27 Heron Circle
Kommetjie
7975
04.10.2025

Enviro-EAP Environmental Consultants
Att: Nicolaas Hanekom

PROPOSED HOUSING DEVELOPMENT AND EXPANSION OF THE EXISTING MUNICIPAL WASTEWATER TREATMENT WORKS ON REMAINDER ERF 279 CLANWILLIAM, CEDARBERG MUNICIPALITY, WESTERN CAPE

PEER REVIEW OF AQUATIC BIODIVERSITY ASSESSMENT (ENVIRO-EAP, 2025)

1 Background

The Cedarberg Municipality proposes the development of affordable/low-cost housing in two areas in Clanwilliam as indicated in Figure 1. The proposed development requires environmental authorisation in terms of the NEMA EIA Regulations (2014, as amended) and Water Use licence (WUL) in terms of the National Water Act (Act 36 of 1998) given that the development triggers NEMA-listed activities and NWA Section 21 c and i activities.

The Cedarberg Municipality appointed Enviro-EAP Environmental Consultants ("Enviro-EAP") as the Environmental Assessment Practitioner (EAP) to manage the required environmental applications including the preparation of the required Aquatic Biodiversity Assessment, given that the Screening Tool Report indicated the site to have a VERY HIGH sensitivity for the Aquatic Biodiversity Theme. However, the authority with competency over the NEMA EIA Regulations, the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), indicated the Enviro-EAP does not have the requisite expertise to conduct specialist aquatic biodiversity assessments and therefore a SACNASP registered scientist with expertise in the field of Aquatic Ecology must conduct a peer review of the study and confirm if the study is compliant with the gazetted Protocol for Aquatic Biodiversity Assessments. EnviroSwift Western Cape ("EnviroSwift") was accordingly appointed by Enviro-EAP to conduct the independent peer review. The CV of the review specialist, Mr Nick Steytler, is provided as Appendix A.

In order to provide this input EnviroSwift conducted a site visit on 26 September 2025. This letter-format report outlines the findings of this peer review.

Figure 1: Location of the proposed areas for development (Area 1 and Area 2) indicated as a yellow polygon. The track followed by EnviroSwift during the site visit is shown as a blue line.

2 Description of the proposed development

The proposed housing project comprises the following:

Area 1: CLANWILLIAM HOUSING IRDP PROJECT (total development footprint of ±29.3883 ha):
- 160 Single Residential Zone 1 erven - Average erf size: ±208m²
- 692 Single Residential Zone 2 erven - Average erf size: ±150m²
- 21 Open Space Zone 1 erven
- 13 Open Space Zone 1 erven
- 6 Community Zone II (church) erven
- 1 Community Zone I (crèche) erven
- 1 Community Zone I (school) erf
- 1 Community Zone I (community centre) erf
- 1 Community Zone III (clinic) erf
- 3 Local Business Zone II erven
- 2 Authority & Utility Zone erven
- Transport Zone II erven

Area 2: CLANWILLIAM HOUSING UISP PROJECT (total development footprint of ±19.7680ha):
- 457 Single Residential Zone II erven - Average erf size: ±120m²
- 2 Open Space Zone I erven
- 2 Community Zone II (church) erven
- 2 Community Zone I (crèche) erven
- 1 Local Business Zone II erven
- Transport Zone II erven

In order to meet the servicing requirements of the housing development the following is proposed:

Sewerage Infrastructure:

- Expansion of the WWTW footprint by approximately 0.5ha to expand the WWTW throughput capacity to treat less than 2000 cubic meters of effluent per day.
- Upgrade of the existing municipal sewerage reticulation as follows:
    - CCIS6.1 – 380 m x 450 mm Ø Upgrade existing 150 mm Ø outfall sewer
    - CCIS6.2 – 950 m x 200 mm Ø Upgrade existing 160 mm Ø outfall sewer
    - CCIS6.3 – 475 m x 525 mm Ø Upgrade existing 150 mm Ø bulk sewer
    - CCIS2.2 – 370 m x 200 mm Ø Upgrade existing 150 mm Ø outfall sewer
    - CCIS2.3 – Upgrade capacity of Milner Street PS to 55 L/s
    - CCIS2.4 – 780 m x 315 mm Ø Upgrade existing 200 mm Ø rising main
    - CCIS4.1 – 260 m x 200 mm Ø New outfall sewer
    - CCIS4.2 – 270 m x 250 mm Ø New outfall sewer
    - CCIS4.3 – 350 m x 200 mm Ø New outfall sewer
    - CCIS4.4 – New 20 L/s Future PS CI2
    - CCIS4.5 – 1 005 m x 160 mm Ø New rising main
- For the development of Area 1 the following upgrades are required:
    - Master plan items CCIS6.2 & CCIS6.3 to reinforce the capacity of the existing gravity system
    - between the proposed development and the Clanwilliam WWTP.
    - Link services items CCIS4.1 & CCIS4.2 to connect the internal sewer network of the development area to future PS CI2, and
    - Future PS CI2 (master plan item CCIS4.4) and rising main (master plan item CCIS4.5) to service the larger drainage area.
    - A small portion of the development drains towards the existing Milner Street PS, which discharges into the Clanwilliam Gravity drainage areas. The bulk sewer downstream of the Milner Street PS is at capacity and should be upgraded (master plan items CCIS6.1 & CCIS6.3).
    - The existing Milner Street PS drainage area has spare capacity to accommodate the erven within development area A which drains towards the Milner Street PS. In the sewer master plan for Clanwilliam upgrading of the Milner Street PS and accommodating rising main is however proposed (refer to master plan items CCIS2.3 & CCIS2.4), as well as upgrading of the main outfall sewer gravitating toward the Milner Street PS (refer to master plan item CCIS2.2). It can be considered to upgrade the PS, rising main and outfall sewer (master plan items CCIS2.2, CCIS2.3 & CCIS2.4) as part of the construction of the development as these items runs through the development area.
- For the development of Area 2 the following upgrades are required:
    - Link services items CCIS4.2 & CCIS4.3 to connect the internal sewer network of the development area to future PS CI2, and
    - Future PS CI2 (master plan item CCIS4.4) and rising main (master plan item CCIS4.5) to service the larger drainage area.

Potable Water Supply:

The existing water reticulation system of the Cederville reservoir water distribution zone has insufficient capacity to accommodate the proposed development and therefore the following upgrades are required:

- Network upgrade:
    - Item 1 – 190m x 200mm diameter; replace existing 160mm pipe
    - Item 2 – 90m x 160m diameter; replace existing 75mm pipe
    - Item 3 – 285m x 160mm diameter internal water pipes
    - Item 4 – 550mm x 160mm diameter internal water pipes
    - CCIW2.1 – 220m x 315mm new supply pipe
    - CCIW2.2 – 320m x 315mm; replace existing 75mm pipe
    - CCIW2.3 – 260m x 315mm; replace existing 75mm pipe
    - CCIW2.6 – 190m x 110mm new supply pipe
- Reservoir upgrade:
    - CCIW.B1: 3 000 kL additional storage capacity for Cederville reservoir site
    - CCIW.B12: 90 m x 315 mm Ø New feeder pipe to Cederville no. 2 reservoir
    - CCIW.B16: 90 m x 315 mm Ø link pipe between Cederville no. 1 & 2 reservoirs
    - CCIW.B17: 5 m x 160 mm Ø inter-connection pipe between 2x bulk pipes

Stormwater:

An underground piped stormwater system will be provided to accommodate for the minor storm events (up to RI 1: 5 years). The major storm events will be accommodated within the street reserves. Stormwater run-off will

be channeled to the existing Jan Dissels River flowing to the east of the proposed development using existing non-perennial river.

Roads:
Access to the proposed development will be provided from the existing Bloekom Avenue, south of the proposed development, Denne and Buitekant Street to the west and from Oranje, Protea and Viooltjie Streets to the north. The internal roads (main access road 16m wide and other internal roads 10m wide) will consist of surfaced streets.

A key deficiency in the description of the proposed development is the absence of any drawings that show the extent of the development and whether any aquatic features are being retained in the Aquatic Biodiversity Assessment (Enviro-EAP, 2025). A Spatial Development Plan (SDP) should be provided.

3 Determination of the regional aquatic biodiversity context based on desktop sources

Enviro-EAP listed the following desktop sources when determining the regional aquatic biodiversity context for the site:

- 1:50 000 topographic mapping sourced from the Surveyor General's office.
- Aerial imagery sourced from Google Earth.
- Aerial imagery sourced from ESRI.
- Vegetation types and their conservation status was extracted from the South African National Vegetation Map (Mucina and Rutherford 2018).
- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) was extracted from the SABIF/SIBIS database hosted by SANBI.
- The IUCN conservation status of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2011).
- Threatened Ecosystem data was extracted from the National List of Threatened Ecosystems 2010.
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011) and National Wetlands Map.
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- The CapeNature Spatial Biodiversity Plan 2017.

While the list is exhaustive certain databases have been updated and it may be the case that Enviro-EAP utilised outdated databases as follows:

- The South African National Vegetation Map (Mucina and Rutherford, 2018) has been updated and the current version is dated 2024. Note however that the applicable terrestrial vegetation type is still indicated as Citrusdal Vygieveld, with no change in the ecosystem status (Least Threatened) in the current gazetted ecosystem threat status (Government Gazette No. 47526 of November 2022). As such this is of no material effect on the accuracy of the reporting.
- The currently applicable database for wetlands is the National Wetlands Map Vers. 5 (NWM5) (CSIR, 2018) and this supercedes the NFEPA wetlands map. The report did not include the NWM5 Map (see Figure 2) and only presented to the NFEPA wetlands map. This is of no material consequence as the two databases are aligned insofar as the location and extent of aquatic features in the Clanwilliam area are concerned.
- While no guidance is specifically given on the preferred database for rivers and drainage lines, the NGI Rivers database (available on Cape Farm Mapper) is regarded by EnviroSwift as a relatively accurate map that indicates the approximate position of major rivers, streams and drainage lines (both perennial and non-perennial). The NGI Rivers database identifies a non-perennial drainage line which arises in the central portion of Site 1 and flows in a north-easterly direction towards the Jan Dissels River, approximately 150m from the boundary of Site 1. The NFEPA map is however aligned with the NGI Rivers database and therefore this deficiency is of no material significance.
- The CapeNature Spatial Biodiversity Plan (CSBP, 2017) is indicated as the key source for determining the biodiversity conservation importance of the site but the most up-to-date database in this regard is the Western Cape Biodiversity Spatial Plan (WCBSP, 2023). No maps are presented in the report indicating the biodiversity conservation importance of the site and surrounding areas so it cannot be deduced whether the CSBP was consulted nor what its outputs were. The WCBSP (2023) indicates that significant portions

of Sites 1 and 2 comprise an Aquatic Ecological Support Area (ESA) 1 due to the presence of important groundwater resource (see Figure 3).

EnviroSwift has prepared the following maps using these databases for comparison with the maps presented by Enviro-EAP (2025) in the following figures (see Figures 2 & 3). Noteworthy is the fact that both the NWM5 (CSIR, 2018) and the WCBSP (2023) indicate that wetlands associated with the Jan Dissels River are located within the NWA Regulated Area for wetlands (500m) with the NWM5 classifying the wetlands as floodplain wetlands while the WCBSP classifying the wetlands as channelled valley bottom wetlands. The key difference between these two wetland types is that floodplain wetlands rely almost entirely on overtopping of the channel during floods while channelled valley bottom wetlands rely on a combination of overtopping and groundwater ingress. In addition, the WCBSP indicates the wetlands associated with the Jan Dissels River as comprising an Aquatic CBA.

Most significantly the outcome of the desktop study is that the non-perennial drainage line that arises in the centre of Site 1 and the wetlands associated with the Jan Dissels River would be at risk of being impacted by the development of site A and the expansion of the WWTW. Site 2 in contrast has no freshwater features mapped within its extent and is sufficiently setback from the Clanwilliam Dam, the key receiving aquatic feature for this site to not be constrained in any way by aquatic biodiversity. This site was therefore not a concern from an aquatic biodiversity perspective and the focus of the peer review was on Site 1. The mapped freshwater features associated with Site 1 should be the focus of an Aquatic Biodiversity Assessment, including the groundtruthing and site investigation. This is evaluated further in the following section.

Figure 2: NGI Rivers (Cape Farm Mapper, 2025) and NWM5 Map (CSIR, 2018). The white stippled line indicates 500m from the site boundary.

Figure 3: WCBSP map (2023). The white stippled line indicates 500m from the site boundary.

4 Groundtruthing and delineation of watercourses

Enviro-EAP (2025) presents a watercourse delineation map based on field work (see Figure 4). The method of delineation is not clearly explained in the report but it would appear that the extent of the wetlands associated with the Jan Dissels River is drawn from the NFEPA database (i.e. was based on desktop sources) and that a wetland not indicated in any online database was delineated in the centre of Site 1 based on groundtruthing and site-based methods. Utilising the online databases for the delineation of off-site freshwater features is considered acceptable, however, the delineation of on-site wetlands should be undertaken using the accepted best-practise site-based methods including but not limited to Job (2009). These methods entail augering to determine the temporary/seasonal wetland boundary based on soil characteristics and best-practise dictates that auger samples should be presented in reporting as proof of the presence of wetland habitat. No such proof of presented in the Enviro-EAP report.

EnviroSwift visited the on-site wetland and its downstream component (which was determined to comprise a non-perennial drainage line) as delineated by Enviro-EAP and presented in Figure 4 and had the following findings:

- The extent of the wetland is slightly greater than the extent mapped by Enviro-EAP (see EnviroSwift Watercourse Delineation Map – Figure 5);
- The wetland is considered to be of natural origins as opposed to Enviro-EAPs opinion regarding the origins of the feature as being artificial as it arose as a result of impoundment of the non-perennial drainage line. An auger sample taken adjacent to the area containing wetland obligate vegetation including *Typha capensis* (bullrush) and *Phragmites australis* (common reed) which clearly shows wetland soils and not alluvial deposits. Had the soils within the drainage line channel comprises alluvial soils then the feature would have been classified as drainage line/river (see Figure 6). The reason why the wetland cannot be considered as artificial is that there is no way the development of a golf course can cause impoundment of a drainage line and the formation of a wetland. Close examination of the downslope extent of the wetland revealed the presence of drainage channels (see Figure 7) leading to a culvert (see Figure 8) which would serve to reduce the hydroperiod of the wetland and thereby reduce its extent as opposed to creating and/or expanding wetland habitat; and
- The delineated non-perennial drainage line arising at the boundary of Site 1 and draining towards the Jan Dissels River is in fact an unchannelled valley bottom wetland (see Figures 9 & 10) and part of a historical unchannelled valley bottom wetland that included the wetland area within the site incorrectly referred to as an artificial feature by Enviro-EAP.

Given these findings it is EnviroSwift's opinion that the detailed ecological assessment and impact/risk assessments should focus on the unchannelled valley bottom wetland that is located in the central part of the site and that drains towards the Jan Dissels River. This is further addressed in the next section.

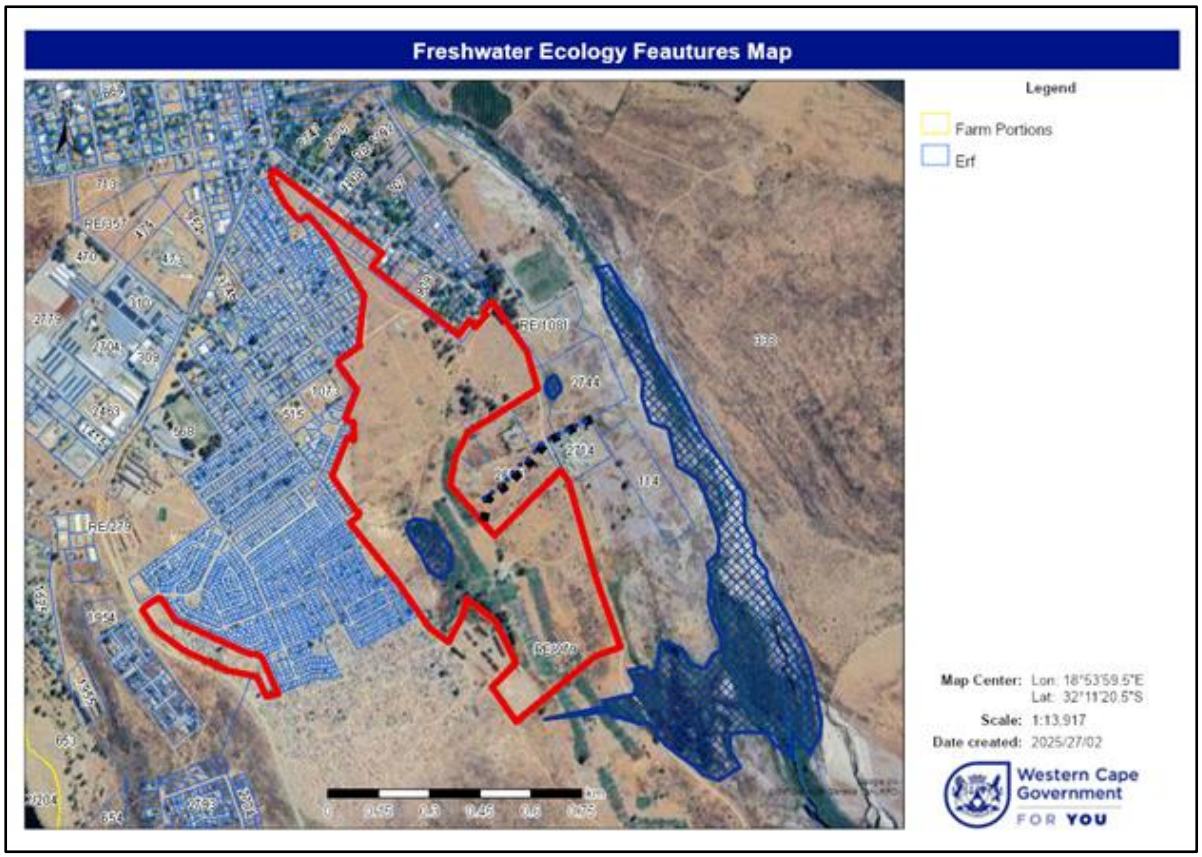

Figure 4: Watercourse Delineation Map as presented as Figure 4 in Enviro-EAP (2025).

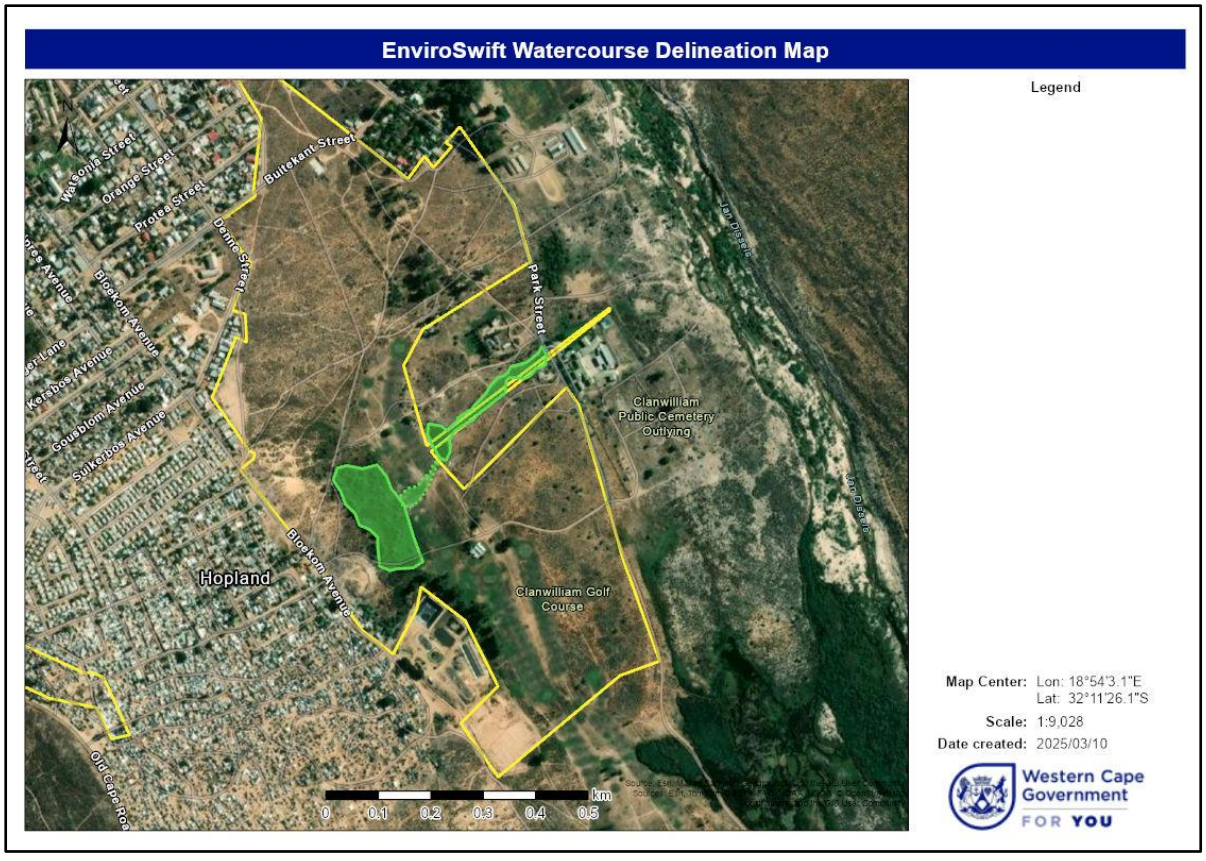

Figure 5: EnviroSwift Watercourse Delineation Map. The green polygon indicates the extent of wetland habitat.

Figure 6: Auger sample taken adjacent to the wetland area. The dark, organically rich soil is indicative of permanent wetland conditions indicating that the wetland extent extends beyond the area containing obligate wetland plants (*Typha capensis* and *Phragmites australis*).

Figure 7: Drainage channel draining the upslope wetland area indicated as a white stippled line.

Figure 8: Culvert draining the wetland area. The culvert discharges on the far side of the golf course into another area containing *Typha capensis* (bullrush) as shown in Figure 9.

Figure 9: The portion of the unchannelled valley bottom wetland on the northern side of the golf course containing *Typha capensis* (bullrush).

Figure 10: The unchannelled valley bottom wetland immediately upslope of Park Street.

A further aspect of the groundtruthing that was not evident in the Enviro-EAP report (2025) is a description of the on-site aquatic habitat and in particular the vegetation community associated with the wetland. In the report Enviro-EAP motivates that the wetland is artificial and that the feature at primary risk is in fact a non-perennial drainage line. This is possibly the reason why no further evaluation of the biotic community associated with the site's aquatic habitat is provided. Enviro-EAP does however make the following two statements in this regard:

- "*The aquatic biodiversity features (non-perennial river) are not ecologically connected and does not support ecological processes and fine-scale habitats as a result of the transformed state of the river. The river also has no hydrological support function."*
- *"The aquatic biodiversity feature are not ecologically connected and does not support ecological processes and fine-scale habitats as a result of the transformed state of the river*."

EnviroSwift disagrees with these assertions as follows:

- The aquatic feature (an unchannelled valley bottom wetland) is ecologically and hydrologically connected to the Jan Dissels River and its associated wetlands as there are no physical boundaries preventing connectivity. While the golf course has impacted on the connectivity by directing flow through a subterranean piped culvert, there is still evidence of wetland hydrology across the fairway with wetland vegetation still present on the portion of the fairway where the wetland would have occurred (indicated as a green stippled polygon in Figure 5). This fact further supports the classification of the feature as a valley bottom wetland and not a drainage line as shallow groundwater, a key driver of wetland systems, reaching the upper 50cm of soil would continue despite the presence of the piped culvert draining of the upslope portion.
- The wetland continues to support several ecological processes (flood attenuation, streamflow regulation, sediment trapping, nutrient assimilation, erosion control and habitat for biota) despite its state of degradation. Had Enviro-EAP undertaken an assessment of the ecological goods and services delivered

by the wetland then Enviro-EAP may have concluded that the feature does provide ecological functional value to the downstream catchment.

The fact that the wetland is hydrologically and ecologically connected with the Jan Dissels River and its associated wetlands and that these freshwater features have been indicated as an Aquatic CBA means that the ecological services provided by the wetland are essential for the Jan Dissels River Aquatic CBA.

5 Detailed freshwater ecological assessment

Due to the incorrect classification of the on-site freshwater feature at direct risk of being impacted as a drainage line whereas it is in fact a wetland, the selection of ecological assessment indices was incorrect. Enviro-EAP utilised the following aquatic ecological assessment indices:

- PES: The Rapid Habitat Assessment Method (RHAM) which is a simplified approach to measure and estimate habitat conditions according to cross sections through broadly defined morphological units (Kleynhans & Louw, 2007); and
- EIS: The EIS method is based on the approach adopted by the Department of Water Affairs (DWA) as detailed in the document “Resource Directed Measures for Protection of Water Resources” (1999).

When undertaking the detailed ecological assessment of wetlands current best practise dictates that the following indices be utilised:

- PES: WET-Health Version 2 (Macfarlane *et al.*, 2020) 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, water quality and vegetation health in four separate modules. The modules are then combined to determine the overall Present Ecological State (PES) of the wetland.
- EIS: The EIS method applied to wetlands is based on the assessment tool developed by Rountree *et. al,* (2014) and is 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 and Sanitation (DWS) and thus enabling consistent assessment approaches across water resource types.

A third index, WET-Ecoservices Version 2 (Kotze et al., 2021) to assess the ecosystem goods and services delivered by the wetland being assessed can also be used in addition to the PES and EIS assessments and its application is invaluable in understanding the ecological functioning of the wetland. Had Enviro-EAP undertaken such an assessment the conclusion that the freshwater feature provides no functional value due to it being transformed would not have been made.

The results of the application of the detailed ecological indices by Enviro-EAP is that the freshwater feature (incorrectly classified as a non-perennial drainage line) has a PES Category of “F” and an EIS of “Moderate”. What the PES of “F” means is that the modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible. EnviroSwift disagrees with this assessment as the wetland has not been completely transformed. Natural habitat, particularly in the two areas containing obligate wetland plants, is only partially impacted by alien invasive plants and water quality impairment due to nutrient loading (phosphates, nitrates and toxicants) from non-point sources and sedimentation from stormwater discharges the upslope urban area with the result that some natural habitat with associated aquatic biota remains in place. While the scope of this independent peer review does not include undertaking a detailed ecological assessment, had EnviroSwift undertaken such an assessment it is likely that the wetland would have been determined to have a PES of “D” or at most “E”.

The EIS assessment of the aquatic feature undertaken by Enviro-EAP came out at Moderate which EnviroSwift agrees with, particularly given that it is hydrologically and ecologically connected with the downstream Aquatic CBA. One statement made by Enviro-EAP that is queried is the statement that while the feature has been assessed to have an EIS of “Moderate” the development is rated as having an EIS of “Low”. EnviroSwift is uncertain of the basis or the merit of such a statement.

6 Assessment of potential impacts on aquatic biodiversity

The standard methods for identifying and assessing potentially significant impacts during the life-cycle of the project have been implemented. However, Enviro-EAP has provided the assessment by means of impact rating tables only and has not provided a separate written description and assessment of the identified potentially significant impacts. Best practise dictates that the tables should be used primarily to summarise the findings of a more detailed written assessment. Also, the recommended mitigation measures are only presented in the impact rating tables. It would have made for better reading had all the recommended mitigation measures been summarised in the report.

Enviro-EAP identified the following two potentially significant impacts associated with the construction and operational phases of the proposed dam:

- Soil erosion and dust; and
- Loss of freshwater habitat.

Soil erosion and dust emissions generated during the construction phase are undoubtedly a potential impact that would affect aquatic biodiversity and its mitigation would be achieved through the implementation of an EMP, as indicated by Enviro-EAP. EnviroSwift is however of the opinion that the aquatic specialist should recommend specific measures to address erosion that in turn need to be incorporated into an EMP. Such measures have not been identified. It is a further requirement that the recommended measures should be articulated in terms of their outcomes to allow some flexibility in the manner in which developers can achieve the intended outcome. The recommended mitigation measures have not been articulated in this manner.

Regarding the loss of freshwater habitat, there is no indication in the report of whether the freshwater feature (described by Enviro-EAP as a drainage line which is in fact a wetland) will be retained in the development scheme. If the feature is going to be retained then Enviro-EAP's assessment that there would be no loss of freshwater habitat would be correct. To further ensure that other impacts associated with urban development in close proximity to aquatic habitat are effectively mitigated, a sufficient buffer should be accommodated. Enviro-EAP should have indicated the minimum buffer width as a key mitigation of various potential impacts including wetland habitat disturbance as a result of edge effects, water quality impairment and biota loss. Determining adequate buffers is a key aspect of an aquatic biodiversity assessment and the National Buffer Guidelines (Macfarlane and Bredin, 2017) provide guidance on this. Annexure 16 of the Guidelines indicates the minimum recommended buffer (worse case) for residential land use as 15m. As such the wetland should be retained in the development and a minimum buffer would need to be established of 15m. Opportunities also exist to rehabilitate the wetland by attending to the following:

- Removal of alien invasive plants;
- Backfilling of drainage channels; and
- Decommissioning of the piped culvert system that directs flow beneath the fairway.

The opportunity to rehabilitate the site's aquatic features was not explored by Enviro-EAP and given the feasibility of rehabilitation (it would be a relatively low-cost exercise), this should have been explored by Enviro-EAP. If the aquatic feature is not going to be retained in the housing development scheme, then the project would qualify for a wetland offset as the loss of the feature, identified to comprise a wetland, would qualify for a biodiversity offset in terms of the National Biodiversity Offset Guideline (Government Gazette No. 3569 of June 2023). If this is the case then a Wetland Offset Management Plan indicating the adequacy of the identified offset site as per the outputs of the Wetland Offsets Calculator (Macfarlane *et al*., 2016) and the rehabilitation, management and protection requirements for the offset wetland. This is a significant undertaking as finding a suitable offset wetland which needs to be of the same wetland type and in the same aquatic ecosystem type, potentially purchasing it and protecting in perpetuity is not a straightforward exercise.

7 Compliance with the gazetted Protocol for Aquatic Biodiversity Assessment

Given that the report comprises an Aquatic Biodiversity Assessment its compliance with the gazetted Protocol needs to be reviewed. Table 1 overpage presents the findings of the assessment of compliance.

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;	
	(a) aquatic ecosystem types; and	Compliant although the aquatic ecosystem was incorrectly classified as a drainage line whereas in the opinion of EnviroSwift should have been classified as a wetland (see Section 4).
	(b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns	Partially compliant as indigenous hydrophytic vegetation was not adequately described or key species identified. This is not material to the outcome of the assessment as the vegetation is mostly alien and is limited in species diversity. Faunal communities have not been described or assessed but this is also not of any material consequence as the habitat is degraded and as a result it can be reasonably assumed that no aquatic faunal Species of Conservation Concern are associated with the on-site wetland.
1.2	the threat status of the ecosystem and species as identified by the Screening Tool	Partially compliant due to the incorrect classification of the aquatic ecosystem. Had it been identified as a wetland then the threat status of the wetland vegetation type and the wetland type would have been gleaned from NFEPA. Instead, Enviro-EAP only provided the threat status of the terrestrial ecosystem type.
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)	Partially compliant. No map indicating the biodiversity conservation status of the site's aquatic features was presented in the report and the national priority status was gleaned from the NFEPA database (Nel *et al*., 2011) which indicated no status. Enviro-EAP did not refer to the WCBSP (2023) which indicates that the mapped non-perennial drainage line (determined based on the site investigation by EnviroSwift to comprise an unchannelled valley bottom wetland) comprised an Aquatic ESA1 (see Figure 3).
1.4	a description of the Ecological Importance and Sensitivity (EIS) of the aquatic ecosystem including:	Compliant although methodologically questionable given the incorrect classification of the aquatic feature (see Section 5).
	(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	Partially compliant because no description was provided in the report although such an understanding would have informed the PES and Eis assessment.
	(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).	Compliant although methodologically questionable given the incorrect classification of the aquatic feature.

No.	Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments	Compliance of current report
2	The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	No alternative scheme is being assessed.
3	Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:	
3.1	Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Uncertain whether the aquatic feature will be retained in the development. Given its identification as an ESA1 that provides an ecological support function to the aquatic biodiversity of a downstream Aquatic CBA, some habitat loss is considered acceptable but the key ecological processes should not be affected.
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 ecosystem under assessment.
3.3	How will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include:	
	(a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);	Not assessed.
	(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);	Briefly assessed as a potential impact in the report.
	(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	The report indicates that there will be no freshwater ecosystem loss but there is no way of confirming if this is the case as it cannot be determined if the on-site feature will be retained and adequately buffered. In the opinion of EnviroSwift there would be wetland habitat disturbance during the operational phase given edge effects and the lack of a properly designed stormwater management system that ensures that post-development stormwater flows do not exceed pre-development flows and also achieves a degree of polishing of stormwater.
	(d) to what extent will the risks associated with water uses and related activities change	Partially compliant as a risk Assessment has been undertaken based on the 2016 Risk Assessment Matrix (RAM) but this RAM has been updated and the current 2023 RAM should have been used.
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);	No assessment was undertaken of the impact on flow regime. In the opinion of EnviroSwift there would be impacts on flow regime during the operational phase given the lack of a properly designed stormwater management system that ensures that post-development stormwater flows do not exceed pre-development flows and also achieves a degree of polishing of stormwater.

No.	**Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments**	**Compliance of current report**
	(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 above comment.
	(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);	This was not assessed although it is unlikely that the aquatic ecosystem would be altered by the proposed development. It will either be retained in which case the feature would remain as an unchannelled valley bottom wetland or it would be lost altogether but it is not possible to confirm the future of the feature in the development scheme.
	(e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	Unable to confirm whether fragmentation of the wetland would occur as a result of the proposed development as no SDP has been prepared and presented in the report to indicate whether the on-site aquatic feature will be retained or fragmented or lost altogether.
	(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 are present on the site.
3.5	How will the proposed development impact on key ecosystems regulating and supporting services especially:	No assessment was conducted of the ecological services provided by the on-site aquatic feature (see Section 5). This is considered a deficiency as this would have resulted in the identification of ecological services provided by the wetland which in turn would have resulted in a different outcome when assessing PES.
	(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?	Unable to confirm whether fragmentation of the wetland would occur as a result of the proposed development as no SDP has been prepared and presented in the report to indicate whether the on-site aquatic feature will be retained or fragmented or lost altogether.
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	Compliant
2	a signed statement of independence by the specialist	Complaint
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	Compliant
4	the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant	Compliant
5	a description of the assumptions made, any uncertainties or gaps in knowledge or data	Compliant
6	the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant	EnviroSwift is of the opinion that the on-site wetland should be retained in the housing scheme and adequately buffered with

No.	**Reporting Requirements as per the Protocol for Aquatic Biodiversity Specialist Assessments**	**Compliance of current report**
		the option for rehabilitation. It was not possible to determine from the report whether the wetland is going to be retained and adequately buffered.
7	additional environmental impacts expected from the proposed development	Compliant
8	any direct, indirect and cumulative impacts of the proposed development on site	Compliant
9	the degree to which impacts and risks can be mitigated, reversed and can cause loss of irreplaceable resources	Compliant
10	a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies	It was not possible to determine from the report whether the wetland is going to be retained and adequately buffered.
11	proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr)	Recommended mitigation measures are not sufficiently detailed in the report.
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	Non-compliant. No reasoned authorisation opinion has been provided.
14	any conditions to which this statement is subjected	See above.

8 Conclusion and Recommendations

The peer review of the Enviro-EAP (2025) Aquatic Biodiversity Assessment of the proposed housing development in Clanwilliam has identified a number of short-comings in terms of alignment with best practice in the field of aquatic biodiversity assessment. The key shortcoming of the assessment is what EnviroSwift believes to be an incorrect classification of the on-site aquatic feature as a drainage line whereas it is in fact a wetland. Also, the origin of the wetland as artificial appears incorrect as the reasoning for its origin (impoundment as a result of the creation of a fairway) does not make sense given that the key hydrological driver of wetlands is groundwater interaction (i.e. impoundment would not result in total dessication of the downstream section as groundwater ingress into the upper 50 cm soil surface would continue, particularly during the wet season in the case of temporary/seasonal wetlands.

When assessed in terms of compliance with the gazetted Protocol for Aquatic Biodiversity Assessment the report is found to have the following critical flaws:

- Drawings such as an SDP that show the extent of the development and whether any aquatic features are being retained were absent in the Enviro-EAP Aquatic Biodiversity Assessment report. As a result, the proximity of the disturbance footprint and hard surfaces etc to the site's aquatic biodiversity features could not be determined and as a result the likelihood of impacts such as wetland habitat disturbance, alteration of flow regime, water quality impairment and biota loss could not be determined.
- Failure to consult the WCBSP (2023) as this would have confirmed the provincial biodiversity conservation importance of the downstream, receiving aquatic features (indicated as an Aquatic CBA).
- Lack of proof of the methods used to classify and delineate the on-site freshwater features such as auger results. Had auger samples been taken within the feature, the lack of evidence of alluvial processes would have been identified and the feature correctly identified as a wetland.
- The delineation presented in the report has under-estimated the extent of the wetland. The correct extent of the wetland should be provided to the project team so that the SDP (if one exists) should reflect the extent of aquatic habitat and whether any buffer would be accommodated.
- Failure to recommend the minimum buffer width; and
- Failure to present a **reasoned** authorisation opinion based on a thorough evaluation of the assessment criteria that comprises an Aquatic Biodiversity Assessment.

Regarding the latter, Enviro-EAP presented the opinion that the proposed development is appropriate as it will not affect the status of the on-site aquatic biodiversity features on the basis of the existing level of disturbance to the feature. This reasoning is flawed as the overall aim of an impact assessment is to determine, based on the assessments made, whether the proposed development should be supported and under what conditions. While the impacts have been assessed in impact rating tables and mitigation measures recommended, a synopsis of the impact ratings insofar as they inform an authorisation opinion is required, as is a summarised list of the recommended essential mitigation measures.

One such mitigation measure which is glaring in its omission is whether the freshwater features should be retained in the development and the recommendation for an effective ecological buffer around the features This is arguably the key short-coming of the assessment. Enviroswift has presented a recommendation that the minimum buffer of 15m should be accommodated between the edge of the development footprint and the edge of the wetland and this should be shown on an SDP. In addition, a further mitigation measure that needs to be included is that the buffer area and wetland must be set aside as a No-Go area for the duration of the construction phase, the boundary of which should be fitted with mesh fencing to ensure that no windblown waste or dust (one of the identified impacts) enter the watercourse.

In conclusion, provided the site's freshwater features are retained in the development scheme and a minimum 15m vegetated buffer is incorporated then these shortcomings are considered immaterial and the report is supported from a peer review perspective.

Prepared by:

Nick Steytler SACNASP Reg. no. 400029/02
EnviroSwift Western Cape
Cell 082-322 4074

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Enviro-EAP. 2025. Aquatic Biodiversity Impact Assessment. Clanwilliam Housing Development and WWTW Expansion on a Portion of Remainder of Erf 279, Clanwilliam. February, 2025.

Job, N. 2009. Application of the Department of Water Affairs and Forestry (DWAF) wetland delineation method to wetland soils of the Western Cape.

Kotze, D.C., Macfarlane, D. and Edwards, R. 2021 WET-EcoServices (Version 2): A technique for rapidly assessing ecosystem services supplied by wetlands and riparian areas. WRC Report No. 2737/1/21. July 2021.

Macfarlane, D.M. and Bredin, I.P. 2016. Buffer zone guidelines for drainage lines, wetlands and estuaries. Part 1: Technical Manual. WRC Report No (tbc), Water Research Commission, Pretoria.

Macfarlane, D.M. and Bredin, I.P. 2016. Buffer zone guidelines for drainage lines, wetlands and estuaries. Part 2: Practical Guide. WRC Report No (tbc), Water Research Commission, Pretoria.

Macfarlane, D.M. and Bredin, I.P. 2017. Buffer zone guidelines for rivers, wetlands and estuaries. Part 1: Technical Manual. WRC Report No. TT 715-1-17, Water Research Commission, Pretoria.

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.

WCBSP. 2023. Western Cape Biodiversity Spatial Plan. Department of Environmental Affairs and Development Planning. Cape Town.

APPENDIX A:
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 experience not listed below)
Freshwater ecological specialist studies:
Freshwater ecological impact assessment of the development of housing opportunities on Portion 22 of the Farm Koopmans Kloof No. 221, Kraaifontein, City of Cape Town (2025)
Freshwater ecological impact assessment to support a S24G Rectification Application for the development of a residential dwelling on Farm 1620 Stellenbosch, Western Cape (2025)
Freshwater ecological risk assessment and preparation of a Rehabilitation Plan for the establishment of a Construction Site Camp in a wetland on Erf 65266 Wynberg, City of Cape Town (2025)
Freshwater ecological impact assessment for the proposed residential development of Erf 534 Bantry Bay, City of Cape Town (2025)
Freshwater ecological impact assessment for the proposed residential development of Erf 2534 Yzerfontein, Western Cape (2025)
Freshwater screening study for the proposed redevelopment of Erf 3129 Oranjezicht, City of Cape Town (2025)
Freshwater screening study for the proposed agricultural expansion at Rio Largo Olive Farm (Farms 757 and 758), Scherpenheuwel, Worcester, Western Cape (2025)
Freshwater screening study for the proposed residential development of Remainder Erf 474 St. Helena Bay, Western Cape (2025)
Freshwater screening study for the proposed residential development of Erf 919 Constantia, City of Cape Town (2025)
Freshwater screening study for the proposed redevelopment of Erf 2762 Camps Bay, City of Cape Town (2025)
Freshwater screening study for the proposed expansion of a school at Erf 4929 Lekkerwater Road, Sunnydale, City of Cape Town (2025)
Freshwater ecological impact assessment for the proposed residential development of Erf 3368 Higgovale, City of Cape Town (2025)
Freshwater screening study for the proposed residential development of Erf 17678 Capri, City of Cape Town (2024)
Freshwater screening study for the proposed Eersteriver Station Development, Erven 18-21, 25-29 and 1072, Eersteriver, City of Cape Town (2024)
Freshwater ecological impact assessment as part of a NEMA Section 24G Rectification process for the unlawful expansion of an egg-laying poultry farm on Portion 128 of the Farm Stocklands and Oatlands No. 878, Currys Post, KwaZulu-Natal (2024)
Freshwater ecological impact assessment as part of a NEMA Section 24G Rectification process for the unlawful clearance of indigenous vegetation on Portion 48 of the Farm 708, Franskraal, Overstrand Municipality (2024)
Freshwater ecological impact assessment for the proposed single residential development of Portions 125 & 126 of Farm 599 Bettys Bay, Overstrand Municipality (2024)
Freshwater ecological impact assessment for the proposed development 4 residential dwellings and associated infrastructure on Portion 86 of the Farm Bosjesmans Valley No. 218, Worcester (2024)
Freshwater screening study for the proposed development of Erf 1847 Hout Bay, City of Cape Town (2024)
Freshwater screening study as part of a NEMA Section 24G Rectification process for the proposed single residential development of Erf 5629 Bettys Bay, Overstrand Municipality (2024)
Freshwater ecological impact assessment for the proposed development of Erf 8384 Hout Bay, City of Cape Town (2024)
Freshwater screening study for the proposed development of Erf 4502 Hout Bay, City of Cape Town (2024)
Freshwater screening study for the proposed subdivision of Erf 4476 in Waterfall Lane, Hout Bay, City of Cape Town (2024)
Freshwater ecological impact assessment as part of a NEMA Section 24G Rectification process for the unlawful development of tourism accommodation facilities at the Portion 1 of Farm 866, Bot River, Theewaterskloof Municipality (2024)
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 tourism accommodation facilities at the Farm Hemelrand, Hemel en Aarde Valley, Overstrand Municipality (2023)
Freshwater screening study for residential development at Oude Bosch, Hermanus Lagoon, Overstrand Municipality (2022)
Freshwater ecological impact assessment for a proposed shopping centre at Erf 666 Hout Bay, City of Cape Town (2022)
Freshwater screening study for the proposed formalisation of the Valhalla Park informal settlement, Cape Flats, City of Cape Town (2022)
Freshwater screening study for a proposed telecommunications mast, Overhex, Breede Valley Winelands Municipality (2022)
Freshwater ecological impact assessment for the proposed expansion of the Leopard Rock residential estate, Onrusrivier, Overstrand Municipality (2022)
Freshwater screening study for the proposed low cost housing development at Wolwerivier, City of Cape Town (2022)
Freshwater ecological impact assessment for the proposed low cost housing development of Erf 148 Philadelphia, City of Cape Town (2022)
Freshwater screening study of Erf 10932 Constantia, City of Cape Town (2022)
Freshwater screening study of Erf 49 Faure, City of Cape Town (2021)
Freshwater screening study for a proposed concrete factory on the Remainder of the Farm Bultfontyn 128, near Middelburg in the Eastern Cape (2021)
Freshwater ecological impact assessment for the proposed expansion of vineyards at Mountain Rose Farm, Hemel en Aarde Valley, Overstrand Municipality (2022)
Freshwater ecological impact assessment for unlawful agricultural expansion at Plennegy Farm, Oudtshoorn, Western Cape (2021)
Freshwater screening study for the development of erven 41 and 59, Knole Park, City of Cape Town (2021)
Freshwater ecological impact assessment for proposed truck stop on Portion of Erf 10229, Beaufort West, Western Cape (2021)
Freshwater screening study for the proposed redevelopment of the Mowbray Golf Course, Pinelands, City of Cape Town (2021)
Provision of rehabilitation specifications for the unlawful excavation of a trench in a non-perennial drainage line at the Farm Vergelegen, Robertson, Western Cape (2021)
Freshwater ecological impact assessment for unlawful agricultural expansion at Samber Farms, Riversdale, Western Cape (2021)
Freshwater ecological impact assessment for proposed expansion of an in-stream irrigation dam at Farm Hartebeest Kuil, George, Western Cape (2021)
Freshwater screening study for the proposed residential development of Erf 208 Bishopscourt, City of Cape Town (2021)
Freshwater screening study for the proposed agricultural processing facility, Maqinqi communal area, Port St. Johns Municipality, Eastern Cape (2021)

Freshwater ecological impact assessment for the proposed agricultural expansion at the Farm Vergelegen, Robertson, Western Cape (2021)
Freshwater ecological impact assessment for a proposed residential development in Plattekloof, City of Cape Town (2021)
Freshwater ecological screening study for the proposed sewerage pipeline for Schulz Vlei development, Philippi, City of Cape Town (2021)
Freshwater ecological impact assessment for the proposed development of an agro-industrial facility, Wemmershoek, Western Cape (2021)
Freshwater ecological screening study for a proposed filling station in Eerste River, City of Cape Town (2020)
Freshwater ecological impact assessment for an unlawfully constructed tourist accommodation facility, Tulbagh, Western Cape (2020)
Freshwater ecological screening study and risk assessment for additions and alterations to an existing residential dwelling, Breede River, Western Cape (2020)
Freshwater ecological screening study for a proposed truck depot and filling station, Paarl, Western Cape (2020)
Freshwater ecological screening study for a proposed phosphate mine, Saldanha, Western Cape (2020)
Freshwater ecological screening study for a single residential development at Oppi Berg, Ceres, Western Cape (2020)
Freshwater ecological screening study for a proposed industrial area expansion, Bredasdorp, Overberg, Western Cape (2020)
Freshwater ecological impact assessment for proposed Canola plant at Erf 15711 Wellington, Drakenstein Municipality (2020)
Freshwater ecological impact assessment for single residential development of Ptn 13 of Farm 563 Kleinmond (2020)
Freshwater ecological impact assessment for new IRT bus depot, Wynberg, City of Cape Town (2019)
Freshwater ecological screening study for Blackheath Printers, Blackheath, City of Cape Town (2019)
Freshwater ecological screening study for La Motte residential extension, St. Helena Bay (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)