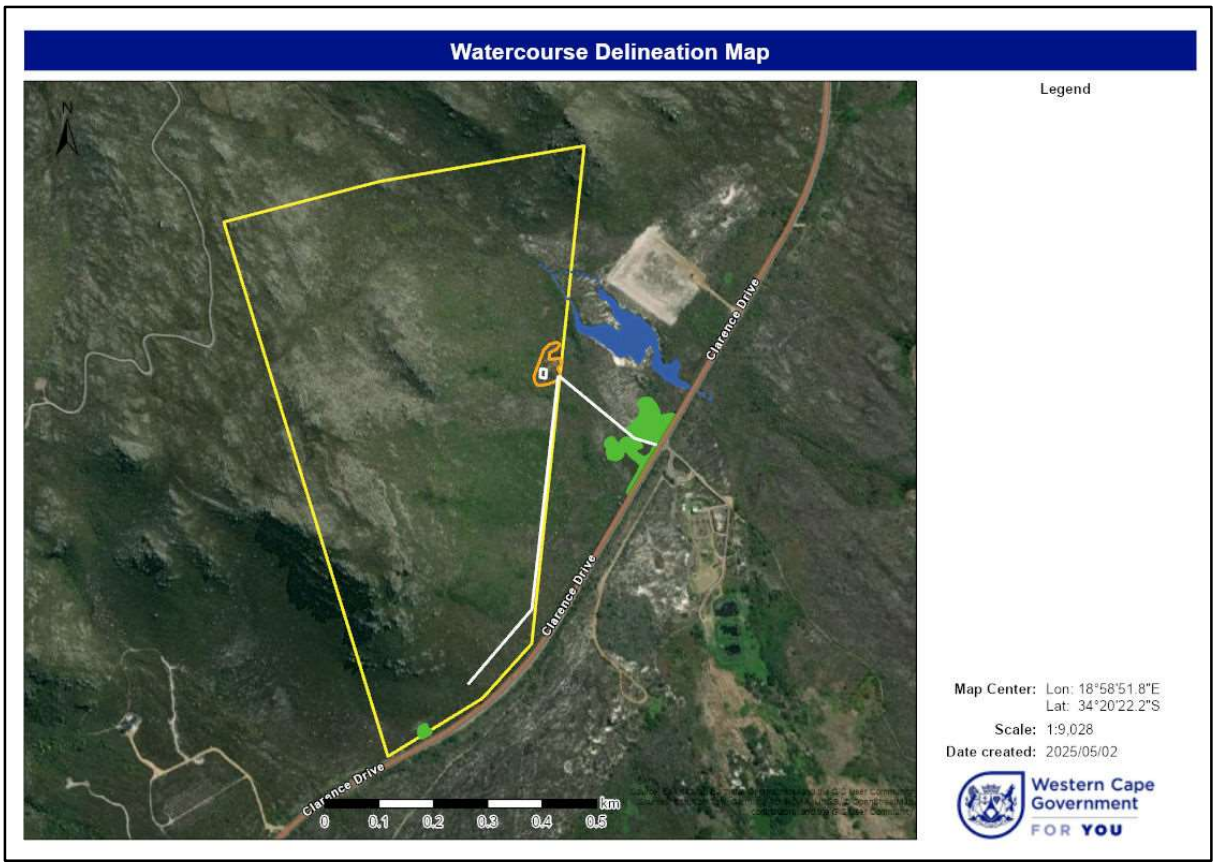

Figure 20: Watercourse Delineation Map showing the on-site and off-site watercourses potentially at risk of being directly impacted. The blue polygon indicates the current extent of a channelled valley bottom wetland and the green polygons indicate the current extent of hillslope seep wetlands. The white lines indicate the preferred access routes to the proposed dwelling on Ptn 126 (indicated as a white polygon) and to Ptn 125. The orange polygon indicates the disturbance footprint of the historic quarry.

3.3 Watercourse Classification

The study area falls within the Southern Coastal Belt Ecoregion, the Breede-Olifants Water Management Area (WMA) and the Overberg West Sub-WMA as defined by NFEPA (2011). The table below 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 at direct risk of being impacted by the proposed development.

Table 7: Level 3, 4, 5 and 6 of the wetland and aquatic ecosystem classification.

Level 3 (Landscape Setting)	**Valley Floor:** the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate. **Slope:** 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.
Level 4 (Hydrogeomorphic unit)	**Channelled Valley Bottom wetland:** a valley-bottom wetland with a drainage line channel running through it. **Hillslope seep:** 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.
Level 5 (Hydrological regime)	**Perennial:** Flows continuously throughout the year, in most years. **Non-perennial:** does not flow continuously throughout the year, although pools may persist.
Level 6 (Descriptors)	**Natural:** may be impacted, or even realigned, but of natural origins.

3.4 Ecological Assessment of the Hillslope Seep

3.4.1 Ecosystem Services

The WET-Ecoservices tool was applied to the hillslope seep (large green polygon in Figure 20). Fifteen Ecosystem Services were assessed with overall rating of the likelihood of the wetland providing ecosystem services being **Intermediate** (see results presented in Figure 21 and Table 8 below). The most noteworthy results are:

- The most important ecosystem services provided by the hillslope seep wetland are erosion control and maintenance of biodiversity both of which scored **High**. Having a significant influence for both of these ecosystem services is the complete vegetation cover which, in terms of erosion increases the surface roughness and, in terms of biodiversity maintenance provides high quality natural habitat. Erosion control is also increased due to the high erodibility of the soil and the presence of important wetlands downstream including CBA wetlands, wetlands in Protected Areas and a CBA estuary, the Palmiet Estuary. The high score for maintenance of biodiversity is attributed to the threat status of the wetland vegetation and surrounding terrestrial vegetation (E and CR, respectively), the size of the wetland and its vegetation cover which is dominated by indigenous species.
- The services of sediment trapping, phosphate, nitrate and toxicant removal were all assessed to be **Moderately High**. In all cases this can be attributed to the presence of important wetlands downstream, the extent of vegetation cover which increases the score but low sources of nutrients and toxicants in the wetland's catchment reduces the score.
- The services of flood attenuation and streamflow regulation were assessed to be **Intermediate** which is influenced by the low score for hydrological zonation given that the wetland predominantly comprises temporary / seasonal zones, but is increased by the surface roughness of the wetland and slope of the wetland.
- The wetland does not provide any water supply for domestic and commercial purposes, any harvestable resources and cultivated foods and does not have any cultural significance. Other than the provision of education and research opportunities, which is rated **Intermediate** due largely to its accessibility and reference site suitability, the wetland provides mostly no direct socio-economic benefits.

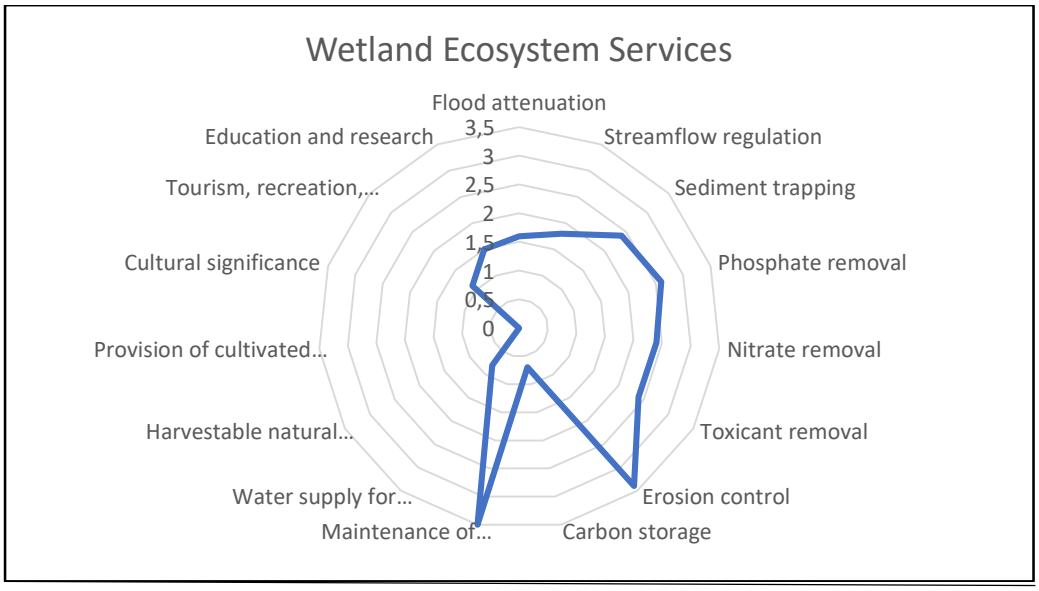

Figure 21: WET-EcoServices results

Table 8: WET-EcoServices results.

Wetland Ecosystem Services		
		Pre-Development
Indirect Benefits	Flood attenuation	1,6
	Streamflow regulation	1,8
	Sediment trapping	2,4
	Phosphate removal	2,6
	Nitrate removal	2,4
	Toxicant removal	2,4
	Erosion control	3,4
	Carbon storage	0,7
Direct Benefits	Maintenance of biodiversity	3,5
	Water supply for direct human use	0,8
	Harvestable natural resources	0
	Provision of cultivated foods	0
	Cultural significance	0
	Tourism, recreation, scenic value	1,1
	Education and research	1,5
	Total	24,1
	Average	1,606666667

3.4.2 Present Ecological State

Table 9 presents the impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for the hillslope seep wetland.

Table 9: WET-health assessment results.

HGM Unit	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Seep		100	6.5	-	1.8	-	3.8	-
PES Category			E	-	B	-	C	-

The overall PES for the hillslope seep was calculated to be 4.4 which equates to 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 impacting on the state of the wetland are as follows:

- **Hydrology:** While the changes to water inputs from the catchment are negligible, the fact that Clarence Drive acts as a significant barrier to flow through the wetland (some deeper subsurface flow will be uninterrupted) results in a significant impact score for hydrology.
- **Geomorphology:** The geomorphology of the wetland is almost intact with only the historical infilling of approximately 20% of the original extent of the wetland having occurred as a result of the construction of Clarence Drive.
- **Vegetation:** While approximately 80% of the hillslope seep is in a pristine condition the remaining

20% is transformed and comprises a main road. While a few alien invasive species were identified their low abundance has not influenced the vegetation score.

3.4.3 Ecological Importance and Sensitivity

The EIS method applied to the hillslope seep wetland is based on the assessment tool developed by Rountree *et. al.* (2013). The key aspects considered during the EIS assessment are presented in Table 10 and summarised below:

- The wetland is likely to support endangered or rare biota or populations of unique species and falls within a Critically Endangered terrestrial vegetation type (Kogelberg Sandstone Fynbos) and contains an Endangered wetland vegetation type (Southwest Sandstone Fynbos).
- The wetland is not known to be an important site for species migration but it may be used for breeding and/or feeding given its size and intact vegetation;
- The wetland is not recognised in the Western Cape Biodiversity Spatial Plan (2017) as being of conservation importance but the downstream wetlands and the Palmiet Estuary are identified as CBAs and occur in a Protected Area;
- While the wetland is relatively large (±0.5 ha), it is not considered to be of a rare type (hillslope seeps are common in the steeper sloping terrain in areas where the underlying geology is sandstone);
- The wetland can be regarded as being insensitive to changes in hydrology due to it being a seep wetland which is largely driven by subsurface water inputs but on the contrary, it is regarded as being sensitive to changes in water quality due to the water driving the wetland system being acidic and low in nutrients.

Table 10: EIS Results.

	Hillslope Seep Wetland	
ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)
Biodiversity support	**Moderate**	
Presence of Red Data species: Endangered or rare Red Data species present	3	2
Populations of unique species: Uncommonly large populations of wetland species	2	2
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	2	1
Landscape scale	**Moderate**	
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	3	5
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	2	5
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	5
Diversity of habitat types: Assessment of the variety of wetland types present within a site	2	5

Sensitivity of the wetland	**Moderate**	
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or3; pans and seeps 0 or 1	0	4
Sensitivity to changes in low flows/dry season: Unchannelled VB's probably most sensitive	2	4
Sensitivity to changes in water quality: Esp natural low nutrient waters – lower nutrients likely to be more sensitive	4	4
ECOLOGICAL IMPORTANCE AND SENSITIVITY	Median value =	**2**

The overall EIS category was determined to be **Moderate** which means that the wetland is ecologically important and sensitive on a provincial or local scale. The biodiversity of the system is not usually sensitive to flow and habitat modifications. The wetland plays a small role in moderating the quantity and quality of water of major drainage lines (see Table 11).

Table 11: EIS Category definitions.

EIS Category definitions	**Range of EIS score**
Very high: 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
High: 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
Moderate: 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
Low/marginal: 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 PES has been calculated as falling within a Category D. Since the EIS has been determined to be Moderate the REC would be a Category C. Accordingly feasible opportunities to improve the PES to a Category C should be evaluated. In this case the only way the PES could be improved significantly would be to decommission Clarence Drive and re-instate the historical extent of the wetland which is not feasible.

3.4.5 Buffer Determination

The National Buffer Zone Guidelines for wetlands (Macfarlane and Bredin, 2017) indicates that the minimum buffer for paved trails or unpaved trails and tracks (the specialist is of the opinion that this description best suits the proposed access road as it will only access one or two residential dwellings and as such is likely to comprise a track rather than a road) is 10m.

3.5 Ecological Assessment of the Channelled Valley Bottom Wetland

3.5.1 Ecosystem Services

The WET-Ecoservices tool was applied to the channelled valley bottom wetland (blue polygon in Figure 20). Fifteen Ecosystem Services were assessed with overall rating of the likelihood of the wetland

providing ecosystem services being **Intermediate** (see results presented in Figure 22 and Table 12 below). The most noteworthy results are:

- The most important ecosystem services provided by the channelled valley bottom wetland are erosion control and maintenance of biodiversity both of which scored **High**. Having a significant influence for both of these ecosystem services is the extent of vegetation cover which, in terms of erosion increases the surface roughness and, in terms of biodiversity maintenance provides high quality natural habitat. Erosion control is also increased due to the high erodibility of the soil and the presence of important wetlands downstream including CBA wetlands, wetlands in Protected Areas and a CBA estuary, the Palmiet Estuary. The high score for maintenance of biodiversity is attributed to the threat status of the wetland vegetation and surrounding terrestrial vegetation (E and CR, respectively), the size of the wetland and its vegetation cover which is dominated by indigenous species.
- The services of sediment trapping, phosphate, nitrate and toxicant removal were all assessed to be **Moderate**. In all cases this can be attributed to the presence of important wetlands downstream, the extent of vegetation cover which increases the score but low sources of nutrients and toxicants in the wetland's catchment reduces the score.
- The services of flood attenuation and streamflow regulation were assessed to be **Intermediate** which is influenced by the low score for hydrological zonation given that the wetland predominantly comprises temporary / seasonal zones, but is increased by the surface roughness of the wetland and slope of the wetland.
- The wetland does not provide any direct consumptive benefits as it does not provide a water supply for domestic and commercial purposes, any harvestable resources and cultivated foods. It also does not have any known cultural significance. The channelled valley bottom wetland does however have potential to provide a water supply, tourism, recreation and scenic value and for education and research and this is reflected in the **Moderately low** to **Intermediate** scores assigned to these benefits.

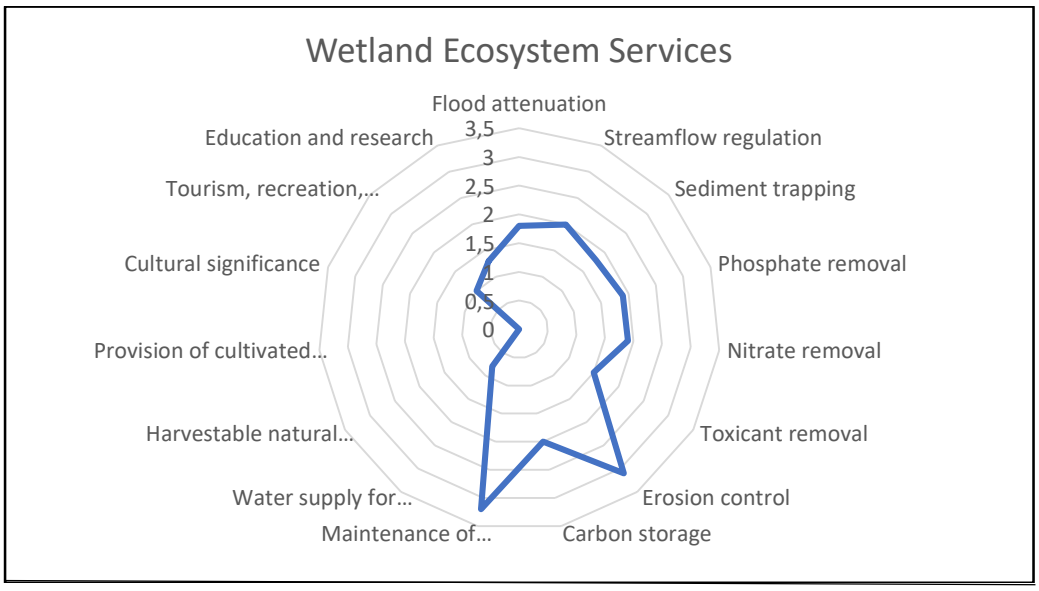

Figure 22: WET-EcoServices results

Table 12: WET-EcoServices results.

Wetland Ecosystem Services		
		Pre-Development
Indirect Benefits	Flood attenuation	1,8
	Streamflow regulation	2
	Sediment trapping	1,8
	Phosphate removal	1,9
	Nitrate removal	1,9
	Toxicant removal	1,5
	Erosion control	3,1
	Carbon storage	2
Direct Benefits	Maintenance of biodiversity	3,2
	Water supply for direct human use	0,8
	Harvestable natural resources	0
	Provision of cultivated foods	0
	Cultural significance	0
	Tourism, recreation, scenic value	1
	Education and research	1,3
	Total	22,3
	Average	1,486666667

3.5.2 Present Ecological State

Table 13 presents the impact scores for hydrology, geomorphology and vegetation condition and the trajectory of change for the channelled valley bottom wetland.

Table 13: WET-health assessment results.

HGM Unit	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation	
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
CVBW		100	3	-	1.9	-	2.9	-
PES Category			**C**	**-**	**B**	**-**	**C**	**-**

The overall PES for the channelled valley bottom wetland was calculated to be 2.6 which equates to a **Category C** (Moderately modified). This means that a moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. The key aspects impacting on the state of the wetland are as follows:

- **Hydrology:** While changes in the water inputs due to activities in the wetland's catchment have been negligible, the reduced roughness brought about by sheet erosion and concomitant reduction in vegetation cover, albeit limited, within the wetland has impacted on the water distribution and retention characteristics within the wetland.
- **Geomorphology:** The geomorphology of the wetland is almost intact with only slight increases in run-off due to areas which have reduced vegetation cover within and immediately upslope of the wetland and evidence sedimentation within the wetland.

- **Vegetation:** The changes in vegetation composition have been brought about by sheet erosion and sedimentation. The result is that approximately 70% of the wetland remains untransformed.

3.5.3 Ecological Importance and Sensitivity

The EIS method applied to the channelled valley bottom wetland is based on the assessment tool developed by Rountree *et. al.* (2013). The key aspects considered during the EIS assessment are presented in Table 14 and summarised below:

- The wetland is likely to support endangered or rare biota or populations of unique species and falls within a Critically Endangered terrestrial vegetation type (Kogelberg Sandstone Fynbos) and contains an Endangered wetland vegetation type (Southwest Sandstone Fynbos).
- The wetland is not known to be an important site for species migration but it may be used for breeding and/or feeding given its size and intact condition.
- The wetland is not recognised in the Western Cape Biodiversity Spatial Plan (2017) as being of conservation importance but it the area has been identified as a terrestrial CBA. Had the wetland been identifies as part of this systematic conservation plan then it would most likely have also been given a CBA status.
- While the wetland is relatively small large (±0.8 ha), it is not considered to be of a rare type (channelled valley bottom wetlands are common in the regions valley bottoms).
- The wetland can be regarded as being sensitive to changes in hydrology due to it being a channelled valley bottom wetland and also as being sensitive to changes in water quality due to the water driving the wetland system being acidic and low in nutrients.

Table 14: EIS Results.

	Channelled Valley Bottom Wetland	
ECOLOGICAL IMPORTANCE AND SENSITIVITY	Score (0-4)	Confidence (1-5)
Biodiversity support	**Moderate**	
Presence of Red Data species: Endangered or rare Red Data species present	3	2
Populations of unique species: Uncommonly large populations of wetland species	2	2
Migration/breeding/feeding sites: Importance of the unit for migration, breeding site and/or feeding	2	1
Landscape scale	**Moderate**	
Protection status of the wetland: National (4), Provincial, private (3), municipal (1 or 2), public area (0-1)	0	5
Protection status of the vegetation type: SANBI guidance on the protection status of the surrounding vegetation	4	5
Regional context of the ecological integrity: Assessment of the PES (habitat integrity), especially in light of regional utilisation	2	5
Size and rarity of the wetland type/s present: Identification and rarity assessment of the wetland types	2	5
Diversity of habitat types: Assessment of the variety of wetland types present within a site	2	5

Sensitivity of the wetland	**High**	
Sensitivity to changes in floods: Floodplains at 4; valley bottoms 2 or3; pans and seeps 0 or 1	2	4
Sensitivity to changes in low flows/dry season: Unchannelled VB's probably most sensitive	3	4
Sensitivity to changes in water quality: Esp natural low nutrient waters – lower nutrients likely to be more sensitive	4	4
ECOLOGICAL IMPORTANCE AND SENSITIVITY	Median value =	**2**

The overall EIS category was determined to be **Moderate** which means that the wetland is ecologically important and sensitive on a provincial or local scale. The biodiversity of the system 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 (see Table 15).

Table 15: EIS Category definitions.

EIS Category definitions	**Range of EIS score**
Very high: 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
High: 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
Moderate: 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
Low/marginal: 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 PES has been calculated as falling within a Category C. Since the EIS has been determined to be Moderate the REC remains at a Category C. As such there is no requirement to improve the PES but no deterioration in the ecological integrity of the wetland should be tolerated. This means that no impacts on the wetland that decrease the PES should be permitted. Given that the moderate EIS suggests that the wetland is not usually sensitive to flow and habitat modifications, minor flow regime and water quality impacts could be tolerated.

3.5.5 Buffer Determination

The National Buffer Zone Guidelines for wetlands (Macfarlane and Bredin, 2017) indicates that the minimum buffer for paved trails or unpaved trails and tracks (the specialist is of the opinion that this description best suits the proposed access road as it will only access one or two residential dwellings and as such is likely to comprise a track rather than a road) is 10m.

4 Assessment of Impacts

4.1 Description of the proposed development activities & Impact Identification

4.1.1 Description of the Proposed Development

The proposed development comprises two aspects, each of different farm portions as follows:

- **Portion 126:** The owner proposes to construct a residential dwelling (details unknown) on an old historical quarry site. Currently there is no access road to Portion 126 and also any signs of historic access to the quarry are not evident. In order to realise his development aspirations for the site and utilise the only transformed part of the site a new dedicated access from Clarence Drive to the quarry site is required. The Municipality has endorsed a new access road starting from the Clarence Drive / WWTW turn-off and heading in a northly direction across municipal land until the erf boundary some 200m from Clarence Drive. From the erf boundary the access road is proposed to lead directly to the quarry site (see Figure 23).
- **Portion 125:** Similar to Portion 126, Portion 125 has no existing access. In order to access this site for purposes of veld management and possible future residential development a new access road is proposed. This new access would start from the point where the proposed access to the quarry site on Portion 126 enters Portion 126. It would then run in a southerly direction just within the boundary of Portion 126 until it enters the southern-most part of Portion 125. As such the approximately 200m portion of new access road through municipal land would be shared and then from the boundary of Portion 126 dedicated accesses to Portion 125 and to the quarry site on Portion 126 would be established. Figure 20 shows the proposed access route along the boundary of Portion 126 until it reaches Portion 125.

While details of the manner in which the access roads will be constructed and materials to be used were not available at the time of preparation of this report it can be reasonably assumed that the roads would comprise a jeep track without any surfacing. The access roads would also not have any formal drainage structures etc.

In terms of associated services required for the proposed single residential dwelling the following is proposed:

- Sewerage – closed conservancy tank pumped by Municipality or private contractor and transferred to Municipal WWTW.
- Electricity – Solar
- Water – rainwater

See Figure 23 for a layout of the proposed development.

4.1.2 Development alternatives under consideration

In addition to the preferred access route to the quarry on Portion 126 of Farm 599 Bettys Bay from the turn-of to the Municipal WWTW across approximately 200m of Municipal land, an alternative route via the existing cemetery is under consideration (see Figure 24). The freshwater ecological impacts of utilising the existing cemetery access and then routing around the eastern side of the cemetery to the back, northern side of the cemetery and then on to the quarry on Portion 126 are assessed in this report and have informed the specialist's reasoned option regarding the best practical environmental option as regards access to Portion 126. Without securing access to Portion 126 the owner's current proposal to access Portion 125 will not be possible.

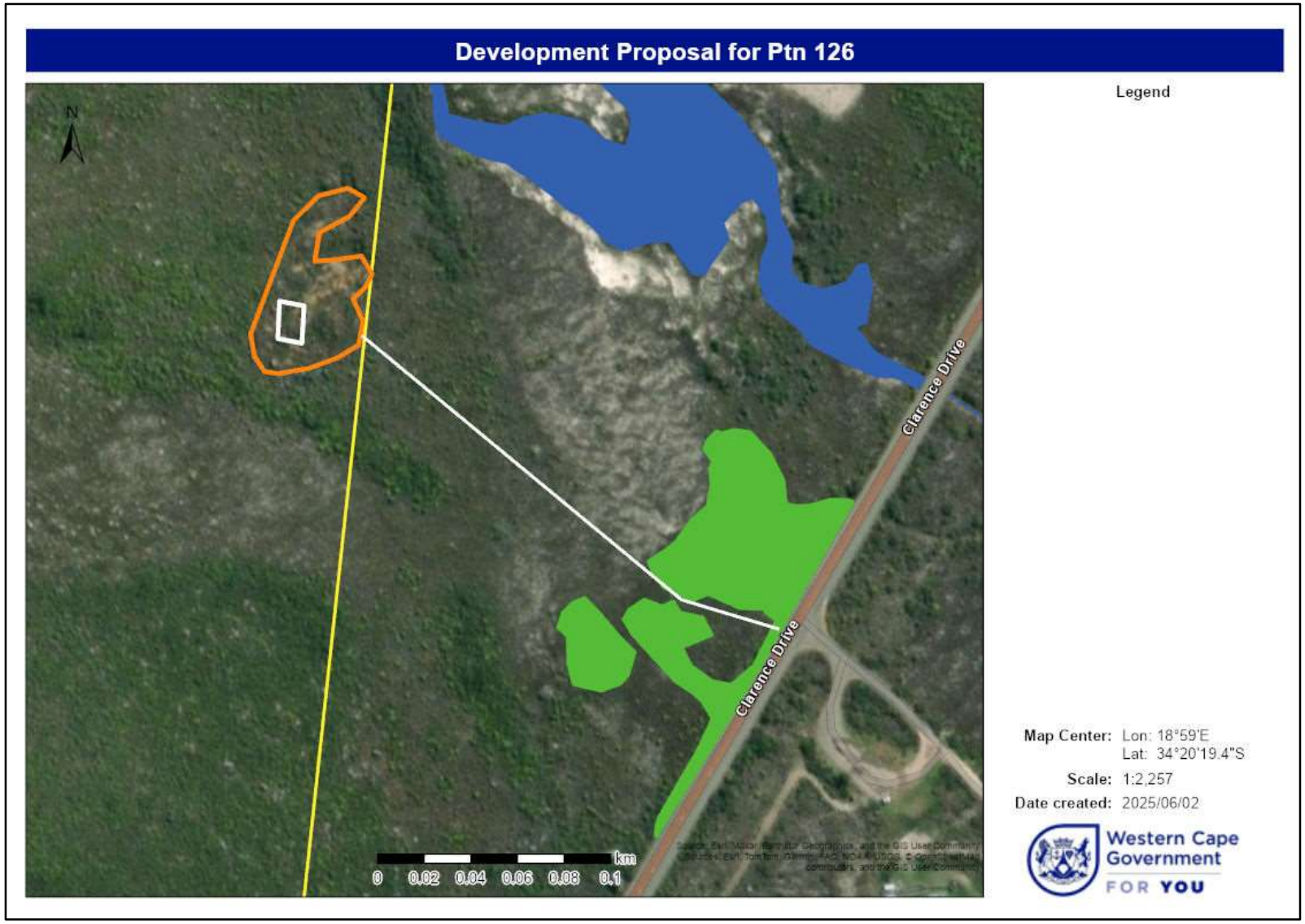

Figure 23: Site Development Plan showing the layout of the proposed development. The orange polygon indicates the disturbance footprint of the historic quarry and the white polygon the extent of the proposed dwelling. The white line indicates the preferred access route from Clarence Drive to the proposed dwelling.

Figure 24: Aerial photograph showing the alternate access route under consideration indicated by the white line and wetlands potentially at risk of being impacted. The green polygons indicate hillslope seeps and the blue polygon the channelled valley bottom wetland.

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 the following potentially significant, direct freshwater ecological impacts have been identified per phase of the proposed development. on downstream receiving watercourses (*viz-a-viz* the delineated hillslope seep wetlands between the site and Clarence Drive and the channelled valley bottom wetland between the proposed access road and the cemetery):

Planning, design and development/construction phase:

- **Disturbance of wetland habitat:** The groundtruthed wetlands may be disturbed as a result of construction activity (driving of construction vehicles and storage of construction materials and spoil).
- **Loss of biota:** Mortality and displacement of organisms may occur as a result of site clearing, stockpiling of soils and construction materials within or near the wetlands, as well as the operation of machinery and the driving of vehicles within or near the wetlands.
- **Alteration of flow regime**: Reduced catchment roughness as a result of the clearing of vegetation would cause an increase in stormwater run-off as well as an increase in flood peaks in the receiving watercourses.
- **Increased erosion and sedimentation**: The exposure of soils to erosion associated with site clearing, excavations and/or infilling would increase erosivity and, if coupled with rainfall, may result bank and channel erosion and sediment loading of receiving watercourses.
- **Water quality impairment:** Water quality impairment may arise as a result of the release of contaminants such as cement and other building materials / chemicals into the downstream receiving watercourses via stormwater run-off. In addition, potential accidental spills of chemicals and fuel may also result in contamination of stormwater and ultimately contaminate the receiving watercourse.

Operational phase:

- **Alteration of natural flow regime**: Flow and flood peaks would increase as a result of the increased extent of hard surfaces and reduced infiltration brought about by the proposed development which includes a roofed building and new access roads with limited to zero permeability.
- **Water quality impairment:** In the event that the proposed sewerage treatment and disposal system fails or is damaged, or the conservancy tank is not emptied timeously, then contamination of the receiving watercourses is highly likely.
- **Biota loss:** If the receiving watercourses receive contaminants, particularly in the form of raw sewage from a failed, damaged and/or poorly maintained sewerage treatment and disposal system then it is likely that biota loss will take place, owing to the high sensitivity of the aquatic ecosystems in the region to water quality changes.

4.2 Assessment of the potential impacts associated with the proposed single residential development

4.2.1 Construction Phase

Impact 1 –Disturbance to wetland habitat

Construction activity and particularly the operation of construction machinery and vehicles within and near wetland habitat can cause significant disturbance to wetland habitat. Most of the impacts arise when wetland vegetation is damaged and topsoil compacted as a result of the driving of construction vehicles in and near wetland areas. Also, inappropriately located construction materials such as soil and sand stockpiles, bricks, steel and timber would similarly crush wetland vegetation and cause disturbance to the habitat.

The construction of the new residential dwelling at the quarry site will not cause any wetland habitat disturbance given that the distance between the proposed site and the nearest wetland is approximately 100m and the scale of the construction project is small (limited to a single residential dwelling). On the contrary, construction of the access road from Clarence Drive to Portion 126 will pass within a few metres of parts of the hillslope seep wetland that occurs on the Municipal land between the site and Clarence Drive (see Figure 23). There is no opportunity to set the access road back from this wetland sufficiently and comply with the recommendations of the Buffer Guidelines (Macfarlane and Bredin, 2017) of a minimum buffer of 10m as there is insufficient space. Accordingly, the intensity rating for the potential impact is rated to be Medium.

Given the proximity of the proposed access road to wetland habitat, the likelihood of wetland habitat being disturbed is Highly Probable. The extent of the impact is site specific as only the hillslope seep wetland would be disturbed and the duration is Short Term given the short time it would take to construct the access road. Accordingly, the impact significance is rated to be **Low (-ve)** without any mitigation. Through clearly demarcating the edge of the development footprint of the proposed road with visible and weather-proof markers and designating the area beyond the development footprint as a No-Go area during the construction phase, minimal disturbance of wetland habitat would occur (see Table 16 below). In addition, the placement of construction materials and the driving of vehicles outside of the construction footprint is strictly prohibited with the nearest material stockpiles being permitted at a minimum distance of 20m from any wetland edge.

Results

Table 16: Impact significance rating for the disturbance of wetland habitat (construction phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Medium	Site specific	Short term	Highly probable	Low (-ve)
With mitigation	Low	Site specific	Short term	Improbable	Very low (-ve)

Essential mitigation measures:

- Clearly demarcate the edge of the development footprint of each accommodation area using weather-proof markers for the full duration of the construction phase and declare all areas outside the development footprint as No-Go areas for the full duration of the construction phase;
- Only with written permission from the ECO may construction workers be permitted to enter the No-Go area and this should only be for the purposes of rehabilitation (in the event that the wetland area is damaged) or for the purpose of collecting wind-blown construction waste.
- Ensure that all construction vehicles remain within the development footprint of the access road. If turning areas are required then ensure that these are located in the terrestrial areas between the wetland area and the quarry site (note: this is subject to endorsement by the appointed terrestrial biodiversity specialist).
- Ensure that all material stockpiles and construction machinery are located/parked at least 20m from any wetland habitat.

Impact 2 – Alteration of Flow Regime

In order to construct the proposed dwelling and the access road indigenous vegetation would have to be cleared and this would have the effect of reducing catchment roughness. The reduced catchment roughness would cause accelerated run-off and reduced infiltration with the likely consequence of altering the natural flow regime in any nearby receiving watercourse. Minimising the intensity of the impact is the very limited area that will be cleared relative to the size of the catchment of the potentially affected wetlands (i.e. the reduction in catchment roughness is minimal). Given the proximity of the proposed access road to the hillslope seep wetland, this wetland is the only wetland that would experience an alteration of flow regime as a result of vegetation clearing. The historic quarry site is already partially devoid of vegetation so vegetation clearing in this area where the dwelling is proposed would have negligible effect on the flow regime of any downslope wetlands.

Overall, the alteration of flow regime associated with the removal of vegetation during the construction phase is rated to be of **Very low (-ve)** significance (see Table 17 below) without mitigation. It is not

considered necessary to mitigate the impact.

Results

Table 17: Impact significance rating for alteration of flow regime (construction phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Local	Short term	Probable	Very low (-ve)
With mitigation	*Mitigation not required*				

Impact 3 – Increased Erosion and Sedimentation

Sediment loading of the site's wetlands and the downstream receiving watercourses could arise if sediment-laden run-off from the construction sites reaches any of the downslope wetlands and drainage lines. Sediment loading of run-off would typically be associated with the following aspects of the construction project:

- Clearing of vegetation resulting in the exposure of the site's highly erosive soils to stormwater erosion;
- Importation of fill material to construct new access road which, prior to compaction, would also be temporarily vulnerable to stormwater erosion;
- Soil, sand and stone (if fines are present) stockpiles which, if exposed to rain, would be susceptible to erosion; and
- Repeated driving of construction vehicles on the site which would result in disturbance of vegetation thereby exposing the underlying highly erosive soils to erosion and causing the concentration of run-off which would exacerbate erosion.

Given the slope of the site, high erosivity of the site's soils and the fact that the proposed access road would be aligned to within a few metres of the hillslope seep wetland, it is considered Highly Probable that sediment loading of the receiving hillslope seep wetland would take place in this manner. This potential impact is unlikely to affect the channelled valley bottom wetland due to the distance between the historic quarry site which is the site of the proposed residential dwelling. Due to minimal soil disturbance occurring due to the limited scale of the construction project, the intensity of the potential impact is rated to be Low and overall the potential impact of increased sedimentation is rated to be of a **Low (-ve)** significance, without mitigation and of a **Very Low (-ve)** significance with the implementation of the recommended mitigation measures (see Table 18 below).

Results

Table 18: Impact significance rating for potential sedimentation (construction phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Local	Short Term	Highly Probable	Low (-ve)
With mitigation	Very low	Local	Short Term	Improbable	Very low (-ve)

Essential mitigation measures:

- Limit the construction phase to the dry summer months when rainfall is at its lowest;
- Minimise the time that exposed soils are potentially exposed to the elements (as far as practically possible);
- Cover all soil, sand and stone stockpiles with plastic sheeting to ensure that the stockpiles are protected from rain;
- Actively repair any erosion runnels and prevent any sediment-laden run-off from exiting the construction area through placement of sandbags or similar; and
- Immediately after construction of the buildings and associated infrastructure is complete, revegetate any exposed areas with locally occurring indigenous plant species.

Impact 4 – Water quality impairment

During the construction phase there is a reasonable likelihood that as a result of the operation of

machinery and vehicles, and if oil leaks remain unchecked and fuel spillages occur during refuelling, then contamination of the stormwater and ultimately the receiving watercourses would occur. Cement, which would be utilised for the construction of the residential dwellings and some of the infrastructure is alkaline and can significantly impair water quality. This is a particular concern given the sensitivity of the wetlands to changes in water quality and also the fact that surface water in the region is characteristically acidic. It is assumed that no cement would be used in the road construction which is clearly the aspect of greatest potential impact to the hillslope seep. Accordingly, the only risk posed by the construction of the access road would be as a result of poor construction site house-keeping.

The potential impact only affects the hillslope seep wetland and is rated to be of Low intensity due to the limited scale of the construction project and limited requirement for cement in the aspects of the construction project that pose the greatest risk to aquatic biodiversity (i.e. the access roads). Given its association with the construction phase the impact is rated to be of a Short-term duration. There is a possibility that contaminants would be transported off-site and across Clarence Drive to impact watercourses further downstream and accordingly the extent of the impact is rated to be Regional. The impact significance rating is accordingly determined to be **Low (-ve)** if unmitigated and **Very Low (-ve)** if mitigated (see Table 19).

Results

Table 19: Impact significance rating for potential water quality impairment (construction phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Regional	Short term	Highly Probable	Low (-ve)
With mitigation	Very low	Local	Short term	Improbable	Very Low (-ve)

Essential mitigation measures:

- Undertake the construction of the access road during the dry summer months.
- Ensure that all construction machinery and vehicles are checked routinely for oil leaks and are in good working order before being permitted onto the development site;
- Use drip-trays at all times when operating petrochemical driven construction machinery (e.g. generators and cement mixers);
- Use drip trays and other appropriate containment methods while refuelling of vehicles and machinery;
- Demarcate an area for the refuelling of machinery and vehicles (this is recommended to be at the Municipal WWTW);
- Ensure that hazardous substances and chemicals are stored in a contained, impermeable area which has the capacity to contain at least 110% of the total volume of stored substances.
- Store cement is a secure weather-proof area (e.g. shipping container) and ensure that used cement bags are placed in plastic bin-bags prior to placement in the on-site solid waste storage area;
- All cement batching on the site must be undertaken on impermeable and bunded batching boards to ensure cement slurry is contained; and
- Any cement residues and concrete waste within the construction site must be removed at the end of every working day and disposed of as rubble.

Impact 5 – Loss of Biota

Construction activities within and/or in close proximity to watercourses inevitably cause biota loss, primarily biota mortality as a result of being crushed by vehicles driving in or near aquatic habitat or through the indiscriminate placement of machinery and/or construction materials. Given the proposed alignment of the access road within metres of the hillslope seep wetland, it is Highly Probable that only localised and very limited biota loss may take place (i.e. Low intensity). Most of the biota at risk would be terrestrial flora and fauna but it is likely that some of the more mobile wetland fauna may use the terrestrial areas for feeding and dispersal purposes and may be crushed during construction.

Accordingly, the impact is rated to be of **Low (-ve)** significance without mitigation (see Table 20). The impact can be effectively mitigated to a **Very Low (-ve)** significance through the designation of the areas outside the development footprint of the proposed access road and the quarry as a No-Go area

during construction and ensuring that construction materials stockpiles are maximally setback away from any wetland edges.

Results

Table 20: Impact significance rating for impact on biota (construction phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Site specific	Short term	Highly Probable	Low (-ve)
With mitigation	Very low	Site specific	Short term	Improbable	Very low (-ve)

Essential mitigation measures:

- Clearly demarcate the edge of the development footprint of the proposed access road using weather-proof markers for the full duration of the construction phase and declare all areas outside the development footprint as No-Go areas for the full duration of the construction phase;
- Only with written permission from the ECO may construction workers be permitted to enter the No-Go area and this should only be for the purposes of rehabilitation (in the event that the wetland area is damaged) or for the purpose of collecting wind-blown construction waste.
- Ensure that all construction vehicles remain within the development footprint of the access road. If turning areas are required then ensure that these are located in the terrestrial areas between the wetland area and the quarry site (note: this is subject to endorsement by the appointed terrestrial biodiversity specialist).
- Ensure that all material stockpiles and construction machinery are located/parked at least 20m from any wetland habitat.

4.2.2 Operational Phase

Impact 1 – Alteration of Flow Regime

The presence of hard surfaces as a result of the development (comprising a dwelling with a roof which is impermeable) increases run-off from the site. This then causes increased flow and increases flood peaks in the downstream, receiving watercourses.

The owner proposes to collect rainwater off the roof so roof run-off from the proposed dwelling will not cause alteration of the natural flow regime and therefore the channelled valley bottom wetland would not be exposed to any risk of being impacted. The new access road, on the other hand, would cause accelerated run-off and increased flood peaks because of the compaction of road surface as a result of being driven on which would limit infiltration. It is assumed that the road would not have any formal drainage control and therefore most of the stormwater would in all likelihood flow down the access road and discharge into the roadside channel that runs along the northern side of Clarence Drive. This channel then discharges beneath Clarence Drive via a culvert from where flow is then unconfined with the result that watercourses to the south of Clarence Drive may be impacted (i.e. the impact extent is rated to be Regional).

The overall intensity of the impact is rated to be Low due to the minimal development footprint and associated area of hard surfaces and proposed rainwater harvesting. This intensity, coupled with the long-term duration of the impact and Highly Probable likelihood of occurrence, results in an impact significance rating of **Low (-ve)**. While the collection of rainwater off the roof of the dwelling has some mitigatory effect, the impact can be further mitigated through directing road run-off into the veld at regular intervals. This will result in the potential impact having a significance rating of **Very Low (-ve)**.

Results

Table 21: Impact significance rating for the alteration of flow regime (operational phase).

	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Regional	Long Term	Highly Probable	Medium (-ve)
With mitigation	Very low	Local	Long Term	Highly Probable	Very low (-ve)

Essential mitigation measures:

- Where the proposed access road is aligned through sloping terrain near wetland habitat (e.g. the first 60m of the access road after leaving Clarence Drive) install drainage control structures every 10m that direct road run-off away from the road and into the surrounding veld.

Impact 2 – Erosion and Sedimentation

The increase in run-off and flood peaks brought about by the development's hard surfaces increases the erosive capacity of stormwater run-off and flow in wetlands and drainage lines. The proposed new access road is the primary cause of run-off acceleration (see Impact 1 above) and therefore any stormwater run-off discharged from the access road into the surrounding area has potential to cause erosion and sediment loading of the nearby hillslope seep.

While the intensity of the impact of hard surfaces on flow regime was rated to be Low (see Impact 1 above), the erosive potential of run-off during the operational phase is exacerbated by the highly erosive nature of the site's soils (derived from quartzitic sandstone) and the slope of the initial 60m portion of the proposed access road. However, these factors are not sufficient to increase the intensity to a Medium rating.

The extent of the potential impact is rated to be Local for the reason that it is not expected that sediment would reach watercourses to the south of Clarence Drive because the ability of the hillslope seep wetland to trap sediment which was rated to be Moderately High (see Section 3.4.1). The Low intensity rating coupled with the Local extent and Highly Probable likelihood of the impact occurring results in an impact significance rating of **Low (-ve)** without mitigation. The intensity of operational-phase erosion and sedimentation would be reduced if the road run-off was dispersed and discharged into the surrounding area at intervals rather than being concentrated and gaining velocity as it runs down the access road. This form of mitigation would have the effect of reducing the significance of the potential impact to **Very Low (-ve)**.

Results

Table 22: Impact significance rating for potential erosion and sedimentation (operational phase).

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Low	Local	Long Term	Highly Probable	Low (-ve)
With mitigation	Very low	Local	Long Term	Probable	Very low (-ve)

Essential Mitigation Measures

- Where the proposed access road is aligned through sloping terrain near wetland habitat (e.g. the first 60m of the access road after leaving Clarence Drive) install drainage control structures every 10m that direct road run-off away from the road and into the surrounding veld.

Impact 3 – Water quality impairment

Domestic effluent (including sewage) generated by the proposed single residential development will be temporarily stored on-site in dedicated closed conservancy tank which will be periodically emptied by either the municipal sewage disposal tanker or by a contractor. The proposed system, if operating efficiently, has a low likelihood of causing nutrient and toxicant loading of the downslope watercourses, primarily the channelled valley bottom wetland which, while being approximately 100m away, is hydrologically coupled to the proposed conservancy tank site. However, if the system fails and results in spillages of raw effluent into the surrounding area, the potential impact would be highly significant, particularly given the high sensitivity of the region's wetlands to changes in water quality. The ways in which the system could fail include:

- Allowing the tank to overflow because the tank has not been emptied timeously;
- Spillages during the emptying of the conservancy tank; and
- Leakages in the system due to damaged pipework and/or conservancy tank.

In order to minimise the risk of the conservancy tank overflowing it is essential that the tank is

appropriately sized and that an operational agreement, specifying the timing of tank emptying, is formalised between the owner/s and the municipality / 3rd party contractor. Because most of the proposed sewerage system's pipework and the conservancy tank will be installed below-ground, it will be difficult to detect any leakages in the system. Operational phase monitoring of the system by being alert to odorous liquids emanating from the ground downslope of the conservancy tank site is recommended as the only practicable measure to mitigate the impact associated with leakages from the system.

The potential impact is rated to have a Medium intensity and a Long-term duration but is considered Improbable thereby resulting in an impact significance rating of **Low (-ve)**. Should the proposed measures to minimise the risk of the conservancy tank overflowing and timeously detect possible leaks be implemented then the significance of the potential impact would be reduced to **Very low (-ve)**.

Results

Table 23: Impact significance rating for potential water quality impairment (operational phase).

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Medium	Local	Long Term	Improbable	Medium (-ve)
With mitigation	Low	Local	Short Term	Improbable	Very low (-ve)

Essential Mitigation Measures

- Ensure that the conservancy tank is appropriately sized (input should be obtained from a professional civils engineer and the calculation endorsed by the municipality).
- Formalise an operational agreement between the owner/s and the Municipality/3rd party contractor that specifies the timing of tank emptying; and
- During the operational phase, monitor the site for any odorous liquids possibly being associated with a leaking sewerage system.

Impact 4 – Loss of Biota

Any discharge of untreated effluent, whether from an overflowing conservancy tank or leakages from the sewerage reticulation system, would cause some loss of wetland biota if the contaminants reached the channelled valley bottom wetland approximately 100m downslope of the site proposed for the dwelling and conservancy tank. This distance renders the likelihood of contaminants reaching the wetland as Improbable. Given that the wetland type is highly sensitive to changes in water quality, it is reasonable to assume that the biota associated with the wetland are equally sensitive. While the likelihood is Improbable, should any contamination occur then the impact would be highly significant. However, it can be reasonably assumed that the proposed sewerage system will be professionally designed and constructed with the best available materials and technology and therefore should not fail. As such the impact is rated to be of Medium intensity if it occurs, due in part to the sensitivity of the system.

The potential impact of loss of biota as a result of failure of the sewerage system is rated to have a significance of **Low (-ve)** without mitigation. The impact can be effectively mitigated through appropriate design, effective operational management and monitoring for early leak detection. The implementation of these measures would reduce the impact significance to **Very low (-ve)**.

Results

Table 24: Impact significance rating for loss of biota (operational phase).

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Without mitigation	Medium	Local	Long Term	Improbable	Low (-ve)
With mitigation	Low	Local	Short Term	Improbable	Very low (-ve)

Essential Mitigation Measures

- Ensure that the conservancy tank is appropriately sized (input should be obtained from a professional civil engineer and the calculation endorsed by the Municipality).
- Formalise an operational agreement between the owner/s and the municipality that specifies the timing of tank emptying; and
- During the operational phase, monitor the site for any odorous liquids possibly being associated with the sewerage system.

4.3 Alternative access route via the Municipal Cemetery

The alternative access to reach the quarry site from Clarence Drive entails use of the cemetery access situated approximately 280m further to the north east along Clarence Drive from the WWTW turn-off (see Figure 24). The route entails constructing a new road immediately adjacent to the north-eastern fence-line of the cemetery (approximately 140m long), then adjacent to the rear, north-western fence-line (approximately 100m long) and then changing direction towards the north-west before swinging back to the south-west to reach the proposed site for the new dwelling (approximately 300m).

While this route is circuitous and more than double the length of the route endorsed by the Municipality, in terms of risk to aquatic biodiversity, the construction of this alternative route poses risks to a hillslope seep located immediately north-east of the cemetery access road and also to the drainage lines that feed into the channelled valley bottom wetland located to the south-west of the cemetery. However, these risks are not as significant as the risks posed by the Municipality's preferred access route for the following reasons:

- There is sufficient space (estimated at 20m) between the initial part of the proposed road and the hillslope seep wetland to buffer the hillslope seep wetland from construction-related impacts such as wetland habitat disturbance, alteration of flow regime, water quality impairment and biota loss. While the risk of these impacts occurring still exist, they are of a lower intensity and less likely to occur.
- The final part of the access road crosses two non-perennial drainage lines that feed into the channelled valley bottom wetland. The channels of these drainage lines are narrow (in the order of 1 – 2m) and therefore these channels could be spanned with a bridge structure that requires no supports within aquatic habitat and therefore does not entail any construction activity within the channel. Impacts such as instream habitat disturbance and water quality impairment as a result of the use of cementitious materials would be avoided.

As far as the operational phase is concerned the significance of the identified potential impacts is effectively the same for both the alternative route and the route endorsed by the Municipality.

In terms of mitigation what is apparent is the requirement to mitigate the potential impacts associated with constructing the alternative is largely not essential because many of the identified impacts without mitigation are either **Insignificant** or of **Very Low (-ve)** significance. The only potential impact associated with the construction phase requiring mitigation is the potential impact of wetland habitat disturbance which would focus on limiting disturbance to the actual construction footprint of the access road and, given that two non-perennial drainage lines require crossings, would be to ensure that the bridge structure spans the channels of the drainage lines and that no footings or stabilisation structures be permitted within either channel.

Results

Table 25: Impact significance ratings for potential impacts on aquatic biodiversity associated with the alternative access route (construction phase only).

Alternatives	Intensity	Extent	Duration	Probability of impact occurring	Significance
Wetland Habitat Disturbance					
Without mitigation	Low	Site specific	Short term	Probable	Very low (-ve)
With mitigation	Very low	Site specific	Short term	Improbable	Insignificant
Alteration of Flow Regime					
Without mitigation	Very low	Local	Short term	Probable	Very low (-ve)
With mitigation	*Mitigation not essential*				
Erosion and Sedimentation					
Without mitigation	Very low	Local	Short Term	Probable	Very low (-ve)
With mitigation	*Mitigation not essential*				
Water Quality Impairment					
Without mitigation	Very low	Local	Short term	Probable	Very low (-ve)
With mitigation	*Mitigation not essential*				
Biota Loss					
Without mitigation	Very low	Site specific	Short term	Probable	Very low (-ve)
With mitigation	*Mitigation not essential*				

Essential mitigation measures:

- Clearly demarcate the edge of the development footprint of each accommodation area using weather-proof markers for the full duration of the construction phase and declare all areas outside the development footprint as No-Go areas for the full duration of the construction phase;
- Only with written permission from the ECO may construction workers be permitted to enter the No-Go area and this should only be for the purposes of rehabilitation (in the event that the wetland area is damaged) or for the purpose of collecting wind-blown construction waste.
- Ensure that all construction vehicles remain within the development footprint of the access road. If turning areas are required then ensure that these are located in the terrestrial areas between the wetland area and the quarry site (note: this is subject to endorsement by the appointed terrestrial biodiversity specialist).
- Ensure that all material stockpiles and construction machinery are located/parked at least 20m from any wetland habitat.
- When designing the crossings of the two non-perennial drainage lines, ensure that the bridge structure spans the channels of the drainage lines and that no footings or stabilisation structures are placed within either channel.

4.4 'No-Go' Scenario

The 'No-Go' alternative implies that no development would take place on Portion 126 of Farm 599 Bettys Bay and the site would remain in a disused, vacant state for the foreseeable future. The site's aquatic biodiversity would not be not under any threat in the No-Go scenario because the upper catchment of the site comprises naturally vegetated, undeveloped mountainous terrain which is protected in perpetuity (i.e. comprises a Protected Area – see Figure 9). Alien invasives were present in low numbers and, given the dominant cover of the well-established indigenous vegetation, the threat of alien invasive plants spreading is low. Accordingly, the potential impact on aquatic biodiversity associated with the 'No-Go' alternative is determined to be **Insignificant**.

4.5 Indirect Impacts

No indirect impacts are deemed to have occurred.

4.6 Cumulative Impacts

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

Considering the historic, wide-scale and highly significant cumulative impact that urban development has caused in the coastal areas of the Overberg, with wetland habitat loss and disturbance being particularly prevalent in the Bettys Bay area, the significance of the cumulative impact on the region's freshwater is rated to be **Very High (-ve)**. The potential impacts associated with the proposed single residential use of Portion 126 and the construction of an access road to Portion 125 would contribute to this significant cumulative impact in the future, albeit only in a minor way. Should the recommended mitigation measures presented in this report be implemented then the contribution to the highly significant, historical cumulative impact associated with the proposed development would be negligible.

5 Conclusion and Recommendations

Portions 125 and 126 of Farm 599 Bettys Bay are two adjacent farm properties that are owned by the same person. Both properties are undeveloped, have no vehicular accesses and are covered with high quality indigenous vegetation. The landowner proposes to develop a residential dwelling on Portion 126 and, in developing the access to the only disturbed part of the site (an old quarry) which is the proposed site for the new dwelling, proposes to also develop access to the adjacent Portion 125. Accessing the sites directly off Clarence Drive cannot be supported from a road safety perspective and therefore the Municipality has recommended the owner consider two alternative access routes as follows:

1. From the turn-off to the Municipal WWTW, the route heads in a direct, northerly direction to the quarry site over a total distance of approximately 250m. The initial 180m of the access road would transgress Municipal land before arriving at the boundary to Portion 126;
2. Via the existing access to the cemetery, which is located east of Portion 126, then around the northern boundary of the cemetery and then approaching the quarry site from the north-east. The total access route is approximately 550m in length with the first approximately 320m being across Municipal land.

The site and downslope area are mapped to contain wetlands and the site is surrounded by Protected Areas and a significant Aquatic CBA is located within the NWA Regulated Zone for wetlands and is hydrologically coupled to the site. The site can be correctly deemed to have a HIGH/VERY HIGH sensitivity for the Aquatic Biodiversity theme.

Ground-truthing of the site over three different site visits in the period October 2024 to January 2025 confirmed the absence of any wetland habitat within either of the farm portions and at direct risk of being impacted by the development proposal. However, a number of hillslope seeps and a channelled valley bottom wetland were identified between the site and Clarence Drive on the Municipal land that needs to be traversed by the access road. Both alternative access routes can however be routed without encroaching any wetland habitat, however the Municipality's preferred access route comes to within a few metres of a hillslope seep and the alternative access route crosses two non-perennial drainage lines immediately upslope of the channelled valley bottom wetland. The proposed dwelling location is sufficiently set-back from all downslope aquatic habitat and as a result the construction of the residential dwelling would not generate any significant impacts on aquatic biodiversity.

The potentially significant construction phase impacts are associated with the access road and are summarised in Table 26. All of the identified construction phase impacts were rated to be **Low (-ve)** significance, with the only exception being the construction phase impact of alteration of flow regime which unmitigated was rated to be **Very low (-ve)**. This is mostly attributed to the very limited disturbance footprints of the access road. Implementation of the recommended mitigation measures, which in the case of the construction phase-related impacts would be mostly achieved through well-managed construction methods, would reduce all the identified construction phase-related impacts to a **Very Low (-ve)** significance.

The operational phase is associated with two potential impacts of **Medium (-ve)** significance unmitigated (alteration of flow regime and water quality impairment) and two impacts of **Low (-ve)** significance. The alteration of flow regime due to road surface run-off achieves this rating largely due to the likelihood that the impact would affect off-site aquatic habitat and therefore was rated to be of a Regional extent. Water quality impairment as, while having a limited likelihood of occurring, is rated to have a Medium impact intensity due to the consequence that a raw effluent leak would have on aquatic biodiversity given the high sensitivity to water quality changes and low naturally occurring nutrient levels in the region's aquatic systems. All the operational phase-related impacts can be effectively mitigated with the result that all the identified impacts would have a **Very low (-ve)** impact significance rating.

Table 26: Summary of the impact significance ratings.

Impact*	Without mitigation	With mitigation
Construction phase:		
Disturbance of wetland habitat	**Low**	**Very low**
Alteration of Flow Regime	**Very low**	*N/A*
Erosion and sedimentation	**Low**	**Very low**
Water quality impairment	**Low**	**Very low**
Loss of Biota	**Low**	**Very low**
Operational phase:		
Alteration of flow regime	**Medium**	**Very low**
Erosion and sedimentation	**Low**	**Very low**
Water quality impairment	**Medium**	**Very low**
Loss of Biota	**Low**	**Very low**

*note: all impacts are negative unless indicated as a benefit.

It is accordingly the specialist's reasoned opinion that provided the recommended mitigation measures are implemented, the proposed residential development should be supported from a freshwater ecological perspective. This extends to the access routes under consideration as both access routes are acceptable provided the recommended mitigation measures are implemented.

When comparing the Municipality's preferred access route with the alternative of using the Municipal cemetery route, the alternative route (i.e. the route via the cemetery) is the most preferred route from an aquatic biodiversity perspective. This is primarily due to the fact that the alternative route is sufficiently set-back from wetlands and only crosses two narrow channels of non-perennial drainage lines which allows for a bridge structure that spans the channels and thereby minimising instream habitat disturbance. Both alternatives are however acceptable from an aquatic biodiversity perspective should the recommended mitigation measures as listed below be implemented:

Essential measures to minimise construction disturbance to wetland habitat:

- Clearly demarcate the edge of the development footprint of each accommodation area using weather-proof markers for the full duration of the construction phase and declare all areas outside the development footprint as No-Go areas for the full duration of the construction phase;
- Only with written permission from the ECO may construction workers be permitted to enter the No-Go area and this should only be for the purposes of rehabilitation (in the event that the wetland area is damaged) or for the purpose of collecting wind-blown construction waste.
- Ensure that all construction vehicles remain within the development footprint of the access road. If turning areas are required then ensure that these are located in the terrestrial areas between the wetland area and the quarry site (note: this is subject to endorsement by the appointed terrestrial biodiversity specialist).
- Ensure that all material stockpiles and construction machinery are located/parked at least 20m from any wetland habitat.

Essential measures to address the construction phase increased erosion and sedimentation:

- Limit the construction phase to the dry summer months when rainfall is at its lowest;
- Minimise the time that exposed soils are potentially exposed to the elements (as far as practically possible);

- Cover all soil, sand and stone stockpiles with plastic sheeting to ensure that the stockpiles are protected from rain;
- Actively repair any erosion runnels and prevent any sediment-laden run-off from exiting the construction area through placement of sandbags or similar; and
- Immediately after construction of the buildings and associated infrastructure is complete, revegetate any exposed areas with locally occurring indigenous plant species.

Essential measures to minimise impairment of water quality during the construction phase:

- Undertake the construction of the access road during the dry summer months.
- Ensure that all construction machinery and vehicles are checked routinely for oil leaks and are in good working order before being permitted onto the development site;
- Use drip-trays at all times when operating petrochemical driven construction machinery (e.g. generators and cement mixers);
- Use drip trays and other appropriate containment methods while refuelling of vehicles and machinery;
- Demarcate an area for the refuelling of machinery and vehicles (this is recommended to be at the Municipal WWTW);
- Ensure that hazardous substances and chemicals are stored in a contained, impermeable area which has the capacity to contain at least 110% of the total volume of stored substances.
- Store cement is a secure weather-proof area (e.g. shipping container) and ensure that used cement bags are placed in plastic bin-bags prior to placement in the on-site solid waste storage area;
- All cement batching on the site must be undertaken on impermeable and bunded batching boards to ensure cement slurry is contained; and
- Any cement residues and concrete waste within the construction site must be removed at the end of every working day and disposed of as rubble.

Essential measures to minimise loss of biota during the construction phase:

- Clearly demarcate the edge of the development footprint of the proposed access road using weather-proof markers for the full duration of the construction phase and declare all areas outside the development footprint as No-Go areas for the full duration of the construction phase;
- Only with written permission from the ECO may construction workers be permitted to enter the No-Go area and this should only be for the purposes of rehabilitation (in the event that the wetland area is damaged) or for the purpose of collecting wind-blown construction waste.
- Ensure that all construction vehicles remain within the development footprint of the access road. If turning areas are required then ensure that these are located in the terrestrial areas between the wetland area and the quarry site (note: this is subject to endorsement by the appointed terrestrial biodiversity specialist).
- Ensure that all material stockpiles and construction machinery are located/parked at least 20m from any wetland habitat.

Essential measures to minimise operational phase alteration and flow regime and associated increased erosion and sedimentation:

- Where the proposed access road is aligned through sloping terrain near wetland habitat (e.g. the first 60m of the access road after leaving Clarence Drive) install drainage control structures every 10m that direct road run-off away from the road and into the surrounding veld.

Essential measures to minimise water quality impairment and associated biota loss during the operational phase:

- Ensure that the conservancy tank is appropriately sized (input should be obtained from a professional civils engineer and the calculation endorsed by the Municipality).
- Formalise an operational agreement between the owner/s and the Municipality/3rd party contractor that specifies the timing of tank emptying; and
- During the operational phase, monitor the site for any odorous liquids possibly being associated with a leaking sewerage system.

Should the Municipality accept the alternative access route via the Municipal cemetery and this receive environmental authorisation then the following measure should be implemented as mitigation of habitat disturbance during the construction phase:

- When designing the crossings of the two non-perennial drainage lines, ensure that the bridge structure spans the channels of the drainage lines and that no footings or stabilisation structures are placed within either channel.

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 proposed development-related activities that would potentially generate negative impacts were found to be associated with a LOW risk class.
- All of the identified negative potential impacts, with the implementation of the recommended mitigation measures, are limited to the impact site or are site-specific.
- The potential impacts have varying durations and probabilities of occurrence.
- Each identified risk has been determined with a Medium level of significance.

Given that all of the activities have been determined to be associated with a LOW risk rating, the proposed development qualifies for a General Authorisation (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

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

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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. 2017. Buffer zone guidelines for drainage lines, wetlands and estuaries. Part 2: Practical Guide. WRC Report No. TT 715-1-17, Water Research Commission, Pretoria.

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 Commision, Pretoria.

Mucina, L. and Rutherford, M.C. (EDS.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitizia 19. South African National Biodiversity Institute, Pretoria, South Africa.

Nel, JL, 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.

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 – 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) ***Cum Laude***	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	**Years experience**
Integrated Environmental Management	25 years +

Natural Resource Management Planning	25 years +
Freshwater Ecological Specialist Studies	5 years +

EMPLOYMENT HISTORY

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.

WORK EXPERIENCE (note IEM and Public Participation experience not listed below)

Freshwater ecological specialist studies:

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, Franschhoek, 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 propsoed 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 residential dwellings 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)

Environmental Planning and Natural Resources Management:
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 1st 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 2 – Impact Assessment Criteria[7]

The criteria used to determine impact consequence are presented in the tables below.

Table 1: Description of criteria considered when assessing potential impacts.

CRITERIA	DESCRIPTION OF ELEMENTS THAT ARE CENTRAL TO EACH ISSUE	
Extent of the impact	SITE SPECIFIC	Site specific/Local: Extends only as far as the activity
	LOCAL	Limited to the site and its immediate surroundings
	REGIONAL	Regional/Provincial: Will have an impact on the region/province
	NATIONAL	National: Will have an impact on a national scale – particularly if an ecosystem or species of national significance is affected
Duration of impact	SHORT TERM	Construction phase
	MEDIUM TERM	Operational phase
	LONG TERM	Where the impact will cease after the operational or working life of the activity, either due to natural processes or by human intervention
	PERMANENT	Where mitigation or moderation by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient or temporary
Intensity of impact	VERY LOW INTENSITY	Natural, cultural and social functions and processes are not affected
	LOW INTENSITY	Affects the environment in such a way that natural, cultural and social functions and processes continue, although in a slightly modified way
	MEDIUM INTENSITY	Affects the environment in such a way that natural, cultural and social functions and processes continue, although in a modified way
	HIGH INTENSITY	Natural, cultural or social functions or processes are altered to the extent that they will temporarily or permanently cease
Probability of impact occurring	LOW	Improbable
	MEDIUM	Probable
	HIGH	Highly probable
	DEFINITE	Impact will occur regardless of any prevention methods
Determination of significance		
	LOW	The impacts will have a minor or insignificant influence on the watercourse.
	MEDIUM	The impacts will have a moderate influence on the watercourse. The impact can be ameliorated (lessened or improved) by a modification in the project design or implementation of effective mitigation measures.
	HIGH	The impacts will have a high influence on the watercourse. The impact can be ameliorated (lessened or improved) by a modification in the project design or implementation of effective mitigation measures. Should have an influence on decision, unless it is mitigated
	VERY HIGH	The impacts will have a major influence on the watercourse. The impacts could have the no-go implications on portions of the development regardless of any mitigation measures that could be implemented. Influence decision, regardless of any possible mitigation.

[7] Adapted from SRK Impact assessment methodology

SIGNIFICANCE RATING	LIST OF CRITERIA USED IN ASSIGNING A SPECIFIC SIGNIFICANCE RATING		
	INTENSITY	**EXTENT**	**DURATION**
Very High	High	National	Permanent / Long Term
	High	Regional	Permanent / Long Term
	Medium	National / Regional	Permanent
High Significance	High	Regional	Medium Term
	High	National	Short Term
	High	Local	Long Term / Permanent
	Medium	National	Medium Term
	Medium	Regional	Long Term
Medium Significance	High	Local	Medium Term
	Medium	Local	Permanent
	High	Regional	Short Term
	Medium	National	Short Term
	Medium	Regional	Medium Term
	Medium	Local	Long Term / Permanent
	Low	National	Medium Term
	Low	Regional	Long Term
Low Significance	High	Local	Short term
	Medium	Local	Short Term / Medium Term
	Medium	Regional	Short Term
	Low	National	Short Term
	Low	Regional	Medium Term
	Low	Local / Site specific	Long Term
	Low	Local	Permanent
Very Low Significance	Very Low	Local	Long Term / Permanent
	Low	Local	Short term
	Low	Site specific	Medium / Short Term
	Very low	Site specific / Local	Short Term

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: 04/03/2025

Appendix 4 – Risk Assessment Matrix

PROJECT: **Portions 125 & 126 of Farm 599 Bettys Bay**

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: 04-Mar-25

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Access road construction	Wetland Habitat Disturbance	9,6	L	Medium
		Alteration of Flow Regime	14,4	L	Medium
		Erosion and Sedimentation	9,6	L	Medium
		Water Quality Impairment	12	L	Medium
	Operation of construction machinery and storage of construction materials	Wetland Habitat Disturbance	9,6	L	Medium
		Biota Loss	9,6	L	Medium
		Erosion and Sedimentation	9,6	L	Medium
OPERATIONAL	Presence of hard surfaces	Alteration of flow regime	24	L	Medium
	Conservancy Tank	Water quality impairment	4,8	L	Medium
		Loss of biota	4,8	L	Medium