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**PROPOSED WATERCOURSE REHABILITATION AND
MANAGEMENT ACTIVITIES ON FARMS 15/37 AND RE/37
(GROOTPLAAT), PIKETBERG, WESTERN CAPE PROVINCE**



**SPECIALIST AQUATIC ECOLOGIST
IMPACT ASSESSMENT REPORT**

DRAFT REPORT

SEPTEMBER 2026

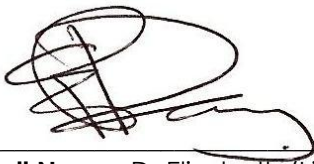
PREPARED BY

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12 September 2026

DECLARATION OF SPECIALIST INDEPENDENCE

I, Elizabeth (Liz) Day as a specialist river and wetland consultant, and Director of Liz Day Consulting (Pty) Ltd, hereby confirm my independence as a specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which I was appointed by Infinity Environmental Consultants to undertake an Aquatic Assessment of the proposed watercourse rehabilitation measures planned for implementation on Farms 15/37 and re/37 (Grootplaat), Piketberg, other than fair remuneration for work performed.



Full Name: Dr Elizabeth (Liz) Day
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Title / Position: Director

Qualification(s): BA, BSc, BSc Hons, PhD

Relevant work experience: Liz has worked as a freshwater ecologist / aquatic ecosystems specialist for the past +30 years, primarily in the Western Cape, and has produced over 1000 technical and Environmental Impact Assessment reports, requiring the assessment of rivers and/or wetlands.

With regard to the current project, Liz has worked extensively in the Berg River catchment in which the study area is located, with early experience in monitoring the main stem Berg River and its tributaries as part of the pre-construction monitoring for the Berg River Dam (e.g. Day 2007) as well as having worked on several smaller projects in the catchment, including involvement as the aquatic specialist consultant on the Department of Environmental Affairs and Development Planning (DEADP) Berg River Rehabilitation project, carried out by Intaba Environmental Services over the past > 8 years. Liz has experience in wetland delineation, using the DWAF (2005 and (still draft) 2008) methodology. She has worked on numerous river and wetland rehabilitation projects and was the lead author on the Water Research Commissions' "Let's Fix Our Rivers Series", published in 2026 and focusing on rehabilitation techniques for rivers and valley bottom wetlands.

Relevant Registrations: Member of IAIASA; Registered Professional Natural Scientist by SACNASP (Reg No 004806) for fields of Aquatic Science, Biological Science, Ecological Science and Zoological Science; Member of WISA.



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1 INTRODUCTION

1.1 Background

Grootplaat, comprising Farm 15/37 and the remainder (Re) Farm 37 Piketberg ("the site"), is under relatively new ownership. The property extends across approximately 2 146 ha and is situated within the upper catchment of the Kuilders River system. It comprises a high plateau which drains into a valley-bottom watercourse and various associated aquatic habitats, including seeps and dams.

The site has however been subject to a long history of agricultural activities, hydrological modification and associated infrastructure development. Over time, these activities, together with the proliferation of invasive alien plant vegetation, impoundments, abstraction, drainage and other hydrological modifications, watercourse channelisation, erosion and sedimentation on the site have together resulted in marked degradation of many of the watercourses on and downstream of the site, affecting their condition, function, structure and capacity to provide ecosystem services.

The owners of Grootplaat now seek to rehabilitate and enhance the hydrological functioning and ecological integrity of watercourses on the site and generally to increase the resilience of the landscape through targeted rehabilitation interventions. Key rehabilitation interventions that have been proposed include the clearing and management of invasive vegetation; rehabilitation of degraded wetland and riparian habitats; rehabilitation of damaged impoundments; inclusion of lowflow outlet facilities in impoundments to improve downstream hydrological function; the installation of erosion-control structures (mainly weirs) in places to address or prevent erosion; revegetation of disturbed watercourses with indigenous plant species; rehabilitation of historically cultivated areas; soil amelioration and formalisation of wetland crossings to minimise future impacts on sensitive aquatic environments.

Many of the proposed activities / interventions focus on watercourses, and it was identified in early project planning that several of these would trigger the need for authorisation in terms of both the National Water Act (NWA) (Act 36 of 1998) and the National Environmental Management Act (NEMA) (Act 107 of 1998). Infinity Environmental (Pty) Ltd ("Infinity") was thus appointed by the landowner (Grootplaat (Pty) Ltd) to oversee the required application processes for development authorisation. Since many of the proposed activities would affect watercourses, Liz Day Consulting (Pvt) Ltd ("LDC") was in turn appointed by Infinity to carry out an independent aquatic ecosystems assessment and, if required, a Risk Assessment, using the Risk Assessment Matrix of DWS (2023).

LDC is an independent company that specializes in freshwater (i.e. inland) aquatic ecosystem assessment. The specialist's CV is attached as Appendix A.

1.2 Terms of reference

The terms of reference for this project required that the appointed specialist aquatic ecologist should include the following activities / inputs:

- A site visit to identify the extent, quality and likely ecological importance of any wetlands or other watercourses on the site, including *in situ* water quality assessments;
- A description of watercourses on and associated with the site, including assessments of their:
 - Present Ecological State (PES) or condition;
 - Wetland ecosystem services;
 - Ecological Importance and Sensitivity;
- Identification of measures to avoid, mitigate or manage impacts to watercourses associated with the proposed development;
- Formal assessment of the impacts of the proposed development on aquatic ecosystems, with and without mitigation measures;

- A Risk Assessment, if appropriate, for Section 21c and i water uses.

1.3 Activities informing this input

This report was informed by the following activities / information sources:

- A site visit (8th and 9th April 2026), when potentially affected wetlands were delineated, using the DWAF (2005 and 2008) methodology and conditions on (and threats to) watercourses on the site were identified;
- Discussions with the project rehabilitation specialist (Mr Deon van Eden, Vula);
- Discussions with the client body regarding their long-term objectives and management priorities / vision;
- Consideration of biodiversity planning and other relevant data for this area.

1.4 Assumptions, limitations and uncertainties

The outputs of this study are subject to the following assumptions, limitations and uncertainties, including the following:

- The Grootplaat site is large and includes extensive high-lying areas, many of which include seepage wetlands and minor drainage lines that flow down into the main valley bottom that forms the focus of this assessment, or drain south, northeast or east off these high-lying areas, variously entering the Hol or Kuilders River systems. These high-lying watercourses were not assessed in any detail in this study, which focused on the key areas for proposed rehabilitation interventions, comprising the lower-lying, more degraded watercourses along and feeding into the main valley bottom system.
- While the report includes assessment of the ecological implications of a number of erosion-control structures in watercourses, it is not yet clear how many would in fact be required, since with imperfect knowledge of watercourse flows (there are no flow data for the affected watercourses) as well as in the context of changes to existing flows as a result of alien clearing, the number of structures may well be different from (less than) those proposed.
- The report assesses rehabilitation interventions that would, if authorised, potentially take place over a long time scale, during which conditions on site might change – it is important that any authorisation for such (ecologically beneficial) interventions should allow for some plasticity in implementation, so that the final output meets its intended objectives, even if the design details change.
- This assessment did not include a detailed plant community assemblage or aquatic faunal assessment – the aquatic habitats assessed on the site are all degraded and it is assumed that by improving habitat quality and actively managing the site for the removal of alien species, indigenous faunal and floral diversity will improve. The absence of such detailed pre-intervention surveys does however mean that quantitative tracking of improvements in biodiversity as a result of the proposed interventions will be more difficult.

1.5 Site location

Figure 1.1 shows the site location. It is situated at approximately 32° 41' 12.84" S, 18° 31' 11.40" E on Farm 15/37 and RE/37 near Aurora in the Bergrivier Municipality, Western Cape. It is accessed north-west from Aurora, via a gravel road.

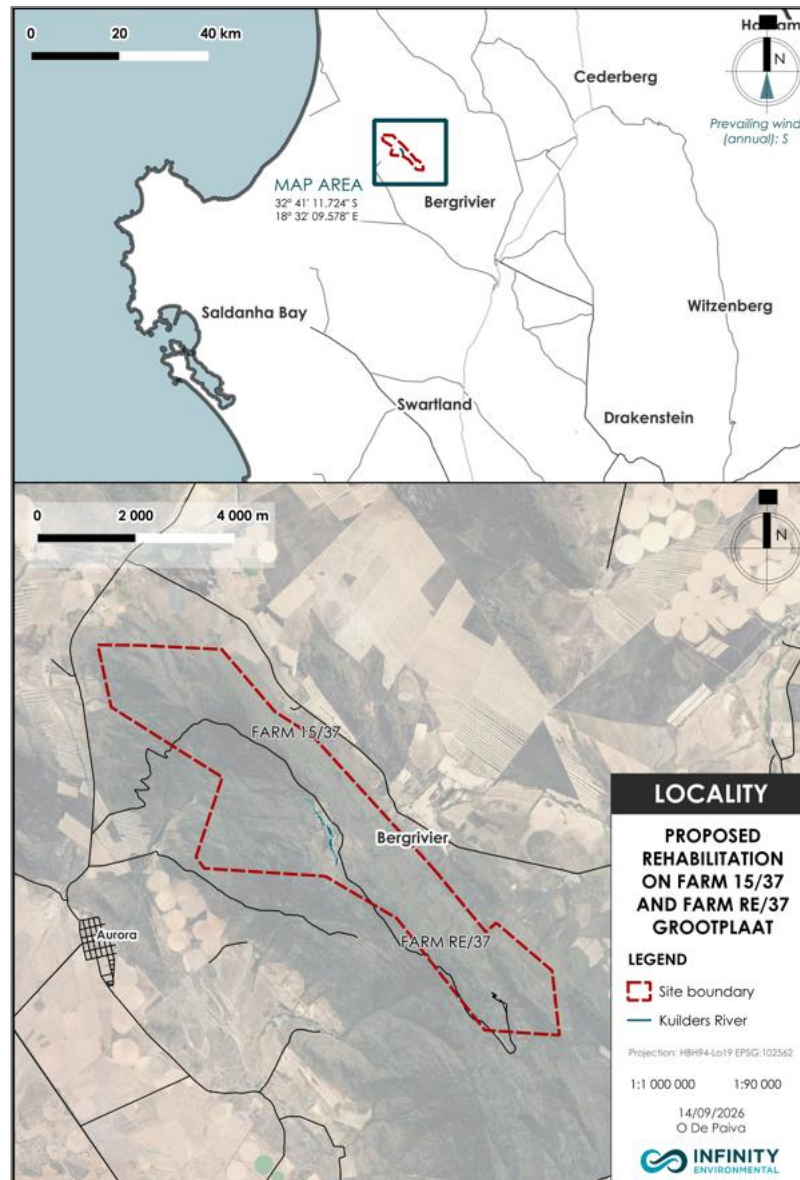


Figure 1.1

Location of Farm 15/37 and the remainder RE/37 near Aurora in the Bergrivier Municipality, Western Cape. Figure courtesy Infinity.

1.6 Assessment Methodologies

The assessment methodologies relevant to this assessment are outlined in Appendix B.

1.7 Definitions

All reference to wetlands and watercourses in this document were based on the following definitions of wetlands and watercourses, as stipulated in the National Water Act (NWA) (Act 36 of 1998):

“**watercourse**” means -

- (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" means -

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.

"Extent of a watercourse" (as defined in Government Notice (GN) 4167 of 2023) means:

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

(b) Wetlands and pans: the delineated boundary (extent) of any wetland or pan.

1.8 Content of the report in terms of addressing EIA regulations for specialist reporting

This report has been compiled so as to comply with the National Department of Forestry, Fisheries and the Environment (DFFE)'s 2020 *"Protocol for the specialist assessment and minimum report contents for environmental impacts on aquatic ecosystems"* (Government Notice 320 of 20 March 2020).

Table 1.1 summarises the reporting requirements listed in the above protocol, and indicates where they are addressed in this report.

Table 1.1

**Required Specialist Report contents and locations of items covered in the present document
(as per the DFFE's "Protocol for the specialist assessment and minimum report contents for
environmental impacts on aquatic biodiversity" (Government Notice 320 of 20 March 2020).**

REFERENCE IN PROTOCOL	DESCRIPTION	SECTION IN THIS REPORT WHERE ADDRESSED
Section 2	Site Sensitivity Verification: Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the Screening Tool must be confirmed by undertaking a Site Sensitivity Verification. Confirmation or rejection of Site Screening Tool findings	Section 2.7
Table 1: Section 1.1	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of: 1.1.1. "very high sensitivity" for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or 1.1.2. "low sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.	This document N/A
Table 1: Sections 2.1-2.4	2. Aquatic Biodiversity Specialist Assessment: Requirements for Aquatic Biodiversity Specialist Assessment where there is a confirmed VERY HIGH SENSITIVITY RATING for aquatic biodiversity features: 2.1 The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP), with expertise in the field of aquatic sciences. 2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint. 2.3. The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: 2.3.1. a description of the aquatic biodiversity and ecosystems on the site, including: (a) aquatic ecosystem types; and (b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns; 2.3.2. the threat status of the ecosystem and species as identified by the screening; 2.3.3. an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given	Page i and Appendix A Sections 1.3 and 2 Section 2 Section 2.6 Section 2.6.6

	status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub-catchment, a strategic water source area, a priority estuary, whether or not they are free -flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and 2.3.4. a description of the ecological importance and sensitivity of the aquatic ecosystem including:(a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and (b) the historic ecological condition (reference) as well as present ecological state of rivers (in- stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater). 2.4. The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	Sections 2.6.1, 2.6.2 and 2.6.6 Section 2.6.5 and Section 2.6 as a whole No development alternative only – since the development proposed is a positive rehabilitation initiative
Table 1: Sections 2.5-2.6	2.5 Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions: 2.5.1 Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal? 2.5.2. is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present? 2.5.3. how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); (b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub -catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns); (c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary I seasonal I permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and (d) to what extent will the risks associated with water uses and related activities change; 2.5.4. how will the proposed development impact on the functioning of the aquatic feature? This must include: (a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system); (b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over -abstraction or instream or off stream impoundment of a wetland or river); (c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley- bottom wetland to a channeled valley -bottom wetland); (d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); (e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and (f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.);	Section 6 Section 6 Table 6.1 Table 6.1

	2.5.5. how will the proposed development impact on key ecosystems regulating and supporting services especially: (a) flood attenuation; (b) streamflow regulation; (c) sediment trapping; (d) phosphate assimilation; (e) nitrate assimilation; (f) toxicant assimilation; (g) erosion control; and (h) carbon storage? 2.5.6. how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator - prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site? 2.6. In addition to the above, where applicable, impacts to the frequency of estuary mouth, closure should be considered, in relation to: (a) size of the estuary; (b) availability of sediment; (c) wave action in the mouth; (d) protection of the mouth; (e) beach slope; (f) volume of mean annual runoff; and (g) extent of saline intrusion (especially relevant to permanently open systems).	Table 6.1 Table 6.1 N/A
Table 1: Sections 2.7	The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information: 2.7.1. Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; 2.7.2. A signed statement of independence by the specialist; 2.7.3. A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; 2.7.4. The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant; 2.7.5. A description of the assumptions made, any uncertainties or gaps in knowledge or data; 2.7.6. The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant; 2.7.7. Additional environmental impacts expected from the proposed development; 2.7.8. Any direct, indirect and cumulative impacts of the proposed development on site; 2.7.9. The degree to which impacts and risks can be mitigated; 2.7.10. The degree to which the impacts and risks can be reversed; 2.7.11. The degree to which the impacts and risks can cause loss of irreplaceable resources; 2.7.12. A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies; 2.7.13. Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr); 2.7.14. A motivation must be provided if there were development footprints [...] that were identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate; 2.7.15. A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and 2.7.16. Any conditions to which this statement is subjected.	Appendix A Page i Section 1.3 Section 1.6; Appendix B Section 1.4 N/A Section 5 Section 5 Section 5 and Table 5.1 Section 5.3.1 Section 5 and Appendix C N/A Section 7 Section 5 (mitigation measures) and Appendix C

2 BASELINE DESCRIPTION OF AQUATIC ECOSYSTEMS ON AND ASSOCIATED WITH THE SITE

2.1 Site overview

The site comprises an extensive (2147.73 ha) area, some of which has been cultivated over the past 20 years or more. These disturbed areas are all located in the low-lying valley bottom areas of the site, with the remainder areas lying on steeply-sloped rocky outcrops to the north and south of the main valley bottom through the site. The site includes a number of existing residential units as well as farm workshops / work areas, all located within the lower-lying valley-bottom areas of the site.

2.2 Climate

The study area has a Mediterranean climate typical of the southwestern Cape, with hot dry summers and cool wet winters. Mean annual rainfall is low, at 344 mm per annum, and is strongly seasonal with more than 65% of this falling between May and August and less than 20% between October and March (Schulze, 2009) (see **Figure 2.1**). Mean annual evapotranspiration is high, at 2058 mm per annum and exceeding rainfall in all months. Even in the wettest winter months, evaporation still slightly exceeds or matches rainfall, so the region is water-stressed year-round. The prevailing wind is southerly in the summer months and northerly in the winter.

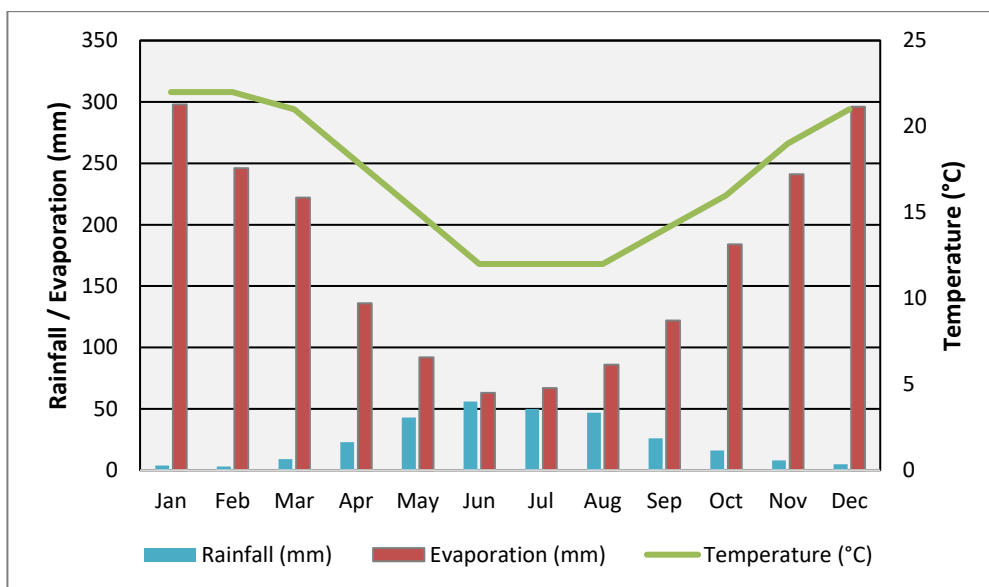


Figure 2.1

Climate in the vicinity of the site (figure courtesy Infinity, based on data from Schulze, 2009).

Climate change projections for the region indicate warming by between 1.5 °C and 3 °C by 2050, with increased volatility: very high temperatures and heat waves are expected to become more common; winter rainfall is projected to decrease over most of the province by mid-century; and longer dry spells and more frequent droughts are likely, as well as more frequent heavy rainfall and flooding, particularly in late spring and early summer (Vos et al., 2016).

2.3 Topography

The site occupies a steep ridge rising from the coastal plains at about 200 m above sea level to 1000 m above sea level, oriented in a northwest-south-east direction. It forms the northwestern end of a spur of the Piketberg mountain range - a low sandstone range with a triangular shape, lying some distance to the west of the main Langeberg fold mountains. The Piketberg 'inselberg' has steep slopes with some higher peaks and plateaus - including the 'Plaat' from which the farm takes its name. The farm occupies a shallow plateau valley near

the crest of the range, with two parallel ridges flanking it to the north and south, and dropping steeply to the surrounding coastal plains.

The Kuildersrivier and several of its minor tributaries rise on the site, with the main stem of the river starting at a height of about 700 mamsl and flowing through the site, draining towards the north-west and leaving the site at an altitude of about 240 mamsl.

2.4 Geology and soils

The underlying geology of the site comprises quartzitic sandstone of the Peninsula Formation in the Table Mountain Group. Very shallow, acidic sandy soils overlie exposed bedrock on the surrounding slopes, with deeper soils accumulated in the Grootplaat valley around the watercourses and in the agricultural lands on the site.

2.5 Vegetation

The site is located within the Fynbos biome, in the Northwest Fynbos bioregion. The Cape Floristic Region, within which the site is situated, is characterised by very high species diversity and a high level of endemism. Many of the habitats in this region are under pressure from agriculture and the site itself includes areas that have been previously cultivated, particularly in the lower-lying, deeper soils of the main river valley.

Vegetation on the site would, before transformation for agricultural purposes, have comprised Piketberg Sandstone Fynbos. This vegetation type is confined largely to the Piketberg range, but because of its association with steep slopes and shallow soils has escaped wholesale transformation for agriculture. Approximately 80% of its original extent thus remains intact (SANBI, 2006-2024).

2.6 Watercourses on and associated with the site

2.6.1 Catchment context

The study area forms part of the Kuilders River catchment, which is a tributary of the Boesmans River, itself a tributary of the Berg River. It lies within DWS Quaternary Catchment G10K, which forms part of the Berg / Olifants Water Management Area (WMA), and is included in the Berg Catchment Resource Quality Objectives promulgated by DWS in 2020 (GN 1179 of 2020). The study area is shown in its catchment context in **Figure 2.2**. It should be noted that no watercourses appear at this scale within the site – however, ground-truthing and mapping at a finer scale using the 1:50 000 rivers layer illustrates that there are in fact numerous watercourses on the site, largely draining into the Kuilders River. Note however that some high-lying seeps on the north-eastern boundary of the site drain into quaternary G30D (drained by the Hol River, itself a tributary of the Verlorevlei – an important wetland system to the north of the Berg River; and high-lying areas along the eastern site boundary drain into the Boesmans River, which is itself a tributary of the Kuilders River.

Resource Quality Objectives (RQOs) require that the minimum Recommended Ecological Condition (REC) for all rivers in the Berg catchment are set at Category D, which is considered the lowest sustainable management category for watercourses in South Africa (Kleynhans and Louw 2007). In the case of the Lower Berg River Catchment, into which the Kuilders / Boesmans River systems flow, both resource units considered in quaternary catchment G10K have a TEC of Category D. These are measured at specified biophysical nodes, with the closest node on the main stem Berg River being Bvii 12, located some 29 km upstream of the confluence of the Boesmans River with the Berg River.

The implications of these ROQs are, in brief, that tributaries flowing into the Berg River in these reaches should not deteriorate below a Present Ecological State Category D and should ideally seek to attain (or maintain) better PES categories (e.g. PES Category C – moderately modified).

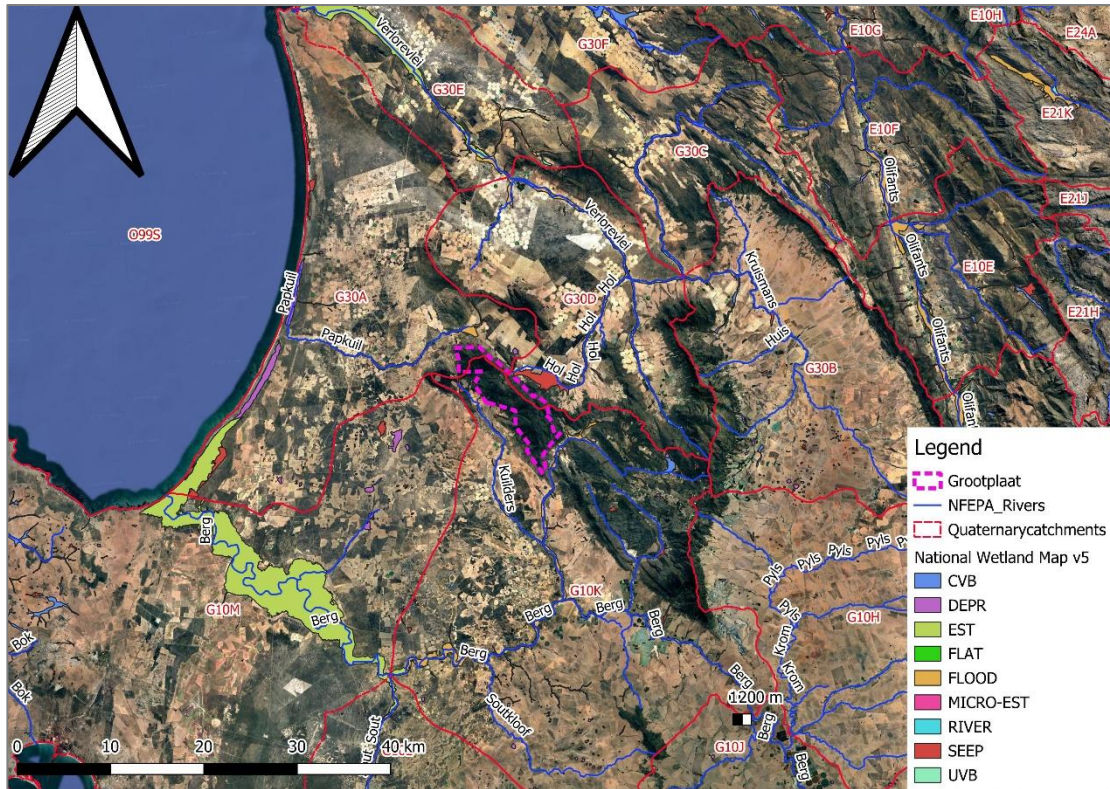


Figure 2.2

Catchment context of the Grootplaat study area, showing mapped wetlands from the National Wetland Map ver 5

2.6.2 Context in the National Freshwater Ecosystem Priority area programme

Figure 2.3 shows the site in the context of the National Freshwater Ecosystem Priority Area (NFEPA) datasets of Driver et al (2011), which includes ranked Freshwater Ecosystem Priority Areas (FEPAs), at a sub-quaternary level.

Most of the site that is, within the Kuilders sub-catchment has been ranked as a Phase 2 FEPA¹. This FEPA type is generally applied to rivers (or rather, their sub-quaternary catchments) that are only in a moderately good condition (Present Ecological State (PES) Category C) but are nevertheless prioritised for conservation because it is not possible to meet national biodiversity targets for these river types using only rivers that remain in a natural or good condition (PES Categories A or B) (Nel et al 2011).

The proposed rehabilitation considered in this assessment would target watercourses in the Phase2 FEPA sub-quaternary and would thus accord well with intentions of this FEPA rating.

The high-lying north -eastern and eastern portions of the site that drain into the Hols and the Boesmans River sub-catchments have both been ranked as FEPAs, and thus have very high conservation priority. These watercourses would not be affected by the current proposed activities.

¹ FEPAs (Freshwater Ecosystem Priority Areas) are strategic priorities for conserving freshwater ecosystems and supporting the sustainable use of water resources (Driver et al 2011). FEPAs have been determined for different river and wetland types throughout South Africa, on the basis of a number of criteria that included ensuring that there is an adequate extent of conservation of different river and wetland ecosystem types, that they represent adequate habitats to support threatened fish species and their migration corridors; that free-flowing rivers (i.e. Rivers without major dams) are prioritised as FEPAs; that water supply areas in high water yielding sub-quaternary catchments are maintained; and that ecological connectivity between systems is maintained as far as possible (Driver et al 2011).

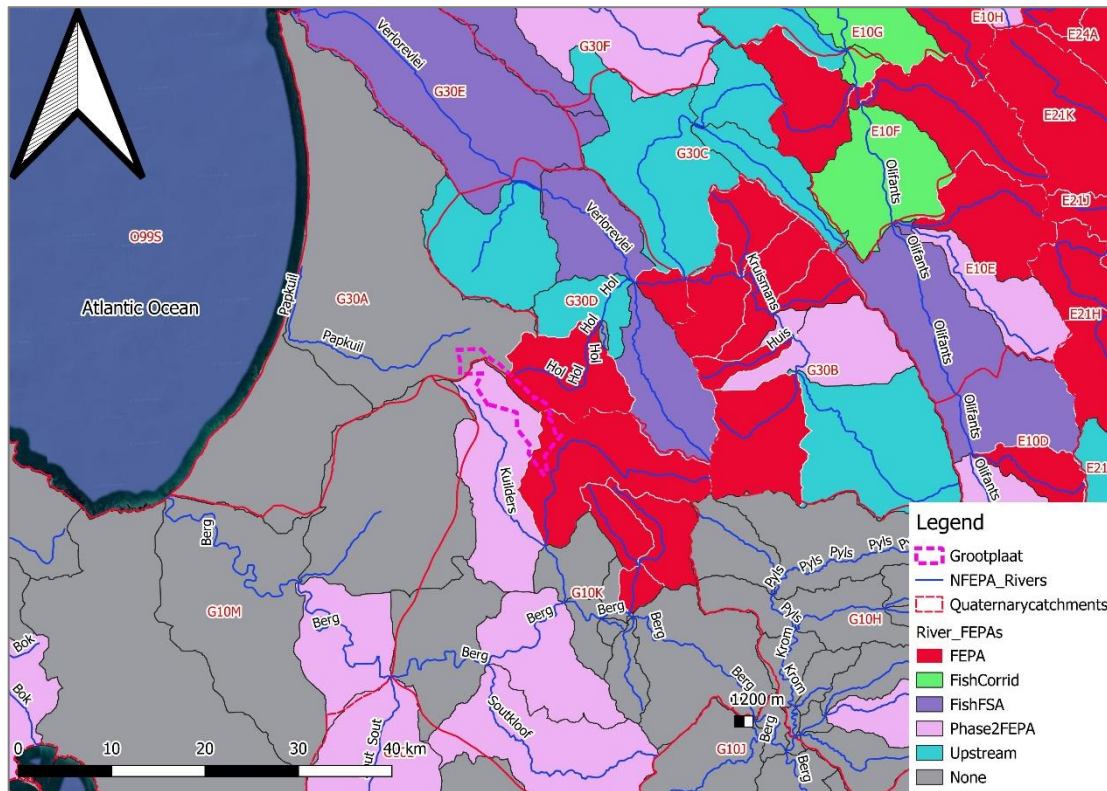


Figure 2.3
Site in the context of NFEPA catchment scale data
(Driver et al 2011)

2.6.3 Overview of extant watercourses on the site

Wetlands on the site are poorly mapped in national and provincial spatial datasets, with the National Wetland Map (NWM) used in the 2025 National Biodiversity Assessment (Job et al 2026a) not showing any wetlands within the study area, although wetland seeps and valley bottom wetlands have been mapped along parts of the Kuilders River in its reaches downstream of the site. This assessment has thus relied heavily on on-site delineation and ground-truthing along mapped drainage lines, taken from the 1:50 000 rivers layer. **Figure 2.4** provides an overview of watercourses as shown in the 1:50 000 rivers layer, overlain by the National Biodiversity Assessment (NBA) National Wetland Map (NWM) Version 5 (NBA 2018).

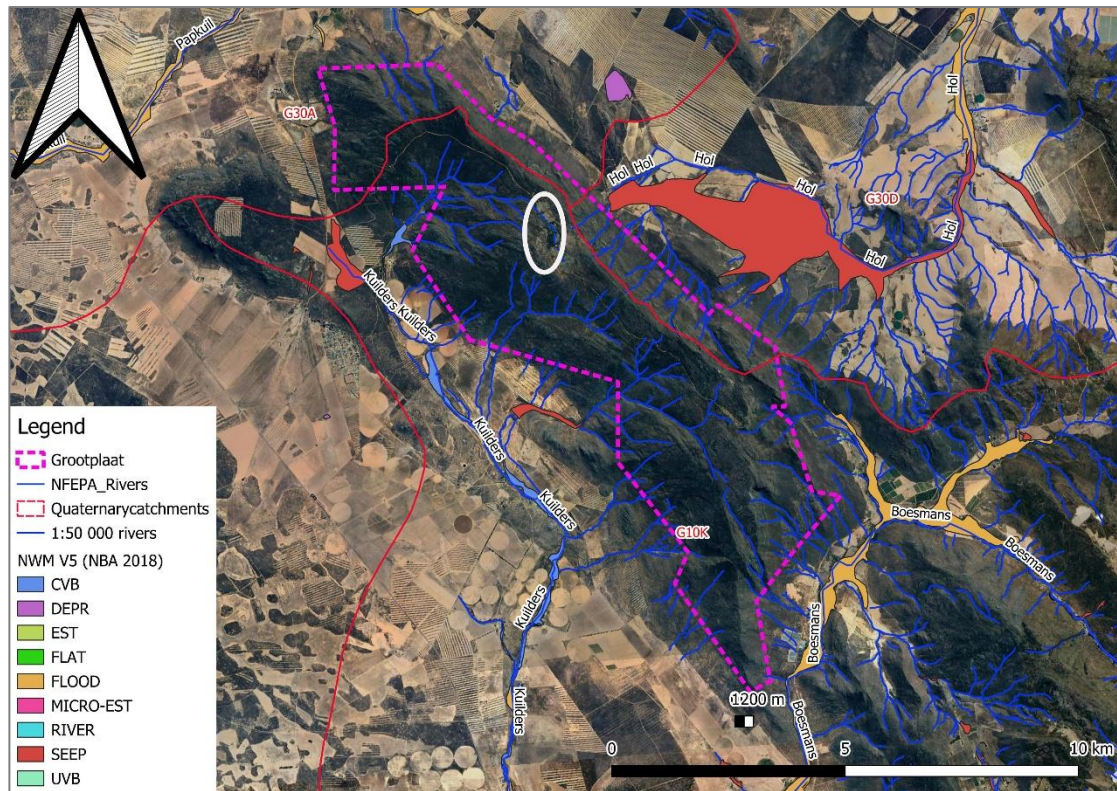


Figure 2.4

Overview of watercourses on and abutting the site as shown in the 1:50 000 rivers layer, overlain by the National Biodiversity Assessment (NBA) National Wetland Map (NWM) Version 5 (NBA 2018). Focus area for this assessment roughly circled in white.

2.6.4 Watercourse reference conditions (Grootplaat site)

No descriptions could be accessed in this study for watercourse condition on the site prior to agricultural and other landuse. Based on visual assessments of the site in April 2026, and drawing on literature and assessments of watercourses in the catchment, the following reference (i.e. natural) conditions are assumed:

- Wetlands would have been seasonal but could still have contributed important controlled flows in early summer to downstream watercourses;
- The main stem river through the site comprised a wetland seep in its upper reaches, which morphed into a mountain stream river further downstream where the gradient increased;
- This mainstem watercourse was fed by runoff from the steep rocky hillslopes to the west and by generally longer drainage lines from the east / north east.

Figure 2.5 shows the watercourses delineated on the site in April 2026. These comprise hillslope seeps, in-channel dams, (naturally) unchanneled valley bottom wetlands, and mountain stream / foothill streams in the downstream reaches of the site. They are described briefly in the following sections.



Figure 2.5
Wetlands and watercourses on the site, forming the focus of the rehabilitation plan assessed in this report.

Wetland Reach A: Source area seep wetland

This area has been classified as a wetland seep (as per Ollis et al 2013) and is in fact part of the headwater area for the Kuilders River system. It is illustrated in Photographs 2.1-2.4 below.

Wetland delineation in April 2026 showed that the temporary wetland edge was characterised by dark / medium grey soils with light mottling at around 40 cm depth. Wetland vegetation indicators included *Centella* sp.; *Juncus capensis* and sparse *Cenchrus macrourus* (previously *Pennisetum macrourum*).

The seep is wide, but disturbed by past land-use impacts, including:

- Agriculture, including ploughing in some areas, as evidenced by disturbed vegetation bands within the delineated seep;
- Grazing by livestock;
- A north-east to south-west running dirt road / track, which interrupts the flow of the seep and has resulted in the historic concentration of flows from the seep, particularly during flood conditions, into an incised channel that leads into Dam 1;
- Downstream of the above road, a berm has been created along the ²right hand channel edge, presumably both to allow disposal of (presumed) dredging of the channel as well as to control flooding of the adjacent area;
- Drainage of the natural seep by the channel created downstream of the road, leading to drying out and shrinkage of the seep wetland;
- Passage of concentrated flows from drainage areas west of the channel, to facilitate agricultural use of these areas, which have subsequently been ploughed over by Vula for soil recovery purposes (see **Photograph 2.3**);
- Inundation of the lower portions of this part of the watercourse by Dam 1, leading to changes in wetland vegetation type in the lower reaches of the channel and furthermore impacting on the timing, duration and magnitude of flows delivered into downstream watercourses.

Watercourse PES has been estimated as PES Category C (moderately modified) upstream of the north-east to south-west access road (Wetland Reach A1), deteriorating to PES Category D/E downstream of the road (Wetland Reach A2).

² By convention, left and right hand as seen when facing downstream along any river/ watercourse



Photograph 2-1
Wetland Reach A (seep wetland) viewed from the north



Photograph 2.2
Vegetation in Wetland Reach A (seep wetland) incl. *Merxmüllera* sp.



Photograph 2.3

Impacted areas in Wetland Reach A (seep wetland) – agricultural berms redirect water flow



Photograph 2.4

Incised / excavated channel downstream of road crossing through Wetland Reach A (seep wetland), concentrating flows and draining adjacent wetland seep areas.

Dam 1

This part of the watercourse has been classified as an artificial depression (as per Ollis et al 2013) and comprises an on-stream dam, located within a watercourse. Its PES is roughly calculated as Category E.

The dam, shown in Photograph 2.5, comprises an earth-wall structure with a high-level overflow / spillway on its eastern side. The dam wall appears to be structurally compromised at present by large trees including invasive alien species. When fully inundated, it appears to inundate up to the level arrowed in Photograph 2.5, which is indicated by plant species typical of seasonal inundation. The lower parts of the dam are periodically deeply inundated and support limited plants, with few plant species able to survive the range in conditions from deep inundation to seasonal drought. Sago pondweed (*Stuckenia pectinata*) was observed in the dam during the April site visit.



Photograph 2.5
Dam 1 viewed from the northeast

Wetland Reach B: Degraded valley bottom wetland downslope of Dam 1

This wetland, which is presumed to have linked naturally with the upstream seep wetland, would probably have comprised a seasonally to permanently saturated unchanneled valley bottom wetland in these reaches under pre-development conditions. Its current condition is illustrated in Photographs 2.6-2.10 below, which help to illustrate that the wetland has been highly modified, as a result of:

- The upstream impoundment, which has historically effectively captured surface flows from the upstream wetland, allowing only late season overflows, if any, once the dam is full. This would have had a catastrophic effect on the hydrology of the downstream wetland, resulting in assumed major shrinkage of extent, with drying of soils making it more vulnerable to erosion and channelisation.
- Channelisation and wetland shrinkage would have been exacerbated by the receipt of periodic overflows from the dam, via its spillway to the east.
- Wetland droughting would have been further heightened by the establishment of extensive alien trees in the area downstream of the dam wall. These comprised mainly poplars and pines, and the area had been subject to intense felling of alien trees by April 2026 (Photograph 2.6). Such activities will be likely to improve flow through the wetland in the future, as the dense stands of trees would have had a profound impact on shallow sub-surface throughflows into the wetland, from minor seeps to the east and

west of the channel as well as on seepage from the dam itself.

The channel in these reaches was difficult to follow in places, being covered over with fallen trees and plant debris. Assuming that the felled material is removed from the valley bottom, the wetland is likely to recover, at least in part, allowing wetland vegetation to re-establish in the unshaded wetter conditions that are likely to be created. Wetland extent shown in **Figure 2.2** is a low confidence extent, assuming wetland conditions prior to alien invasion and channelisation. Actual extant wetland extent comprises an initially poorly discernible channel downstream of the dam.

With distance downstream, the channel becomes more evident, running along the western side of the valley floor and then widening into a broad, wetter seep, just west of a small dam – Dam 2 in **Figure 2.2**. The area has undergone major changes from natural, with a berm running across the valley upslope of the dam, allowing water from both the channel on the western side to seep out and build up on the upslope side of the dam, as well as seepage water from a wetland seep (side seep B1 in **Figure 2.2**). These wetter conditions have resulted in the establishment of patches of wetland plants such as *Juncus kraussii* and *Juncus capensis* in the area, which is otherwise vegetated mainly by kikuyu grass (see Photographs 2.7 to 2.10). Old irrigation pipes in places suggest that it was previously irrigated and probably used for pasture, thus explaining the diversion of the western channel. Augering of soils in this area revealed dark brown loamy soils with organic material at depth.

The main flows from the western channel (which was dry in April 2026) pass into the area downslope of the berm, where indigenous wetland plants such as *Psoralea affinis*, *Juncus kraussii* and *Juncus capensis* occur in dense stands.

The watercourse between Dam 1 and Dam 2 has been evaluated as PES Category D/E, on the basis of the major change (decrease) in hydrology; extensive loss of indigenous vegetation; high vulnerability to erosion; major changes to bed, channel and extent. It is probably rehabilitable with effort to PES Category D.

The reduction in flows from the upstream area (upslope of Dam 1) remains a significant concern for this area, and a limitation on the extent of achievable rehabilitation.



Photograph 2.6

Felled alien vegetation (pines and poplars) downstream of Dam 1 (Wetland Reach B)



Photograph 2.7

More defined channel along the western edge of Wetland Reach B towards Dam 2.



Photograph 2.8

Wetland Reach B: Alien-cleared area between dam 1 and Dan 2, with Dam 2 arrowed



Photograph 2.9

Wetland vegetation established upslope of Dam 2, with the influence of inflows from Side Seep B1 into Wetland Reach B shown in foreground (*Juncus kraussii* and *Ficinia nodosa*)



Photograph 2.10
Wetland Side Seep B1

Seep wetland B1

This seep has been briefly described in the previous section (see Photograph 2.10). It enters the main valley bottom wetland (Wetland Reach B) just upstream of Dam 2. Wetland vegetation along its flow path towards the Dam 2 berm and the western channel of the main river suggest that the seep receives regular seasonal discharge from its catchment to the west. Runoff from the adjacent access road also flows strongly down the seep line, bringing with it concentrated flows of water as well as silt and plant debris during rainfall events.

Wetland condition has been impacted by road runoff, alien invasion and limited upstream development (roads and a small area of agricultural land). The seep has however retained seepage function in its lower reaches, despite grazing and loss of indigenous vegetation. The seep wetland has been assessed as PES Category C/D.

Dam 2

This dam is a relatively small dam (see Photograph 2.11), surrounded by wetland vegetation which, it is assumed, has developed in response to the build-up of water in the dam and upslope of its surrounding berms and other flow impediments. The dam provides an aesthetically pleasing area and open water habitat, still present in late summer (April) 2026. It does however result in further shrinkage of what is assumed to have been a wide wetland area on this relatively flat valley bottom, with flows from Dam 2 to Dam 3 being confined in a narrow wetland channel, running along the western side of the valley, and with clear droughting of the area downstream of the dam, along the eastern side of the valley floor. Inflows from Side Seep B1 enter the dam and/or build up upslope of the dam.



Photograph 2.11
View downslope into Dam 2

Wetland Reach C: 'Oak' channeled valley bottom wetland

Downstream of Dam 2, the watercourse continues as a naturally unchanneled valley bottom wetland, although upstream impoundment and abstraction have severely impacted on assumed natural valley bottom wetland extent and character, with the wetland now being channelled along the western edge of the valley floor; in places difficult to identify; and furthermore impacted by cut-off channels, parallel with the hillslope contours; alien vegetation (being cutdown at the time of the April 2026 site visit) (see Photograph 2.12). The delineated wetland was marked by scattered *Merxmuellera* sp., with *Pteridium aquilinum* (considered a facultative rather than an obligate wetland species) occurring on alien-cleared slopes leading

into the delineated wetland area, demarcated primarily on the basis of the extent of *Pteridium aquilinum*, *Ficinia nodos* and *Cenchrus macrourus*. Seepage into the wetland from the hillslopes to the west is assumed and these inflows are assessed as very important for sustaining this watercourse, albeit in a highly impacted condition, with changes (decreases) in surface and through-flows; alien vegetation; loss of indigenous vegetation and changes in wetland / river channel morphology being the major impacts identified. Together, these changes mean that this reach of the watercourse (Dam 2 to Dam 3) has been assessed as PES Category D.



Photograph 2.12
View along Wetland Reach C ("oak" wetland), downstream of Dam 2

Dam 3

This in-channel dam had no water in it at the time of sampling, with a sump having been installed on the dam floor, towards its wall, allowing passage of accumulated flows from the dam into the downstream river / wetland reaches.

The dam margins were extensively invaded by large stands of mature (invasive alien) *Sesbania punicea* but low-lying areas supported indigenous wetland vegetation such as *Juncus lomatophyllus*, *Juncus capensis* and *Juncus kraussii*. None of the indigenous species noted would be likely to survive under conditions of permanent inundation, if the sump system was not in place.

The dam includes a highly overgrown spillway, which drops off vertically into a channel that passes between Dam 3 and Dam 4, edged by extensive stands of *Pteridium aquilinum* (bracken fern). The dam was largely empty at the time of assessment in April 2026.

Wetland Reach D: 'Bracken' channeled valley bottom wetland

Downstream of Dam 3, a channel some 5-10 m wide and 2 -3 m deep has been created, possibly by excavation and exacerbated by concentrated flows from the dam spillway. This

channel effectively drains the natural valley bottom wetland that should have occurred in these reaches, with the result that while the channel itself is vegetated with wetland obligates such as *Carex sp.*, *Psoralea affinis*, *Juncus kraussii*, *Juncus lomatophyllus* and *Ficinia nodosa*, these incised margins give way to dense stands of *Pteridium aquilinum* (bracken fern), which dominate the surrounding area. An area of the higher-lying valley bottom between the incised channel and the stands of *Pteridium aquilinum* appears to have been infilled and comprises a kikuyu grassed area, assumed to have been created to support livestock grazing in this area in the past (see Photographs 2.13 and 2.14).

This reach of the watercourse has been assessed as PES Category D/E, given the severe changes to hydrology, channel, wetland morphology and vegetation that have accrued in this reach.



Photograph 2.13
***Pteridium aquilinum* (bracken fern) dominating the area above the incised channel comprising Wetland Reach D between Dam 3 and Dam 4**



Photograph 2.14

***Pteridium aquilinum* (bracken fern) between Dam 3 and Dam 4, with grassed area of infill. Incised channel (Wetland Reach D) is to the left of this (upstream-facing) view.**

Dam 4

This dam (illustrated in Photographs 2.13 to 2.15) comprises an in-channel dam, with a concrete spillway and eight pipe outlets onto the concrete spillway overflow area. The dam was largely empty at the time of the April 2026 site visit, but included a small area of standing water on its north eastern edge, which was assumed to be groundwater-fed rather than fed by surface flows from the highly impounded upstream reaches. The wetter lower-lying portions of the dam were vegetated by indigenous wetland species such as *Ficinia nodosa*, *Juncus kraussii*, *Juncus capensis* and *Juncus lomatophyllus*, extending upslope from the inundated depression.



Photograph 2.13
Concrete spillway over the dam wall of Dam 4



Photograph 2.14
Pipe outlets from Dam 4 into the concrete spillway



Photograph 2.15
Standing water in Dam 4 (April 2026)

Wetland Reach E: Channeled valley bottom wetland downstream of Dam 4

The watercourse in this area is channelised but less incised than in the reaches between Dams 3 and 4. Areas outside of the channel are dominated by *Pteridium aquilinum* but the valley bottom wetland itself is morphologically less impacted than in the upstream reaches, and includes relatively natural wetland habitat towards Dam 5, although the weir / dam wall at Dam 5 is likely to have played a part in reducing upstream channel incision at least in the reaches immediately upstream of the dam wall, which effectively flattens out the upstream channel gradient.

This reach of the watercourse has been assessed as PES Category C/D, taking into account existing indigenous vegetation, albeit with some (cleared) alien vegetation (see Photograph 2.16) and with the understanding that hydrology has been significantly impacted by upstream impoundment as well as by alien invasion.



Photograph 2.16
Watercourse between Dam 4 and Dam 5 (April 2026)

Dam 5

This dam/ impoundment was created by a concrete weir and was completely infilled with sediment at the time of the April 2016 site visit, suggesting significant or ongoing erosion of upstream areas between Dams 4 and 5 – this would probably largely be due to agricultural activities in this area, but could also reflect the more recent impacts of alien plant clearing in the upstream reaches, exacerbating sediment accumulation. , The impoundment is illustrated in Photograph 2.17.



Photograph 2.17
Accumulated sediment in Dam 5 (April 2026)

Reach F: Foothill stream

Downstream of the weir that controls water levels in Dam 5 (and facilitates sediment accumulation in this dam), the watercourse changes abruptly from an (assumed) naturally unchanneled valley bottom wetland system to a foothill river, characterised by much steeper slopes and, in this case, flows over, at least in places, bedrock (see Photograph 2.18).

These river reaches are impacted by impoundment and alien invasion upstream, but their geomorphology is relatively intact, being driven by the underlying bedrock. The river in these reaches is thus fast-flowing and unchannelised. Clearing of alien vegetation on both sides of the river channel was evident in April 2026, and this is likely to increase base flows in the river from this point downstream. Seepage into the river from hillslope seeps / groundwater on the western side of the stream were also evident at the time of sampling. These seeps were assumed to be primarily groundwater-driven, given the evident spongy orange-brown iron oxide flocs leading into the main stream flow. These flocs result from the oxidation and precipitation of dissolved iron, often mediated by iron-oxidising bacteria, and are characteristic of groundwater-fed systems.

This reach of the watercourse has been assessed as PES Category C, using a modified version of the Habitat Integrity rating of DWAF (1999) (in Southern Waters 2001) with the main impacts being invasion by alien vegetation (and its impacts on hydroperiod), upstream impoundment (and its impacts on hydrology and hydroperiod) and loss of indigenous vegetation.



Photograph 2.18
Foothill stream downstream of Dam 5 (April 2026) – weir shown in foreground.

2.6.5 Summary of watercourse EIS and PES

The protocol for assessment of Ecological Importance and Sensitivity (EIS) is provided in Appendix B3. Overall, the watercourses assessed in this report, considered as one interconnected system, have been rated as of Moderate EIS, on the basis of their generally low residual habitat and (assumed) species richness. Nevertheless, the system is evidently connected to groundwater and interflows, relying on these for the formation of seeps and the extended maintenance of flows in downstream reaches, despite high levels of upstream impoundment. The river could also potentially play a role in hydraulic buffering of the downstream river system within the lower Berg catchment. The rating was thus set at 2, marking

the upper level of Importance Class C.

Watercourse condition was assessed using the Present Ecological State methodology, as outlined in Appendices B2 and B3.

The following assessments of condition have been made:

- Wetland reach A(1): PES Category C
- Wetland reach A(2): PES Category D/E
- Wetland reach B: PES Category D/E
- Seep wetland B1: PES Category C/D
- Wetland reach C: PES Category D.
- Wetland reach D: PES Category D/E
- Wetland reach E: PES Category C/D
- Reach F (foothill stream): PES Category C.

The above are illustrated in **Figure 2.6**.

Note that assessment of PES is not appropriate for dams, since they are artificial habitat types and PES ratings relate present watercourse condition to its natural or reference state.

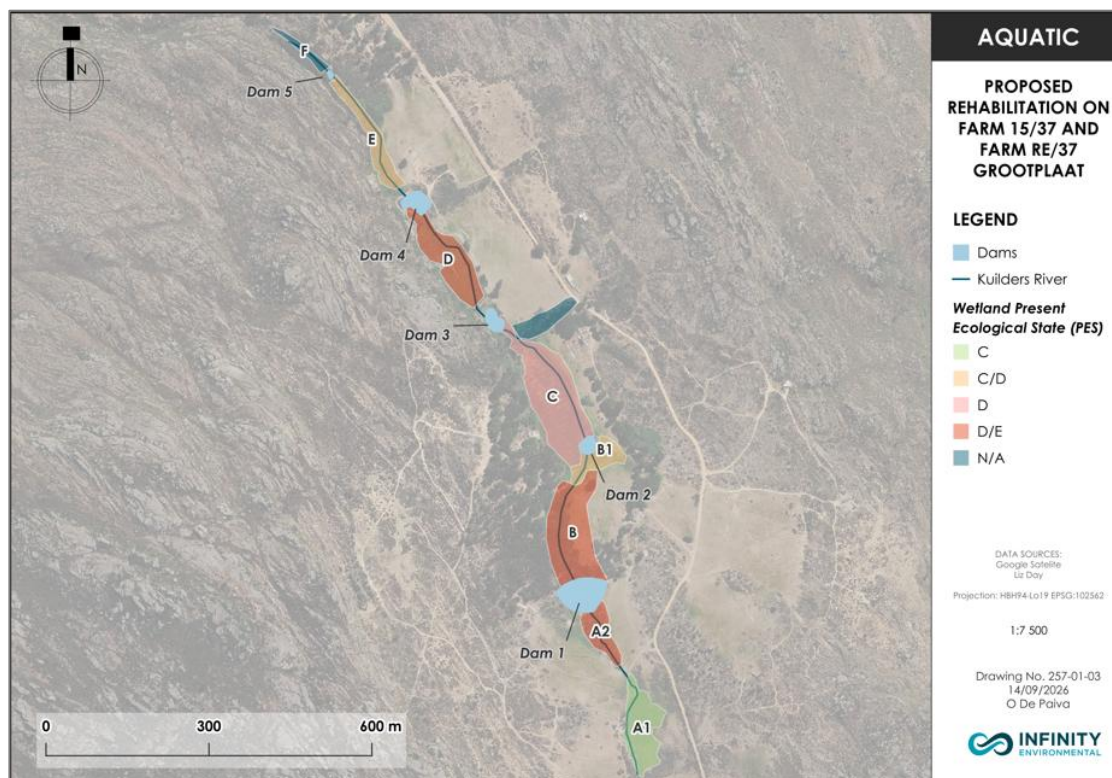


Figure 2.6

Watercourse condition, as assigned to delineated watercourses on the site, focusing on the core rehabilitation areas. Map produced by Infinity.

2.6.6 Watercourse bioregion and threat status

This assessment was conducted using the IUCN Red List of Ecosystems framework (version 2), which has been applied across all realms for the 2025 assessments (Job et al 2026b). The Red List of Ecosystems (also known as Ecosystem Threat Status in South Africa) assesses the risk of collapse of each ecosystem type based on a range of criteria on extent, condition and pressures faced by each ecosystem type.

Watercourses in the present study area all fall within the **Northwest Fynbos bioregion**, as classified in the NWM of the 2025 NBA. Wetlands within this bioregion are classified as Northwest Fynbos seeps, unchanneled valley bottom wetlands, floodplain wetlands or depressions. These classifications stem from an interim typology of South Africa's wetland ecosystem types, based on a combination of bioregional and hydrogeomorphic criteria, with 82 regional wetland types having been distinguished nationally (Job et al 2026a).

On the Grootplaat study area, natural wetland types identified comprised valley bottom and seep wetlands, with Threat Status and Level of Protection (as per the 2025 NBA dataset³) as follows:

- Northwest Fynbos seep wetlands (seep upstream of Dam 1, side seep A and numerous other smaller seeps into the valley):
 - Threat Status: Endangered
 - Level of Protection: Moderate
- Northwest Fynbos unchanneled valley bottom wetlands (downstream of Dam 1):
 - Threat Status: Endangered
 - Level of Protection: Low.

The fact that both natural wetland types on the site have a threat status of Endangered suggests that efforts to improve wetland condition would be well-placed and in line with conservation priorities in this region.

2.7 Comments on site sensitivity ratings (DFFE Screening Tool outputs)

The DFFE Screening Tool for the Aquatic Biodiversity Theme for the site is shown in **Figure 2.7**. The figure indicates that large areas of the site have been rated as of Very High Sensitivity, including the valley bottom wetland system that forms the focus of rehabilitation activities in this project. The latter, along with other tributaries in the lower-lying generally degraded portions of the valley have been mapped as Very High Sensitivity, within a localized area of Low Sensitivity (i.e. the degraded surrounding terrestrial area), although the exact delineation of sensitivity is difficult to determine at this scale.

The extensive areas of Very High Sensitivity that extend along the eastern and south eastern boundary and into the area beyond reflect the extent of the Hols and Boesmans River Sub-Quaternaries, both of which have been rated as River FEPAs. These entire drainage areas consequently have high conservation importance at a national level (see Section 2.6.2), hence their rating in the Screening Tool.

On the basis of ground-truthing, and taking the extensive watercourses across much of the site indicated in **Figure 2.4**, the Screening Tool output is thus largely concurred with, noting that it does not show the extent of wetlands and the five dams ground-truthed in this study, but marks up only the 1:50 000 river layer for the watercourses flowing into and along the valley bottom wetlands on which the current proposed activities would focus.

³ Data sourced from https://nba.sanbi.org.za/content/freshwater/fw_wet_epl.html

3 REHABILITATION OBJECTIVES AND PRINCIPLES

This Impact Assessment Report considers the interventions proposed by the landowner, working with a team of rehabilitation planning and implementation specialists, including specialists from Vula, LDC and Infinity. The proposed interventions have all been developed with a view to facilitating the effective rehabilitation of watercourses and other areas on the Grootplaat site, in order to create sustainable natural habitats that support improved ecosystem function and can provide improved ecosystem services.

The following over-arching rehabilitation objectives and guiding rehabilitation principles, developed by the above project team, were used to inform the proposed interventions and their planned implementation methodology, namely:

1. **Do no harm** – rehabilitation interventions should not result in any further degradation of natural ecosystems, although it is recognised that the implementation stage of some of these measures would involve disturbance of existing systems;
2. **Improve ecosystem condition**, with the aim of improving all aquatic ecosystems to a Recommended Ecological Condition (REC) of Category D or better, noting that the REC does not apply to dams (since they are artificial aquatic habitat types) and moreover that, where PES has been assessed as better than Category D, no deterioration and ideally improvement should be sought;
3. Attempt, through the implementation of authorised mitigation measures, to **improve aquatic ecosystem function and condition**, by, where feasible:
 - **Improving wetland hydrology and hydroperiod**, where possible, so that more natural flow regimes can be implemented downstream of dams – this would depend on a combination of:
 - Large-scale clearing of invasive alien vegetation at a catchment scale (such measures have already commenced);
 - Including controlled outlet structures at all dams, with the exception of Dam 2, which lies outside of the main flow of Wetland Reach B, such that early wet season flows can pass into wetlands downstream of the dams, with major flows being stored in the dams for irrigation or other use. Such interventions could be allowed for by diversion of low wet season base flows past the dam; inclusion of a low-level controlled-flow pipe outlet in the dam walls; or other equivalent devices;
 - **Addressing channel incision and associated wetland drainage and draw-down** of the water table, by raising the water table, where necessary and feasible through the use of gabion weir structures, designed by an appropriately experienced engineer;
 - **Addressing wetland shrinkage** as a result of channelisation and concentration of flows, by grading and shaping of impacted areas, to create wide, flat areas of saturation and seasonal flow – these measures would be particularly applicable to Wetland Reaches B and D, as well as the lower, channelised section of Wetland Reach A (A2 in **Figure 2.6**). The use of machinery such as excavators, if supervised and managed in terms of Best Practice, would assist in such interventions and would probably produce more effective results than the use of manual labour;
 - **Improving watercourse biodiversity** by:
 - Clearing of invasive alien vegetation;
 - Clearing of invasive indigenous vegetation where monocultures of particular plant species (e.g. *Pteridium aquilinum*) occur – the use of machinery such as excavators, if supervised and managed in terms of

Best Practice, would assist in such interventions and produce more effective results than the use of manual labour;

- Active establishment of a diverse array of appropriate locally indigenous wetland plant species in areas cleared of alien vegetation;
4. Improve dam function by repairing dam walls where necessary and removing sediment, taking care that dam capacity does not increase beyond original capacity – that is, only eroded sediment that has entered the dam from upstream should be removed – the dams should not be deepened beyond original capacity without authorisation;
 5. Establish the Kuilders River system and its associated wetland seeps as **resilient ecological corridors** through the landscape, by establishing effective ecological buffers around all of these systems, designed to protect them from adjacent activities including concentrated runoff from roads; seepage from agricultural areas, potentially exposed to fertilisers or other sources of nutrient enrichment; improve their ability to resist erosion, variously by developing high plant ground cover and including deep-rooted species to retain soils at depth in flood conditions;
 6. Enhance the value of watercourses as **areas with high amenity value**, for low-impact recreational activities, such that they are actively conserved in order to protect these and other (biodiversity-linked) values. Appropriate measures would include the construction and maintenance of boardwalks in some areas, to facilitate low-impact human passage across wetland areas.

The above guiding principles / objectives have informed the specific activities under assessment in this report.
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4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Overview⁴

The applicant (the landowner) proposes to rehabilitate extensive areas of the site, in order to rehabilitate watercourses; increase biodiversity; make use of historically cultivated land and install low-impact infrastructure to improve the usage of the site.

Rehabilitation measures for the site as a whole were developed in a series of collaborative engagements between the landowner, Vula , the aquatic ecologist (this author) and Infinity (see Section 3).

Measures relevant to this aquatic biodiversity assessment include the following, the locations of which are indicated in **Figure 4.1**:

- The installation of up to five erosion-control gabion weirs of 1.5m height each, spaced approximately 15m apart (measured from weir centre to centre), upstream of Dam 1 (Reach A2);
- Dissipation of surface flows into Reach A2 from the surrounding terrestrial area, by re-grading these areas, such that they no longer concentrate flows into the water course but dissipate them;
- Dam 1:
 - Reinforcements of the Dam 1 spillway with gabion weirs at 4-5m intervals;
 - Installation of a pipeline to allow for the passage of low flows from Dam 1 during the wet season, using an infiltration trench to allow spread of flows into downstream areas, and allowing for pipe-jacking or excavation of a low flow release through the dam wall downstream of Dam 1;
- Boardwalk installation within Reach B;
- Dam 2:
 - Localised dredging of sediment and clearing of vegetation;
- Boardwalk installation within Reach C;
- Dam 3:
 - Repair of drain structure
 - Reinforcement of spillway
 - Allowance for a low flow release of early wet season flows into the watercourse downstream of Dam 3 – this could be by way of adjustments to existing pipes in the dam or by pipe-jacking through the dam wall or other alternative measures that would achieve the desired outcome while still allowing for dam storage;
- Grading and shaping of eroded banks to re-create a wider valley bottom wetland in Reach D;
- Installation of up to three gabion structures in Reach D downstream of Dam 3 to dissipate energy and prevent erosion;
- Dam 4:
 - Reinforcement of the vehicle crossing with reno mattress
 - Installation of timber boardwalk
 - Upgrading of the spillway
 - Installation of a drop-structure / castellated weir to spread flows into downstream channels (to be instated)
 - Installation of an up to 4 m x 8 m reno mattress immediately downstream of the Dam 4 wall

⁴ This section adapted from the BAR for this project (Infinity 2026)

- Allowance for a low flow release of early wet season flows into the watercourse downstream of Dam 4 – this could be by way of adjustments to existing pipes in the dam or by pipe-jacking through the dam wall or other alternative measures that would achieve the desired outcome while still allowing for dam storage;
- Installation of a reno mattress to spread flows downstream of Dam 4 into between two and four valley bottom wetland channels, to be created within Reach E, by (mechanical) grading and pulling back the existing eroded banks to recreate a wider valley bottom wetland;
- Dam 5:
 - Dredging of sediment from within the dam;
 - Installation of a boardwalk crossing at the Dam 5 wall;
- Ongoing clearing of invasive alien vegetation from all of the watercourses within the site;
- The development of orchards in the vicinity of Reach A2; and Dam 3, Reach C and Reach D (these would be located in previously disturbed land but could have implications for adjacent watercourses).

4.2 Detailed rehabilitation methodology

Appendix C presents a detailed outline of the proposed rehabilitation interventions, developed collaboratively by the project rehabilitation team, during project planning. The impact assessment in this report assumes that these methods would be followed, in the event that authorisation for this project was secured.

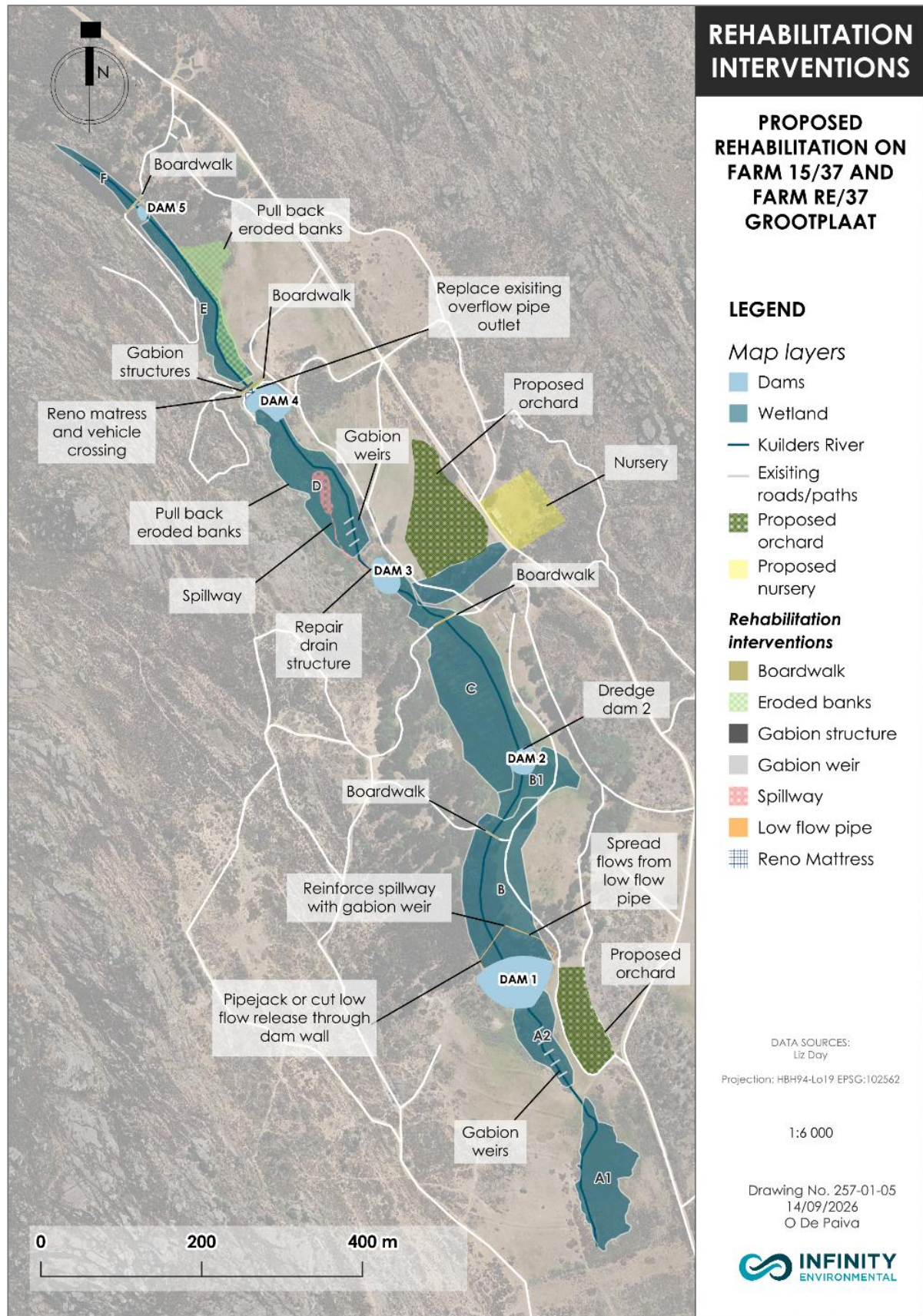
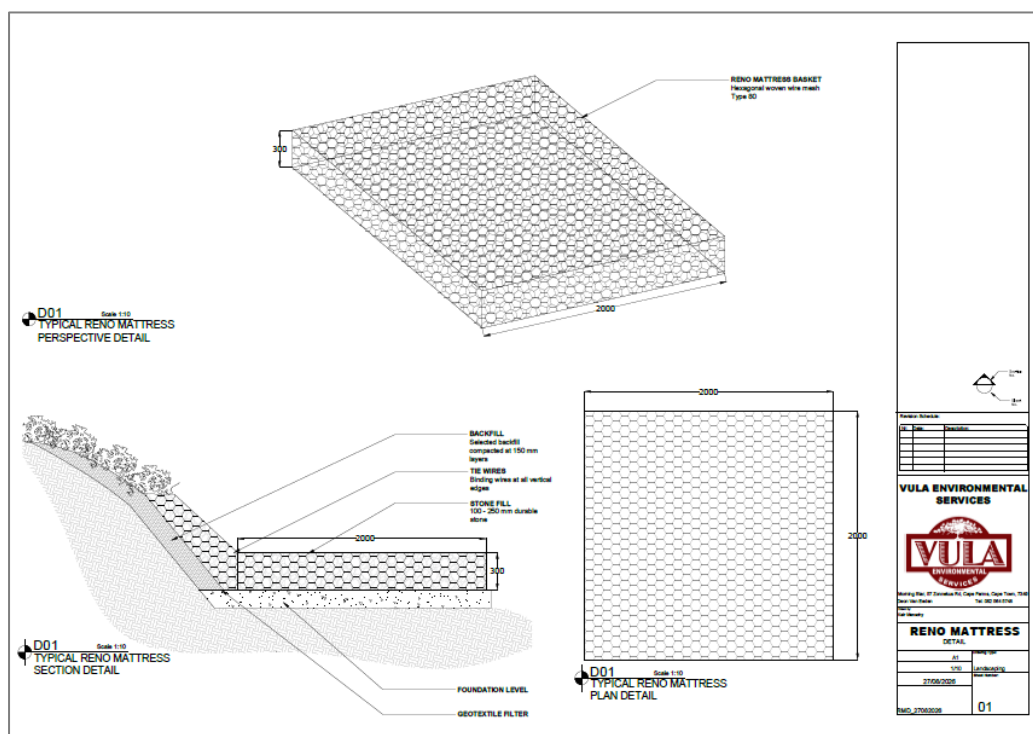
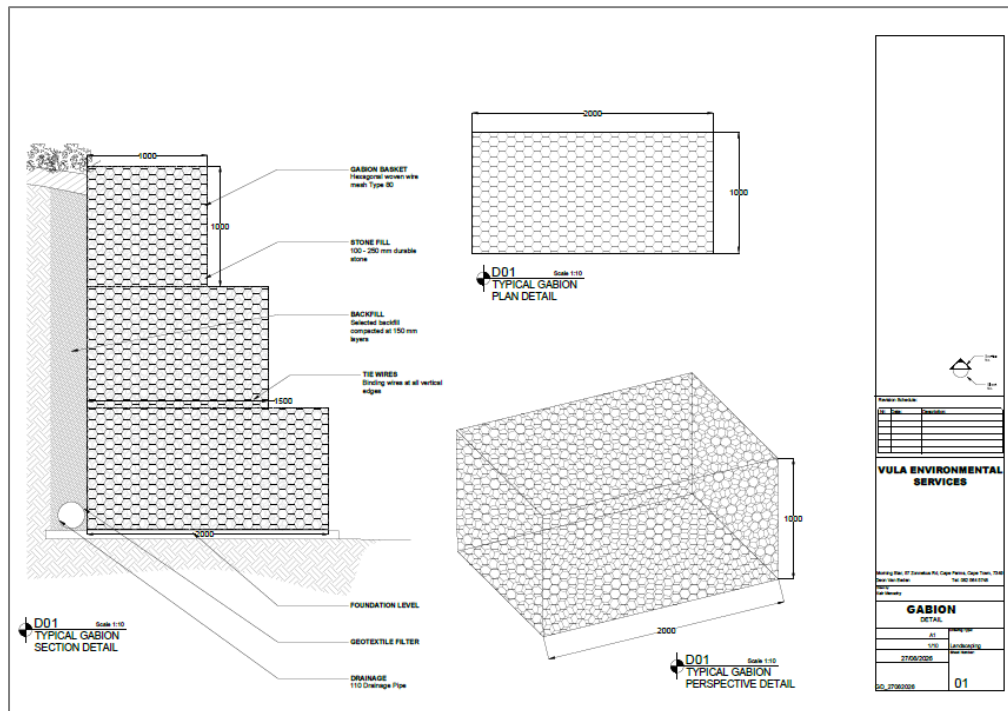


Figure 4.1

Proposed watercourse rehabilitation interventions considered in this assessment on the Grootplaat site, along with other (non-aquatic) measures also planned for terrestrial areas.
Figure courtesy Infinity

4.3 Conceptual design details

Figures 4.2 to 4.4 provide illustrations of the key proposed infrastructure intervention designs (i.e. boardwalks, gabion weirs and reno mattress stabilisation).



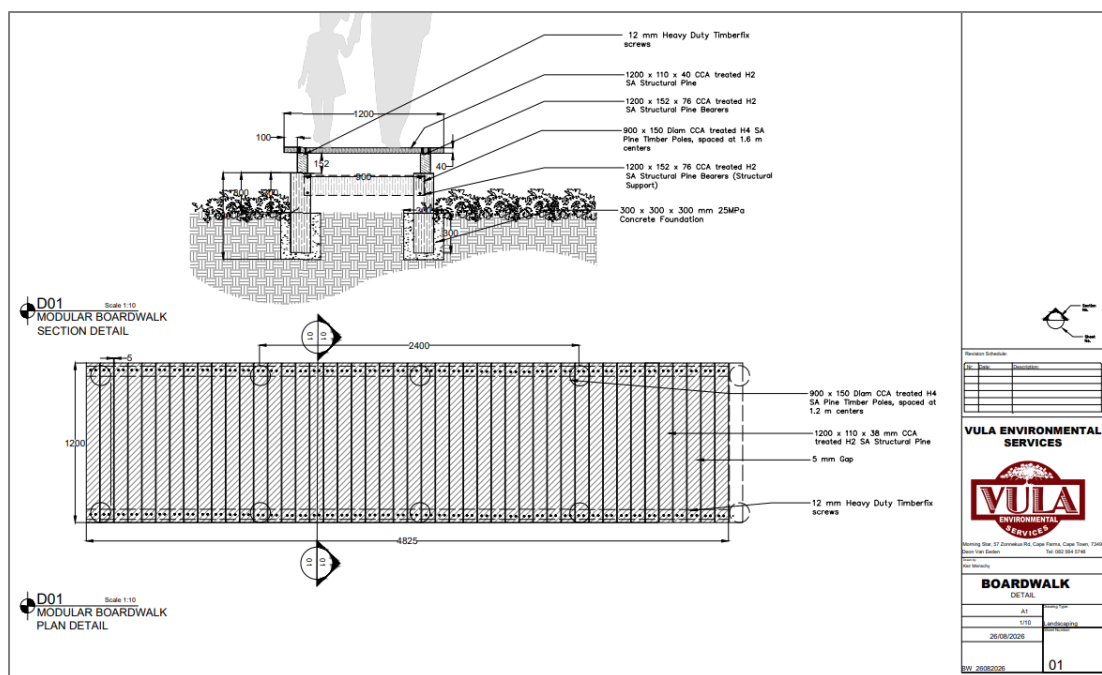


Figure 4.4
Conceptual design for board walks across water courses in identified reaches in the Grootplaat site (Figure provided by VULA)

4.4 Implementation phasing

Although not explicitly stated in the listing of activities and interventions considered in this assessment, it is understood that their implementation would potentially be phased over two to ten years, as shown in **Table 4.1**, (after Vula, submitted to Infinity in prior project planning documents).

Table 4.1
Conceptual phasing of proposed interventions on Grootplaat (as suggested by Vula - submitted to Infinity in prior (ca June 2026) project planning documents)

PHASE	APPROXIMATE TIMEFRAME	PRIORITY ACTIVITIES
Phase 1	Year 1–2	Initial invasive alien plan (IAP) clearing (priority areas); nursery establishment; soil sampling; dam alien clearing and outflow rehabilitation (subject to NWA authorisation); priority wetland stabilisation; agricultural field soil amelioration.
Phase 2	Year 3–5	Continued IAP clearing and follow-up; earthworks and structural stabilisation; wetland revegetation; agricultural field phased planting (MU2, MU6); nursery transition to local management; wetland crossing formalisation.
Phase 3	Year 6–10	Follow-up IAP maintenance; supplementary planting; passive restoration monitoring (MU3, MU7); structural diversity enhancement in MU6; ongoing monitoring and adaptive management.

5 IMPACTS OF THE PROPOSED DEVELOPMENT ON AQUATIC ECOSYSTEMS

5.1 Impact overview (aquatic ecosystems perspective)

The “development” as proposed in Section 4 in reality comprises a series of interventions, designed around achieving the objectives outlined in Section 3.

As such, negative impacts are likely to be associated primarily with the construction phase, or as a result of design failure (assessable with difficulty at this phase, although design principles and concepts have been rigorously scrutinised).

Outside of the construction phase, “mitigation” measures are thus usually not really relevant, as the intended outcome of most interventions are ecologically positive. However, opportunistic measures to enhance ecological outcomes from an aquatic ecosystems perspective have been included where relevant.

Note too that the methodologies outlined in Appendix C are all assumed in the present assessment to be an integral part of the assessed project design, and their inclusion should form part of any authorisation of the proposed rehabilitation interventions.

Table 5.1 provides a formal assessment of the identified impacts, using the methodology outlined in Appendix D.

5.2 Impacts associated with layout and design

5.2.1 Impact 1: Improvement in wetland condition and extent

Impact driver: The interventions listed below and included in Section 4.1 would result in a direct improvement in both wetland condition and extent, although the latter cannot be quantified at this stage (see **Figure 4.1** for reach locations):

- The installation of erosion-control gabion weirs in Reach A2 - their purpose would be to prevent further channel incision and to raise the incised river bed, thus raising the water table and partly addressing desiccation of surrounding wetland areas – although the gabion footprints themselves would result in localised wetland loss, there would be a net gain in wetland extent through these and other interventions listed below;
- Dissipation of flows into Reach A2 from surrounding terrestrial areas, preventing erosion and spreading flows into the watercourse across a wider area of vegetated riparian and wetland vegetation;
- Allowance for the passage of controlled low flows from Dams 1, 3 and 4, such that downstream watercourses receive controlled and dissipated flows from the dams early on in the wet season, commensurate with the start of the wet season – this will allow for sustained, better quality wetland habitat in the reaches between dams, reducing erosion threat and enhancing ecosystem services such as erosion control;
- Installation of gabion, reno and /or pipeline infrastructure at dam outlets / spillways to prevent ongoing erosion and allow downstream watercourses to stabilize and recover from sustained concentrated flows and scour in paces;
- Grading, clearing of invasive indigenous and alien vegetation, re-shaping and the installation of up to three gabion weirs in Reach D (if needed to prevent channel incision) – these measures would lead directly to increases in wetland habitat, improving ecosystem services such as water retention for slow dry season release; carbon storage; provision of habitat and ecological corridor functions;
- Reinforcement and upgrading of spillways and vehicle crossings over spillways using gabion weirs / reno mattresses or other measures – these would reduce existing damage to downstream watercourses as a result of uncontrolled flows, and prevent future significant damage in the event of structural failure of any of these dams if maintenance is not adequately and timeously carried out;
- Management of human movement through sensitive (rehabilitated) wetland areas

through the construction of boardwalks to allow access across and through the rehabilitated area, without trampling, compacting or otherwise disturbing wetland vegetation – inclusion of this infrastructure recognizes the long-term benefit to sustained funding of rehabilitation and management of increasing the amenity value of watercourses, and thus maintaining interest and appreciation of these areas by landowners and future visitors;

- Clearing of invasive alien vegetation from all watercourses – these interventions should increase seepage into the watercourses, especially during low flow conditions when the systems are likely to be most stressed. IAP removal would also improve wetland habitat by removing unnatural shading, thus allowing indigenous wetland plants to thrive. This would both improve habitat quality and reduce erosion threats, by increasing basal plant cover. Note that this intervention is treated as a positive long-term design and strategy phase intervention, but included in Section 5.5 under operational phase impacts, as a long-term source of disturbance, completely outweighed over time by positive long-term impacts (assuming best practice implementation).

Impact description:

Overall, the interventions would be expected to improve watercourse hydrological function; reduce erosion and associated sedimentation risk; improve the functioning of a longitudinal ecological corridor along the main valley bottom wetland; improve biodiversity through the establishment of appropriate locally indigenous plants; and through these measures, improve watercourse resilience to impacts such as floods, droughts and fire.

The interventions would thus be expected to result in an (unquantified) improvement in wetland extent, while wetland condition in affected reaches should improve by at least one ecological category, provided that the mitigation and additional measures outlined below were implemented. These should thus be requirements of any authorisation for these interventions.

Risks

Risks to project success (i.e. achieving the positive impacts listed above) include:

- Funding shortages;
- Lack of maintenance including IAP control;
- Unforeseen events such as fire, flood or drought that impact on watercourse resilience during early construction activities – these are discussed in Section 5.3.2;
- Inadvertent creation of barriers to faunal movement if boardwalks are constructed too low to allow the movement of small to medium sized fauna beneath them;
- Failure to complete rehabilitation interventions, on which downstream systems and their interventions are dependent;
- Inadequate or excessive release of flows from dams as a result of inadequate designs, with the result that the anticipated establishment of high quality wetlands in downstream reaches does not occur to the predicted degree.

Recommended additional / mitigation inclusions

Although probably implicit in the implementing team's vision, the following specific aspects must form part of project planning and design, to help ensure that the predicted ecological benefits can be realised:

- i. If funding is constrained, then the proposed rehabilitation interventions should be phased, with those measures addressing ongoing current sources of degradation or major risks if not maintained, being prioritised;
- ii. Allowance must be made for engineering input into gabion weir design (particularly weir height and width / tie in to adjacent banks) and the design of any flow release mechanism involving pipe-jacking through dam walls or any other interventions that might potentially compromise dam safety.

- iii. Allowance should be made for monitoring of flow releases from relevant dams, to gauge the efficacy of the release mechanisms. Ideally, flow recording devices should be installed in the outlet pipelines to record flow discharges and durations. In the absence of these:
 - a. Dam water level should ideally be measured weekly and records kept – a graduated measuring pole placed in the affected dams would allow for simply, quick measurements of depth;
 - b. The dates on which flows begin releasing into the downstream reaches should be noted, along with the duration of flows;
 - c. The outlet pipe “fullness “ should be roughly noted during discharge periods (full, half, quarter, trickle) to gauge efficacy of release mechanisms;
 - d. Signs of downstream erosion should be noted and these areas addressed through shaping and planting and/or the installation of reno mattress or other appropriate stabilising material that encourages infiltration;
 - e. The release mechanism should be adjusted, if it activates too seldom to improve downstream watercourse condition, or so effectively that it drains the dams, impacting their storage capacity;
- iv. Planning must allow for adequate appropriate plants to be available for establishment in cleared areas in watercourses, before any work on mechanical or manual shaping / removal of fill commences;
- v. Raised walkways must be constructed such that the support structures beneath the walkway do not create barriers to the movement of small to medium fauna (porcupines, otters, mongooses, tortoises, frogs, and small mammals unlikely to be able to navigate the boardwalk itself. A minimum height of 300 mm between the ground and the bottom of the boardwalk must be allowed for, and side struts / supports must be arranged to allow regular ease of access through;
- vi. Monitoring of watercourse condition using fixed-point photography and periodic revisions of PES assessments, potentially including WET-Health assessments, is recommended, for the landowner to be able to track the ecological return on investment – monitoring of alien invasion extent; indigenous vegetation establishment; wetland extent and condition; are all recommended on an annual to at least three yearly basis.

5.3 Construction phase impacts

The implementation (construction) phase of the rehabilitation programme is the only period consistently likely to result in negative ecological impacts which, if carefully managed and mitigated, should at worst be short term and of a low intensity. These impacts are considered below.

5.3.1 Impact 2: Watercourse degradation

Impact driver: All of the interventions listed as drivers in Section 5.3.1, with additional potential impacts also associated with the proposed development of orchards in the vicinity of Reach A2, Dam 3, Reach C and Reach D, potentially activating sediment pathways into the watercourse; introducing nutrients and other pollutants (depending on farming methodology); and the removal of sediment from Dams 1-5, in order to maintain capacity.

Impact description: Watercourse degradation could potentially take the form of increased sedimentation as a result of disturbed areas both within the watercourse (e.g. during gabion construction, installation of reno mattresses, alterations to spillways, watercourse bank and bed reshaping, removal of fill, alien clearing, boardwalk installation. Clearing of areas for new orchards outside of the watercourses might also generate sediment as a result of unmanaged runoff into the adjacent watercourse(s). These activities would also be likely to be associated with trampling and compaction of watercourses and their riparian areas, increasing short-term

vulnerability to erosion and impacting on water quality (increased suspended solids) and sedimentation in downstream areas including dams. Recent sediment in watercourses often provides areas for rapid establishment of IAPs, and if unmanaged, this would further contribute to potential construction phase degradation of watercourses, exacerbated by localized impacts such as remnant construction materials (gabion baskets, rocks, solid waste from site camps) left in or near the watercourses.

The above issues are readily manageable and best practice management is assumed to be already implicit in the Vula implementation plan. Less easily managed however would be degradation resulting from major storms/flood events; drought; or fire. All of these could potentially impact on watercourse condition, particularly if occurring during construction of in-stream interventions and most significantly associated with interventions such as clearing and shaping of the bracken fern wetland, which would affect a large area within the water course.

Risks

Identified risks include rainfall during construction; inadequate availability of plants for rapid re-establishment in disturbed areas; inadequate funding to address erosion and sedimentation impacts following rainfall or flood events; inadequate capacity for irrigation of planted areas in their establishment phase (if required).

Recommended mitigation measures

Many of the measures listed below are assumed to be included in the Vula implementation programme, but are included here for completeness, and should be included in rehabilitation implementation:

- i. Reshaping (i.e. disturbance of watercourse soils during excavation and shaping) and removal of sediment from dams (and potentially Reach D) should be timed for the dry season only (September to early March – see **Figure 2.1**); should be followed immediately by planting of appropriate densities of locally indigenous plants suited to the target zone; and, where significant rainfall events outside of the “normal” wet season, earthworks and sediment removal should be avoided;
- ii. Revegetation and planting should be aligned with the autumn-winter rainfall period to maximise establishment success;
- iii. Best practice measures should be in place that ensure that:
 - a. Temporary stockpiles of excavated sediment or construction material lie outside of the 1:100 year flood line (i.e. outside of areas prone to flooding and at least 50 m from the delineated watercourse edge;
 - b. Such stockpiles or waste piles are removed as quickly as possible;
 - c. Mechanical plant (e.g. excavators) that are used in the rehabilitation interventions must be managed such that they do not cause pollution of any watercourse or adjacent areas from fuel changes; oil spills and their passage through and adjacent to watercourses should be closely controlled, so as to minimise the extent of wetland degradation as a result of machine compaction;
 - d. Alien plants removed during construction should be disposed of outside of any sensitive watercourse area;
 - e. Excavation of sediment from dams should ideally be followed by re-establishment of indigenous aquatic vegetation in these disturbed areas, to encourage macroinvertebrate establishment (e.g. Sago pondweed (*Stuckenia pectinata*));
- iv. Where sedimentation, erosion or damage to infrastructure occurs in watercourses during the construction phase, measures (including budget) must be set in place to address these, through additional shaping, planting or other interventions as deemed necessary – any new intervention required to address significant damage would need

to be approved by an aquatic ecologist and (if infrastructure damage has occurred), by an engineer.

Recommended additional measures: Establishment of ecological buffers

In order to give credence to the objective of establishing the Kuilders River system and its associated wetland seeps as resilient ecological corridors through the site it is recommended that all aquatic ecosystems should be managed within ecological buffer areas.

As a broad guideline, minimum ecological setbacks of 30 m from all wetlands and 20m from the full supply level of all dams are recommended.

This recommendation considers:

- Minimum setbacks recommended in Macfarlane et al (2015), for (worst case) agricultural areas (20m)
- Low certainty regarding wetland delineation in some areas, where wetlands have been impacted by decades of alien invasion and other disturbance;]
- The rural nature of the area;
- The added conservation benefits of provision of strong ecological corridors through the site.

Ecological buffer areas would need to be managed such that:

- They are vegetated with locally indigenous (terrestrial) vegetation;
- Alien vegetation including kikuyu grass is kept out of these area, where feasible;
- With the exception of limited boardwalks / pathways, hardened areas are minimised (e.g. no paving or buildings);
- They do not include infrastructure likely to add to the impacts on adjacent watercourses (e.g. no wellpoints, sewer lines, other reticulation of concern (none of which are likely in an agricultural context)).

The above should be a requirement where the development of orchards, other agricultural landuse and/or new infrastructure is proposed in areas abutting any watercourses.

5.4 Operational phase impacts

In fact, many of the positive impacts assessed as "Design Phase" impacts in Section 5.5 would only accrue in the operational phase of the development, kicking in in phases, as implementation measures are rolled out. They are however not repeated in this section, which deals only with the short-term impacts associated with effecting repairs and maintenance to watercourses and associated infrastructure in the long term.

5.4.1 Impact 3: Watercourse degradation

Impact driver description: The following interventions are assumed to be required on an ongoing, occasionally emergency, but not necessarily frequent basis in watercourses on the site, and would potentially be associated with short-term disturbance and watercourse degradation:

- Ongoing manual clearing of invasive alien vegetation from watercourses;
- Repairs to gabion baskets, reno mattresses, spillways, dam walls;
- Periodic (mechanical or manual) sediment removal from dams;
- Erosion repair, through (mechanical or manual) re-shaping of eroded areas, with the potential introduction of additional gabion weirs or protection devices as required;
- Replacement of eroded, dead or senescent watercourse and riparian plants;
- Repairs to boardwalks;
- Repairs / adjustments to dam outlet mechanisms (in line with providing wet season flows into downstream watercourses to sustain high quality watercourse vegetation.

Impact description:

The above activities would be likely to be associated with trampling and compaction of watercourses and their riparian areas, increasing short-term vulnerability to erosion and impacting on water quality (increased suspended solids) and sedimentation in downstream areas including dams, and increasing the vulnerability of impacted areas to IAP establishment.

Risks:

The greatest risks in this case would in fact be those associated with failure to carry out management or maintenance interventions, with reduced attention to ongoing IAP clearing probably the greatest risk to the long-term sustainability of watercourses on the site.

Recommended mitigation measures

- i. The mitigation measures recommended in Section 5.4.1 would be applicable in this instance as well, although it is assumed that they would in practice be undertaken at much lower frequencies.
- ii. Where new infrastructure is required to address new erosion in watercourses, it is recommended that such interventions should be authorised as part of this application, subject to approval of both the need for, and the design of, the structures, which should be limited to structures made using bitem-lined, rock-filled gabion or reno mattress structures only.

5.5 Cumulative Impact Assessment

The cumulative impacts of the proposed watercourse rehabilitation measures, viewed in conjunction with broader terrestrial rehabilitation interventions also planned for the site, would be considered positive and in line with the ranking of the Kuilders River catchment as a Phase2 FEPA sub-quaternary (see Section 2.6.2).

5.6 Assessment of the No Development Alternative

Unlike the rehabilitation programme assessed in this report, the “no development” / “maintain the *status quo*” alternative would be associated with no positive outcomes, and with some likelihood of a step-wise worsening of aquatic ecosystem condition, as a result of reduced resilience to impacts such as drought, fire and floods, all potentially associated with climate change in the Western Cape, with Jack et al. (2022) modelling a likelihood of increased temperature, increased (associated) evaporation rates, generally decreased rainfall, and possible increases in rainfall intensity in some events (see also Vos et al 2016 – Section 2.2).

Note however that clearing of listed IAPs remains the legal duty of the landowner in terms of the National Environmental Management Act: Biodiversity Act (NEM:BA) (Act 10 of 2004), even without authorisation for the rehabilitation measures sought in this assessment.

5.7 Impact summary

Table 5.1 provides the outcomes of the formal assessment of impact significance, based on the methodology outlined in Appendix D.

Table 5.1
Outcomes of formal assessment of impact significance – see Appendix D for assessment methodology

SUMMARY OF IMPACTS		
IMPACTS ASSOCIATED WITH DESIGN AND LAYOUT		
Potential impact and risk:	Impact 1: Improvement in wetland condition and extent No mitigation	With mitigation
Nature of impact:	Positive	Positive
Extent of impact:	Local	Local
Duration of impact:	Long term	Long term
Intensity of impact or risk:	Medium	Medium
Probability of occurrence:	Probable	Highly probable
Degree to which the impact may cause irreplaceable loss of resources:	None – the activity overtly seeks to improve ecosystem integrity	None – the activity overtly seeks to improve ecosystem integrity
Degree to which the impact can be reversed:	Not required	Not required
Indirect impacts:	Improved downstream flow regime	Improved downstream flow regime
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Low to Medium Positive	
Degree to which the impact can be avoided:	N/A: Positive impact from a voluntary implementation measure	
Degree to which the impact can be managed:	N/A: Positive impact from a voluntary implementation measure	
Degree to which the impact can be mitigated:	N/A: Positive impact from a voluntary implementation measure	
Proposed mitigation:	See Section 5.2.1 and Appendix C	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)	Medium (Positive)	
CONSTRUCTION PHASE IMPACTS		
Potential impact and risk:	Watercourse degradation / disturbance No mitigation	With mitigation (including recommended additional measures – ecological buffers)
Nature of impact:	Negative	Negative
Extent of impact:	Local	Immediate
Duration of impact:	Short term	Short term
Intensity of impact or risk:	Medium	Medium
Probability of occurrence:	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	Low to none	Low to none
Degree to which the impact can be reversed:	Medium	Medium
Indirect impacts:	Positive: improved ecosystem function	Positive: improved ecosystem function
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-	Low	

Medium, Medium, Medium-High, or High)		
Degree to which the impact can be avoided:	Low	
Degree to which the impact can be managed:	Medium	
Degree to which the impact can be mitigated:	High	
Proposed mitigation:	See Section 5.3.1	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)	Low (negative)	
OPERATIONAL PHASE IMPACTS		
Potential impact and risk:	Watercourse degradation / disturbance No mitigation	With mitigation
Nature of impact:	Negative	Negative
Extent of impact:	Local	Immediate
Duration of impact:	Short term	Short term
Intensity of impact or risk:	Low to Medium	Low to Medium
Probability of occurrence:	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	Low to none	Low to none
Degree to which the impact can be reversed:	Medium	Medium
Indirect impacts:	Positive: improved ecosystem function	Positive: improved ecosystem function
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Low	
Degree to which the impact can be avoided:	Low	
Degree to which the impact can be managed:	Medium	
Degree to which the impact can be mitigated:	High	
Proposed mitigation:	Not applicable in the No Development alternative, although alien clearing legally required of landowner.	

6 RESPONSE TO SPECIFIC REQUIREMENTS OF THE NEMA IMPACT ASSESSMENT PROTOCOLS

The National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) assessment protocols, as amended, were promulgated in Gazette No. 42451, Government Notice No. 648 of 10 May 2019. These comprised procedures for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the NEMA, when applying for Environmental Authorisation.

Although these issues have been considered indirectly in the Sections 2 and 5, this section has been included to address each point raised in the amended assessment protocol specifically. Where relevant, the reader is referred to the section of the overall report where the issue has been addressed already.

Table 6.1
Response to specific questions relating to the environmental impact of the proposed development on aquatic ecosystems

ISSUE	RESPONSE – note that all responses assume that mitigation measures including measures in Appendix C have been applied
Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Yes – the planned interventions revolve entirely around the desired intention of effecting (voluntary) rehabilitation of impacted aquatic ecosystems.
Is the development consistent with maintaining the Resource Quality Objectives (RQOs) for the aquatic ecosystems present?	Yes – the proposed interventions would actively seek to improve PES and meet or exceed minimum RQOs of PES Category D in this sub-catchment.
How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: - Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); and - Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; - The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). - Assessment of the risks associated with water use/s and related activities.	There would be a net improvement There would be a net improvement There would be a net improvement The assessment shows there would be a low risk in terms of GN4167 of 2023.

How will the development impact on the functionality of the aquatic feature, including: • Base flows (e.g. too little/too much water in terms of characteristics and requirements of system); • Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over abstraction or instream or off-stream impoundment of a wetland or river) • Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley-bottom wetland to a channeled valley-bottom wetland). • Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication) • Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and Longitudinal) . • The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.) associated with or within the aquatic ecosystem.	There would be a net improvement (from an aquatic ecosystems perspective) There would be a net improvement (from an aquatic ecosystems perspective) Irrelevant in this assessment, which seeks to improve condition Improvement Improvement N/A
How will the development impact on key ecosystem regulating and supporting services especially: • Flood attenuation; • Streamflow regulation; • Sediment trapping; • Phosphate assimilation; • Nitrate assimilation • Toxicant assimilation; • Erosion control; and • Carbon storage.	All of these functions and ecosystem services would be improved by the implementation of the proposed Grootplaat rehabilitation project
How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	The implementation of the proposed Grootplaat rehabilitation project should improve habitat quality and diversity and as such result in attraction of local indigenous fauna and flora to rehabilitated portions of the site.
In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered in relation to: • Size of the estuary; Availability of sediment; • Wave action in the mouth; • Protection of the mouth; • Beach slope;	Not applicable

• Volume of mean annual runoff (MAR); • Extent of saline intrusion (especially relevant to permanently open systems).	
A motivation must be provided if there were development footprints identified as having a "low" biodiversity sensitivity and were not considered appropriate.	The planned interventions revolve entirely around the desired intention of effecting rehabilitation of impacted aquatic ecosystems.

7 IDENTIFICATION OF WATER USES AND ASSESSMENT OF RISK ASSOCIATED WITH PROPOSED REHABILITATION ACTIVITIES

7.1 Identification of water uses

Some of the proposed rehabilitation activities on the Grootplaat site could also potentially require authorisation in terms of the National Water Act (NWA) (Act 36 of 1998), where these include water uses. Section 21 of the NWA defines a range of water uses. Of these, the following four are potentially applicable to the proposed development:

- Impeding or diverting the flow of water in a watercourse (Section 21c water use);
- Altering the bed, banks, course or characteristics of a watercourse (Section 21i water use);
- Taking of water from a water resource (Section 21a water use)
- Storage of water (Section 21b water use).

Of these, this application considers only Section 21 (c) and 21(i) water uses. Separate, parallel processes will need to determine the degree to which Section 21 (a) and 21 (b) water uses (not associated with the proposed rehabilitation activities under consideration here) are applicable, and whether they fall within the limits of General Authorisations for these uses or would require licensing in terms of the NWA.

7.2 Applicability of GN4167 (November 2023) to the proposed Section 21c and i water uses associated with watercourse and other rehabilitation measures

Government Notice (GN) 4167 of November 2023 presents the conditions for General Authorisation (GA) of Section 21c and i water uses in terms of the NWA. If this GA applies to a development, then there should be no need for licensing of Section 21c and i water uses, and the uses need only be registered as such through the Department of Water and Sanitation, via the Breede-Olifants Catchment Management Agency (BOCMA).

The GN highlights some exclusions to the applicability of GN4167, of which the most relevant to this application include the following:

“Section 3. This Notice does not apply [...]

- *(b) to the use of water in terms of section 21(c) or (i) of the Act within the regulated area of a watercourse where the Risk Class is Medium or High as determined by the Risk Matrix (Appendix A). This Risk Matrix must be completed by a suitably qualified SACNASP professional member; [...]*
- *(c) in instances where an application must be made for a water use license for the authorisation of any other water use as defined in section 21 of the Act that may be associated with a new activity. “*

A Risk Assessment Matrix (RAM) must be completed to determine the degree of risk associated with the proposed rehabilitation activities.

In the event that the RAM indicates any risk to water resources that is greater than “low”, a water use licence would be required.

In the event that licensing of existing dams and borehole and/or dam abstraction exceed the limits of available GAs for these activities. Licensing of the Section 21c and i water uses would also be required, and the GA would not be applicable.

7.3 Results of application of the Risk Assessment Matrix to proposed (rehabilitation-associated) water uses

Table 7.1 provides the results of the assessment of Risk to the water resource, assuming implementation of the measures outlined in Section 4, as well as, critically, **Appendix C: Table C1**, which outlines implementation methodologies for:

- Invasive Alien Plant Clearing and Vegetation Management
- Wetland and Riparian Rehabilitation
- Dam Outflow Rehabilitation and Hydrological Restoration
- Earthworks and Structural Stabilisation
- Wetland Crossing Formalisation
- General environmental management and mitigation measures

Note that the RAM considers water uses fairly generically in the table, separating out different sections of the watercourse only where different levels of risk would be likely to accrue.

The Risk Ratings shown in **Table 7.1** indicate that all risks associated with the implementation phase of the rehabilitation programme as well as operational phase implementation of repeat measures to ensure ongoing ecosystem maintenance, would be considered of **LOW** risk, provided that the Control Measures listed in Appendix C: Table C1 and in Sections 5.2 to 5.4 are all applied.

In the event that they are not, then the Low Risk calculated here would no longer be applicable, and a WULA would be required, for consideration of water use authorisation.

Not however assessed in the table is the long-term positive impact that implementation of these measures would have overall on aquatic ecosystem condition on the site and in the downstream river reaches, provided that the full suite of recommended measures is implemented over time.

Table 7.1
Aspects and Impact Register/Risk Assessment for Section 21c and i water uses associated with the proposed rehabilitation of watercourses on Grootplaat Farm (Farms 15/37 and RE/37 Piketberg)
Impacts assume full implementation of mitigation measures. Risk Matrix completed by Liz Day (SACNASP Reg no. 004806)

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating (without mitigation)	Confidence level
			Name/s	PES	Ecological Importance	Abiotic Habitat (Drivers)			Biota (Responses)											
						Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
Construction and ongoing operational phase maintenance	Rehabilitation of Wetland Reach A, including alien clearing, wetland shaping, infilling of agricultural drainage trenches and construction of gabion weirs where necessary	Erosion and sedimentation into Dam 1, along with potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Reach A(2)	D/E	Moderate	1	1	2	2	1	4	1	2	7	3	21	80%	16.8	L	High
	Rehabilitation of Wetland Reach B, including alien clearing, wetland shaping and possible (but unlikely) construction of gabion weirs where necessary and construction of boardwalks	Erosion and sedimentation into wetlands associated with Dam 2, and into Wetland Reach C, as well as potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Reach B	D/E	Moderate	2	2	2	2	1	4	2	2	8	3	24	80%	19.2	L	Medium
	Rehabilitation of Wetland Reach C, including alien clearing, wetland shaping and construction of gabion weirs where necessary (unlikely) and construction of boardwalks	Erosion and sedimentation into Dam 3, along with potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Reach C	D	Moderate	1	1	1	2	1	4	2	2	8	3	24	60%	14.4	L	Medium
	Rehabilitation of Wetland Reach D, including alien clearing, wetland shaping and construction of gabion weirs where necessary (unlikely) and construction of boardwalks - activities would include mechanical excavation of areas abutting the wetland	Erosion and sedimentation into Dam 4, along with potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Reach D	D/E	Moderate	3	2	3	3	2	6	2	2	10	3	30	80%	24	L	Medium
	Rehabilitation of Wetland Reach E, including alien clearing, wetland shaping and construction of gabion weirs where necessary (unlikely) and possible construction of boardwalks	Erosion and sedimentation into Dam 5, along with potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Reach E	C/D	Moderate	1	1	1	1	1	2	2	2	6	3	18	60%	10.8	L	Medium
	Rehabilitation of Wetland Seep B1, including alien clearing and possible wetland shaping	Erosion and sedimentation into Dam 2, along with potential disturbance to /compaction of vegetation along and within the channel	Kuilders River wetlands: Wetland Seep B1	C/D	Moderate	1	1	1	1	1	2	2	2	6	3	18	40%	7.2	L	Medium
	Rehabilitation of Reach F, including alien clearing	Erosion and sedimentation into the river, along with potential disturbance to /compaction of vegetation along and within the channel and disturbance to	Kuilders River foothills: Reach F	C	Moderate	-1	1	1	1	1	2	1	2	5	3	15	80%	12	L	Medium
	Rehabilitation of Dams 1-5, including sediment removal, alien clearing and repairs to dam wall and spillway structures	Possible erosion and sedimentation into downstream wetland or river reaches <u>during construction</u> , along with potential disturbance to /compaction of vegetation in and around the works	Kuilders River : Dams 1-5	n/a (artificial)	Low	2	2	2	2	1	4	2	2	8	2	16	80%	12.8	L	Medium
	Adjustment of outflow structures from Dams 1-5, to allow for passage of wet season baseflows into downstream wetland areas, while allowing for storage of flows from larger rainfall events (ideally, at least 60% of flows from events up to 1:0.5 year events to be let downstream - this recommendation is not based on any flow data for this system but aims to improve the current situation)	Possible erosion and sedimentation into downstream wetland or river reaches <u>during construction</u> , along with potential disturbance to /compaction of vegetation in and around the works	Kuilders River : Dams 1-5	n/a (artificial)	Low	2	1	2	2	1	4	4	2	10	2	20	60%	12	L	Medium

8 CONCLUSIONS

This report has assessed a number of rehabilitation and management measures as proposed by the owners of Grootplaat, in collaboration with their specialist rehabilitation consulting team. The assessment has been made from the perspective of aquatic ecosystems, and has interrogated all of the proposed interventions with regard to aquatic ecosystem function, structure and biodiversity, as well as from the perspective of the capacity of these ecosystems to deliver key ecosystem services.

The report found that all of the proposed interventions would support improved aquatic biodiversity and resilience on the site and would furthermore be in support of NFEPA recommendations for rehabilitation and/or conservation of the sub-catchments in which the study area lies.

The proposed interventions range from IAP clearing; through to wetland re-establishment and creation by shaping, planting and improved distribution of flows; addressing channel incision through wetland shaping and installation of gabion weirs; installation of boardwalks; and dam rehabilitation, including addressing compromised dam walls and spillways as well as making provision for the release of low flows from dams, from early in the wet season onwards, while still allowing for water storage,

Assessment of the ecological impacts associated with the Implementation of all of the above was assessed as associated with overall positive impacts to aquatic ecosystems, despite short-term negative impacts associated with the construction / implementation phase of each intervention. The latter are however considered readily remediable through best practice measures, and the rehabilitation team itself has produced a comprehensive list of impact mitigation and management measures, that are assumed to underpin any authorised interventions in the study area.

Given the above, authorisation of the proposed rehabilitation measures is strongly supported, and the landowner is commended for the initiative. This said, monitoring and maintenance measures are also strongly recommended, and implicit in actually achieving the sought-after ecological benefits.

With regard to the need for authorisation of the proposed interventions in terms of the National Water Act for Section 21c and 21i water uses, the Risk Assessment Matrix, as per GN4167, showed that all of the proposed activities associated with these water uses would be of Low Risk only, if carried out with the specified control / mitigation measures in place. A water use licence should not therefore be necessary and a registration of these water uses with the DWS through the Breede Olifants Catchment Management Agency (BOCMA) should be required.

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APPENDIX A
SPECIALIST CV

LIZ DAY'S CURRICULUM VITAE

SUMMARY DOCUMENT (2026)

Name	Dr Elizabeth (Liz) Day (née Reynolds)
Address	6 Flamingo Crescent, Zeekoevlei, 7941, Cape Town, South Africa
Cell number	083 454 2309
Email	liz@lizdayconsulting.co.za
Date of birth	3 May 1968
Place of birth	Zimbabwe
Nationality	South African
Current Position	Director: Liz Day Consulting (Pty) Ltd

Liz Day is a **Freshwater Ecologist** who provides specialist input into river and wetland ecosystems management and rehabilitation, water quality, baseline assessments, impact assessments, wetland offset determinations, strategic planning and review and other aspects of aquatic ecosystem consulting. She has particular experience in working in rehabilitation and management of urban and agricultural areas, across a wide range of socio economic conditions.

KEY WORK EXPERIENCE

2019 -	Specialist consultant on freshwater ecosystems (rivers and wetlands) – Liz Day Consulting (Pty) Ltd
1999- 2019	Specialist consultant on freshwater ecosystems; co-founder of Freshwater Consulting (FCG)
1997 - 1999	Senior Consultant for Southern Waters Ecological Research and Consulting cc
1994 - 1996	Scientific Officer on Water Research Commission Project, Freshwater Research Unit, UCT.

SUMMARY OF RELEVANT EXPERIENCE

> 30 years' experience in aspects of aquatic ecology, specialising in:

- Water quality - river, vlei and wetland water quality monitoring, data analysis and interpretation as well as urban stormwater quality, pollution tracking and pollution abatement assessments;
- Lake, wetland and river rehabilitation, (ecological) design and management;
- Urban river and wetland management and rehabilitation;
- Stormwater design with respect to freshwater ecosystems and water quality amelioration;
- Specialist input into environmental impact assessments; baseline and situation assessments;
- DWS Risk Assessments;
- Wetland Offset calculations and agreements;
- Catchment and River Management Plans;
- River corridor plans;
- River and wetland Maintenance and Management Plans;
- River and wetland mapping and biodiversity planning;
- Wetland and riparian area delineation;
- SASSS bioassessments.

Liz has compiled over 1000 specialist riverine ecology technical reports, 12 scientific papers (6 in international literature); 20 popular biological articles published in local environmental magazines, scripts for several environmental documentaries; *ad hoc* lecturer in freshwater ecology at UCT; co-author on 5 Water Research Commission reports; lead author on chapter in UNESCO Sustainable Management of Urban Aquatic Ecosystems handbook; lead author on chapter in Fynbos Ecosystem Management book; project leader and author of WRC Technical Manual for River Rehabilitation in South Africa (2016) and on the (in prep) "Let's Fix your Rivers" WRC handbook series. She has also sat on the Reference Groups / Steering Committees of numerous Water Research projects, including those relating to wetland ecological infrastructure, wetland rehabilitation monitoring protocols, Sustainable Urban Drainage Systems (SUDS) and Water Sensitive Urban Design (WSUD) in the City of Cape Town and eThekweni Municipalities.

KEY QUALIFICATIONS

- Bachelor of Arts (English), University of Cape Town, 1989
- Bachelor of Science (Zoology and Environmental and Geographical Science); University of Cape Town; 1992
- Bachelor of Science (honours- Zoology, first class); University of Cape Town, 1993
- PhD (Zoology / Marine Biology); University of Cape Town, 1998

PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS

- Registered Professional Natural Scientist by SACNASP (Reg No 004806)
- Member of SAWS, WISA and IAIA-SA
- Member of False Bay Nature Reserve Protected Area Advisory Committee
- Member – Section 80 Mayoral Advisory Committee on Water Quality in Wetlands and Waterways
- Chair: Zeekoe Catchment Management Forum

APPENDIX B

Assessment protocols

B1 Wetland condition

Wetland condition was assessed using the desk-top Present Ecological State (PES) methodology, adapted from DWAF (1999). The methodology is based on a comparison of current attributes of the wetland, which are scored against those of a desired baseline or reference condition, resulting in the assignment of a wetland to one of six PES categories, as defined in DWAF (1999) and described in Table B1. The methodology is applicable to natural wetlands only.

Table B1
Relationship between Present Ecological State (PES) and showing deviation from natural conditions, as defined in DWAF (2008) (Note: subcategories of DWAF 2008 have been excluded)

PES RATING/ VALUE	DEVIATION FROM REFERENCE CONDITIONS	SCORE (% SIMILARITY TO REFERENCE OR NATURAL CONDITION)	PES CATEGORY
0	No Change	≥92	A
1	Small Change	>82 to 92	B
2	Moderate Change	>62 to 82	C
3	Large Change	>42 to 62	D
4	Serious Change	> 22 to 42	E
5	Extreme Change	0 to 42	F

B2 Habitat integrity assessments of rivers

Habitat integrity is a measure of the degree of intactness of a system, and refers to the maintenance of the natural physico-chemical and habitat characteristics of a river, both spatially and temporally. Habitat integrity is considered greatest where these characteristics are most comparable to the natural riverine habitats of the region (Southern Waters 2001).

Habitat Integrity assessments involve the following procedures:

- River classification: rivers, or reaches of a river are classified into broad categories, based primarily on their gradients, as outlined in section 2.3. The categories (or geomorphological zones) are as follows:
 - source zone
 - mountain headwater stream
 - mountain stream
 - foothills (cobble bed)
 - foothills (gravel bed)
 - valley bottom wetlands (channeled and unchanneled)
 - lowland floodplain.

Habitat integrity assessment: the assessment itself is based on a qualitative assessment of a number of pre-weighted criteria, with each criterion being scored between 1 and 25 and the final Habitat Integrity score being calculated as a percentage, as outlined in Southern Waters (2001). The criteria are listed below.

- water abstraction
- flow modification
- bed modification
- channel modification
- water quality

- inundation
- exotic macrophytes
- exotic fauna
- solid waste disposal
- indigenous vegetation removal
- encroachment of exotic vegetation
- bank erosion
- channel modification.

The assessment of the severity of impact of each modification is based on six descriptive categories with ratings ranging from 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact).

The calculated overall habitat integrity scores for each geomorphological zone are grouped, to allow classification of subregions into Habitat Integrity categories. These are defined in **Table B2**, after Kleynhans (1996).

Table B2
Descriptions of Habitat Integrity categories (after Kleynhans 1996)

CATEGORY	DESCRIPTION	SCORE
A	Unmodified, natural	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-90
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	0

B3 Ecological Importance and Sensitivity (EIS) of wetlands

The method used to assess the EIS of wetlands is a refinement of the Resource Directed Measures for Water Resources: Wetland Ecosystems method (DWAF 1999). It includes an assessment of ecological (e.g. presence of rare and endangered fauna / flora), functional (e.g. groundwater storage / recharge) and socio-economic criteria (e.g. human use of the wetland).

Scoring of these criteria places a wetland in a Wetland Importance Class (A-D) (see **Table B3**).

Table B3
Wetland Importance Class integrating Ecological Importance and Sensitivity, and functional and socio-cultural importance modifiers

Importance class (one or more attributes may apply)	Range of Median	Wetland Importance Class
Very high Representative of wetlands that: • support key populations of rare or endangered species;	>3 <=4	A

• have a high level of habitat and species richness; • have a high degree of taxonomic uniqueness and/or intolerant taxa; • provide unique habitat (e.g. salt marsh or ephemeral pan; physiognomic features, spawning or nursery environments); • is a crucial avifaunal migratory node (e.g. RAMSAR wetlands); • may provide hydraulic buffering and sediment retention for large to major rivers that originate largely outside of urban conurbations; • have groundwater recharge/discharge comprising a major component of the hydrological regime of the wetland; • are highly sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or disturbance; and • are of extreme importance for conservation, research or education.		
High Representative of wetlands that: • support populations of rare or endangered species, or fragments of such populations that are present in other similar and geographically-adjacent wetlands; • contain areas of habitat and species richness; • contain elements of taxonomic uniqueness and/or intolerant taxa; • contain habitat suitable for specific species (e.g. physiognomic features); • provide unique habitat (e.g. salt marsh or ephemeral pan; spawning or nursery environments, heronries); • may provide hydraulic buffering and sediment retention for rivers that originate largely outside of urban conurbations, or within residential fringes of urban areas; • have groundwater recharge/discharge comprising a component of the hydrological regime of the wetland; • may be sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or human disturbance; and • are important for conservation, research, education or eco-tourism.	> 2 <= 3	B
Moderate Representative of wetlands that: • contain small areas of habitat and species richness; • provide limited elements of habitat that has become fragmented by development (e.g. salt marsh, ephemeral pan; roosting sites and heronries); • provide hydraulic buffering for rivers that originate in urban areas; • are moderately sensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; • perform a moderate degree of water quality enhancement, but are insensitive to sustained eutrophication and/or pollution; and	>1 <= 2	C

are of importance for active and passive recreational activities.		
Low/marginal Representative of wetlands that: - contain large areas of coarse (reeds) wetland vegetation with minimal floral and faunal diversity; - have a high urban watershed:wetland area ratio; - are important for active and passive recreation; - provide moderate to high levels of hydraulic buffering; - may be eutrophic and generally insensitive to further nutrient loading; - are generally insensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; - have regulated water; and - contain large quantities of accumulated organic and inorganic sediments.	>0 <= 1	D
Rating	Explanation	
None, Rating = 0	Rarely sensitive to changes in water quality/hydrological regime	
Low, Rating =1	One or a few elements sensitive to changes in water quality/hydrological regime	
Moderate, Rating =2	Some elements sensitive to changes in water quality/hydrological regime	
High, Rating =3	Many elements sensitive to changes in water quality/ hydrological regime	
Very high, Rating =4	Very many elements sensitive to changes in water quality/ hydrological regime	

B4 Regional Wetland biodiversity importance

The Western Cape Biodiversity Spatial Plan (WCBSP) of Pool-Stanvliet et al (2017) includes the City's aquatic biodiversity data and was considered in this assessment. This has the following categories (after Snaddon and Day 2009):

- Critical Biodiversity Areas (CBAs)*: High ranking "natural or semi-natural" wetlands within each type (top quarter of total scores = CBA1 (rank 1); second quarter = CBA2 (rank 2)); all estuaries (top quarter of total scores = CBA1; remaining estuaries = CBA2);
- Critical Ecological Support Areas (CESAs)*: High ranking artificial wetlands (top quarter of artificial wetlands) (rank 1); middle ranking natural or semi-natural wetlands (third quarter of total scores) (rank 3), and
- Other Ecological Support Areas (OESAs)*: Lower ranking artificial wetlands (ranks 2, 3 and 4); lowest ranking natural or semi-natural wetlands (rank 4).

B5 Approach to the identification and delineation of wetlands

The presence of wetlands, and their extent (if any) was determined on the basis of the principles outlined in DWAF (2005) and DWAF (2008) – only wetlands within the pipeline corridor (a 20m wide area) were delineated, on the basis of visual evidence of surface water and saturation in early summer; plants; limited augering; and aerial photography.

B6 River and wetland classification

The South African National Aquatic Ecosystem Classification system of Ollis et al (2013) was utilised in this study. This is a hierarchical system, which recognises three distinct wetland types – Inland, Estuarine and Coastal systems. The classification system is shown in **Table B4**.

Table B4

Structure of the National Wetland Classification Systems for Inland systems (rivers and wetlands excluding estuaries) showing main Hydrogeomorphic (HGM) Units at Level 4a and Subcategories at Levels 4b to 4c. Table after Ollis et al (2013)

LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT		
<i>HGM type</i>	<i>Longitudinal zonation/Landform/ Outflow drainage</i>	<i>Landform/Inflow drainage</i>
A	B	C
River	Mountain headwater stream	Active channel Riparian zone
	Mountain stream	Active channel Riparian zone
	Transitional	Active channel Riparian zone
	Upper foothills	Active channel Riparian zone
	Lower foothills	Active channel Riparian zone
	Lowland river	Active channel Riparian zone
	Rejuvenated bedrock fall	Active channel Riparian zone
	Rejuvenated foothills	Active channel Riparian zone
	Upland floodplain	Active channel Riparian zone
Channelled valley-bottom wetland	[not applicable]	[not applicable]
	[not applicable]	[not applicable]
Unchannelled valley-bottom wetland	[not applicable]	[not applicable]
	[not applicable]	[not applicable]
Floodplain wetland	Floodplain depression	[not applicable]
	Floodplain flat	[not applicable]
Depression	Exorheic	With channelled inflow
		Without channelled inflow
	Endorheic	With channelled inflow
		Without channelled inflow
	Dammed	With channelled inflow
		Without channelled inflow
Seep	With channelled outflow	[not applicable]
	Without channelled outflow	[not applicable]
Wetland flat	[not applicable]	[not applicable]

B7 River ecosystem threat status

Threat Status data were accessed from the NBA (2025) dataset for rivers and wetlands.

APPENDIX C

PROPOSED REHABILITATION METHODOLOGY

The proposed rehabilitation activities are grouped below by intervention type, and all activities would be implemented in accordance with the methods set out below, compiled by Vula with input from the project team (LDC and Infinity). The table also specifies monitoring and reporting requirements. These are all assumed in the present assessment to be an integral part of the assessed project design.

The locations of the proposed activities are illustrated in **Figure 4.1**.

Table C1

Rehabilitation methodology applicable to watercourses on Grootplaat (referred to as Management Unit 1 in Vula planning documentation)

Invasive Alien Plant Clearing and Vegetation Management	
Description of intervention	Invasive alien plant (IAP) clearing is the primary enabling intervention across the property. It will be implemented within all Management Units where IAP infestation has been identified. Target species (not all of which are listed invasive alien species) include: • <i>Populus</i> spp. (poplars) • <i>Eucalyptus</i> spp. (gums), • <i>Quercus</i> spp. (oaks) • <i>Sesbania punicea</i> (sesbania) • <i>Pinus</i> spp. (pines) • <i>Pteridium aquilinum</i> (bracken fern) • Various agricultural weed species within former cultivated areas Clearing methods will be selected based on species, infestation density, plant size, and site sensitivity, and will include manual removal, mechanical clearing, selective cut-stump treatment, and follow-up maintenance. Herbicide application, where required, will be undertaken by suitably qualified personnel in accordance with registered label requirements and the conditions of the Generic EMPr. Cleared biomass will be managed on-site through chipping, composting, reuse as erosion control material, or temporary stockpiling in approved areas. No invasive propagule-bearing material will be stockpiled adjacent to wetland systems or drainage lines.
Mitigation and management measures	• Use existing access routes where feasible; restrict disturbance footprints to approved work areas only • Identify and demarcate no-go areas and environmentally sensitive zones before commencement • Clearly identify target species prior to clearing to avoid accidental removal of retained indigenous vegetation • Retain all indigenous vegetation outside approved clearing areas • Do not damage mature indigenous trees identified for retention • Apply cut-stump herbicide treatment as soon as practicable after cutting to prevent coppicing; reapply to regrowth as required • Herbicide application to be undertaken only by suitably qualified personnel, under suitable weather conditions (no wind, no rain), and strictly in accordance with registered label requirements • No herbicide to be applied within 5 m of open water, drainage lines, or wetland systems unless specifically authorised • Herbicide mixing to be performed off-site where possible; only

	pre-mixed, labelled containers to be brought to the work area • Manage seed-bearing invasive material separately; bag or contain propagule-bearing material to prevent spread • Biomass stockpiles to be placed in approved areas only; not to obstruct drainage lines, wetland systems, or access routes • Manage stockpile heights to reduce fire and safety risk • Refuelling to occur outside wetland areas and drainage lines; drip trays to be used beneath stationary machinery • Spill kits to be available on site at all times; any hydrocarbon spill to be immediately contained, cleaned, and contaminated material removed to an approved disposal facility • Exposed soils resulting from clearing to be stabilised progressively to prevent erosion • No uncontrolled burning of biomass unless specifically authorised; fire-fighting equipment to be available during high-risk activities
Monitoring requirements	• Routine site inspections by the Environmental Officer to verify compliance with method statements • Monitor alien vegetation regrowth and follow-up clearing requirements at appropriate intervals post-clearing • Inspect cleared areas for erosion, soil instability, or excessive disturbance • Monitor stump treatment success and record coppicing or regrowth at treated stumps • Confirm biomass stockpiles do not obstruct drainage lines, wetland systems, or access routes • Monitor for unintended spread of invasive propagules from cleared material • Inspect herbicide storage, mixing areas, and application records • Photographic monitoring at fixed photo-points before and after clearing in each management unit • Record all non-compliance incidents and corrective actions taken
WETLAND AND RIPARIAN REHABILITATION	
Description of intervention	Wetland and riparian rehabilitation will focus on restoring hydrological functionality, improving ecological integrity, and stabilising degraded wetland systems across the Grootplaat property Wetland rehabilitation activities will include: • Removal of woody alien vegetation and accumulated debris from wetland and riparian areas; • Selective sediment removal and reshaping of degraded wetlands and their margins; • Bank stabilisation and erosion control measures; • Possible inclusion of engineering structures such as gabion weirs, in order to address channel incision and/or locally raise water tables to more natural levels; • Demarcation of wetland boundaries and buffer areas; • Establishment of indigenous wetland and riparian vegetation through planting and seeding; and • Seasonal monitoring of vegetation establishment and hydrological response. Buffer rehabilitation will address the stabilisation of degraded wetland edges and transitional areas through soil amelioration, indigenous seeding, mulching, and installation of temporary erosion control measures where required.
Mitigation and management measures	• Demarcate wetland boundaries and buffer areas on the ground before commencement of any activities • Restrict disturbance footprints to the minimum required within wetland and riparian areas

	• <u>Unless for the purposes of rehabilitation within wetland areas,</u> avoid machinery access within saturated wetland areas wherever possible; where unavoidable, use low ground-pressure equipment and limit access to approved crossing points • Retain existing indigenous wetland vegetation where feasible • Remove woody alien vegetation and accumulated debris incrementally to minimise disturbance and allow progressive stabilisation • Stabilise disturbed wetland margins and wetland surfaces progressively following any intervention; do not leave bare soils exposed for extended periods • Minimise sediment mobilisation into downstream systems throughout all activities; install temporary sediment control measures (brush packs, jute matting) where required • No spoil, waste material, or biomass stockpiles to be placed within wetland buffer areas unless specifically approved by the wetland ecologist • Compost and soil amendment materials to be free of invasive species propagules before application within wetland buffer zones • Only indigenous and site-appropriate species to be used for revegetation of wetland and riparian areas • Irrigation where required to be undertaken in a controlled, water-efficient manner • Newly revegetated areas to be protected from trampling and unnecessary disturbance during the establishment period • Refuelling and chemical storage to occur outside wetland areas and drainage lines at all times
Monitoring requirements	• Routine inspections of wetland rehabilitation areas and buffer zones by the Environmental Officer (at least weekly) and Ecologist (at least once every two months) • Monitor vegetation establishment and survival rates within revegetated wetland and riparian areas • Assess erosion, sediment movement, and stability of disturbed areas following intervention • Monitor for invasive alien plant regrowth within cleared wetland and riparian areas and schedule follow-up clearing accordingly • Photographic monitoring at fixed photo-points within wetland systems before, during, and after intervention • Monitor hydrological response within rehabilitated wetland areas, including water retention and flow path restoration • Record all non-compliance incidents, spill events, and corrective actions taken
Dam Outflow Rehabilitation and Hydrological Restoration	
Description of intervention	Hydrological restoration works will be undertaken within the dam system in the main valley bottom wetland system to improve water retention, restore connectivity between the dam system and associated wetland areas, and rehabilitate droughted wetland areas currently disconnected from the main waterway due to altered outflow configurations.
Dams for which this intervention is applicable	Specific hydrological interventions by dam are described below: • Dam 1: Sealing of leakage along the dam wall using floating bentonite. Removal of woody alien species from the northern bank. Reshaping of the inlet zone and planting with indigenous wetland species tolerant of seasonal water level variation. • Dam 2: Reshaping and selective deepening of the transitional wetland area. Replacement of invasive vegetation with site-appropriate sedge and grass species. • Dam 3: Adjustment of the syphon outflow, currently set too

	low, limiting the dam's ability to retain water. Realignment of the outlet will restore water levels and improve connectivity to downstream wetland areas. Targeted indigenous planting along the banks following structural works. • Dam 4: Removal of Eucalyptus trees from the riparian zone. Minor selective deepening. Planting of indigenous marginal wetland species. • Dam 5: Silt excavation to restore historical water holding capacity. Removal of poplar trees from within and adjacent to the dam. Indigenous riparian planting along the dam margins following alien clearing. • All dams: Include controlled outlet structures at all dams, with the exception of Dam 2, which lies outside of the main flow of Wetland Reach B, such that early wet season flows can pass into wetlands downstream of the dams, with major flows being stored in the dams for irrigation or other use. Such interventions could be allowed for by diversion of low wet season base flows past the dam; inclusion of a low-level controlled-flow pipe outlet in the dam walls; or other equivalent devices.
Mitigation and management measures	• Confirm that all required NWA authorisations are in place before commencement of any works within or adjacent to dam infrastructure • Allow for engineering input into dam outlet design, to reduce the risk of dam failure or loss of excessive storage capacity as a result of downstream flow allocations • Restrict earthworks and structural works to designated work areas; avoid over-excavation and unnecessary disturbance beyond the approved footprint • Minimise disruption to flow during implementation wherever feasible • Avoid works during periods of elevated flow, saturated conditions, or heavy rainfall where there is an increased risk of sediment mobilisation or environmental damage • Prevent excessive sediment release into downstream wetland systems during sediment excavation and dam reshaping activities • Stockpile excavated material in approved areas outside wetland systems and drainage lines; protect stockpiles from erosion • Stabilise disturbed soils and reshaped areas progressively following completion of earthworks • Revegetate disturbed areas around dam margins with indigenous wetland and riparian species following structural works • Retain existing indigenous riparian vegetation adjacent to dam systems wherever feasible • Drip trays to be used beneath stationary machinery; refuelling to occur outside wetland areas and drainage lines • Spill kits to be on site at all times during machinery operations
Monitoring requirements	• Inspect earthworks areas and dam margins for erosion, instability, or excessive disturbance during and after implementation • Monitor sediment movement and downstream water quality impacts during sediment removal and reshaping activities • Monitor dam water levels and outflow performance following adjustment of syphon (or other) outflow structures • Inspect rehabilitated dam margins and planting areas for vegetation establishment and slope stability • Assess hydrological connectivity between dam system and associated wetland areas following outflow rehabilitation – this would require a combination of monitored soil and surface water levels in the dams and downstream – installation of

	monitoring piezometers for these purposes is recommended – to be overseen by aquatic ecologist with on-site monitoring by landowner or ECO. Installation of flow gauges at the dam outlet structures would also be a useful inclusion. • Photographic monitoring at each dam before, during, and after intervention • Record all non-compliance incidents, spill events, and corrective actions taken
Earthworks and Structural Stabilisation	
Description of intervention	Earthworks and structural stabilisation activities will support hydrological restoration, erosion control, and slope stabilisation within degraded or erosion-prone areas of the property. Activities will be implemented incrementally to minimise environmental disturbance. Structural stabilisation works will include: • Installation of gabion baskets and reno mattresses at erosion-prone locations within the waterway corridor; • Retaining gabion and log retaining structure installation at selected slopes and embankments; • Minor hydrological reshaping and stabilisation works associated with the dam and waterway system; and • Soil movement and redistribution associated with reshaping of degraded wetland and dam edge systems. • All earthworks will be restricted to designated work areas. Disturbed soils will be stabilised progressively through revegetation and erosion control measures following completion of earthworks activities. Sediment movement into downstream systems will be minimised throughout.
Mitigation and management measures	• Allow for engineering input into structure designs (weirs), to reduce the risk of failure • Restrict earthworks to designated work areas; machinery operators to remain within approved access routes where possible • Avoid excessive disturbance of intact vegetation surrounding installation areas • Cease earthworks during unsafe or environmentally unsuitable weather conditions • Avoid machinery access within saturated wetland areas wherever feasible • Place geotextile materials beneath gabion and reno mattress installations where required to prevent scour and undermining • Manage construction material stockpiles to prevent sediment movement into drainage systems • Structural works not to unnecessarily obstruct natural flow paths • Stabilise and revegetate disturbed areas progressively following completion of structural installation • Drip trays to be used beneath stationary machinery; refuelling to occur outside wetland areas and drainage lines • Spill kits to be on site at all times during machinery operations • Faulty or leaking machinery to be repaired immediately or removed from site • Allow for rehabilitation of disturbed areas following structural installation – rehabilitation may need to include further earthworks, bank shaping, replanting
• Monitoring requirements	• Routine inspections of earthworks areas for erosion, instability, or excessive disturbance • Inspect gabion baskets, reno mattresses, retaining structures, and log retaining structures for structural integrity and performance • Monitor sediment movement and downstream impacts during and after earthworks activities

	- Inspect drainage lines and rehabilitated hydrological features for blockage or instability - Monitor vegetation establishment and stabilisation success in areas surrounding structural works - Photographic monitoring at earthworks and structural installation locations before, during, and after works - Record all non-compliance incidents, spill events, and corrective actions taken - Include feed-back loops to the rehabilitation implementing team, to ensure that problems highlighted by monitoring or addressed in design, or implementation or additional interventions of works.
Wetland Crossing Formalisation	
Description of intervention	Existing informal tracks and access routes currently crossing wetland and riparian areas will be formalised through the installation of low-impact boardwalk crossings. This intervention will replace existing uncontrolled crossings that are causing ongoing erosion, compaction, and vegetation disturbance within wetland margins, thereby reducing trampling impacts and channel disturbance while maintaining necessary site access for rehabilitation operations. Boardwalk alignments will be limited to the footprint of existing crossing points. Construction will minimise hydrological disruption, and disturbed areas surrounding installation zones will be rehabilitated progressively.
Mitigation and management measures	- Limit boardwalk alignments strictly to the footprint of existing informal crossing points; no new crossing points to be created - Mark out the approved alignment and confirm with the Ecologist before commencement of any ground preparation - Minimise ground preparation and excavation within the wetland crossing footprint; use hand tools where feasible to reduce soil disturbance - Installation within wetland areas to minimise hydrological disruption; boardwalk design to allow natural water and small faunal movement beneath the structure – structures to be raised so that the undersides of the boardwalks allow at least 300 mm between the structure and ground level - Retain existing indigenous vegetation adjacent to crossing alignments where feasible - Rehabilitate and revegetate disturbed areas surrounding the installation zone progressively following completion - Manage construction waste and surplus materials; no waste to be disposed of within wetland systems or drainage lines - Restrict vehicle access to approved routes during installation; no heavy machinery within wetland areas unless specifically approved by the Ecologist
Monitoring requirements	- Inspect installed boardwalk crossings and support structures for stability and integrity at regular intervals - Monitor surrounding wetland vegetation and hydrological conditions for evidence of disturbance or impeded flow following installation - Assess revegetation success in disturbed areas surrounding crossing installations - Monitor informal tracks that have been replaced to confirm they are closed, stabilised, and recovering - Photographic monitoring at each crossing location before, during, and after installation - Record all non-compliance incidents and corrective actions taken
General environmental management and mitigation measures	
Mitigation and management measures	Access and Site Movement: Existing access routes will be used wherever

	practicable to minimise additional disturbance. • Vehicle and machinery access within wetland and riparian areas will be restricted to approved crossing points. • Environmentally sensitive areas and no-go zones will be demarcated on the ground prior to commencement of activities. • No unnecessary disturbance of indigenous vegetation outside designated work areas will be permitted. Wetland and Riparian Area Protection • Disturbance footprints within wetland and riparian areas will be kept to the minimum required to achieve rehabilitation outcomes. • Machinery access within saturated wetland areas will be avoided where possible, unless specifically required to achieve rehabilitation outcomes in these areas. • Existing indigenous wetland vegetation will be retained where feasible. • Sediment mobilisation into downstream systems will be minimised throughout all activities. • Wetland rehabilitation areas will be stabilised progressively following disturbance. Erosion and Sediment Control • Disturbed soils will be stabilised as soon as reasonably practicable following any rehabilitation activities. • Soil stockpiles will be located outside wetland areas and protected from erosion where necessary. • Temporary erosion control measures (straw bales, brush packs, jute matting) will be installed where required to prevent sediment movement into drainage systems. • Activities resulting in significant soil disturbance will be avoided during periods of heavy rainfall or saturated conditions. Fuel, Chemicals, and Spill Management • No fuel storage or refuelling will occur within wetland areas or within close proximity to drainage lines and dams. • Spill kits will be maintained on site during all operational activities. • Hydrocarbon or hazardous material spills will be immediately contained and cleaned. Contaminated material will be removed to an approved disposal facility. • Herbicides will be used only under suitable weather conditions, by suitably registered personnel, and in strict accordance with label requirements. No herbicide will be applied within 5 m of open water unless specifically authorised. Alien Vegetation and Biomass Management • Alien vegetation clearing will be selective and controlled to minimise disturbance to surrounding indigenous vegetation and soils. • Seed-bearing material from invasive species will be contained and removed or managed separately to prevent reinvasion. • Biomass stockpiles may not obstruct drainage lines, wetland systems, or access routes. • Follow-up clearing will be undertaken at appropriate intervals to prevent reinvasion. Waste Management • General waste generated during rehabilitation activities will be collected and removed from the site regularly. • No waste burning will occur unless specifically authorised by the relevant authority. • No waste material will be disposed of within wetland
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	systems or drainage lines. Fire Prevention and Management • No open fires will be permitted within rehabilitation areas unless authorised. • Biomass accumulation from vegetation clearing will be managed to reduce excessive fire load. • Fire-fighting equipment will be available during all machinery operations and high-risk activities. • Workers will be briefed on fire response procedures prior to commencement of high-risk works. Indigenous Vegetation Protection • Indigenous vegetation outside approved disturbance footprints will be retained and protected throughout. • Large indigenous trees and sensitive wetland vegetation will not be damaged during implementation activities. • Only indigenous and site-appropriate species will be used for revegetation unless otherwise specifically approved by a botanical specialist.
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APPENDIX D

METHODOLOGY FOR DETERMINING IMPACT SIGNIFICANCE

Adapted by Liz Day Consulting

METHODOLOGY FOR ASSESSING IDENTIFIED IMPACTS	
Extent of impact being either	Immediate (the site and immediate surrounds)
	Local (a significant portion of the waterbody (wetland) or river reach)
	Regional (Affecting watercourses at a catchment scale)
	National (Affecting watercourses with national importance in terms of water supply or large systems with irreplaceable biodiversity)
	International (Affecting watercourses that traverse international boundaries; with international importance in terms of water supply or large systems with irreplaceable biodiversity)
Duration of impact being either:	Short term (0-5 years)
	Medium term (5-15 years)
	Long term (operational life of the development)
	Permanent (beyond the operational life of the development)
Intensity of impact being either:	Low (where natural, cultural and social functions and processes are not affected – affecting small watercourses of relatively low importance; or barely impacting on more important systems)
	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue – moderate impacts on important watercourses (e.g. Ramsar wetlands, IBAs); major impacts on insignificant watercourses)
	High (where the affected environment is altered but natural, cultural and social functions and processes are altered to the extent that it will temporarily or permanently cease – major impacts on important watercourses)
Probability of impact being either:	Low probability (possibility of impact occurring is low)
	Probable (where there is a distinct possibility that it will occur)
	Highly probable (where the impact is most likely to occur)
	Definite (where the impact will occur)
Significance of impact:	Very Low (where natural, cultural and social functions and processes are essentially unaffected or insignificantly affected)
	Low (where natural, cultural and social functions and processes are slightly affected)
	Low to Medium (where natural, cultural and social functions and processes are slightly affected causing a minor change in functions and processes but are still able to continue)
	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue)

	Medium to High (where natural, cultural and social functions and processes are altered and most likely the impact will not allow functions and processes to continue, but in some cases, the function or process may continue)
	High (where the affected environment is altered but natural, cultural and social functions and processes are altered to the extent that it will temporarily or permanently cease)
Reversibility Rating:	Irreversible (the activity will lead to an impact that is permanent)
	Partially reversible (The impact is reversible to a degree e.g. acceptable re-vegetation measures can be implemented but the pre-impact species composition and/or diversity may never be attained. Impacts may be partially reversible within a short (during construction), medium (during operation) or long term (following decommissioning) timeframe)
	Fully reversible (The impact is fully reversible, within a short, medium or long-term timeframe)