

Client

UAV Prop (Pty) Ltd

**WETLAND DELINEATION AND SPECIALIST COMMENT RELATING TO
THE PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 1486,
VERMONT, WESTERN CAPE**



FINAL REPORT

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Submitted to:

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1 INTRODUCTION

1.1 Background

Freshwater Consulting was appointed to undertake an updated wetland delineation and specialist freshwater review for Erf 1486, Vermont, and the adjoining portion of the Hoek van die Berg Private Nature Reserve. The appointment arose in the context of extensive alien vegetation clearing undertaken within the upper catchment and associated changes in the hydrological dynamics of the wetlands, together with concerns regarding discrepancies between previous wetland delineations completed for Erf 1486 between 2006 and 2025.

The study was commissioned while public participation for a residential redevelopment application for Erf 1486 was underway. In addition to updating the wetland delineation, Freshwater Consulting was requested to review relevant project documentation and provide an independent freshwater specialist opinion on selected aspects of the proposed development, including the relationship between the development footprint and wetland extent, the implications of catchment-scale alien vegetation clearing and changing hydrological conditions, the proposed wetland offset, and broader considerations relating to ecological connectivity and climate change. The findings of this assessment are intended to inform the client's comments on the current development application.

1.2 Terms of Reference

Specifically, Freshwater Consulting was contracted to:

- Undertake a review of available historic imagery for Erf 1468 and the Hoek van den Berg Private Nature Reserve.
- Undertake a site visit to ground-truth, delineate and map the extent of the wetland system potentially affected by the proposed residential development. This will include a detailed wetland delineation following DWS guidelines (DWAF 2005+2008), using field-based transects to demarcate the wetland boundary across both Erf 1468 and the adjacent Hoek van den Berg Private Nature Reserve.
- Review relevant previous project reports and supporting documentation to inform a specialist freshwater opinion on the following aspects, as identified by PHS Consulting:
 - The findings of the current freshwater report (Van Zyl et al. 2026);
 - The location of the proposed erven in relation to the wetland and associated buffer;
 - The wetland extent prior to mass alien clearing within HVDB, compared with the current extent;
 - Potential climate change implications, considered together with further alien vegetation clearing within HVDB and along the mountain slope, and the potential implications for the proposed development; and
 - The proposed wetland offset.
- Compile a short specialist report detailing the findings of the wetland delineation, document review and specialist freshwater opinion.

1.3 Definition of inland aquatic ecosystems

The following definitions from the National Water Act (1998) are adhered to in this report:

- Watercourse:
 - a. A river 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 watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;
- Wetland:
 - 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.

1.4 Assumptions and limitations of the assessment

Mapping was done with a hand-held GPS in order to save time and costs. Accuracy is estimated as being approximately 2-3m. Delineation of wetlands was done using the indicators described in the DWAF (2005+2008) guidelines for delineation. No primary data (such as macroinvertebrates and water quality) were collected from inland aquatic ecosystems found on site.

1.5 Use of this Report

This report reflects the professional opinion of its author. It is the policy of Freshwater Consulting that the full and unedited contents of this report should be presented to the client, and that any summary of the findings should only be produced in consultation with the author.

1.6 Declaration of Independence

This is to confirm that **Philip Frenzel-Daniels** and **Justine Ewart-Smith**, the specialist consultants who are responsible for undertaking this study and preparing this report, are independent, and have no vested interests, financial or otherwise, in the activities under consideration.

1.7 Specialist Details

Philip Frenzel-Daniels, the author of this report, is an independent specialist consultant with 8 years of experience in the field of freshwater ecology. Justine Ewart-Smith, the reviewer of this report, is also an independent freshwater specialist with 27 years of experience in the field. Both specialist consultants are registered as professional scientists (Pr Sci Nat) with the South African Council for Natural Scientific Professions (SACNASP) (registration numbers: 123620 [PF-D] and 400746/15 [JES]).

Both specialists have extensive experience in the assessment of inland aquatic ecosystems across the Western Cape, including mapping and delineation as well as assessment of impacts, ecological condition and importance of wetlands and rivers. A short CV is provided in Section 8 (Appendix A).

1.8 Study area

Erf 1486, hereafter referred to as the study site, is situated within the broader Vermont Pan wetland catchment, at the transition between the lower slopes and back-dune landscape north and west of Vermont and the more developed lowlands surrounding the pan. The site is bounded by the R43 to the north, Lynx Road to the east and residential development to the south, while its western boundary adjoins the Hoek van die Berg Nature Reserve.

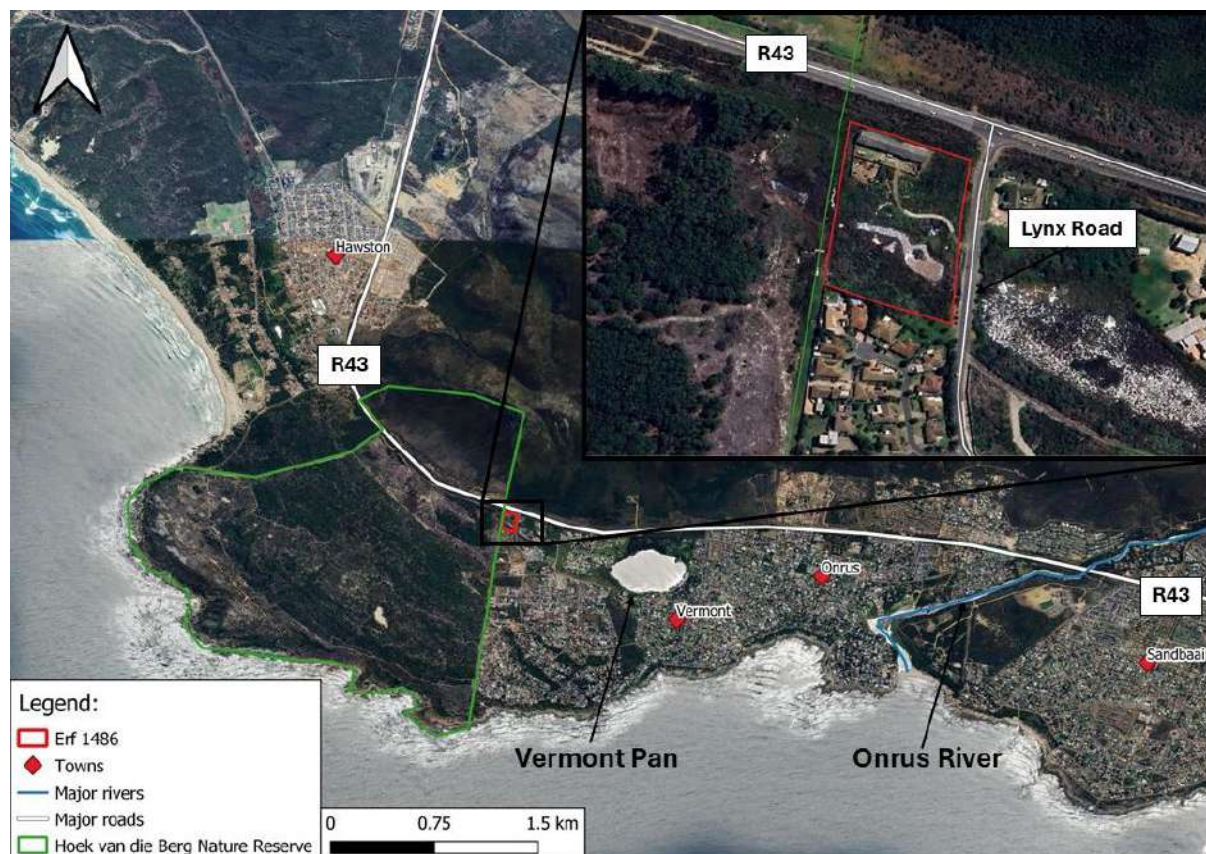


Figure 1.1: Map showing the location of erf 1486 in relation to the broader Vermont catchment.

2 CATCHMENT OVERVIEW FROM A DESKTOP PERSPECTIVE

2.1 Catchment context

Job and Ratcliffe (2006) described the broader Vermont wetland system as a hydrologically connected complex comprising the Vermont Pan and an elongated wetland extending westwards from the pan. Water moves through this landscape via a combination of overland runoff, hillslope seepage and shallow subsurface flow, rather than predominantly through a defined surface-water channel. The wetland crossing Erf 1486 forms part of the upper portion of an approximately 1.4 km-long wetland system that extends eastwards and south-eastwards towards Vermont Pan.

The catchment has been substantially modified by surrounding land uses, including residential development, smallholdings, a conference centre and caravan park, roads, undeveloped land and historically disturbed areas. Portions of the wetland system have also been modified through development, excavation, drainage and the establishment of alien vegetation. Within this context, water derived from rainfall, hillslope runoff and shallow subsurface flow is conveyed from the higher-lying areas north of the R43 into the lower-lying wetland corridor around the Hoek van die Berg Nature Reserve and Erf 1486, from where it generally moves eastwards and south-eastwards towards Vermont Pan.

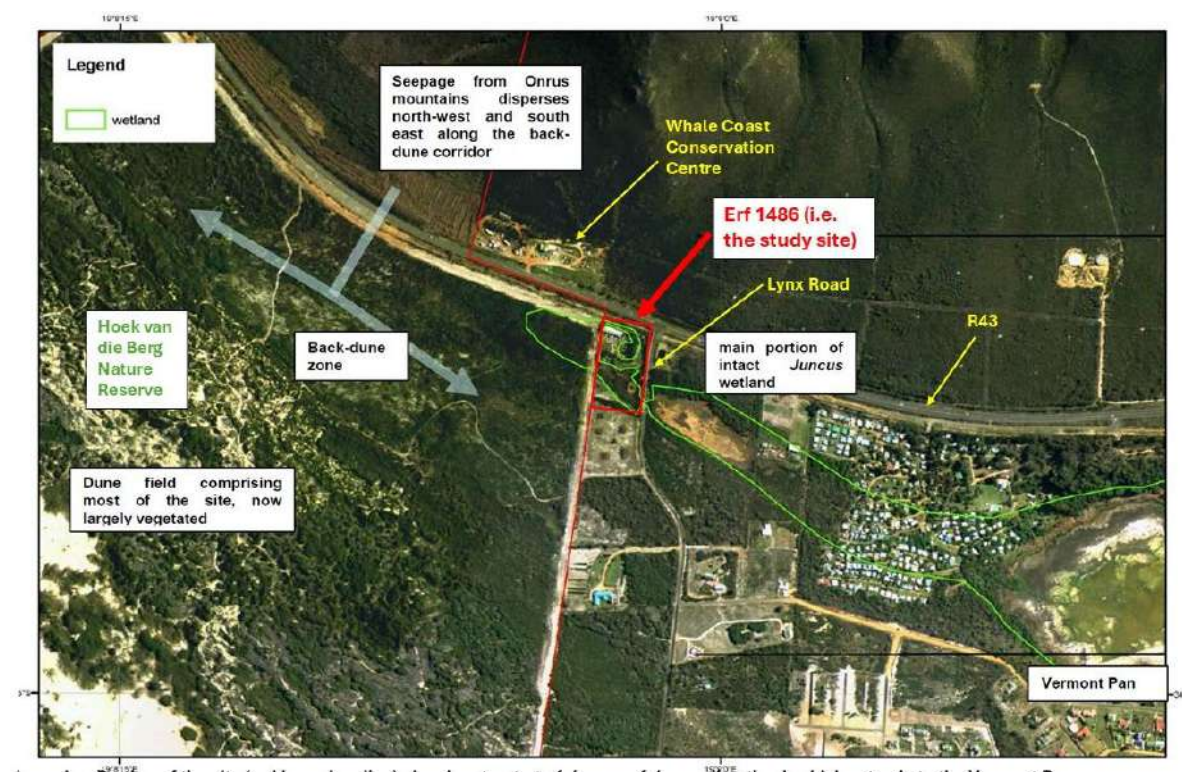


Figure 2.1: Map showing the study site (i.e. erf 1486) in relation to the broader Vermont Pan catchment. Source: Ratcliff 2012 (with additional annotations).

2.2 *Hydrogeological setting and connectivity to wetlands in the study area*¹

The wetlands within the broader Vermont study area overlay a dual-aquifer system comprising a shallow, primary Quaternary aquifer and an underlying fractured-rock aquifer associated with the Peninsula Formation of the Table Mountain Group. The Peninsula Formation consists predominantly of fractured quartzitic sandstone and forms the principal bedrock beneath the Vermont area. This bedrock is overlain by a relatively thin and spatially variable layer of more recent unconsolidated and alluvial sediments, including Waenhuiskrans Formation dune sands along the coastal platform and talus, scree and colluvial deposits near the base of the Onrus Mountains. Within the study area, these surficial deposits are considered likely to be approximately 10–20 m thick, although their thickness may vary locally depending on topography, depositional history and the degree of weathering along faults and fractures.

The unconsolidated dune and alluvial sediments collectively form the shallow primary Quaternary aquifer. It is expected to respond relatively rapidly to seasonal rainfall. During late autumn, winter and early spring, direct rainfall, runoff and water draining from the mountain slopes are likely to recharge the shallow sands, causing groundwater levels to rise to within approximately 1–3 m of the ground surface and, in low-lying areas, potentially reach or intersect the surface. Because the valley floor is very flat, hydraulic gradients are low and water is likely to move slowly through the system. This promotes prolonged saturation and may limit the magnitude of vertical groundwater-level fluctuations in comparison with more steeply sloping landscapes. Water reaching the rear of the coastal dune system may subsequently move laterally towards low-lying features such as Vermont Pan or towards the Paddavlei area near Hawston.

The underlying Peninsula Aquifer is a secondary aquifer in which groundwater movement is primarily controlled by fractures, joints and faults within the quartzitic bedrock. Groundwater levels within this aquifer are expected to be deeper and more stable than those of the shallow Quaternary aquifer, although some seasonal fluctuation is still likely because the aquifer is largely unconfined. Regional information indicates that groundwater levels may range from approximately 5–20 m below ground level, depending on topographic position. Groundwater movement within the Peninsula Aquifer is driven broadly by topography but is also strongly influenced by the orientation and connectivity of northwest–southeast- and northeast–southwest-orientated fracture systems (Figure 2.2). Thus, groundwater from the Peninsula Aquifer may discharge through fractures as springs and seeps, either directly at the surface or into the base of the overlying Quaternary aquifer.

¹ Source: Mr Dylan Blake, principal geologist at Umvoto Africa, personal communication, 13–15 July 2026.



Figure 2.2: Map showing the fractures within the broader Vermont study area Abbreviations are as follows: “Ope” = Peninsula Formation, “O-Sc” = Cedarberg Formation, “Sg” = Goudini Formation, “Ss” = Skurweberg Formation, “Dr” = Rietvlei Formation (all TMG), “Dg” = Gydo Formation (Bokkeveld Group) and “Qw” = Waenhuiskrans Formation (Bredasdorp Group). Source: D. Blake, Umvoto.

Wetland hydrology within the study area is therefore likely to be supported by a combination of surface-water inputs and groundwater discharge from both aquifers. During winter, rainfall, runoff and shallow groundwater recharge are likely to dominate, resulting in widespread saturation of the Quaternary aquifer and the formation or expansion of wetland conditions across the flat valley floor. During late spring and summer, surface-water inputs and recharge to the shallow sands decline. However, continued discharge from the Peninsula Aquifer through fractures may sustain saturation within the lower portion of the Quaternary aquifer and support persistent seepage or waterlogging in specific locations. Consequently, seasonal wetlands are likely to be more strongly associated with winter saturation of the shallow Quaternary aquifer, whereas more persistent or perennial wetlands and springs are more likely to indicate a continuing contribution from the fractured Peninsula Aquifer.

Extensive clearing of invasive alien vegetation within the surrounding area has likely contributed to increased groundwater recharge and higher shallow groundwater levels through reduced evapotranspiration. Although the magnitude of this effect has not been quantified at the site, similar responses, including rising groundwater levels and the reappearance of prolonged saturation characteristic of wetlands, have been observed in other coastal primary aquifers (i.e. Stanford Aquifer) following alien vegetation removal.

2.3 Landscape context and development history of Hoek van die Berg Private Nature Reserve

The Hoek van die Berg property, located upslope of Erf 1486, was acquired by the Raimondo family in 1984. At that time, extensive areas of the property were already invaded by *Acacia cyclops*, which had historically been planted by the Department of Forestry as part of dune stabilisation programmes along the Overberg coastline. Alien vegetation clearing has therefore been undertaken on the property for many years.

During the early 2010s, the Raimondo family investigated the potential development of the Hoek van die Berg property as a mixed-use eco-estate. A full Environmental Impact Assessment process was consequently initiated and supported by a range of specialist studies, including botanical, freshwater and geohydrological assessments.

A botanical survey undertaken in 2012 identified three principal vegetation types on the property, namely Hangklip Sand Fynbos, Overberg Sandstone Fynbos and Overberg Dune Strandveld, which were classified at the time as Vulnerable, Critically Endangered and Least Threatened respectively (Helme, 2012). The survey also confirmed that the property supported a notable assemblage of plant Species of Conservation Concern (SCC). At least 13 such species had been recorded across the broader property, with at least nine occurring within the main study area, while several additional species were considered likely to occur.

Of particular relevance to the lower-lying back-dune area, Helme (2012) recorded two additional Proteaceae of conservation concern on the acidic sand flats south of the R43. These included *Leucadendron linifolium*, listed as Vulnerable, and *Protea obtusifolia*, listed as Near Threatened. The occurrence of the latter was considered particularly noteworthy, as the species is more typically associated with limestone substrates and its presence represented an unusual record west of Stanford. Importantly, many of these botanical records were made while substantial portions of the property were still densely invaded by alien vegetation.

The proposed eco-estate development was subsequently abandoned, and the long-term vision for the property shifted towards retaining it largely undeveloped and placing greater emphasis on conservation management. A more strategic approach to alien vegetation control was therefore initiated from approximately 2018 and was formalised through the development of a Protected Area Management Plan for the private nature reserve. Despite ongoing clearing efforts, alien vegetation remains present across the property at varying densities. The principal invasive species include *Acacia saligna* (Port Jackson), *Hakea drupacea* (rock hakea), *Eucalyptus* species, particularly *E. lehmannii* (spider gum), *Acacia pycnantha* (golden wattle), *Myoporum* species, and Australian myrtle (*Gaudium laevigatum*). The associated Alien Vegetation Management Plan provides the framework for the continued control of these species, consistent with the landowner's legal obligations to manage listed invasive alien plants.



Figure 2.3: Map showing the extent of alien invasive plants cleared between 2019 and 2022, relative to the remaining extent as of 2022. Source: PAMP 2020.

Since the preparation of the above map (Figure 2.3), alien vegetation clearing efforts have intensified considerably. Most of the back-dune area between the R43 and the parallel dune system has now been cleared, with the exception of a small remaining stand that is currently being cleared. The extent of this recent clearing and the resulting recovery of the landscape are illustrated in the photographs below (Figure 2.4, Figure 2.5 and Figure 2.6).



Figure 2.4: Drone image showing the extent of alien clearing within the dune back area located between the R43 (left) and the dune system (right). Note: This image was taken in July 2024. The aliens noted within the reserve (marked with yellow arrows) have since been removed. Drone image courtesy of Michael Raimondo.

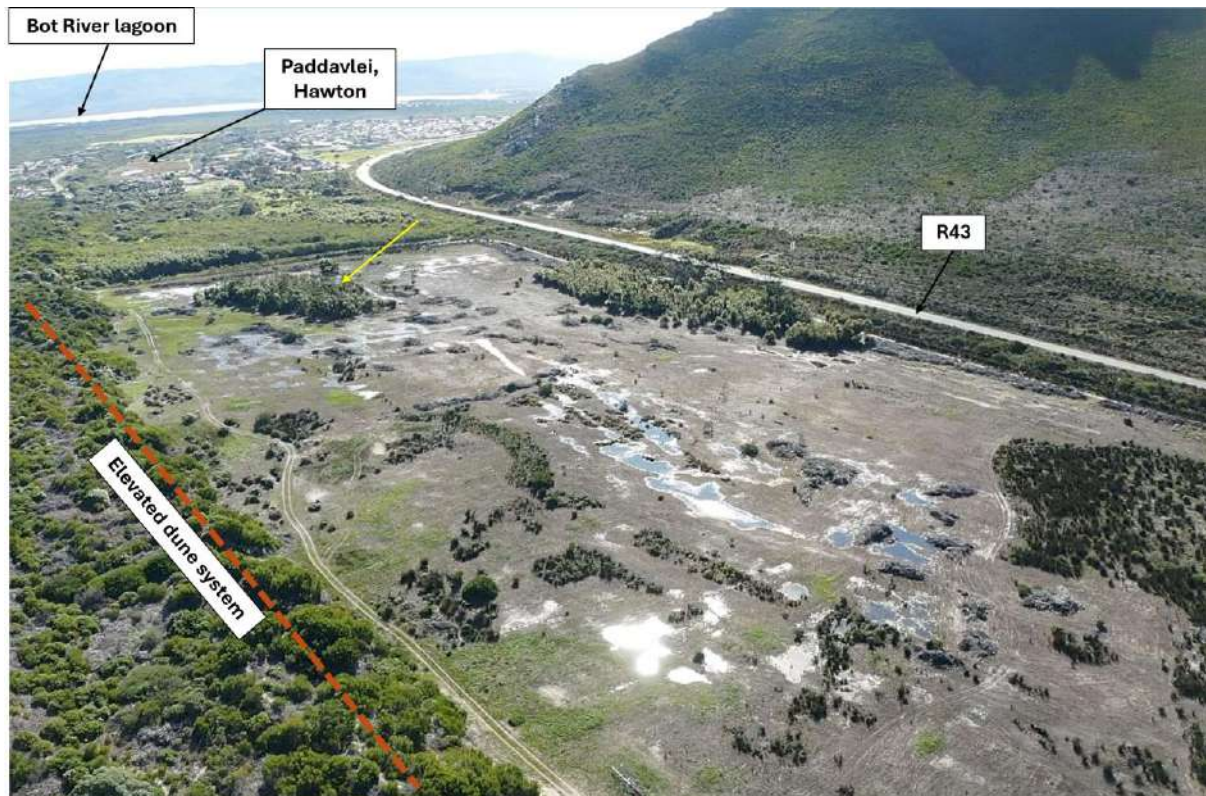


Figure 2.5: Drone image showing the extent of alien clearing within the dune back area located between the R43 (right) and the dune system (left). Note: This image was taken in July 2024. The aliens noted within the reserve (marked with yellow arrows) have since been removed. Drone image courtesy of Michael Raimondo.



Figure 2.6: Drone image of erf 1486 (foreground) in relation to the Hoek van die Berg Nature Reserve in the middle to background of the image i.e. upslope view. Note the extensive alien clearing having taken place between the R43 (located on the right-hand side of the image) and the first set of dunes (on the left-hand side of the image). Drone imagery taken on 7 July 2026, courtesy of Marco Cornelius, Overstrand Municipality.

2.4 Historic imagery of erf 1486 and the broader study area

Historic aerial imagery provides useful insight into landscape changes that may have influenced the extent and condition of wetland habitat in the vicinity of Erf 1486, with the earliest available imagery dating to 1938 (Figure 2.7). Based on the available imagery, Erf 1486 appears to have remained relatively undisturbed between 1938 and 1986.

The historical imagery also provides some context regarding the feature described by Job and Ratcliffe (2006) as a “basin seep” downstream of Erf 1486 (indicated by the yellow arrow in Figure 2.7). It is unclear whether this feature is entirely natural or whether it was subsequently modified or enlarged through excavation. By 1961, it is visible as a largely open and sparsely vegetated waterbody, while in the 1938 imagery it appears to have been more densely vegetated. Regardless of its origin, the feature forms part of the broader wetland complex draining towards Vermont Pan. By 1986, a firebreak or servitude had been established along the eastern boundary of the Hoek van die Berg Nature Reserve, which also forms the western boundary of Erf 1486. Between 1986 and 1997, a pond, west of Lynx Road (i.e. on erf 1486), was excavated into the underlying clay layer, creating an open waterbody (which is clearly visible in the zoomed-in image of 2005b). By 2005, the dwelling in the north-western corner of Erf 1486, had been constructed, and much of the property had been cleared of vegetation. During the same period, land immediately south of Erf 1486 had also been cleared in preparation for residential development. Job and Ratcliffe (2006) noted that, “from Lynx Road westwards, the main body of the seep had been encroached upon by housing developments”. This suggests that wetland habitat historically extended beyond the current boundaries of Erf 1486 into areas that have since been developed. Between 2005 and 2017, the imagery shows continued disturbance within Erf 1486, including vegetation clearing and possible dumping, while dense alien vegetation is evident within the adjoining Hoek van die Berg Nature Reserve. Important to note is that, despite dense alien trees on the upslope property, standing water was noted within the excavated pond on erf 1486 during the peak of the drought period (see 2017). More recent imagery indicates substantial vegetation recovery within Erf 1486. By 2026, much of the site supports a relatively stable and diverse vegetation cover, comprising predominantly indigenous species with only limited alien vegetation present.

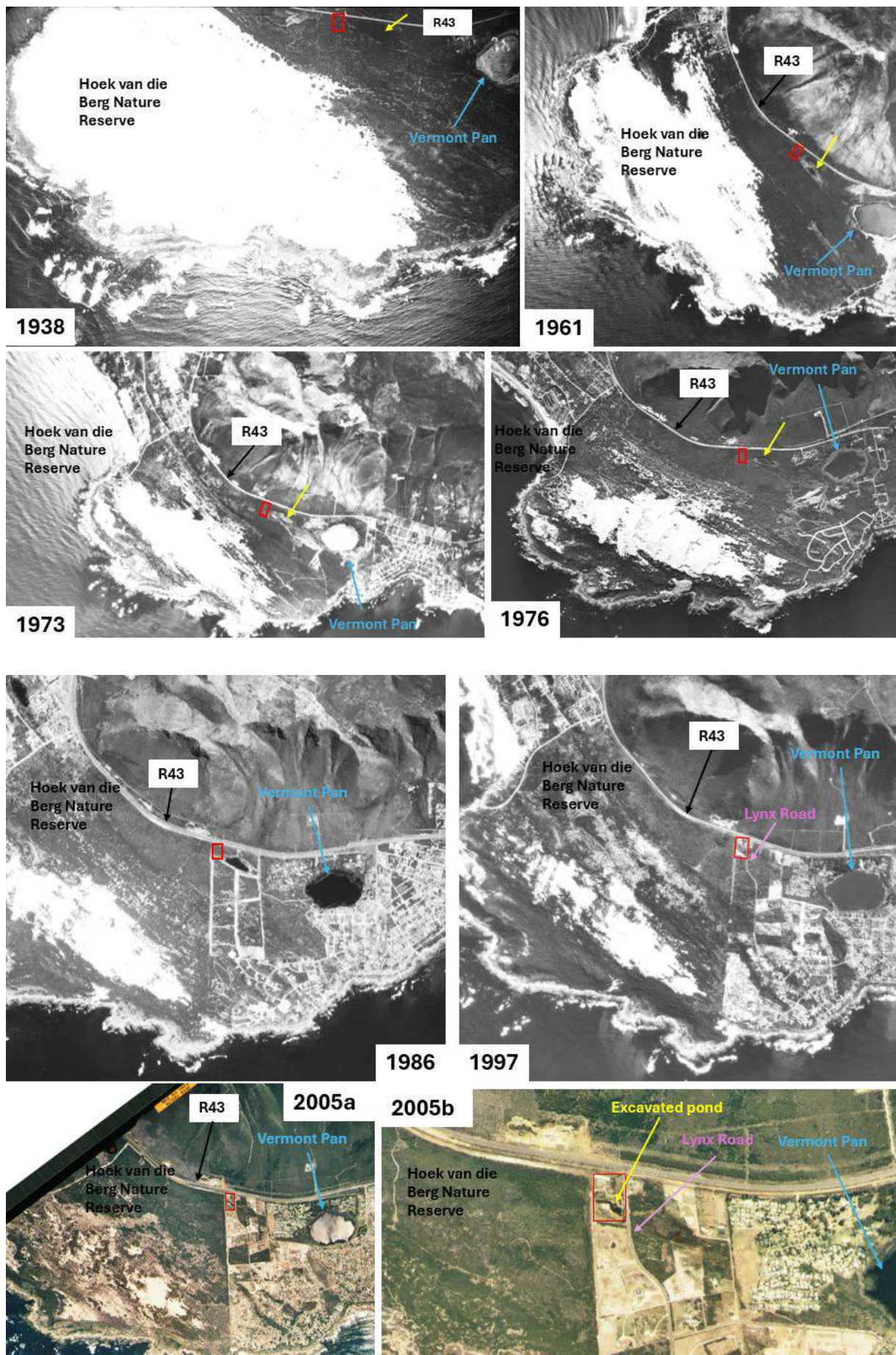




Figure 2.7: A series of historic imagery of erf 1486.

2.5 Conservation importance of erf 1486 in relation to the broader context

The Overstrand Municipality website identifies a strategic landscape corridor within the study area, intended to facilitate the movement of fauna across the broader landscape (see pink lines and arrows in Figure 2.8). This corridor forms part of a wider ecological connectivity network, with the long-term vision of improving linkage between Vermont Pan and Paddavlei in Hawston (Sheraine van Wyk, Whale Coast Conservation, pers. comm.).



In the context of rapid urbanisation within the Overstrand Municipality, together with increasing pressures associated with climate change, the retention and management of good-quality ecological corridors is critical for facilitating the movement of fauna, including terrestrial, semi-aquatic and aquatic species. The intention within this broader landscape is therefore to restore and enhance corridor functionality through the concerted clearing and ongoing management of alien invasive plants, thereby improving habitat condition and ecological connectivity. This includes initiatives aimed at supporting connectivity between existing populations of cape dwarf chameleons, which are classified as Near Threatened on the IUCN Red List, by maintaining suitable habitat through which they can move (Sheraine van Wyk, Whale Coast Conservation, pers. comm.).

Erf 1486 occurs within a particularly important and constrained portion of this corridor. It effectively forms a bottleneck in the corridor network, particularly in relation to wetland-linked connectivity between the upper extent of the valley-bottom wetland within Hoek van die Berg Nature Reserve and Vermont Pan (Figure 2.9 and Figure 2.10). Any proposed development within this narrow corridor should therefore be carefully considered to ensure that it does not compromise ecological

connectivity or reduce the functionality of the corridor. Urban encroachment into this link has the potential to significantly weaken corridor function and should therefore be critically assessed within the broader regional and landscape context outlined in this report.



Figure 2.9: Upslope view of the ecological corridor, showing Erf 1486 in the foreground (red boundary line) and the Hoek van die Berg Nature Reserve in the background. Drone imagery captured on 7 July 2026, courtesy of Marco Cornelius, Overstrand Municipality.



Figure 2.10: Downslope view of the ecological corridor, showing Erf 1486 in the foreground (red boundary line) and Vermont Pan in the background. Drone imagery captured on 7 July 2026, courtesy of Marco Cornelius, Overstrand Municipality.

3 IDENTIFICATION AND DESCRIPTION OF INLAND AQUATIC ECOSYSTEMS BASED ON INFIELD VERIFICATION

3.1 *Guidelines to delineate inland aquatic features*

The Department of Water and Sanitation's wetland and riparian zone delineation manual (DWAF 2005+2008) was used to identify and delineate inland aquatic ecosystems within the study area. The manual describes the indicative characteristics that can be used to distinguish between wetlands or riparian zones and the surrounding terrestrial landscape. These indicators are:

- **Vegetation:** the presence, or at least occasional presence, of plants adapted to or tolerant of saturated soils (hydrophytes) or alluvial soils. These plants are known as either obligate or facultative wetland plants (Corry 2012) which means they are found most often in wetlands;
- **Soils:** in the case of wetlands, the presence of wetland (hydromorphic) soils that display characteristics (soil colour, mottles², organic streaking or gleying³) resulting from prolonged saturation, and for riparian areas, the presence of alluvial soils and / or deposited material. Hydromorphic soils must display signs of wetness within 50 cm of the soil surface, as it has been shown that regular saturation of the top 50 cm of soil is necessary to support hydrophytic vegetation;
- **Hydrology:** a high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil;
- **Terrain:** the position in the landscape that allows for retention of water and the development of wetlands, or for riparian areas, in association with a watercourse.

The authors of this report acknowledge the work undertaken by Job (2009) as part of the Western Cape Wetland Soils Project, particularly the investigation of wetland soils in the Vermont area. The findings provide valuable local context regarding the limitations of conventional soil wetness indicators for wetland identification and delineation within sandy coastal environments.

While hydromorphic soil features are generally regarded as important and relatively reliable indicators of wetland conditions, they should not be interpreted in isolation. The Western Cape Wetland Soils Project highlighted that certain soils, particularly sandy coastal soils, may show weak, atypical or no readily discernible conventional wetness indicators such as mottling and gleying. In these circumstances, reliance on soils alone may result in the presence or extent of wetland habitat being underestimated, and delineation should instead be based on the combined interpretation of soils, vegetation, hydrology, topographic position and broader landscape context.

² These are orange, yellow or reddish-brown splotches that appear in mineral soils that are alternately wet and dry and therefore indicative of seasonal wetland habitat.

³ Gleying occurs when iron deposits in the soil are converted from an oxidized to a reduced state due to extended periods of saturation and low oxygen conditions.

The Vermont case study is particularly relevant in this regard. The study found that wetland and adjacent non-wetland areas occurring on sandy soils could be difficult to distinguish on the basis of conventional soil wetness indicators alone, with some wetland areas instead characterised by darker, higher-carbon surface soils and supported by other evidence relating to hydrology and landscape position. This demonstrates that the absence of obvious hydromorphic soil features does not necessarily confirm the absence of wetland conditions in the Vermont area. Accordingly, historical wetland boundaries derived predominantly from soil indicators should not necessarily be regarded as absolute or definitive, particularly where other lines of evidence suggest that wetland conditions may extend beyond the previously mapped boundary. Rather, the delineation should be interpreted within the broader site-specific hydrological, ecological and landscape context.

3.2 Wetland delineation history of erf 1486

Erf 1486 in Vermont has been subject to a number of wetland delineations over the past two decades. To the author's knowledge, these are:

Year	Full Report Name	Delineators and authors	Survey date and season
2006	Vermont Pan and wetlands: wetland delineation study. Prepared for the Overstrand Municipality Engineering Department	Nancy Job and Geordie Ractliffe of Freshwater Consulting	24 and 26 July 2006
2018	Freshwater Screening of erf 1486, Vermont, Western Cape Province. Prepared for Lornay Environmental Consulting on behalf of the property owner	Joshua Gericke and Luke Moore of Enviro Swift (Pty) Ltd	17 August 2018
2023	Aquatic Biodiversity Impact Assessment: erf 1486, Vermont, Western Cape Province. Prepared for Lornay Environmental Consulting on behalf of the property owner	Kimberly van Zyl, Robyn Morton and Joshua Gericke of Delta Ecology	30 May 2023 (Note: the same delineation was used for the 2023 and 2026 reports. The second report commissioned due to a change in the proposed layout plan)
2026	Aquatic Biodiversity Impact Assessment: erf 1486, Vermont, Western Cape Province. Prepared for Lornay Environmental Consulting on behalf of the property owner		
2025	Wetland delineation, erf 1486, Overstrand Municipality, Western Cape. Prepared for Lornay Environmental Consulting on behalf of the property owner	Nick Steytler of Enviro Swift (Pty) Ltd	3 August 2025
2026	This report/study*: Wetland delineation of erf 1486, Vermont. Prepared for UAV Properties (Pty) Ltd	Philip Frenzel-Daniels of Freshwater Consulting	9 July 2026

*This study constitutes the fifth wetland delineation of erf 1486, Vermont, and the findings outlined in Section 3.3.

Based on the findings of the previous studies, it is clear that both permanent and seasonal wetland habitats occur on Erf 1486. Notably, however, the delineated extent of this wetland habitat has varied between the different assessments, as illustrated in Figure 3.1 (Job and Ratcliff 2006), Figure 3.2 (Gericke and Moore, 2018), Figure 3.3 (van Zyl et al 2023) and Figure 3.4 (Steytler 2025). Several of the studies also identified ecological buffers or development setbacks around the wetland. Job and Ratcliffe (2006) recommended a 30 m buffer, while the more recent aquatic assessments undertaken by EnviroSwift and Delta Ecology between 2018 and 2025 did not explicitly prescribe a specific buffer width. The latest Final Basic Assessment Report (FBAR) for erf 1486, however, refers to a 32 m regulated area around the wetland only.

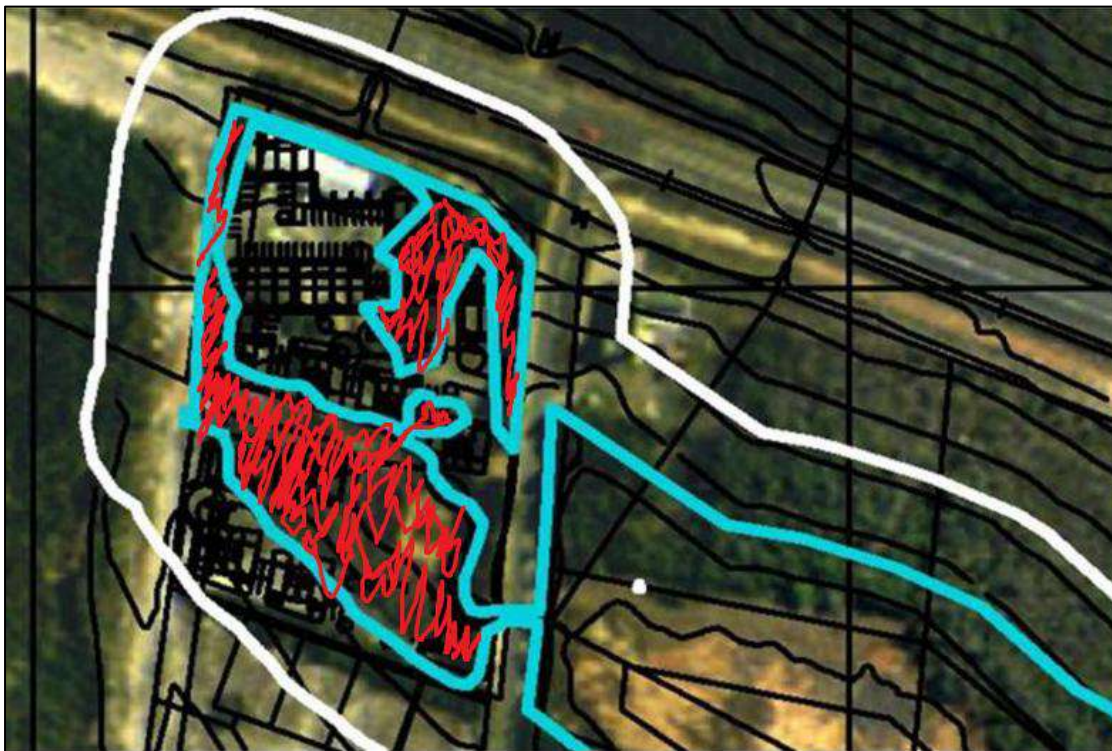


Figure 3.1: Wetland extent delineated as per Job and Ratcliffe (2006). Note: This image is an excerpt of the broader wetland delineation that was conducted for this study. The blue line indicates the wetland boundary, with the additional red scribble (added for illustrative purposes for this report) indicating the wetland extent. The proposed/recommended 30m buffer is denoted as a white line.



Figure 3.2: Wetland delineated as per Gericke and Moore (2018).

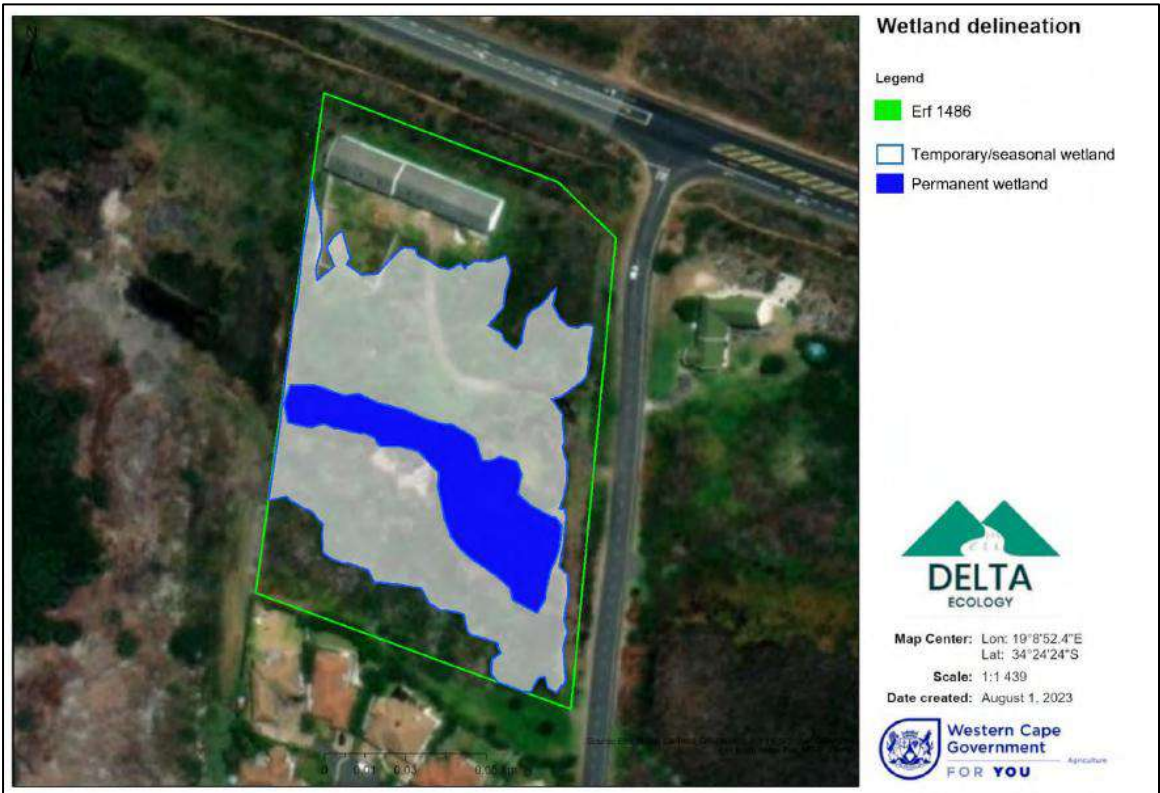


Figure 3.3: Wetland delineation as per van Zyl et al (2023).

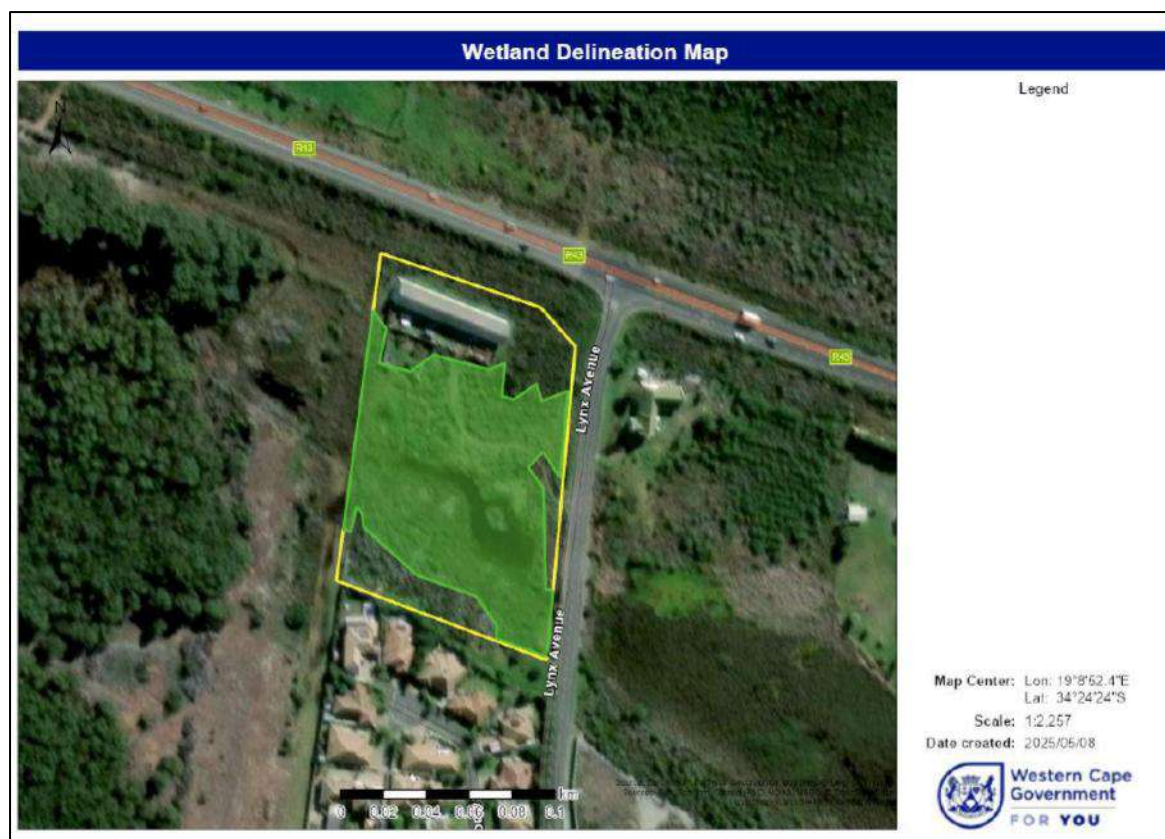


Figure 3.4: Wetland delineation as per Steytler (2025).

3.3 Delineated wetland extent as part of this study (July 2026)

A full-day site visit to Erf 1486, Erf 2317 (municipal property) and the Hoek van die Berg Nature Reserve was conducted on 9 July 2026 (winter). Wetland delineations in the Western Cape are ideally undertaken in winter/early spring and thus this assessment is reflective of suitable conditions for determining wetland extent. The field assessment followed a transect-based approach, with extensive soil augering undertaken across the study area to determine the outer extent of wetland habitat and the transition into terrestrial habitat. This approach allows for a rigorous field-based verification of wetland boundaries.

The outcome of the site verification is shown in Figure 3.5 of the broader wetland extent and then a close-up of erf 1486 in Figure 3.6. Detailed vegetation and soil descriptions, together with a map showing the soil auger locations and whether each auger point was classified as wetland or terrestrial, are provided in Appendix B (Section 9).



Figure 3.5: Map showing the delineated wetland extent (pink) within the broader study area as per the July 2026 site visit. Note: the boundaries of the upper edges of the wetland on the nature reserve are of low confidence, considering the limited vegetation recovery since the recent alien clearing efforts. Considering that the focus was only upstream of Lynx Road, the wetland boundary does not extend downstream within this map.



Figure 3.6: Map showing the delineated wetland boundary (pink) with a focus on erf 1486 as per the July 2026 site visit. Considering that the focus was only upstream of Lynx Road, the wetland boundary does not extend downstream within this map.

As confirmed by previous wetland delineation studies, the current assessment identified extensive wetland habitat on Erf 1486. This comprises a permanently saturated wetland core, situated within the lowest-lying portion of the property adjacent to the excavated pond, surrounded by a broader area of seasonal and temporary wetland habitat. Collectively, these areas support well-established communities of obligate and facultative wetland plant species.

The permanently saturated core (Figure 3.7) is dominated by indigenous wetland vegetation, including *Senecio halimifolius*, *Juncus kraussii*, *Orphium frutescens*, *Typha capensis*, *Plecostachys serpyllifolia*, *Schoenoplectus scirpoides*, *Isolepis striata*, *Nidorella ivifolia*, *Elegia nuda* and *Cotula coronopifolia*. These species, together with several additional wetland-associated plants, were also recorded by Helme (2023) within the permanently saturated portion of the wetland. Invasive species are also present, most notably *Cenchrus clandestinus* (kikuyu grass). Although not an obligate wetland species, kikuyu commonly proliferates in wet and disturbed environments and can form dense stands.

The surrounding seasonal wetland, which experiences seasonal inundation, saturation or temporary wetness, supports a more varied vegetation assemblage (Figure 3.8 and Figure 3.9). Dominant and commonly occurring species include *Senecio halimifolius*, *Juncus kraussii*, *Orphium frutescens*, *Plecostachys serpyllifolia*, *Nidorella ivifolia*, *Zantedeschia aethiopica*, *Stenotaphrum secundatum*, *Cynodon dactylon*, *Senecio rigidus*, *Cyperus* spp., *Pycneus* sp., *Juncus cephalotes* and *Elegia nuda*.

Toward the temporary wetland margin, the vegetation becomes increasingly transitional, with more terrestrial species such as *Passerina corymbosa*, *Athanasia trifurcata* and *Searsia lucida* occurring interspersed with the seasonal wetland plant community (Figure 3.10).

Helme (2023) indicated that, of additional conservation interest, *Disa hallackii*, which is listed as Endangered, has previously been recorded from a nearby erf and there are several records of the species from the wider Onrus and Vermont area. The species may be most readily detectable during the first few years following fire. As Erf 1486 has reportedly not burnt for more than 20 years, its absence during the current survey does not necessarily confirm that it does not occur on the property. Furthermore, as per Helme (2012), the Critically Endangered *Haemanthus canaliculatus* (vlei paintbrush) has been recorded from similar habitat near Onrus (SANBI Rares – gis database), and there is a small chance that it may occur in this habitat on site.



Figure 3.7: Photos of the permanently saturated portion of the wetland on erf 1486. Left: excavated pond which appears to be permanently saturated and permanently inundated. Right: View across the permanently saturated portion of the wetland taken from the southern portion of the wetland towards the R43.



Figure 3.8: Images of the seasonal wetland that is seasonally inundated looking south towards the existing residential dwellings located on the southern boundary of erf 1486.



Figure 3.9: Images taken on the western boundary of erf 1486 showing the permanently saturated portion of the wetland (left) and the seasonally saturated portion of the property immediately adjacent to the derelict building (right).



Figure 3.10: Images of the seasonal to temporary margin of the wetland on the northernmost section of erf 1486 (immediately south of the R43).

To provide additional supporting evidence and to assist in validating and interpreting the extent of wetland habitat within and around Erf 1486, the area immediately upslope of the property, within the adjoining Hoek van die Berg Nature Reserve, was also investigated. Clear vegetation and soil indicators consistent with wetland conditions were observed in this area, as illustrated in Figure 3.11 and Figure 3.12.



Figure 3.11: Images of the wetland habitat (top portion) on the nature reserve property immediately west of erf 1486 and immediately south of the R43. The main dwelling is situated behind.



Figure 3.12: Wetland habitat immediately west of erf 1486 (adjacent to the derelict building) (left). The wetland core is visible in the image on the right.

Erf 1486 and its immediate surroundings contain a number of noteworthy site features, including:

- A two-track entrance road, constructed from a mixture of bricks, gravel and seashells, which links the main dwelling to Lynx Road. Several small pipes beneath the road allow water to pass through (Figure 3.13).
- An excavated pond located within the lowest-lying portion of the property, with an associated berm comprising excavated and/or dumped material situated within the wetland (Figure 3.14).
- The main dwelling located in the north-western portion of the property (Figure 3.15).
- A stormwater culvert beneath the R43 that discharges surface runoff upslope of the main dwelling (Figure 3.16).
- Numerous informal walkways, some of which have been covered with wooden pallets to facilitate access across persistently wet and muddy ground (Figure 3.17).
- A derelict building/platform extending into the wetland, which is currently used for the storage of various materials (Figure 3.18). Augering confirmed that the platform does not comprise a solid constructed base, although some rubble is present. Vegetation in this area is dominated by dense kikuyu grass and mint, with scattered *Senecio* shrubs, other weedy species and a small stand of bulrush (*Typha capensis*) establishing in the corner furthest from the main wetland area.
- Garden escapees and dumped garden refuse within the south-western corner of the property (Figure 3.19).
- Along the south-eastern boundary, Erf 1486 adjoins a municipal property (Erf 2317), which is dominated by kikuyu grass with several planted milkwood trees. A concrete stormwater outlet is also present in this area and appears to discharge runoff from the residential area situated south of Erf 1486 (Figure 3.20).



Figure 3.13: Images showing the entrance road from Lynx Road to the main dwelling on erf 1486 (left). This road contains numerous pipes to allow water to flow underneath it.



Figure 3.14: Images showing the excavated pond within the lowest portion of the property (left) and with dumped material creating a berm (see area dominated by lush green kikuyu grass in the right-hand image).



Figure 3.15: Image showing the main dwelling located on the northwestern portion of the property. The area to the south of this dwelling was surrounded by inundated soils at the time of the site visit.



Figure 3.16: Image of a stormwater culvert underneath the R43 draining the upper catchment and discharging flows towards erf 1486.



Figure 3.17: Evidence of muddy conditions with the placement of wooden crates around the property.



Figure 3.18: A derelict building associated with the main dwelling that was built within the wetland.



Figure 3.19: Evidence of dumped garden refuse and the presence of garden escapees in the southwestern corner of erf 1486.



Figure 3.20: Images of the municipal erf 2317 located along the southeastern boundary of erf 1486. It is dominated by Kikuyu grass. There is also a stormwater discharge point draining into the wetland immediately upslope of Lynx Road.

Furthermore, during the field assessment, three locations exhibiting iron-rich deposits were observed along the boundary between Erf 1486 and the adjoining nature reserve (Figure 3.21). The associated bubbling and trickling seepage is consistent with groundwater discharge and may reflect interaction between groundwater derived from the Peninsula Aquifer and the overlying sandy aquifer. According to D. Blake (Umvoto, pers. comm.), iron-rich sludge and staining can develop where acidic, iron- and manganese-bearing groundwater interacts with more alkaline, carbonate-bearing dune sediments and is subsequently exposed to more oxidising conditions. These geochemical changes promote the precipitation of iron oxides and hydroxides, which may accumulate around spring and seepage outlets.



Figure 3.21: Images of two springs noted during the site visit. Left: bubbling spring noted immediately upslope of erf 1486 on the nature reserve. Right: slow bubbling spring immediately adjacent to the derelict building on erf 1486.

Additional anecdotal information was obtained during the site visit through discussions with a homeowner immediately south of Erf 1486. The landowner indicated that no damp problems were experienced when they moved into the property in 2022, but that rising damp has since become increasingly problematic following intensified alien vegetation clearing within the adjoining nature reserve. The homeowner also noted that a road along the eastern boundary of the nature reserve had historically remained dry. However, following the removal of alien vegetation, dense stands of *Typha capensis* (bulrush) have established along this area (Figure 3.22). The presence of *T. capensis*, which is typically associated with permanently saturated conditions, suggests that hydrological conditions along this boundary have become considerably wetter. While this observation is anecdotal and does not in itself demonstrate a direct causal relationship, it may indicate that the shallow water table has risen locally over the past four years, broadly coinciding with the period of more intensive alien vegetation clearing.



Figure 3.22: Image of the previous dry road along the eastern boundary of the nature reserve that is now dominated by dense stands of *Typha capensis* following alien clearing.

4 CURRENT DEVELOPMENT APPLICATION

4.1 Proposed development layout

As per the Final Basic Assessment Report (version 4) (dated 20 May 2026) for the proposed residential development on erf 1486, four alternative layout plans have been assessed over the years and were modified (See Table 4.1). Alternative layout 4, which is currently the final preferred layout, “comprises the subdivision of Erf 1486 to create six single residential erven, one private internal access road, and one large open space erf (Erf 8) incorporating the entire delineated wetland. The total development footprint under the preferred Alternative 4 is approximately 5 709 m², with 9 361 m² (approximately 62% of the site) designated as protected private open space in perpetuity.” (Table 4.2 and Figure 4.1).

Table 4.1: The various alternative development layouts proposed for erf 1486. Sourced from the FBAR.

Alternative	Description
Alternative 1	12 residential erven, no open space. Complete loss of the wetland area. Ecological impact unacceptable. Not preferred.
Alternative 2	13 residential erven and road. Reduced wetland impact but still unacceptable encroachment into permanent and seasonal wetland. Not preferred.
Alternative 3 (previously preferred)	9 erven, two road erven, one open space erf. Significant reduction in wetland impact. Not supported by CapeNature due to residential encroachment of erven into seasonal wetland and enforceability concerns.
Alternative 4 (final preferred)	6 residential erven, 1 road erf, 1 open space erf. All residential erven positioned outside delineated wetland. Only unavoidable encroachment is access road (0.024 ha, 3% of wetland). Supported by CapeNature (6 November 2025).
No-Go	No development. Status quo maintained. Continued unmanaged disturbance, alien vegetation, and no formal wetland protection. Not preferred.

Table 4.2: Summary of Alternative 4 footprint. Sourced from the FBAR.

Component	Description
Residential erven (Erven 1–6)	6 × single residential erven — total footprint approximately 4 253 m ²
Private access road (Erf 7)	One internal access road connecting to Lynx Avenue — approximately 1 456 m ²
Private open space (Erf 8)	Protected open space incorporating the entire wetland — approximately 9 361 m ² (62% of site)
Total development footprint	Approximately 5 709 m ²
Wetland encroachment	Approximately 0.024 ha (3%) — access road only; offset required

In terms of water and sanitation services, the proposed development will require the installation of new potable water and sewage pipelines, primarily within Erf 1486. In addition, an existing sewage pipeline that crosses the same wetland system further downstream, approximately midway between Erf 1486 and Vermont Pan, will need to be upgraded from a 110 mm to a 160 mm diameter pipeline (Figure 4.2).

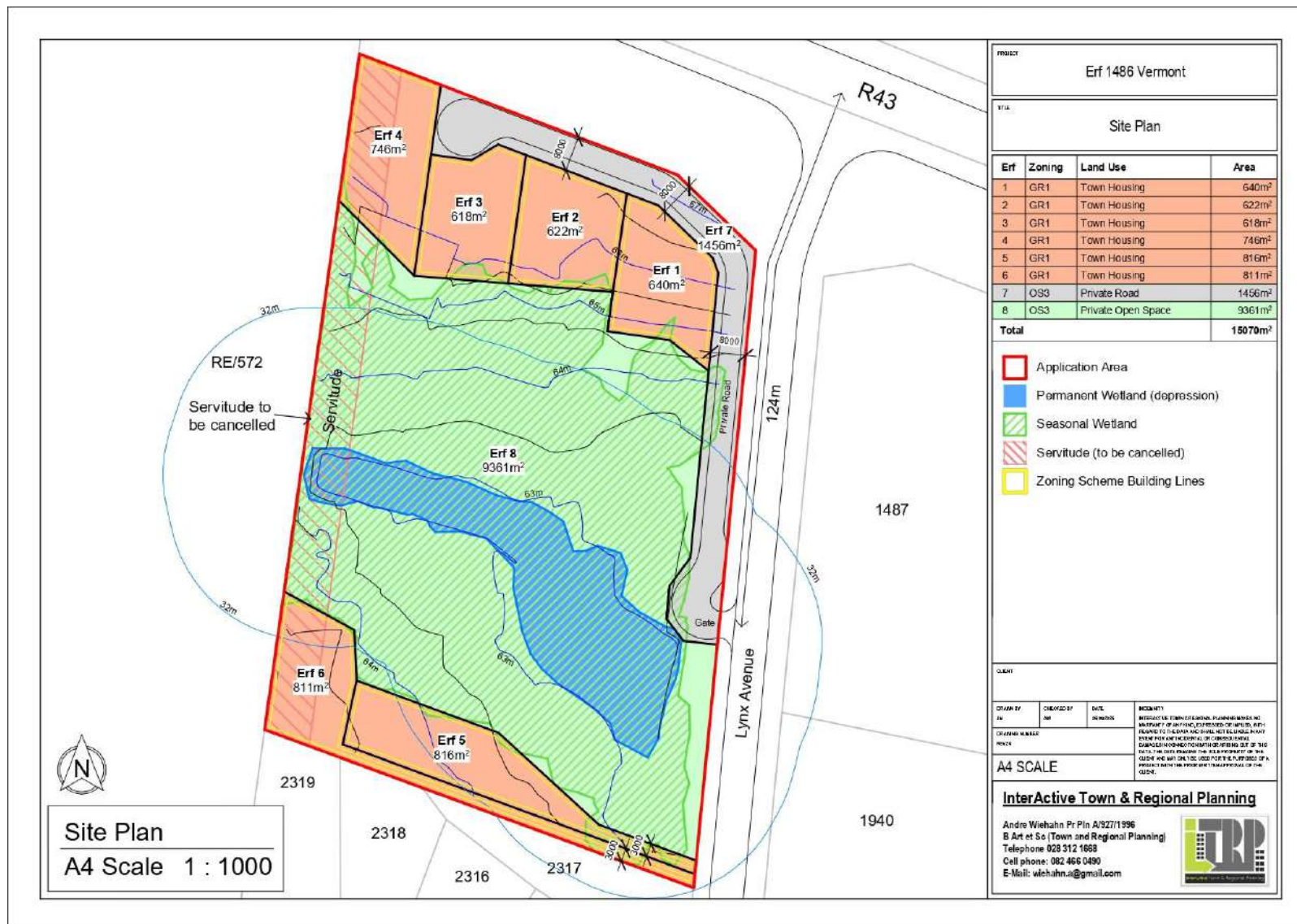


Figure 4.1: Alternative 4, which is the preferred layout as per the latest FBAR.



Figure 4.2: Map showing the location of existing and newly proposed potable water and sewage pipelines to accommodate the proposed development on erf 1486. Source: Louwrens (2025)

4.2 Proposed Wetland Offset

The following information regarding the proposed Wetland Offset, Rehabilitation and Management Plan has been extracted from the FBAR and is based on Van Zyl and Morton (2026):

The unavoidable loss of approximately 0.024–0.027 ha of seasonal wetland (3% of the 0.90 ha UVB wetland) due to access road construction has been assessed and quantified using the Macfarlane et al. (2016) Wetland Offset Calculator. The calculation applies the upper precautionary figure of 0.027 ha.

Wetland area lost	0.027 ha
Function loss (HE)	0.0157 HE
Habitat loss (HE)	0.1985 HE
Offset area (remaining wetland)	0.846 ha
Function gain through rehabilitation (HE)	0.1173 HE
Habitat gain through rehabilitation (HE)	1.0025 HE
Net function surplus (HE)	0.1016 HE
Net habitat surplus (HE)	0.8041 HE
Offset target PES	Upper Category C (minimum PES score 79%)
Current PES	Category D (largely modified)

Key rehabilitation interventions include the removal of all foreign fill material and rubble during summer months, reshaping the wetland to restore unchanneled valley bottom slope characteristics (central basin 0–1%), removal of alien invasive species (pampas grass, Kikuyu, Port Jackson, Rooikrans), revegetation with a minimum of six locally indigenous wetland species at 4 plants/m² targeting 80% cover within 8–12 months, and implementation of all stormwater management measures. A conservation servitude over the 0.876 ha offset wetland area must be registered as a title deed restriction within six months of Water Use Authorisation issuance.

The freshwater specialist from Delta Ecology concludes that the offset is practically implementable and will result in substantial biodiversity gains, supporting approval of the development subject to the plan being implemented as a condition of authorisation (Van Zyl and Morton 2026).

4.3 Proposed Stormwater Management Plan

Stormwater is proposed to be managed through three primary measures (sourced from: Deca (2026)):

- **An enhanced swale** designed to capture and convey runoff generated from Erven 1–4.
- **Permeable paving** to promote infiltration and reduce the volume and rate of surface runoff.
- **Three stormwater discharge outlets**, all located within, or in very close proximity to, the wetland extent delineated by Van Zyl et al. (2023).
 - Outlet 1 will convey stormwater originating from the mountain slopes north of the R43 via a swale. The outlet will discharge into a small area mapped as non-wetland

habitat, although this area is situated immediately adjacent to the delineated wetland boundary.

- Outlet 2 will convey runoff from the permeable paving and the internal road network and discharge into delineated seasonal wetland habitat.
- Outlet 3 will convey stormwater generated along the main access road and discharge it towards the wetland system.

These measures are visualised in Figure 4.3.



Figure 4.3: A series of images taken from the proposed stormwater management plan for the proposed development on erf 1486. Source: Deca (2026).

Further recommendations within the Aquatic Biodiversity Impact Assessment (van Zyl et al 2026):

- Discharge stormwater from rooftops into rain harvesting tanks. This will limit the volumes of stormwater runoff that will reach the wetland. Where possible, water collected in rain harvesting tanks can be utilised for flushing of toilets, washing etc.
- Vegetated swales must be utilised rather than concrete drains or underground stormwater pipes in order to encourage infiltration, particularly next to roadways.
- Energy dissipaters / erosion protection measures (such as lining with stones, grass, reno-mattresses, or gabions) must be constructed where stormwater is released in order to reduce the runoff velocity and therefore erosion.
- Sheet runoff from hardened surfaces must be intercepted and the treatment and infiltration of runoff must be promoted.
- Sediment traps should be incorporated into stormwater drains / swales upstream of all discharge points into the wetland.
- All stormwater draining into the wetland must receive basic filtering and treatment prior to its release.
- Incorporate measures into the stormwater design to trap solid waste, debris and sediment carried by stormwater. Measures may include the use of curb inlet drain grates and debris baskets/bags.
- Stormwater generated from areas with a higher risk of contamination such as parking areas and roads must receive basic filtering and treatment prior to its release into surrounding areas. Treatment methods may include sand filter traps and oil-water separators which will require maintenance.
- The extent of hardened surfaces must be minimised. E.g. where required permeable paving must be used.
- Homeowners must be encouraged to landscape their gardens with the use of indigenous species to decrease the area of hardened surface and increase infiltration.
- Homeowners should store any potential pollutants in such a way that pollution will not occur to the wetland (such as any fuel, etc.). Potential pollutants should be stored in an adequately bunded area.
- The use of herbicides, pesticides and any other poisons within private gardens must be strictly prohibited. The home owner's association must be responsible for ensuring that residents are compliant with this.
- Backwashing of swimming pools directly into the wetland must be strictly prohibited. Backwash water can be collected in settling tanks where dirt and debris settle to the bottom. The cleaner water can then be reused for non-potable purposes or even filtered back into the pool system. Backwash water can be diverted to greywater tanks.
- Monitor the proposed development and adjacent wetland for erosion and sedimentation after heavy rainfall events. Any erosion noted must be immediately addressed. Rehabilitation measures may include the removal of accumulated sediment by hand, filling of erosion gullies and rills, the stabilisation of gullies with silt fences, riprap, and the revegetation of stabilised areas.
- Stormwater systems will require ongoing maintenance. Any build-up of silt or debris within stormwater drains or swales will need to be cleared to ensure the continued functioning of the systems.
- Any damage to stormwater infrastructure, and any flaws identified in the functionality of stormwater infrastructure, must be rectified immediately.

- Stormwater systems must be monitored and maintained into perpetuity and collections of debris and solid waste removed from grates and baskets. The developer must confirm who will be responsible for this monitoring and maintenance as well as their roles.
- The stormwater system must be designed by a suitably qualified engineer with input from an aquatic specialist.

5 CRITICAL REVIEW OF THE DOCUMENTATION RELEVANT TO THE LATEST DEVELOPMENT APPLICATION

Following a review of the available project reports and supporting documentation, and taking into account the findings of the current study, a critical and objective freshwater specialist opinion is provided on the following aspects:

5.1 Critical review of previous wetland delineations

A comparison of the wetland extents delineated during the various studies undertaken on Erf 1486 indicates considerable variation over time. This variability should be interpreted within the broader context of substantial changes in catchment condition, particularly the progressive removal of dense stands of invasive alien vegetation from the Hoek van die Berg Nature Reserve and adjoining upper catchment.

At the time of the 2006 assessment, much of the back-dune area upslope of Erf 1486 was densely invaded by alien vegetation. By the time of the 2018 assessment, extensive alien vegetation remained within the upper catchment and the region was also experiencing the effects of the severe Western Cape drought between 2016 and 2018. The comparatively reduced wetland extent delineated at this time may therefore, at least in part, reflect temporarily drier hydrological conditions associated with both prolonged drought and the continued influence of dense alien vegetation on local water availability.

By 2023, substantial alien clearing had occurred within portions of the upper catchment. However, the area immediately west and upslope of Erf 1486 remained relatively densely invaded. It is therefore plausible that the hydrological response to clearing had not yet fully manifested across the entire wetland system, particularly if the long-term presence of deep-rooted alien vegetation had resulted in sustained suppression of the shallow water table.

By late 2025 and into 2026, substantially larger portions of the upper catchment and back-dune corridor had been cleared. Field observations undertaken during the current study indicate notably wetter conditions within and immediately upslope of Erf 1486, including areas of active seepage, iron-rich groundwater discharge, expanded wetland vegetation and the establishment of species associated with prolonged or permanent saturation. These observations suggest that the progressive removal of alien vegetation may have contributed to a recovery of shallow groundwater levels and an expansion, or re-expression, of wetland conditions within areas that had previously been comparatively dry. However, this relationship should be interpreted cautiously, as wetland hydrology is also influenced by interannual rainfall variability and longer-term groundwater responses.

A further uncertainty relates to the level of field verification undertaken during the previous delineation studies. The previous wetland delineation reports do not indicate the number or spatial distribution of soil auger points used to define the wetland boundaries. It is therefore difficult to assess

the level of confidence associated with some of the earlier delineations or the relative weighting given to soil, vegetation and hydrological indicators. This is particularly relevant in landscapes undergoing hydrological recovery, where vegetation may respond more slowly than changes in soil saturation and groundwater levels. Conversely, where groundwater levels have been suppressed over prolonged periods, the re-establishment of characteristic wetland soil and vegetation indicators may also lag behind the hydrological response.

The wetter conditions encountered during the current winter survey undoubtedly assisted with the identification of wetland extent. However, the broader field evidence suggests that the greater extent of wetland habitat identified cannot necessarily be attributed to seasonal conditions alone. Rather, it is likely to reflect a combination of favourable recent rainfall and a changing catchment hydrology following extensive alien vegetation removal.

The differences between the various wetland delineations therefore highlight the importance of interpreting wetland boundaries within their broader catchment and historical context. They also demonstrate the need for delineation studies in long-invaded and actively rehabilitated landscapes to clearly acknowledge hydrological uncertainty and the potential for wetland extent to change as catchment conditions recover. In such settings, reliance on a single indicator or a single point-in-time assessment may underestimate the potential extent of wetland habitat.

Accordingly, in such circumstances, a precautionary approach should be adopted when determining wetland extent. Where uncertainty exists, the delineation should take into account the maximum plausible wetland extent based on the broader topographic and landscape setting, observed hydrological and soil indicators, and the understanding of the site's geohydrological functioning and historical hydrological condition.

5.2 Current wetland extent in relation to the proposed development footprint

In the context of the extensive alien vegetation clearing undertaken within the upper catchment, and based on the field data collected during the current assessment, it is apparent that the majority of Erf 1486 comprises wetland habitat, including permanent, seasonal and temporary wetland zones. Although portions of the wetland have been modified by the existing dwelling, access infrastructure and historical infilling, the extent of wetland habitat immediately west of the property suggests that, under less disturbed conditions, the **entirety of Erf 1486 is likely to have historically been part of the broader wetland system**. Thus, it is recommended that the assessment of impacts to inland aquatic ecosystems and the proposed wetland offset strategy be revised to reflect the change in wetland extent.

5.3 Presentation of information within the FBAR

One overarching concern relates to the manner in which the FBAR describes the relationship between the proposed development and the wetland. The FBAR repeatedly indicates that the residential erven

will be located outside the permanent and/or seasonal wetland habitat, with the exception of the internal road. While this is broadly consistent with the wetland extent delineated by Van Zyl et al. (2023), some encroachment into the mapped seasonal wetland is evident (refer to Figure 4.1 in Section 4.1). More importantly, based on the revised delineation undertaken as part of the current study, which indicates that the majority of Erf 1486 comprises permanent, seasonal or temporary wetland habitat, this statement is no longer considered accurate.

A related concern is the recommendation that “all dwellings [are] to be raised a minimum of 1.0 m above wetland level” and that “raft foundations [are] required to reduce subsurface flow impacts” (page 10 of 303 of the FBAR). This recommendation requires further clarification. It is not clear whether the proposed raising of dwellings is primarily intended to address anticipated damp or flood-related constraints associated with constructing within wetland habitat, or whether it is intended to maintain subsurface water movement beneath the development. If the latter is the objective, it would be important to demonstrate how the proposed design would maintain the broader shallow subsurface and interflow connectivity between the upper catchment, Erf 1486 and the downstream wetland system.

The revised wetland extent also has important implications for the proposed stormwater management strategy. If most of the development footprint is located within wetland habitat, there is effectively no meaningful terrestrial buffer within which stormwater can be managed before entering the wetland system. This is particularly relevant in the context of increased water availability associated with extensive alien vegetation clearing in the upper catchment, together with the additional catchment hardening that would result from the proposed development. Without appropriate attenuation and dispersal, these combined changes may increase the risk of concentrated flows, erosion, further wetland degradation and increased flood pressures both on the site and further downstream, with potential consequences for downstream properties and aquatic ecosystems.

The treatment of the wetland buffer or setback also requires clarification. Job and Ractliffe (2006) recommended a 30 m buffer around the wetland, while the more recent aquatic assessments undertaken between 2018 and 2025 did not explicitly prescribe a specific ecological buffer width. The latest FBAR refers to a 32 m regulated area; however, the layout presented in Section 4.1 appears to apply this distance only around the permanently saturated depression. If the 32 m distance is intended to function as an ecological buffer or development setback, it should be measured from the outer boundary of the wetland, including the seasonal and temporary wetland zones, rather than from the permanently saturated core alone. As currently presented, the layout may therefore give the impression that a wetland buffer has been incorporated, when in practice the setback does not appear to be applied to the full delineated wetland extent.

Furthermore, the concern regarding potential downstream hydrological changes following alien vegetation clearing is acknowledged. However, the removal of listed invasive alien plants is a legal

land-management obligation and is generally intended to restore catchment functioning by reducing the elevated evapotranspiration associated with dense alien vegetation. Any resulting increase in groundwater levels, seepage or downstream flow should therefore not automatically be regarded as a new impact caused by the clearing, but rather as a potential recovery towards the more natural hydrological functioning of the catchment and associated wetland system. In this context, downstream land-use planning should account for the reasonably foreseeable restoration of natural water movement and wetland conditions, rather than treating the hydrologically altered state created by long-term alien infestation as the baseline condition.

5.4 Proposed wetland offset

As a point of departure, wetland offsets should only be considered once the mitigation hierarchy has been fully applied and where the competent authorities are satisfied that the need and desirability of the proposed development outweigh the environmental sensitivities and residual impacts that cannot reasonably be avoided or minimised. Offsetting should therefore not be regarded as a routine or “go-to” mechanism for enabling development within wetland habitat, but rather as a measure of last resort to compensate for unavoidable residual impacts associated with an otherwise acceptable development.

The proposed wetland offset strategy should be reconsidered in light of the revised wetland delineation undertaken as part of the current study. The existing offset calculation is based on a wetland extent of approximately 0.90 ha, of which only 0.027 ha is assumed to be lost and approximately 0.846 ha retained for rehabilitation and protection. However, the current assessment indicates that the extent of permanent, seasonal and temporary wetland habitat across Erf 1486 is substantially greater than previously mapped (in 2023). This has direct implications for both sides of the offset calculation, as the actual area of wetland loss may be considerably greater, while the area genuinely available to generate offset gains may be correspondingly reduced. The existing offset balance should therefore be recalculated using the revised wetland extent before any conclusion can be reached regarding the adequacy of the proposed offset.

The assumed improvement in wetland condition also requires further substantiation. The offset calculation relies on the remaining wetland improving from a largely modified condition to an upper Category C, with a corresponding increase in functional value. This improvement is fundamental to the calculated offset surplus. However, the retained wetland would simultaneously be exposed to increased development pressure associated with residential erven, roads, stormwater discharges and associated water and sewage infrastructure in very close proximity to the wetland. Given these ongoing pressures, the feasibility of achieving and maintaining the targeted ecological improvement should be demonstrated through clearly defined, measurable and realistic rehabilitation outcomes.

The absence of a functional wetland buffer is also of concern. The offset assessment records no buffer area as being secured as part of the offset. In the context of Erf 1486, where the wetland forms part

of a narrow ecological and hydrological corridor between the Hoek van die Berg Nature Reserve and Vermont Pan, the lack of an effective buffer may substantially constrain the long-term resilience of the retained wetland. The implications of edge effects, increased disturbance, stormwater inputs, domestic activities and potential infrastructure failure should therefore be explicitly incorporated into the assessment of whether the proposed offset area can realistically maintain the anticipated ecological gains.

The proposed interventions aimed at modifying or improving hydrological connectivity, including changes to flow beneath Lynx Road, should also be approached cautiously. Any intervention intended to alter conveyance or reconnect flows should be supported by a clear understanding of the natural and current hydrological regime. This is particularly important given the changing hydrological conditions within the upper catchment following extensive alien vegetation clearing. Without a sufficiently robust hydrological and geohydrological basis, there is a risk that such interventions could alter wetland hydroperiods or increase downstream flow rates rather than restore natural functioning.

Accordingly, the conclusion that the proposed strategy will result in a net ecological gain should be treated with caution. The stated surplus is dependent on several key assumptions, including the accuracy of the mapped wetland loss, the extent of wetland available for rehabilitation, the successful improvement in ecological condition, effective stormwater management, maintenance of hydrological connectivity and long-term protection of the offset area. Given the revised understanding of wetland extent and catchment hydrology, these assumptions should be revisited before the adequacy of the proposed offset can be confirmed.

5.5 Location of the proposed development in relation to the wetland and its associated buffer

Based on the updated wetland delineation undertaken as part of this study, most of the proposed development footprint is located within permanent, seasonal and temporary wetland habitat. Consequently, the proposed infrastructure would result in the direct infilling and loss of wetland habitat, with no meaningful buffer remaining between the development footprint and the wetland.

In addition, the proposed development would require the installation of new potable water and sewage pipelines in very close proximity to, or within, the wetland. Existing sewage infrastructure located further downstream, between Erf 1486 and Vermont Pan, would also need to be upgraded where it crosses the wetland corridor that is intended to be retained as an ecological link. In the event of infrastructure failure, leakage or accidental discharge, the absence of an effective buffer would provide little opportunity for impacts to be intercepted or attenuated before reaching the broader wetland complex, including the unchannelled valley-bottom wetland and Vermont Pan.

The cumulative effect of wetland infilling, infrastructure encroachment and the absence of a functional buffer would further weaken the resilience and ecological functioning of the corridor. This would reduce the ability of the wetland system to absorb disturbance, maintain hydrological connectivity and continue functioning as an ecological link between the Hoek van die Berg Nature Reserve and Vermont Pan.

5.6 Proposed development in the context of climate change

As outlined in Section 2.5, Erf 1486 is situated within a particularly constrained section of the broader ecological corridor and effectively forms a bottleneck in the wetland-linked connection between the upper extent of the valley-bottom wetland within the Hoek van die Berg Nature Reserve and Vermont Pan. In the context of continued urbanisation within the Overstrand Municipality and the increasing pressures associated with climate change, the retention of functional ecological corridors is becoming progressively more important for supporting landscape connectivity and facilitating the movement of terrestrial, semi-aquatic and aquatic fauna.

The broader management intent for this landscape is therefore to restore and strengthen corridor functionality through the progressive clearing and ongoing control of invasive alien vegetation, with the aim of improving habitat condition and ecological connectivity. Against this background, any proposed development on Erf 1486 should be carefully considered in terms of its potential to further constrain this already narrow ecological linkage. Urban encroachment within the corridor could reduce its functional width, fragment wetland-associated habitat and weaken connectivity between the Hoek van die Berg Nature Reserve and Vermont Pan.

Climate change also has important implications for the hydrological functioning of the site and the wider wetland system. More intense rainfall events may increase the volume and rate of surface runoff entering the wetland corridor over short periods, thereby increasing the risk of localised flooding and placing additional pressure on stormwater infrastructure. Given the downstream connectivity of Erf 1486 to the broader wetland system and ultimately Vermont Pan, the consequences of altered runoff are not confined to the development site itself. Increased and more concentrated flows could also elevate flood risk, erosion and hydrological disturbance further downstream. It is therefore important that the proposed development does not reduce the capacity of the wetland corridor to store, attenuate and slowly convey water through the landscape.

The proposed development should consequently be considered not only in terms of its direct footprint, but also in relation to the long-term resilience of the broader ecological and hydrological corridor. Maintaining sufficient open space, protecting wetland habitat and avoiding unnecessary concentration or acceleration of runoff will be important in reducing both ecological fragmentation and future flood-related risks under a changing climate.

6 CONCLUSION AND RECOMMENDATIONS

The current assessment confirms that Erf 1486 forms part of the broader wetland system extending from the Hoek van die Berg Nature Reserve towards Vermont Pan. Field verification undertaken in July 2026 identified a permanently saturated wetland core surrounded by extensive seasonal and temporary wetland habitat, with the majority of Erf 1486 consequently classified as wetland. The wetland also extends upslope into the adjoining nature reserve, where vegetation, soil and hydrological indicators confirm the continuation of wetland conditions beyond the property boundary.

The extent of wetland habitat identified during the current assessment is greater than that delineated in several of the more recent studies undertaken for the proposed development. The differences between these delineations are considered likely to reflect a combination of factors, including survey timing and methodology, the prolonged influence of dense alien vegetation within the upper catchment, the 2016–2018 drought, and the subsequent extensive removal of invasive alien vegetation. The latter has likely contributed to increased water availability and a recovery of shallow groundwater levels, although the magnitude of this response has not been quantified. Importantly, the hydrologically altered conditions associated with historical alien infestation should not necessarily be regarded as representative of the natural or reference condition of the wetland system.

Given the revised wetland extent, the majority of the currently proposed development footprint would occur within permanent, seasonal or temporary wetland habitat. Development would therefore result in direct wetland loss through infilling and would leave little to no meaningful ecological buffer between the remaining wetland and the proposed residential development and associated infrastructure. This differs materially from the assumptions underlying the current aquatic impact assessment, stormwater design and wetland offset strategy, which are based on a smaller wetland extent and substantially lower estimate of direct wetland loss. These components of the development application would therefore require reconsideration should the current delineation be accepted.

Erf 1486 is also situated within a particularly constrained portion of the broader ecological and hydrological corridor between the Hoek van die Berg Nature Reserve and Vermont Pan. Further infilling and urbanisation within this narrow link would reduce the available wetland and open-space corridor, increase edge effects and place additional pressure on hydrological connectivity and ecological functioning. These considerations are particularly relevant given the ongoing restoration of the adjoining nature reserve, the potential recovery of wetland hydrology following alien clearing, and the need to retain landscape resilience under future climate conditions characterised by potentially more intense rainfall and associated flood risks.

On the basis of the findings of the current assessment, the following recommendations are made:

- **The wetland delineation undertaken as part of this study should be used as the basis for reconsidering the proposed development layout and associated freshwater impacts.** The impact assessment, stormwater management strategy and proposed wetland offset should be revisited in relation to the revised wetland extent.
- **The mitigation hierarchy should be applied from the outset, with avoidance of wetland loss being the primary objective.** A wetland offset should not be regarded as a mechanism for enabling an otherwise avoidable development footprint within wetland habitat. Offsetting should only be considered once the competent authorities are satisfied that the need and desirability of the development outweigh the environmental sensitivities and that all reasonable opportunities for avoidance and minimisation have been exhausted.
- **In line with the precautionary approach advocated by Job and Ractliffe (2006), it is recommended that no new development take place within the currently undeveloped portions of Erf 1486.** Any future development or redevelopment should, from a freshwater perspective, be confined to the existing disturbed and transformed footprint associated with the current dwelling and immediately associated infrastructure, and should not result in further infilling, fragmentation or loss of the surrounding wetland system. Even if redevelopment were to occur within the existing footprint, implementation of an ecological buffer or development setback to reduce potential impacts to the surrounding wetland would effectively render very little to no potential for development to occur on erf 1486 without significant impacts. Job and Ractliffe (2006) similarly emphasised the protection of wetlands and associated open-space linkages from further urban development and recommended appropriately vegetated setbacks around the identified wetland system.
- Any proposal to redevelop within the existing disturbed footprint should nevertheless be subject to detailed design review to ensure that the footprint is not expanded into surrounding wetland habitat and that construction does not impede shallow subsurface or surface-water movement through the site.
- A suitable ecological buffer should be maintained from the outer boundary of the delineated wetland rather than only from the permanently saturated core. Where the existing disturbed footprint constrains achievement of a conventional buffer, the design should seek to maximise the setback from wetland habitat and minimise edge effects.
- Stormwater generated by any retained or future development should be managed in a manner that maintains diffuse flow patterns and avoids the concentration, acceleration or artificial diversion of flows through the wetland corridor. Stormwater infrastructure should be designed with consideration of the recovering catchment hydrology and potential increases in runoff associated with both catchment hardening and high-intensity rainfall events.

- The installation of new sewage and potable water infrastructure within wetland habitat should be avoided where feasible. Any infrastructure that cannot reasonably avoid the wetland should be designed to minimise disturbance and the risk of future leakage or failure.
- Continued alien vegetation clearing and follow-up control within the Hoek van die Berg Nature Reserve should be supported as part of the long-term ecological restoration of the catchment. The resulting recovery of groundwater levels, seepage and wetland extent should be recognised as a likely response towards more natural hydrological functioning rather than treated as an adverse impact of alien clearing.
- The wetland and adjoining ecological corridor should be managed as an integrated system extending beyond the cadastral boundaries of Erf 1486. Future management should therefore consider connectivity between the upper wetland within the nature reserve, Erf 1486 and the downstream wetland system leading towards Vermont Pan.

Overall, from a freshwater ecological perspective, the currently proposed development layout is **not supported**, as it is based on a wetland extent that is substantially smaller than that identified during the current assessment and would result in extensive development within wetland habitat. The preferred outcome is the retention of the undeveloped portions of Erf 1486 as part of the broader wetland and ecological corridor, with any future development confined, as far as possible, to the existing disturbed footprint.

7 REFERENCES

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8 APPENDIX A: SHORT CURRICULUM VITAE

FRESHWATER ECOLOGIST (NAME): PHILIP FRENZEL-DANIELS									
EMPLOYER AND CURRENT JOB TITLE	QUALIFICATIONS AND DATES	ASSOCIATION AND PROFESSIONAL REGISTRATION NO.	NO. OF YEARS POSTGRADUATE EXPERIENCE						
Freshwater Consulting cc Aquatic Ecosystem Consultant  Freshwater Consulting	MSc (Conservation Ecology) (2016-2018) BSc (with Hons) (Conservation Ecology) (2012-2015) (<i>cum laude</i>) Both degrees from Stellenbosch University	Registered Professional Natural Scientist by SACNASP (Reg No 123620)	8						
Background: Philip is a freshwater ecologist based in Cape Town, South Africa, with 8 years of postgraduate experience, including 7 years in environmental consulting. His work focuses on inland aquatic ecosystems, particularly rivers and wetlands, in South Africa and the broader southern African region. As an aquatic ecosystem specialist, he provides scientifically defensible, practical and solution-oriented input to help clients, project teams and authorities understand how developments, infrastructure, groundwater abstraction, wastewater discharges and land-use changes may affect freshwater systems. His experience spans municipal infrastructure, bulk water supply, renewable energy, housing, road maintenance, wastewater treatment, conservation planning and private development projects where he has authored and co-authored >60 specialist reports. Key areas of expertise include: • Wetland and river assessments – delineation, verification, condition assessment, sensitivity mapping and impact assessment. • Water quality and biomonitoring – ecological and water quality monitoring, including long-term monitoring linked to groundwater abstraction, wastewater discharge and treated effluent management. • Impact assessment and authorisation support – freshwater specialist input into EIAs, Water Use Authorisations, General Authorisations, aquatic biodiversity compliance, Maintenance and Management Plans, and rehabilitation planning. • Rehabilitation and management planning – practical mitigation, rehabilitation, monitoring and management recommendations. • Project management and coordination – fieldwork coordination, specialist input management, client and authority liaison, project planning and technical delivery. • Freshwater conservation and research – wetland inventory development, ecological prioritisation, Ramsar-related assessments, biodiversity research and applied freshwater conservation projects within southern Africa. Overview of postgraduate experience: <table><tr><td>2019 - present</td><td>Aquatic Ecosystem Consultant, Freshwater Consulting cc</td></tr><tr><td>2019 - 2020</td><td>Researcher with the Freshwater Research Centre</td></tr><tr><td>2018 – 2019</td><td>Intern with the Freshwater Research Centre</td></tr></table>				2019 - present	Aquatic Ecosystem Consultant, Freshwater Consulting cc	2019 - 2020	Researcher with the Freshwater Research Centre	2018 – 2019	Intern with the Freshwater Research Centre
2019 - present	Aquatic Ecosystem Consultant, Freshwater Consulting cc								
2019 - 2020	Researcher with the Freshwater Research Centre								
2018 – 2019	Intern with the Freshwater Research Centre								

End June 2026

FRESHWATER ECOLOGIST (NAME): JUSTINE EWART-SMITH			
EMPLOYER AND CURRENT JOB TITLE	QUALIFICATIONS AND DATES	ASSOCIATION AND PROFESSIONAL REGISTRATION NO.	NO. OF YEARS POSTGRADUATE EXPERIENCE
Freshwater Consulting cc Partner and Senior Consultant 	PhD (Freshwater Ecology) MSc (Marine Biology) BSc Hons (Marine Biology) BSc (Environmental and Geographical Science & Zoology)	Registered Professional Natural Scientist by SACNASP (Reg No 400746/15)	27
Background Dr Justine Ewart-Smith is a freshwater ecologist with 27 years of experience in the assessment and evaluation of aquatic ecosystems. Her experience ranges from specialist input into biomonitoring, strategic environmental assessments, situation assessments, and ecosystem rehabilitation initiatives to EFlows studies in southern Africa and further afield. Justine completed a PhD in periphyton communities on the effects of flow and nutrient changes in riverine ecosystems. Justine is a qualified SASS practitioner and has experience in wetland delineations and assessments of ecological health and functional value. Justine has been involved in a number of wetland assessments in the western Cape and was responsible for the development of a national wetland classification system through collaboration and co-ordination of wetland specialists from throughout South Africa. Justine recently completed her role as project leader on an ongoing monitoring project aimed at investigating the potential effects of groundwater abstraction from the Table Mountain Group Aquifer (TMGA) on surface water ecosystems. She is also the specialist freshwater ecologist on the City of Cape Town's New Water Project, a recently established initiative aimed at developing various groundwater wellfields in response to extreme drought conditions in recent years. Her role in this project involves specialist input into planning, evaluation of impacts, rehabilitation, and monitoring of freshwater ecosystems.			

RELEVANT FIELDS OF SPECIALIZATION, EXPERIENCE AND COMPARABLE PROJECTS
Specialisation: - Specialist ecological and water quality assessments for wetlands and rivers - Freshwater ecological and water quality monitoring, including the development of monitoring design and protocols. - Water Resource Management and Ecological Reserve Determinations - River and wetland rehabilitation - Research and development - Project management and co-ordination of specialist teams Experience & comparable projects (key projects only): Ecological Monitoring: - Table Mountain Group Aquifer (TMGA): hydro (geo) logical and Ecological Monitoring (2022-2025)(Client: City of Cape Town: Bulk Water). - Table Mountain Group Aquifer (TMGA): hydro (geo) logical and Ecological Monitoring (2018-2021)(Client: City of Cape Town: Bulk Water). - Water Use License Compliance Monitoring: River Health Assessments for watercourses receiving treated effluent within the Theewaterskloof Municipality (2021-2022)(Client: Theewaterskloof Municipality - Ecological and Water quality monitoring of the Groot River, Meirings Poort, following a diesel spill (2017-2020) (Client: EnviroSure). - Baseline assessment and ecological monitoring of the Ecological Condition of the Blinde River, Mosselbay (2013-2014) (Client: PetroSA). - TMGA Ecological and Hydrogeological Monitoring (2010-2013) (Client: City of Cape Town: Bulk Water).

- Berg River Baseline Monitoring Programme (2003-2006) (Client: Department of Water Affairs).

Wetland and river assessments:

- Freshwater Specialist: The New Water Project, Contract 194C (2021-2026) (Client: City of Cape Town: Bulk Water).
- The Bredasdorp WWTW upgrade: Freshwater Assessment (2022) (Client: Cape Agulhas Municipality).
- Freshwater assessment for the Concordia Copper Mining Right Application (2022) (Client: Shirley Hayes-IPK (Pty)Ltd).
- Hartenbos Heuwels Residential Development: Freshwater Assessment (2022) (Client: ATKV).
- Freshwater Specialist: The New Water Project (2018-2021) (Client: City of Cape Town: Bulk Water).
- Assessment and evaluation of potential impacts to freshwater ecosystems associated with effluent discharge, Klip River, Swellendam. (2020) (Client: Southern Oil (Pty) Ltd).
- Potential development of Franschhoek Pass Estate, Western Cape. Basic Assessment: Freshwater Ecosystems (2020) (Client: Fivefold Investments).
- Proposed development of Erf 666-RE, Hout Bay, City of Cape Town. Constraints Analysis: Freshwater Ecosystems (2018) (Client: Variflex Trading 64 (Pty) Ltd).
- Potential impacts to freshwater ecosystems associated with the Zoar and Amalienstein agricultural development feasibility study (2017-2018) (Client: Casidra).
- NEMA section 24G Rectification Application for a Weir and Pipeline on Farm 781, Botrivier (2017) (Client: Erin de Vigne (Pty) Ltd).
- Pinotage (Firgrove), Substation, Somerset West. Estimation of wetland extent to offset wetland loss (2017) (Client: Eskom Holdings SOC Limited).
- National Strategic Environmental Assessment (SEA) for strategic electricity grid infrastructure corridors throughout SA (2015) (Client: Department of Environmental Affairs).
- National Strategic Environmental Assessment (SEA) for the efficient and effective rollout of wind and solar photovoltaic (PV) energy (2014) (Client: Department of Environmental Affairs).
- Development of a comprehensive GIS Wetland layer for the City of Cape Town (2008) (Client: City of Cape Town).
- Lake Victoria Environmental Management Project: Pilot study on sedimentation and sediment characteristics on Nyando and Nzoia river mouths and Winam Gulf of Lake Victoria (2004-2005) (Kenyan Agricultural Research Institute).

Water Resource Management and Ecological Reserve Determinations:

- CIA of the Mpatamanga HPP on the Shire River, Malawi (2023) (Client: MHPL)
- Eco-Social Flow (Eflows) Assessment of the Pungwe River Basin, Zimbabwe/Mozambique (2022-2024)(Client: GWPSA)
- Integrated flow assessment for the Luangwa Basin, Zambia, Phase 1 (2016), Phase 2 (2017-2018) (Client: WWF).
- Development of procedures to operationalise Resource Directed Measures (RDM) (2016-2017) (Client: Department of Water & Sanitation: RDM directorate).
- Shale Gas Development in the Central Karoo: A Scientific Assessment: Surface Water Resources (2016) (Client: CSIR).
- Batoka Hydropower Plant on the Zambezi River (2014) (Client: Zambezi Water Authority).
- Flow assessment for the Neelum-Jhelum Hydropower Project, Pakistan (2012-2013) (Client: Hagler-Bailly Pakistan).
- Implementation of Instream Flow Requirements Biophysical Monitoring Procedures Downstream of Phase 1 Dams (2005) (Client: Lesotho Highlands Development Authority (LHDA)).

Research:

- Developing a refined suite of tools for assessing the Present Ecological State of wetland ecosystems (2017-2019) (Client: Water Research Commission (WRC)).
- The Development and Application of Periphyton as indicators of Flow and Nutrient alterations for the management of Water Resources in South Africa (2014-2017) (Client: Water Research Commission).
- Consolidation and optimization of wetland health assessment methods through development of a decision support tree (DST) (2013-2014) (Client: Water Research Commission).
- Development of a National Wetlands Classification System for South Africa (2005-2006) (Client: SANBI and WRC).

Rehabilitation:

- Road Repairs due to flooding near Montague. Freshwater Ecological Assessment (2014) (Client: Department of Transport and Public Works).
- Rehabilitation of wetland areas following construction activities for the laying of the Driftsands Sewer Bypass Pipeline (2012) (Client: City of Cape Town).

- Rehabilitation and management of Rhamtha Lagoon, Al Wasit Nature Reserve, Sharjah Emirate (2005) (Client: Dr Sheikh Sultan bin Mohammed Al Qasimi, UAE Supreme Council member).

Review:

- Specialist Wetland Studies associated with the proposed ACWA Power Khanyisa IPP Project, Mpumalanga Province, South Africa (2019) (Centre for Environmental Rights).
- Determination of Water Resources Classes and associated Resource Quality Objects in the Berg CMA: Wetland Report (2018) (Commissioned by Aurecon South Africa (Pty) Ltd) (Client: Department of Water and Sanitation)
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- Reserve Determination Studies for the selected surface water, groundwater, estuaries and wetlands in the Gouritz Water Management Area. Wetland Report (2015) (Commissioned by AECOM SA (Pty) Ltd (Client: (Client: Department of Water and Sanitation)

MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS AND PUBLICATIONS

South African Society of Natural and Scientific Professionals – member *PriSciNat* 400746/15

South African Wetland Society – member

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9 APPENDIX B: SOIL AND VEGETATION DESCRIPTIONS



Figure 9.1: Map showing the locations where soil auguring was undertaken as part of the wetland delineation exercise in July 2026. Considering that the focus was only upstream of Lynx Road, the wetland boundary does not extend downstream within this map.

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
1	Downstream of the dug-out pond, auguring took place within the flowing water immediately upslope of the road culvert on Lynx Road	Dominated by <i>Juncus kraussii</i> , arum lilies and pockets of <i>Typha capensis</i> within the wet core, whereas the drier banks of the pond are <i>Senecio halimifolius</i>	0-15cm: mix of organics, root mass and sand 15-50cm: washed out/gleyed clays comprising very fine silt (Gley 1 3/N)	Lowest point on the property; iron-rich bacteria located on the plants within and adjacent to the channel	Permanent wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
2	Downslope of the entrance road within a dense <i>Typha capensis</i> stand	<i>Typha capensis</i> dominated with sparse <i>Nidorella</i> spp and <i>Juncus krausii</i> and kikuyu grass along road verge	0-20cm: sponge-like organic matter 20-60cm: 10YR 2/1 highly organic loamy soils with increasing clay content further down the soil profile	Strong sulphur/egg smell; saturated soils throughout the profile; water ingress at 5cm	Permanent wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
3	Upslope of access road	Grass-like sedge that transitions into <i>Typha capensis</i> stands further south	0-60cm: fine silty sands with high organic content (10YR 2/1)	Inundated at the surface and saturated throughout the profile	Permanent wetland	
4	Adjacent to the eastern fence line along Lynx Road	Buffalo grass; grass-like sedge interspersed with <i>Plecostachys serpyllifolia</i> ,	0-70cm: dark grey/black fine sands with high organic content (10YR 2/1)	Mostly damp to saturated from 20- 30 cm; no streaking	Permanent wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
		<i>Passerina corymbosa</i> and <i>Athanasia trifurcata</i>	@70cm: appears to be a clay layer			

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
5	Adjacent to the eastern fence line along Lynx Road	Dominated by Buffalo grass and interspersed with <i>Passerina corymbosa</i> , <i>Ficinia</i> spp, <i>Seriphium plumosum</i> , grassy sedge, sparse <i>Metalasia muricata</i> and <i>Passerina corymbosa</i>	0-60cm: dark grey fine sands (10 YR 2/1)	Increased moisture/damp with increasing depth; streaking at approx. 30cm with 1 or 2 small mottles	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
6	Adjacent to the eastern fence line along Lynx Road	Groundcover comprises of dense buffalo grass but several interspersed shrubs occur which are <i>Metalsia muricata</i> and <i>Passerina corymbosa</i>	0-60cm: 10YR 2/1.5 fine grey sands @60cm: bleached light grey sands (10YR 5/1)	Slightly damp but largely dry; streaking at around 35cm	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
7	Near the northeastern corner of the property	Dense buffalo grass with tufts of grassy sedge; interspersed with <i>Passerina corymbose</i>	0-35cm light grey sands (dry) (10YR 2/1) 35-60cm: light/bleached grey fine sands (10YR 3.5/1)	Streaking between 30 and 40cm; increased effort to augur at depth – which is likely because of the finer sands relative to the coarse sands in the top of the profile	Seasonal to temporary wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
8	Along the northern boundary of the site	Thick buffalo grass and grassy sedge; interspersed with scattered <i>Helichrysum</i> , <i>Nidorella</i> and <i>Passerina corymbose</i> ; 1 <i>Searsia</i> spp	0-8cm organics and roots 8-35cm dry light grey sands (10YR 2/1) 35-60cm bleached grey sands (10YR 3.5/1)	Streaking between 30 and 40cm	Seasonal to temporary wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
9	Downslope of SAP8, but upslope of the Searsia stand	Dense buffalo grass with isolated arum lilies, <i>Passerina corymbose</i> and renosterbos	0-10cm organic root/biomass and some brown sands 10-40cm: dry grey sands (10YR 2/1) 40-60cm: grey sands (10YR 3/1)	Streaking between 35 and 45cm	Seasonal to temporary wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
10		Dominated by the grassy sedge and buffalo grass, and interspersed with <i>Nidorela</i> and <i>Passerina corymbose</i>	0-5cm: biomass/roots 5-25cm: grey sands (10YR 2/1) 25-50cm light grey sands (10YR 3.5/1)	Damp from 30cm onwards; Sparse olive brown mottles at 25cm	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
11	Upslope of a small dug-out	Grassy sedge dominated and interspersed with Nidorella and renosterbos	0-10cm dry light grey sands 10-30cm: damp grey sands 10YR 2/1 30-50cm: dark grey sands (10YR 2/1) (saturated from 40cm)	Dry at surface, then damp and then saturation at depth	Seasonal wetland	 

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
12	Upslope of dense <i>Typha capensis</i> stand	Grassy sedge and <i>Nidorella</i>	0-60cm dark grey organic sands (10YR 2/1)	Saturation from 20cm onwards; no streaking observed, but this is likely because of permanent saturation	Permanent to seasonal wetland	 

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
13	Near northern fence of erf 1486, approx. 4m east of the white building	Buffalo grass (dominant), with sparse cobra lilies, <i>Passerina corymbose</i> and <i>Searsia</i>	0-15cm: organics 15-35cm: dark grey sands (10YR 3/1) 35-50cm: very light grey/bleached sands (10YR 5/1)	Rubble at 50cm	Seasonal to marginal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
14	Located between the white dwelling and the fence line on the northern boundary	Mix of kikuyu, grassy sedge and buffalo grass	0-25cm: light grey sands (10YR 3/1) 25-50cm: bleached light grey sands (10YR 3/1)	Dry sands between 0 and 25cm, after which, damp until 50cm	Seasonal to marginal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
15	Downslope of the stormwater culvert below R43 entering erf 1486. Site between building and northern fence line	Mix of kikuyu, grassy sedge and buffalo grass	0-20cm: dark grey sands (10YR 2/1) 20-50cm: bleached light great sands (10YR 3/1)	Mottles at 25-30cm; dry sands between 0 and 20cm; damp between 20 and 50cm	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
16	East of the main dwelling between tall Searsia trees	<i>Fuirena hirsuta</i> ; <i>Passerina corymbosa</i> and <i>Senecio halimifolius</i> ; sparse cobra lily, and <i>Nidorella</i> spp	0-10cm: organics 10-25cm: grey sands 10YR 2/1 (damp) 25-50cm: grey sands 10YR 2/1 (saturated)	Damp until 25cm, after which saturation from 25cm; no streaking	Seasonal to marginal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
17	Next to the crates located southeast of the dwelling	Grassy sedge; <i>Senecio halimifolius</i> ; <i>Nidorella</i> ; <i>Fuirena hirsuta</i>	0-50cm dark grey sands	Damp between 0 and 10cm, after which saturation	Seasonal to permanently saturated wetland	
18	Near beehives with some bricks scattered around	Grassy sedge; <i>Fuirena hirsuta</i> and <i>Nidorella</i>	0-25cm: dark grey sands (10YR 2/1) 25-50cm: lighter grey sands (10YR 3/1)	Saturated soils throughout	Seasonal to permanently saturated wetland	
19	Between derelict building and access road	Grassy sedge; <i>Juncus krausii</i> ; <i>Senecio halimifolius</i>	0-50cm organic dark grey/black sands (10YR 2/1)	Saturated soils throughout	Seasonal to permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
20	Within the derelict building platform	Mint, kikuyu, isolated Typha stand	0-10cm: dark black organics 10-50cm: dark grey sands (10YR 3/1)	Several points within the derelict building had underlying rubble, but SAP 20 did not		
21	West of erf 1486 fence on reserve (at top nearest R43)	Grassy sedge; Nidorella	0-5cm: organics 5-50cm grey sands (10YR 3/1)	Saturated throughout	Seasonal to permanently saturated wetland	
22	West of erf 1486 fence on reserve (west of derelict building)	Grassy sedge; <i>Orphium frutescens</i> ; <i>Senecio halimifolius</i> ; <i>Fuirena hirsuta</i>	0-50cm: dark grey sands (10YR 2/1)	Inundated at the surface; saturated throughout	Seasonal to permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
23	West of erf 1486 fence on reserve (southwest of derelict building)	<i>Juncus</i> spp; <i>Orphium frutescens</i> ; <i>Nidorella</i> ; <i>Plecostachys</i> ; <i>Cotula</i>	0-50cm: dark grey sands (10YR 2/1)	Inundated at the surface; saturated throughout	permanently saturated wetland	
24	On erf 2317 (municipal land) nearest southeastern set of houses	Kikuyu	0-20cm: dark grey/black sands (10YR 2/1) 20-50cm: light grey/bleached sands (10YR 3/1)	Damp throughout; no streaking	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
25	South of stormwater discharge point into wetland	Kikuyu and planted milkwood trees	0-20cm: dark grey/black sands (10YR 2/1) 20-50cm: light grey/bleached sands (10YR 3/1)	Damp throughout; no streaking	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
26	Approx. 2.5m upslope of stormwater discharge point into permanent wetland	Arum lilies; Senecio halimifolius	0-20cm: loamy brown organics (feels like a sponge) 10YR 2/2 20-50cm: dark grey sands 10YR 2/1	saturated throughout; water ingress at 10cm	Seasonal to permanently saturated wetland	
27	On erf 2317 (municipal land) nearest houses	Dominated by kikuyu grass, but includes buffalo, 1 helichrysum	0-40cm: coarse dark grey sands (10YR 2/1) 40-50cm: coarse light grey sands (10YR 2.5/1)	Damp between 0 and 40cm; saturated from 40 to 50cm	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
28	North of SAP27 towards the permanently saturated wetland	Helichrysum; arum lily; Senecio halimifolius; Nidorella; <i>Fuirena hirsute</i>	0-20cm: dark grey loamy sands 10YR 2/1 (damp) 20-50cm: dark grey sands 10YR 2/1 (saturated)	Saturated from 20cm onwards	Seasonal to permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
29	Along southern boundary of erf 1486	Mowed kikuyu grass; Sencio halimifolius, Searsia	0-20cm: Coarse grey sands 10YR 2/1 (damp) 20-50cm: Coarse grey sands 10YR 2/1 (saturated)	Seems to be coarse sands up until 35cm, after which finer sands; strong egg smell; saturation from 20cm onwards	Seasonal to permanently saturated wetland	
30	Towards southwestern boundary of erf 1486	Helichrysum; Senecio halimifolius; <i>Seriphium plumosum</i>	0-25cm: dark grey sands (10YR 2/1) damp 25-50cm: dark grey sands (10YR 2/1) saturated	Water ingress at 35/40cm	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
31	North of SAP 30 towards the permanently saturated wetland	Renosterbos; Nidorella and Senecio halimifolius	0-35cm: grey sands (10YR 2/1) 35-50cm: grey sands (10YR 3/1)	Bleaching at 30/35cm; Water ingress at 40cm	Seasonal wetland	
32	within permanently saturated wetland	Nidorella; Helichrysum; <i>Seriphium plumosum</i> ; renosterbos; Juncus krausii	0-8cm: organic roots etc 8-20cm: dark grey sands (10YR 2/1) (damp) 20-50cm: dark grey sands (10YR 2/1) (saturated)	Strong egg smell; saturation from 20cm onwards; water ingress at 20cm; no streaking	Seasonal to permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
33	Towards the western boundary of erf 1486	Passerina; Helichrysum; <i>Seriphium plumosum</i> ; Vygie; also garden escapees	0-40cm grey sands (10YR 2/1) (damp) 40-50cm: grey sands (10YR 2/1) (saturation)	Subtle streaking between 30 and 40cm	Seasonal wetland	
34	On reserve (transect from wet to dry dunes)	<i>Juncus krausii</i> ; <i>Senecio halimifolius</i> ; grassy sedge; <i>cotula</i> ; <i>Cyperus spp</i>	0-10cm organics and sand 10-50cm: bleached grey sands (10YR 3/1)		permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
35	On reserve (transect from wet to dry dunes)	<i>Cyperus spp</i> ; Nidorella; light grey/green pioneer grass	0-15cm: organics 15-50: grey sands (10YR 2/1)	Damp: 0-20/25cm) Saturated from 25cm onwards; water ingress at 25cm; strong egg smell	permanently saturated wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
36	On reserve (transect from wet to dry dunes)	<i>Erigeron sumatrensis</i> ; <i>Senecio halimifolius</i> ; light grey/green pioneer grass	0-15cm: dark grey organic 15-50cm: light grey sands (10YR 3/1)	Damp: 0-25cm; saturated from 25cm onwards; egg smell	Seasonal to permanently saturated wetland	
37	On reserve (transect from wet to dry dunes)	<i>Erigeron sumatrensis</i> ; <i>Senecio halimifolius</i> ; <i>Cyperus spp</i> ; light grey/green pioneer grass; <i>helichrysum</i>	0-8cm: organics 8-50cm: bleached grey sands (10YR 3/1)	Egg smell	Seasonal wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
38	On reserve (transect from wet to dry dunes)	Weedy plants; Acacia seedlings; <i>Erigeron sumatrensis</i> ; light grey/green pioneer grass	0-50cm: bleached grey sands (10YR 3/1)	Damp throughout but not saturated. Seems like this is on higher ground. More terrestrial-looking plants.	Marginal edge of wetland	
39	On reserve (transect from wet to dry dunes)	Acacia seedlings and terrestrial-looking sedge	0-50cm: bleached grey sands (10YR 3/1)	No egg smell; saturation at 35/40cm	Marginal edge of wetland	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
40	On reserve (transect from wet to dry dunes)	Very recently cleared Eucalyptus; no plants	0-50cm: bleached grey/brown sands (10YR 3/1)	Damp from 40cm onwards	Likely terrestrial	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						
41	On reserve (transect from wet to dry dunes)	Very recently cleared Eucalyptus; no plants	0-50cm: bleached grey sands (10YR 3/1)	Dry until 30cm, after which damp	Likely terrestrial	

SAP	Location description	Vegetation	Soils	Other notes	Habitat type	Photo(s)
						

42	On reserve (transect from wet to dry dunes)	Ehrharta; <i>Thamnochortus</i> ; terrestrial sedge spp (<i>Schoenus compar</i>); small <i>restio</i>	0-40cm dark grey sands (10YR 2/1) 40-50cm: bleached grey sands (10YR 3/1)	Possible streaking from 20cm onwards but could also be fire residue; dry soils throughout	Likely terrestrial	
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43	On reserve (transect from wet to dry dunes)	Ehrharta; <i>Thamnochortus</i> ; terrestrial sedge spp (<i>Schoenus compar</i>); <i>Acacia</i> seedlings	0-50cm dark grey sands (10YR 2/1)	Possible streaking between 35 and 50cm but could also be fire residue; dry soils throughout	Likely terrestrial	
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44	On reserve (transect from wet to dry dunes)	Ehrharta; small restio; <i>Colpoon compressum</i>	0-5cm: organics 5-50cm: grey sands (10YR 2.5/1)		Likely terrestrial		

45	On reserve (transect from wet to dry dunes) (at the base of the dune)	Ehrharta; Osteospermum moniliferum; weedy grasses	Brown sands		Likely terrestrial	
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