Construction of Stormwater Infrastructure for Erosion Control – Erf 326, 318 and 139, Herolds Bay, Western Cape.

Aquatic Compliance Statement

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EXECUTIVE SUMMARY

Confluent Environmental was appointed by the George Municipality to undertake an aquatic assessment for the construction of a stormwater infrastructure to address a sever erosion problem on erf 318 and a portion of erf 139, Herolds Bay, George Local Municipality. The proposal includes the construction of a subsoil drainage system, a 2 m high gabion basket wall and a gabion channel to control erosion and stormwater runoff.

The site visit confirmed the presence of a highly eroded channel located between erven 317 and 319, that extends relatively far down the steep slope to the south of Voëlklip Road towards a non-perennial watercourse that originates further to the west. The channel has been caused by stormwater flows originating from a culvert beneath Voëlklip Road. Given the extensive nature of the erosion it was not possible to determine whether the erosion channel eventually reaches the watercourse, but based on the gradient of the area and the extent of the erosion it is likely that it does. It is therefore essential that this stormwater infrastructure be constructed with the aim of addressing the erosion problem and reducing the energy of stormwater discharge and reducing impacts to the watercourse further down the slope. No aquatic biodiversity will be impacted as a result of the construction of the gabion channel (or the sub-soil drainage and gabion wall upstream of Voëlklip Road). The proposal is aligned with the management objectives of SWSAs and will result in improved protection of the natural, watercourse further down the slope. With respect to the WCBSP, while the construction footprint falls within an aquatic ESA2, it does not fall within the watercourse for which this ESA has been assigned. Construction of the gabion channel will reduce the current impact on water-related services by allowing for the continued delivery of surface runoff without causing further degradation to CBA habitat further down the slope. For this reason, the sensitivity of the site is considered to be **Low**.

Given a watercourse is located further down the slope from the eroded channel, it is however important that several management recommendations are implemented to avoid unnecessary impacts to the watercourse during the construction and operational phase.

DECLARATION OF SPECIALIST INDEPENDENCE

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public;
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant;
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.

Dr. James Dabrowski (PhD)

February 2024

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1. INTRODUCTION

Confluent Environmental was appointed by the George Municipality to undertake an aquatic assessment for construction of stormwater infrastructure on erven 326, 318 and a portion of erf 139, Herolds Bay, George Local Municipality. The stormwater infrastructure is required to address a severe erosion problem on erven 318 and 139. The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA) and the National Water Act (NWA).

1.1 Key Legislative Requirements

According to the protocols specified in GN 1540 (Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation), assessment and reporting requirements for aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (screening tool). An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of:

- **Very High** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or
- **Low** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

The screening tool classified the site as being of **Very High** aquatic biodiversity due its location in a Strategic Water Source Area. According to the protocol, a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool.

1.1.1 National Water Act

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers.

A watercourse means:

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

For the purposes of this assessment, a wetland area is defined according to the NWA (Act No. 36 of 1998):

"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".

Wetlands must therefore have one or more of the following attributes to meet the NWA wetland definition (DWAF, 2005):

- A high water table that results in the saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil;
- Wetland or hydromorphic soils that display characteristics resulting from prolonged saturation, i.e. mottling or grey soils; and
- The presence of, at least occasionally, hydrophilic plants, i.e. hydrophytes (water loving plants).

No activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). According to Section 21 (c) and (i) of the National Water Act, an authorization (Water Use License or General Authorisation) is required for any activities that impede or divert the flow of water in a watercourse or alter the bed, banks, course or characteristics of a watercourse. The regulated area of a watercourse for section 21(c) or (i) of the Act water uses means:

a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

According to Section 21 (c) and (i) of the NWA, any water use activities that do occur within the regulated area of a watercourse must be assessed using the DWS Risk Assessment Matrix (GN 509) to determine the impact of construction and operational activities on the flow, water quality, habitat and biotic characteristics of the watercourse. Low Risk activities require a General Authorisation (GA), while Medium or High Risk activities require a Water Use License (WUL).

1.2 Scope of Work

The objectives of this assessment included the following:

- To undertake a desktop analysis and site inspection to verify the sensitivity of aquatic biodiversity as **Very High** or **Low**; and
- Compile an Aquatic Biodiversity Compliance Statement or Aquatic Biodiversity Specialist Assessment based on the site verification of the sensitivity of the site.
- Determine whether any activities fall within the regulated area of a watercourse as defined by the NWA.

2. DEVELOPMENT PLAN

It is proposed to create subsoil drains on the embankment of Erf 326 to collect runoff from higher lying erven (Erven 125 and 327) (Figure 1). It is further proposed to install a 2m high gabion basket wall on the southern boundary of Erf 326 to prevent further erosion. Erven 317 was most affected with both stormwater runoff and building works leading to the stripping of vegetation and erosion. It is proposed to construct a stepped gabion basket channel and associated infrastructures (reno mattresses, retaining walls) on Erf 318 and a small portion of Erf 139 to control erosion and stormwater runoff. The outlet of the gabion basket channel will be on Erf 139, approximately 2 m beyond an existing sewer line.

A non-perennial watercourse is mapped to originate from just south of Voëlklip Road, originating from Erf 319, further to the west of the eroded channel (Figure 2). It flows for a relatively short period before discharging into the sea, just to the east of Herolds Bay beach. The extent of the proposed stormwater infrastructure falls outside of the mapped watercourse but the flows originating from the eroded channel will most likely flow into the watercourse.

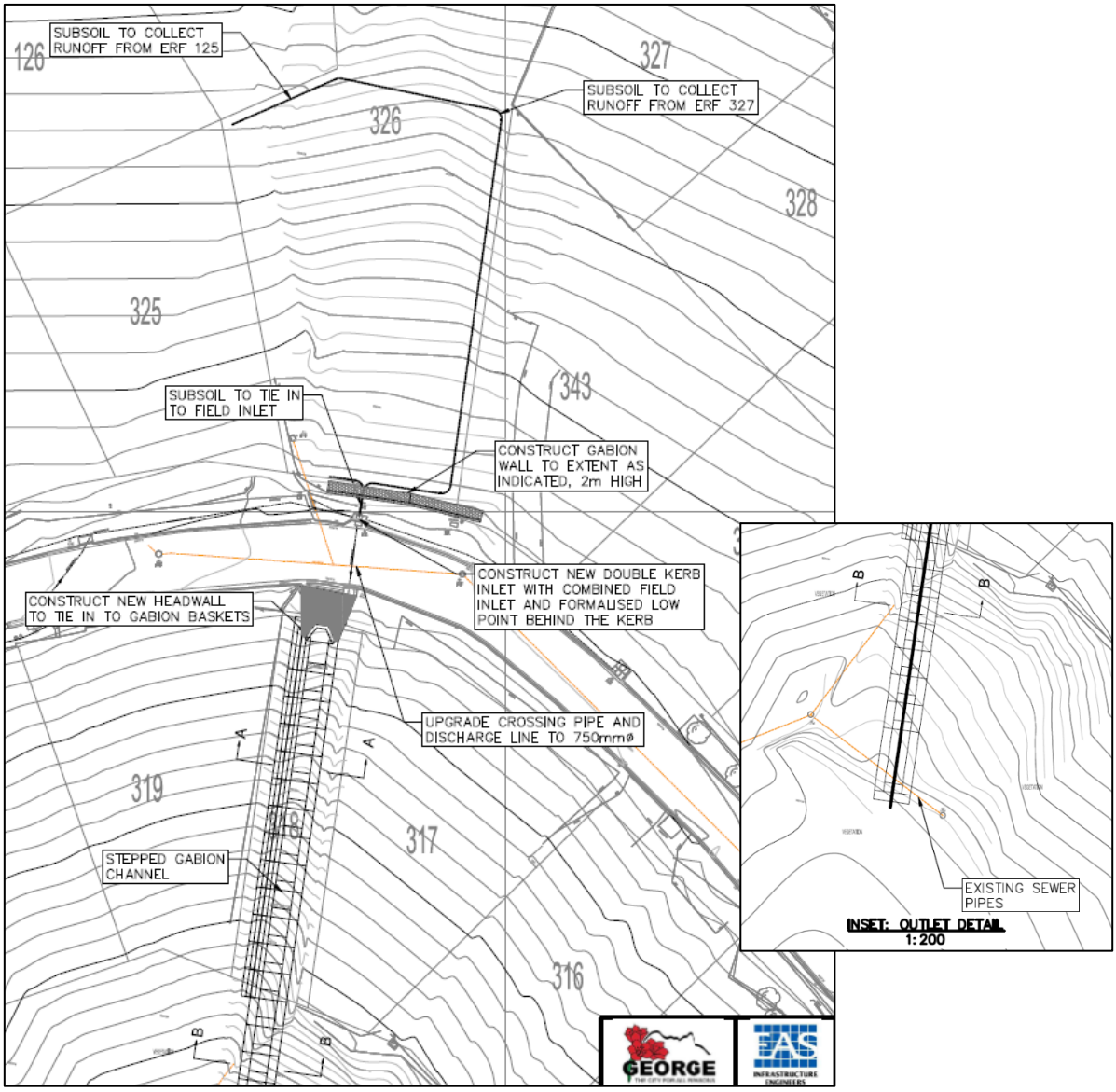

Figure 1: Proposed layout of stormwater infrastructure.

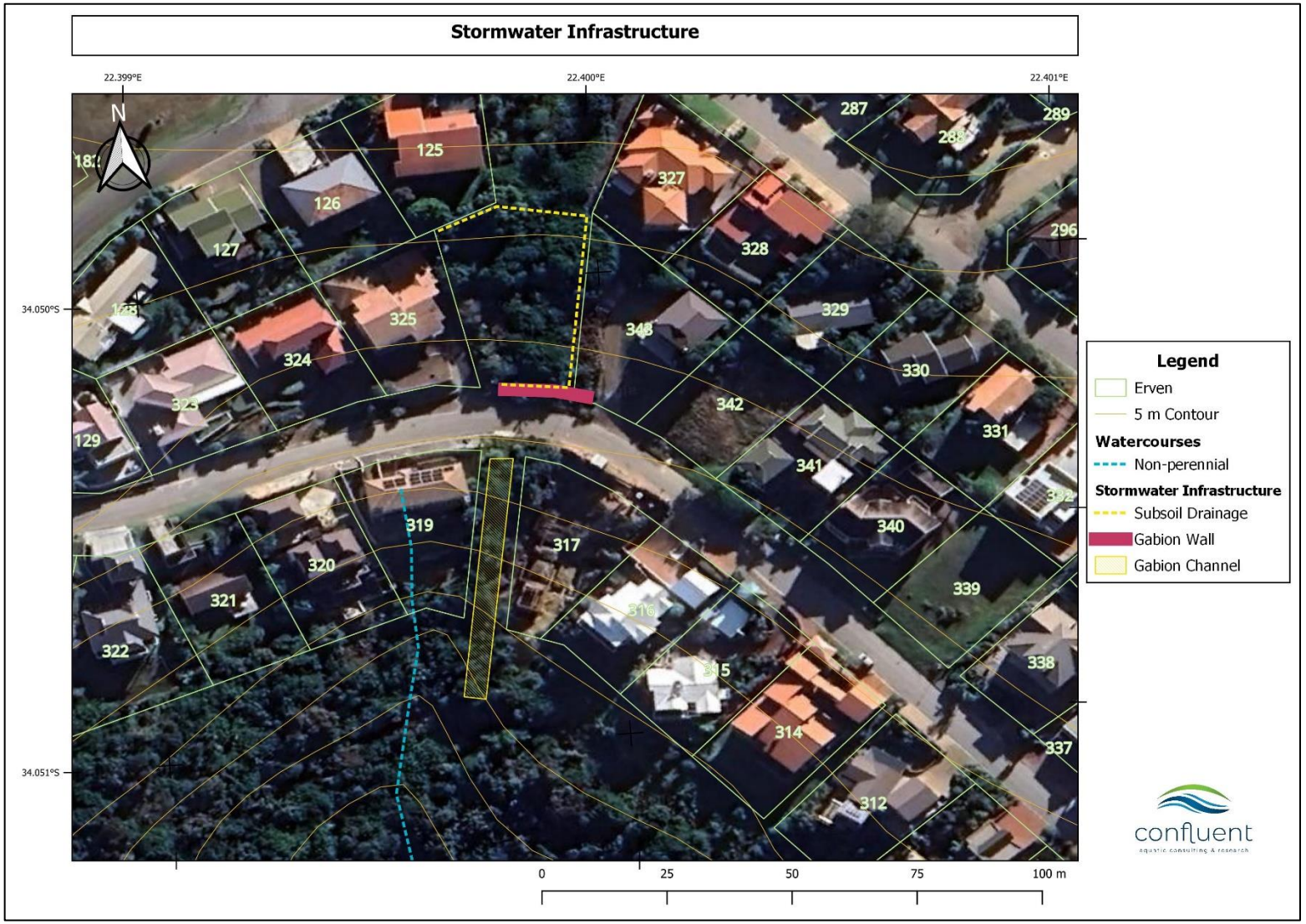

Figure 2: Map indicating location of stormwater infrastructure relative to watercourses.

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3. APPROACH

The following rationale was adopted to determine the sensitivity of aquatic biodiversity within the footprint of the site:

- In the event that watercourses are confirmed to fall within the development footprint and that these watercourses will be impacted by the development, then the site sensitivity is confirmed as **Very High** and a full specialist freshwater assessment is required; and
- In the event that no watercourses are identified within the development footprint the site sensitivity is confirmed as **Low** and an Aquatic Compliance statement is required.

The determination of the site sensitivity relied upon the following approaches:

- Interrogation of available desktop resources including:
    - DWS spatial layers;
    - National Freshwater Ecosystem Priority Areas (NFEPA) spatial layers (Nel et al., 2011);
    - National Wetland Map 5 and Confidence Map (CSIR, 2018) – the latest national wetland inventory map for South Africa;
    - Western Cape Biodiversity and Spatial Plan (WCBSP) for Mossel Bay (CapeNature, 2017).
- A site visit was undertaken, during which time the following activities were undertaken:
    - Identification and classification of watercourses within the footprint of the site according to methods detailed in Ollis et al. (2013);
    - Soil augering to confirm the presence of soil indicators (DWAF, 2005) that may indicate the presence of a wetland (if applicable); and
    - Identification of hydrophilic plant species that may indicate the presence of wetland plant species (if applicable).

4. ASSUMPTIONS & LIMITATIONS

- The affected site had experienced severe erosion caused by stormwater originating from Voëlklip Road. This led to high drop-offs along the eroded channel. As such it was not possible to walk the entire length of the eroded channel.

5. DESKTOP SURVEY

5.1 Catchment Context

The site is located to the north and south of Voëlklip Road, Herolds Bay, in quaternary catchment K30B (Figure 1). The project area falls within the South Coastal Belt (20) Level 1 ecoregion (20.02 Level 2 Ecoregion), which is characterized by moderately undulating plains and low mountains with altitude ranging from 0 to 1 300 m above mean sea level. Mean annual precipitation for the catchment area is approximately 800 mm per year and occurs all year-round, with peaks in October to November and March to April. Dominant natural vegetation in the vegetation comprises broadly of fynbos, renosterveld, dune thicket, and afromontane forest.

Soils in the catchment area are relatively shallow consisting of a diagnostic pedocutanic duplex soil, with a clear textural contrast between the A and B horizon. The B horizon is however heavily enriched with clay, which serves as a barrier to both root growth and water movement. Sub-surface water therefore tends to flow laterally over the top of the B horizon, through the more coarsely textured A horizon. In addition, the area falls within a very high intensity rainfall zone. For these reasons, soils are highly erodible and is undoubtedly an important contributing factor to erosion at stormwater outlets. Furthermore, high intensity rainfall in urban areas results in very high volumes of high energy stormwater inputs, which is the underlying cause of flood damage experienced in George.

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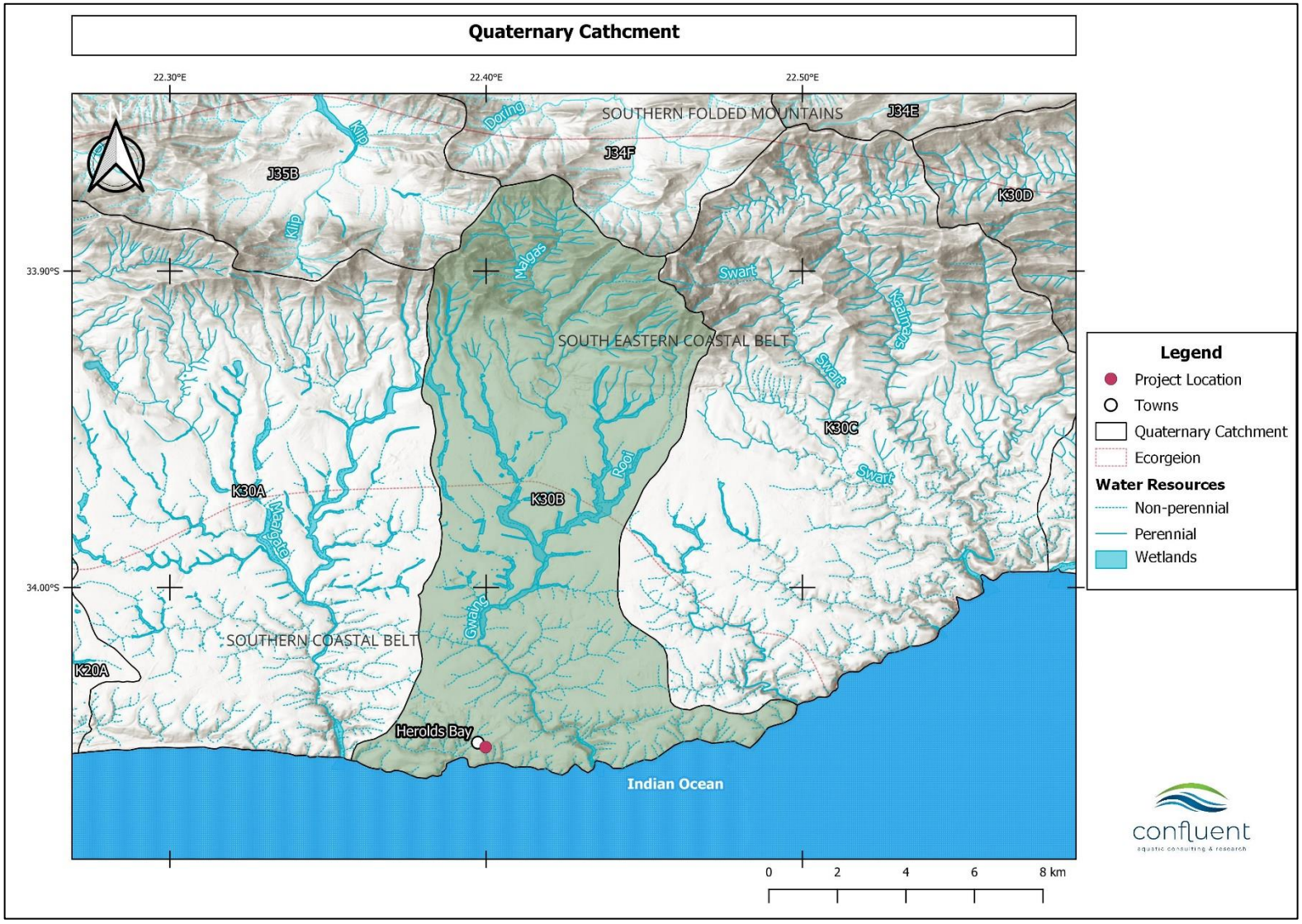

Figure 3: Map indicating the location of the project area in quaternary catchment K30B.

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5.2 Freshwater Ecosystem Priority Areas

The study site is located within sub-quaternary catchment (SQC) 9151, which, according to the National Freshwater Ecosystem Priority Atlas (NFEPA, Nel *et al.,* 2011), has not been classified as a FEPA (Freshwater Ecosystem Priority Area). The project area therefore falls within an SQC that is not considered as being a priority for maintaining freshwater biodiversity at a national scale.

5.3 Strategic Water Source Areas

The project area falls within the Outeniqua Strategic Water Source Area (SWSA), which is considered to be of national importance. SWSAs are defined as areas of land that either:

a) Supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or

b) Have high groundwater recharge and where the groundwater forms a nationally important resource; or

c) Areas that meet both criteria (a) and (b).

SWSAs are vital for water and food security in South Africa and also provide the water used to sustain the economy. Given this context, management and implementation guidelines have been developed with the objective of facilitating and supporting well-informed and proactive land management, land-use and development planning in these nationally important and critical areas (Le Maitre, et al., 2018). The primary principle behind this objective is to protect the quantity and quality of the water they produce by maintaining or improving their condition. The proposed development footprint falls within an urban 'working landscape' and in this context the management objectives are:

- To maintain at least the present condition and ecological functioning of these landscapes;
- To restore where necessary; and
- To limit or avoid further adverse impacts on the sustained production of high-quality water.

5.4 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (2016) covers both terrestrial and freshwater habitats. According to the plan, the portion of the site below Voëlklip Road is mapped as an aquatic ESA2 (Figure 4) which are relatively degraded areas that are not required to meet biodiversity targets but do play an important role in maintaining ecological and hydrological processes.

Table 1: WCBSP categories and management objectives relevant to the upgrade of Rooidraai Road.

Category	Description	Management Objectives
CBA1	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.
ESA2	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 minimize impact on ecological processes and ecological infrastructure functioning, especially soil and water-related services, and to allow for faunal movement.

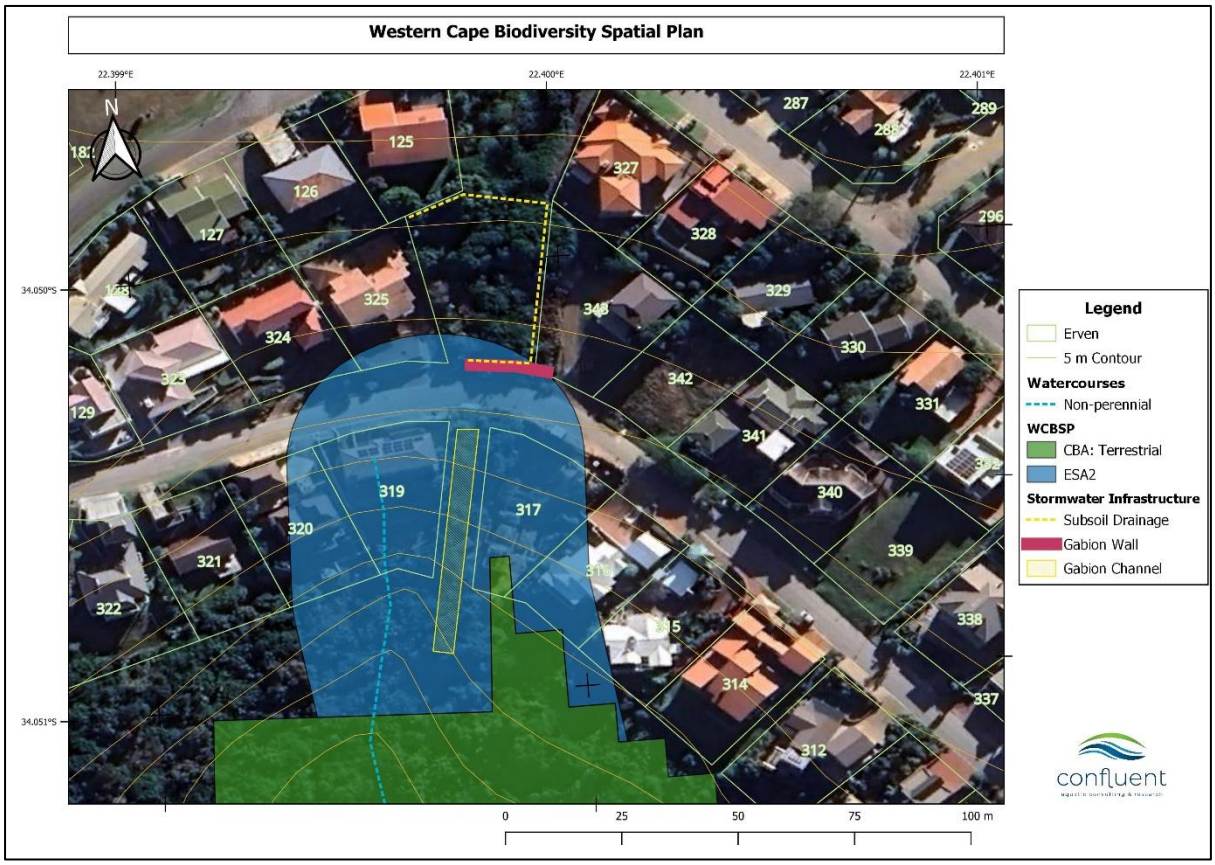

Figure 4: Location of the property in relation to the Western Cape Biodiversity Spatial Plan.

6. SITE VISIT

The site visit was conducted on the 26th of January 2024. Significant erosion was observed to the south of Voëlklip Road resulting in a very steep, narrow, deeply incised channel (Figure 5). This erosion has most definitely been caused by stormwater originating from a culvert beneath Voëlklip Road. It was not possible to walk the entire length of the eroded channel due to very steep drop-offs along its length, but a clear view of the channel up to the sewer line crossing the watercourse was visible. From this view it was evident that the erosion extended far down the slope and is likely to have reached the non-perennial watercourse that runs just to the west of the channel. Given the inaccessibility of the length of the erosion channel it is uncertain to what extent the stormwater runoff has impacted on the watercourse further down the slope – but based on observations made at the site it is quite likely that stormwater from

Voëlklip Road does most likely reach the watercourse. There was no clear indication of any channel or erosion upstream of Voëlklip Road.

Figure 5: Photographs of the eroded channel below Voëlklip Road including the stormwater outlet discharging into the channel (A); a view of the eroded channel to the north (B); view of the eroded channel to the south (C); and the heavily eroded banks of the channel (with the sewer pipe crossing in the background (D).

7. AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

The site visit revealed a highly eroded channel that extends relatively far down the steep slope to the south of Voëlklip Road towards the direction of a non-perennial watercourse that originates further to the west. This has been caused by stormwater flows originating from a culvert beneath Voëlklip Road. Given the extensive nature of the erosion it was not possible to determine whether the erosion channel eventually reaches the watercourse, but based on the gradient of the area and the extent of the erosion it is likely that it does. It is therefore

essential that this stormwater infrastructure be constructed with the aim of reducing the energy of stormwater discharge and reducing impacts to the watercourse further down the slope. No aquatic biodiversity will be impacted as a result of the construction of the gabion channel (or the sub-soil drainage and gabion wall upstream of Voëlklip Road). The proposal is aligned with the management objectives of SWSAs and will result in improved protection of the natural, watercourse further down the slope. With respect to the WCBSP, while the construction footprint falls within an aquatic ESA2, it does not fall within the watercourse for which this ESA has been assigned. Construction of the gabion channel will reduce the current impact on water-related services by allowing for the continued delivery of surface runoff without causing further degradation to CBA habitat further down the slope. For this reason, the sensitivity of the site is considered to be **Low**.

Given a watercourse is located further down the slope from the eroded channel it is however important that several management recommendations are implemented to avoid unnecessary impacts. These include the following:

- A construction schedule must be developed and clearly defined so as to avoid multiple sites being exposed and unattended to at any moment in time. The completion date for each phase of the construction must be indicated and all clearing, excavation, and stabilisation operations must be completed before moving onto the next phase;
- Dry working conditions must be established in the channel. Stormwater originating from the outlet on Voëlklip Road must be temporarily diverted around the construction site and safely discharged into the channel below;
- A temporary straw-bale check dam must be placed across the channel, immediately downstream of the construction area as a back-up to trap high levels of sediment in the event of a high rainfall event. The check dam and any accumulated sediment must be removed by hand as soon as construction is complete;
- No construction materials or topsoil must be stockpiled within the eroded channel. Stockpiles of construction materials must be placed outside of the channel (on as flat an area as possible) and protected (e.g. through use of sandbags and/or tarpaulins) to prevent materials being washed into the channel.
- Construction of a stilling basin at the outlet of the gabion channel should be considered so as further reduce stormwater energy and minimise erosion of the slope and watercourse downstream of the channel.

8. REFERENCES

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