



# Draft Environmental Management Programme

Proposed Rehabilitation of Watercourses on Farm 15/37 and Farm RE/37, Grootplaat, Piketberg

PREPARED IN COMPLIANCE WITH THE REQUIREMENTS OF THE EIA REGULATIONS, GN 326 OF 2017 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, ACT NO. 107 OF 1998

DEA&DP REF NO. 16/3/3/1/F1/1/2037/26

**VERSION:** DRAFT

**DATE:** September 2026

**APPLICANT**

Grootplaat (Pty) Ltd

**FOR PUBLIC PARTICIPATION FROM  
18 SEPTEMBER 2026 TO 19 OCTOBER 2026**

Written comments should be submitted to the Environmental Assessment Practitioner, Infinity Environmental, at the details below or online at

[www.infinityenv.co.za](http://www.infinityenv.co.za)



Email: [comments+grootplaat@infinityenv.co.za](mailto:comments+grootplaat@infinityenv.co.za)

Tel: 021 834 1600

Collingwood Building, Black River Park  
2 Fir Street, Observatory, Cape Town

## REPORT DETAILS

### PROPOSED REHABILITATION OF WATERCOURSES ON FARM 15/37 AND FARM RE/37, GROOTPLAAT, PIKETBERG: DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

#### APPLICANT

**Grootplaat (Pty) Ltd**, Farm 37, Aurora, 7325

#### ENVIRONMENTAL ASSESSMENT PRACTITIONER

**Infinity Environmental (Pty) Ltd.**

Collingwood Building  
Black River Park  
2 Fir Street, Observatory

**Contact**  
comments@grootplaat@infinityenv.co.za  
www.infinityenv.co.za

#### Prepared by

Infinity Environmental (Pty) Ltd. and Liz Day Consulting (Pty) Ltd, with input from Vula Environmental (Pty) Ltd

#### Authors

Jeremy Rose B.Sc Hons (Reg E.A.P. #2019/1116, Pr.Sci.Nat. 120148)  
Olivia De Paiva MSc (Cand E.A.P, Cand.Sci.Nat)  
Kelly Gilmour MSc (Cand E.A.P, Cand.Sci.Nat)

#### Project support

Seemole Shika MSc. (Cand.Sci.Nat)

#### Report purpose

This Environmental Management Programme is prepared as part of a Basic Assessment in terms of the Environmental Impact Assessment Regulations, 2014 (as amended). It describes watercourse rehabilitation measures proposed on Farm 15/37 and Farm RE/37, Groot Plaat, in the Bergrivier Municipality near Piketberg. The EMPr prescribes control methods to mitigate and manage negative environmental impacts and enhance positive impacts associated with the rehabilitation works and provides a programme for monitoring the performance of personnel in applying such methods.

#### DOCUMENT CONTROL

| Date              | Version |
|-------------------|---------|
| 17 September 2026 | Draff 1 |

#### DECLARATION OF EAP'S INDEPENDENCE

I, Jeremy Rose, appointed by the Grootplaat (Pty) Ltd as Environmental Assessment Practitioner for the Proposed Rehabilitation of Watercourses on Farm 15/37 and Farm RE/37, Grootplaat, Piketberg, hereby declare that the information provided in this report and supporting documentation is complete and correct to the best of my knowledge; that other than fair remuneration for work performed in terms of this application I have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; that I have disclosed, to the Applicant, the specialist(s), the Competent Authority and registered interested and affected parties all material information that have or may have the potential to influence the decision of the Competent Authority; that I have ensured that information in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments; and that I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.



**Jeremy Themba Rose** BSc (Hons), Reg. E.A.P. 2019/1116, Pr.Sci.Nat. 120148, IAIA member 5781

Infinity Environmental (Pty) Ltd: Director & Principal EAP

© Infinity Environmental 2026. This document contains intellectual property and propriety information that are protected by copyright in favour of Infinity Environmental (Pty) Ltd. The document may therefore not be reproduced, used or distributed to any third party without the prior written consent of Infinity Environmental.

# RECORD OF REVISIONS

| Rev. No. | Reason for Revision | Section Revised | Revised By | Effective Date    |
|----------|---------------------|-----------------|------------|-------------------|
| 00       | DRAFT               | ALL             | J ROSE     | 18 September 2026 |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |
|          |                     |                 |            |                   |

# EMPR OVERVIEW

|           |                                              |
|-----------|----------------------------------------------|
| Chapter 1 | INTRODUCTION                                 |
| Chapter 2 | ENVIRONMENTAL CONTEXT                        |
| Chapter 3 | APPROACH AND STRUCTURE                       |
| Chapter 4 | PROJECT ROLES AND ORGANISATIONAL STRUCTURE   |
| Chapter 5 | REHABILITATION ENVIRONMENTAL MANAGEMENT PLAN |
| Chapter 6 | ENVIRONMENTAL AWARENESS TRAINING PLAN        |
| Chapter 7 | MAINTENANCE MANAGEMENT PLAN                  |

# 1 INTRODUCTION

## 1.1 Project Background

The Grootplaat rehabilitation project is focused on the watercourses on Farm 15/37 and the remainder RE/37 near Aurora within the Bergrivier Municipality, Western Cape. The property extends across approximately 2 146 ha and is situated within the upper catchment of the Kuilders River system. The site is a high plateau historically used for agriculture, with a valley-bottom watercourse and various associated habitats. The property has been subject to historical agricultural activities, hydrological modification and associated infrastructure development. Over time, these activities, together with the proliferation of invasive alien plant vegetation, altered hydrological processes, drainage modifications, channelisation, erosion and sedimentation, have resulted in prolonged degradation of watercourses and their associated freshwater ecosystems, which reduced the hydrological connectivity, ecological functioning of these aquatic system.

The project seeks to restore and enhance the hydrological functioning, ecological integrity and increase the resilience of the landscape through targeted rehabilitation interventions. Key rehabilitation interventions include the clearing and management of invasive vegetation, restoration of degraded wetland and riparian habitats, hydrological restoration of dam systems, installation of erosion control structures where required, revegetation with indigenous species, rehabilitation of historically cultivated areas, soil amelioration and formalisation of wetland crossings to minimise future impacts on sensitive aquatic environments. The rehabilitation approach is informed by detailed wetland delineations, freshwater and terrestrial biodiversity assessments which identified priority areas for intervention and informed the design of restoration measures.

## 1.2 Project Description

The applicant proposes the rehabilitation of degraded wetlands, watercourses, in-channel dams and former agricultural lands on the Grootplaat site through targeted rehabilitation interventions that improve hydrological functioning, biodiversity and ecosystem resilience.

### **The rehabilitation programme aims to:**

- improve wetland hydrology;
- reverse the impacts of historical agricultural activities;
- control alien invasive vegetation;
- restore and increase indigenous biodiversity;
- stabilise erosion-prone areas; and
- improve the long-term resilience of aquatic and terrestrial ecosystems across the property.

### **Proposed rehabilitation interventions include:**

- Structural works in the watercourse: up to five gabion weirs upstream of Dam 1, boardwalk crossings in Wetland Reach B, a vehicle crossing and pedestrian boardwalk at Dam 4, and a drop structure below the Dam 4 wall (approximately 300 m<sup>2</sup> of new structural footprint);
- Reinforcement of the Dam 1 and Dam 3 spillways, a low-flow release culvert and infiltration trench at Dam 1 and Dam 3, and repair of the existing Dam 4 spillway and construction of a flow spreading structure;
- Wetland reshaping, regrading, bank pull-back, sediment removal and alien plant clearing within existing degraded watercourse areas;

- Clearing of invasive alien vegetation (including Populus, Pinus, Eucalyptus, Quercus and Sesbania species) across all management units, with cleared material composted, used in erosion control, or stockpiled outside wetlands;
- Soil amelioration, ripping, contouring and revegetation with indigenous pioneer species on old agricultural land (MU2A, MU2B and MU6);
- Rehabilitation of the semi-intact fynbos mosaic (MU3) and transitional wetlands (MU4), including protection of regenerating vegetation and rehabilitation of wetland edges;
- Alien clearing for fire-risk reduction and revegetation in the woodland and recreational zone (MU5); and
- Ongoing removal of pine and other invasive species from the former pine plantation (MU7).

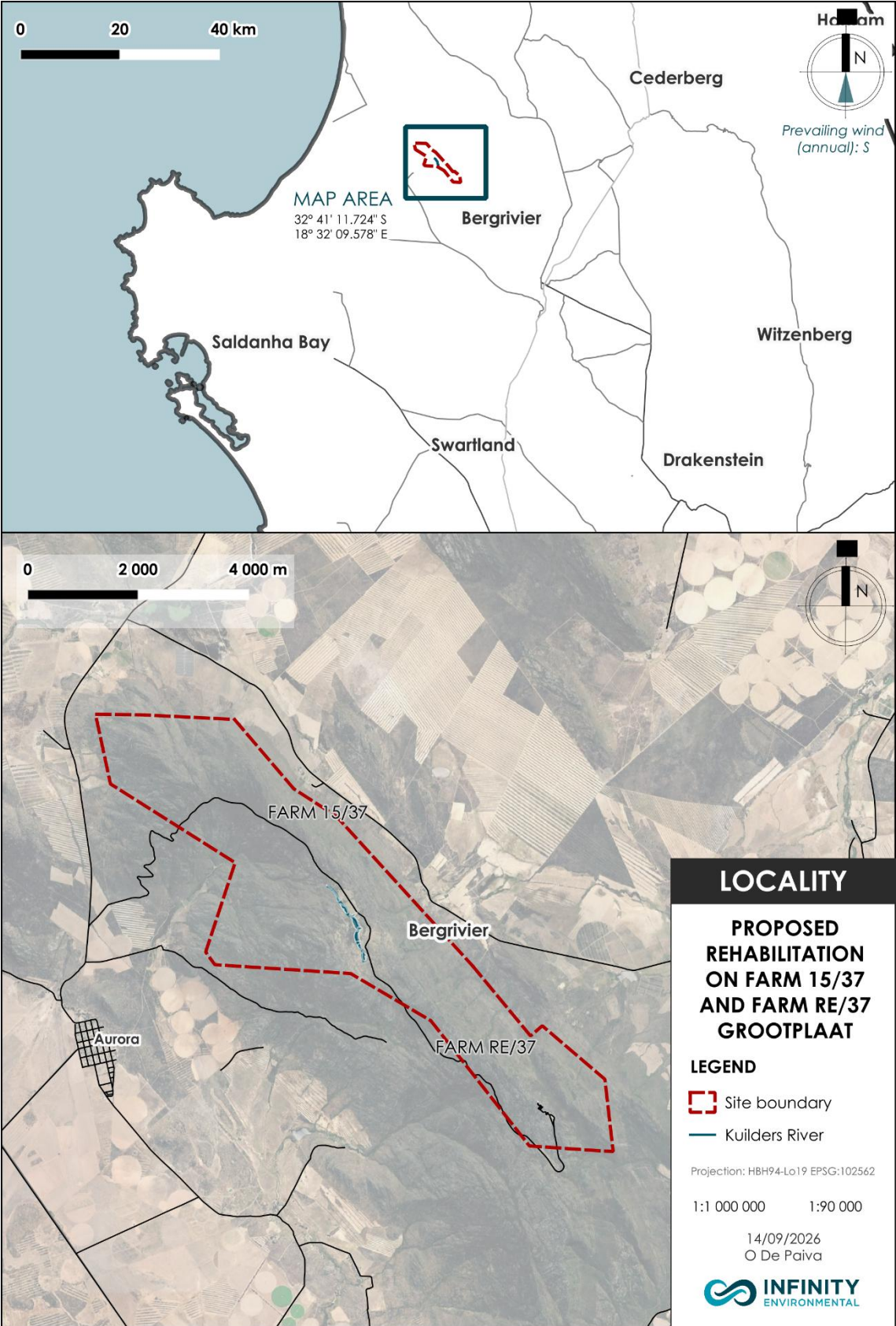


Figure 1-1: Locality

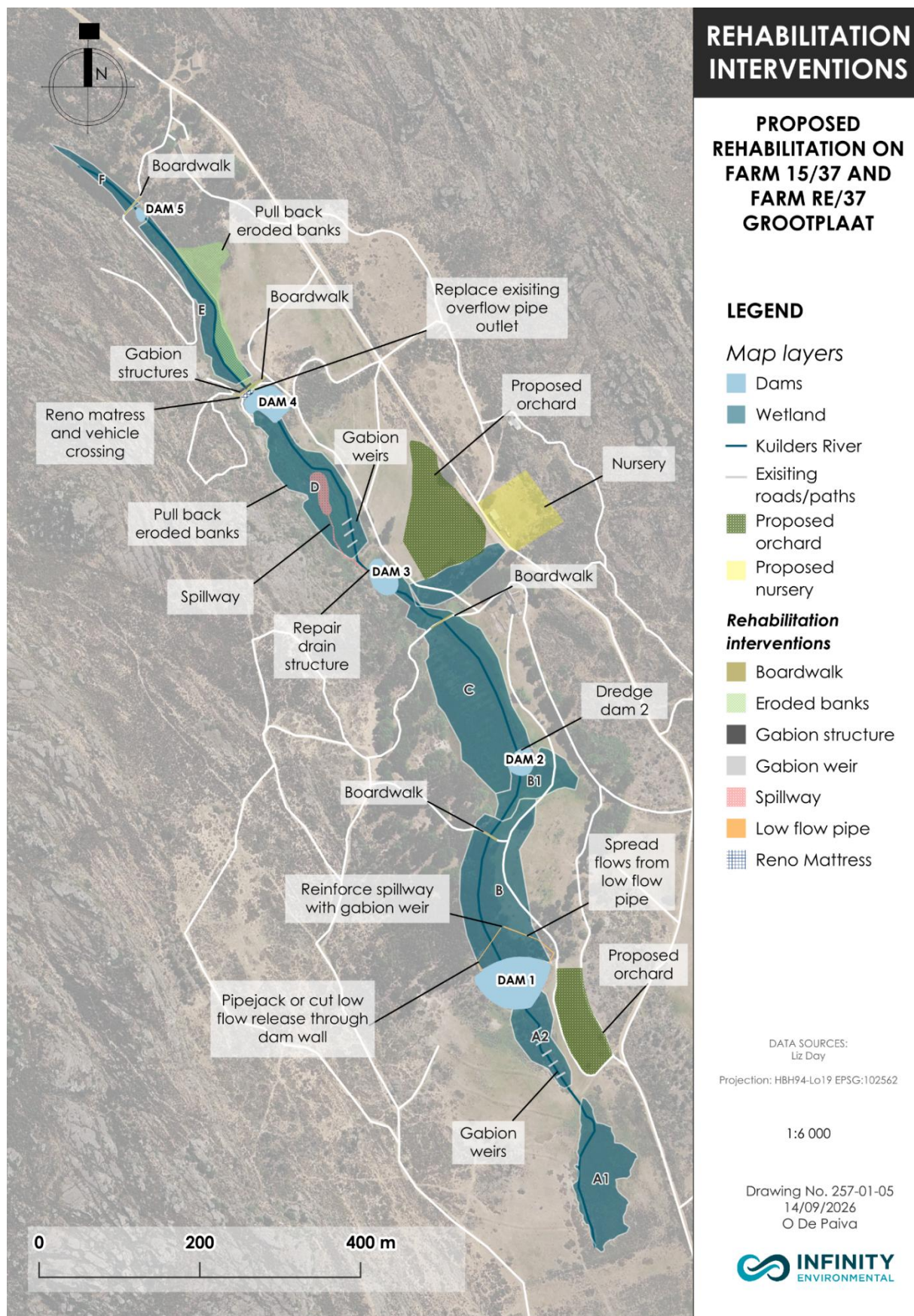


Figure 1-2: Proposed rehabilitation interventions for Farm 15/37 and Farm RE/37

## 2 ENVIRONMENTAL CONTEXT

### 2.1 Site overview

The site comprises an extensive (2147 ha) area, some of which has been cultivated over the past 20 years or more. These areas are all located in the plateau valley 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 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.

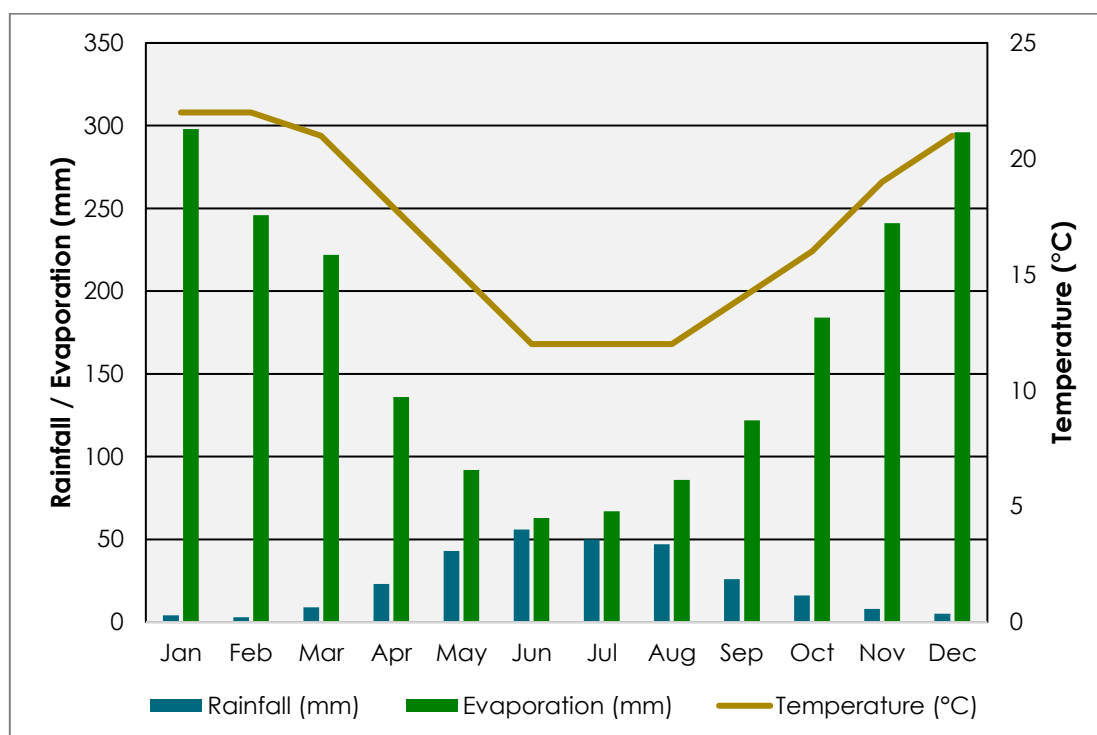


Figure 2-1: Climate in the vicinity of the site (data from Schulze, 2009)

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 Kuindersrivier 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 (see Figure 2-2).

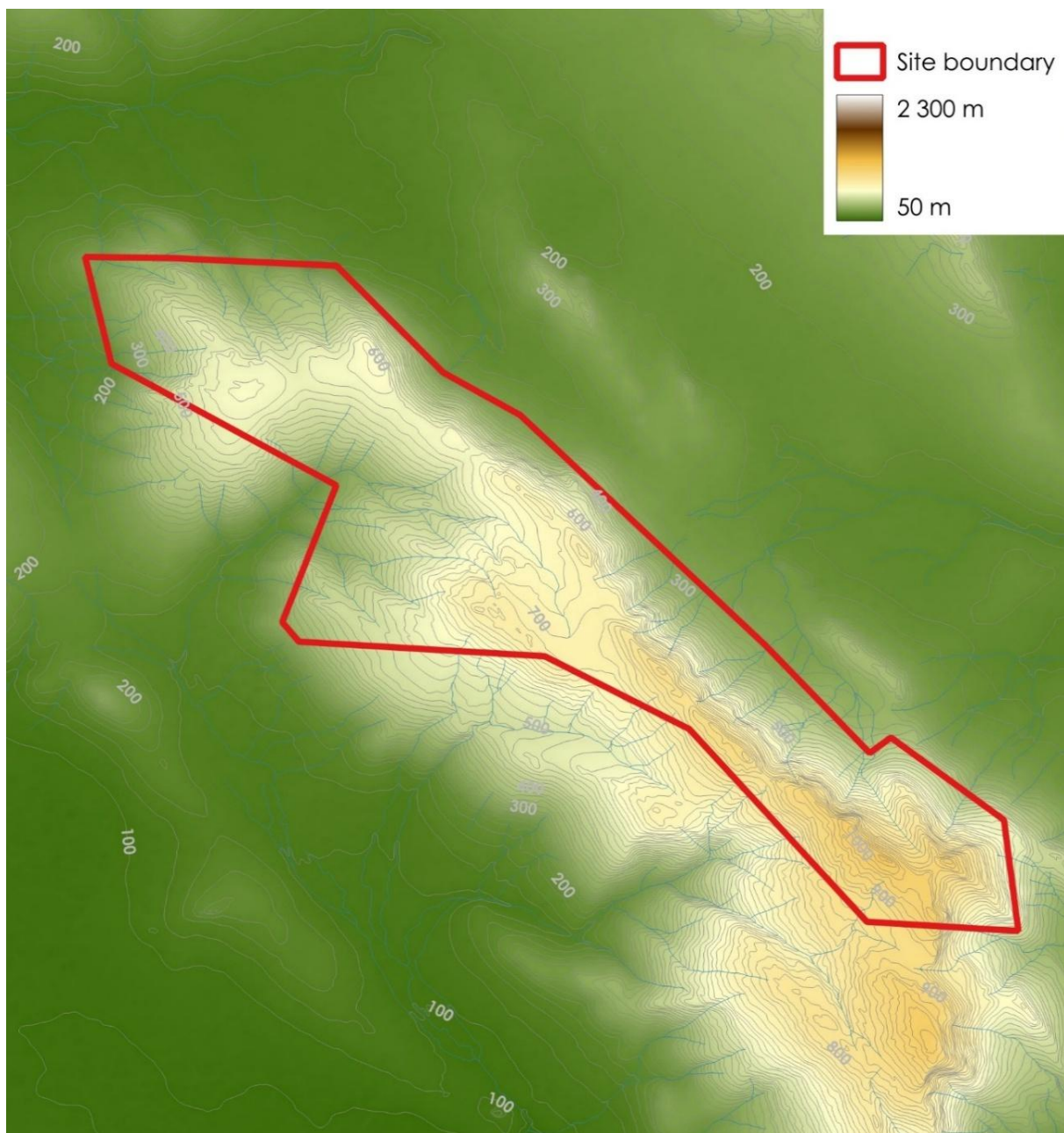


Figure 2-2: Site topography

## 2.4 Geology and soils

The underlying geology of the site is 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.

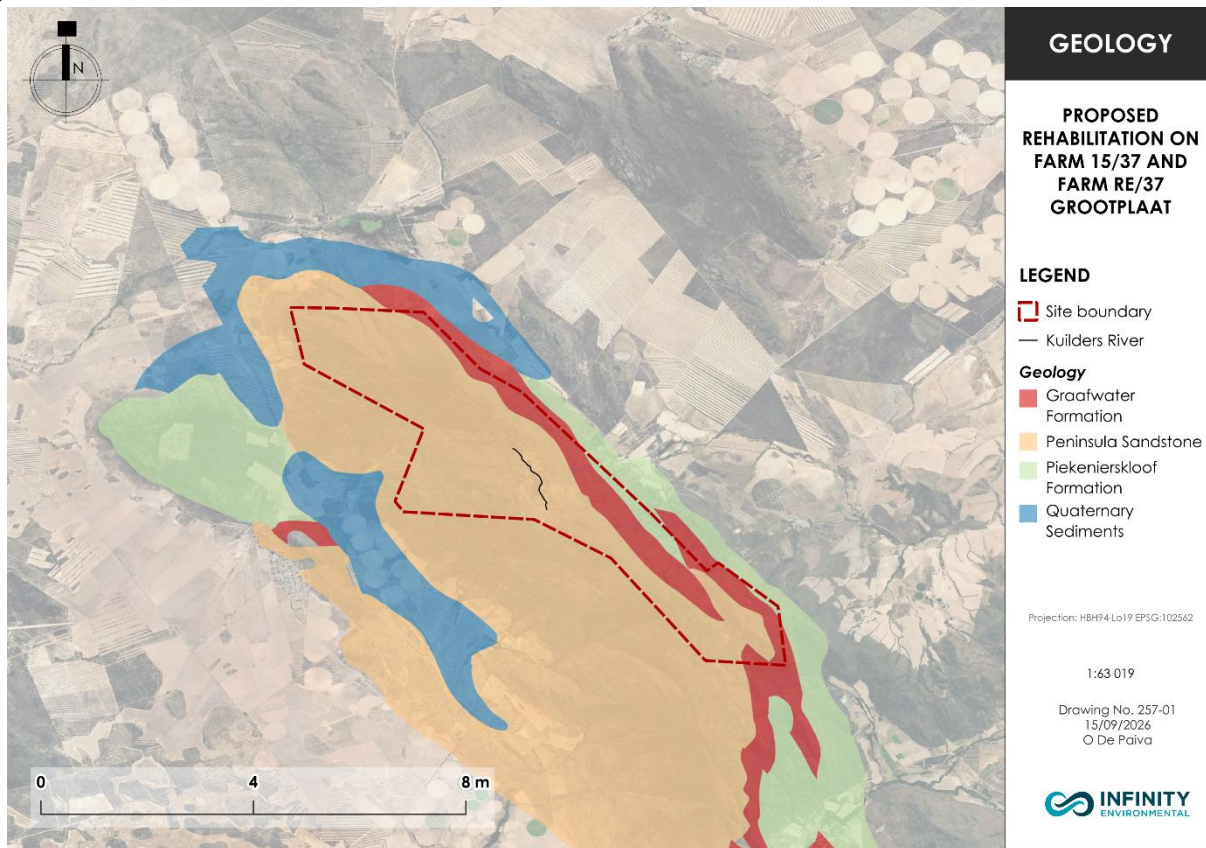


Figure 2-3: Geology of the site and surrounds

## 2.5 Vegetation

The study area lies within the Core Cape Subregion (CCR) of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The study area is also part of the Fynbos biome and is located within the Northwest Fynbos bioregion. This bioregion has a fairly distinct and very rich flora, with a particularly high number of locally and regionally endemic plant species, as well as plant Species of Conservation Concern (Raimondo et al 2009).

The entire study area falls within what is mapped as Piketberg Sandstone Fynbos (Mucina & Rutherford). This vegetation type is listed as being of Least Concern on a national basis (Government of South Africa 2022). Some 82% of the original total extent of this vegetation unit still remains, <1% is formally conserved, and the conservation target is 29% of total extent (Rouget et al 2004).



Figure 2-4: Natural vegetation types on the site and surrounding area (data from SANBI, 2021)

Indigenous vegetation cover in the study area ranges from 5-100%. Habitat diversity is high. Some areas are permanent wetland with near intact flora and others are floodplain and seep that have been heavily disturbed and support almost no indigenous species currently. The areas fringing the actual study area are characterised by exposed sandstone bedrock, and support a high diversity of plant species, including all the SoCC recorded in the immediate area. Many different alien invasive plant species are present, ranging from mature pines, gums, poplars and oak trees to annual herbs and grasses. Many of the woody alien invasives (*Quercus*, *Pinus*, *Eucalyptus*, *Acacia* and *Populus*) have already been largely removed from the actual project area, but some of the smaller woody species still remain (*Acacia mearnsii*, *A. longifolia*, *A. saligna*, *Eucalyptus* sp., *Sesbania punicea*).

Notable indigenous species seen in the wetland areas in the study area include *Fuirena hirsuta*, *Zantedeschia aethiopica*, *Carpha glomerata*, *Athanasia crithmifolia*, *Halleria lucida*, *Pteridium aquilinum*, *Senecio halimifolius*, *Cliffortia ruscifolia*, *Aponogeton distachyos*, *Psoralea sp.*, *Anatherum eucomum*, *Laurembergia repens*, *Juncus lomatoophyllus*, *Capeochloa cincta*, *Nidorella ulmifolia*, and *Cotula turbinata*.

No plant Species of Conservation Concern (SoCC) were recorded within the proposed project area, and none are likely to occur here. Some of the many SoCC recorded (even during this brief survey) within 1000m of the project footprint area include *Leucospermum profugum* (Vulnerable), *Leucadendron discolor* (Vulnerable), *Geissorhiza adriaanii* (not yet assessed; known only from this property), *Adenandra marginata ssp. mucronata* (Rare), *Babiana lineolata* (Endangered), *Aspalathus pendula* (Near Threatened), *Leucadendron loranthifolium* (Near Threatened), *Muraltia arachnoidea* (Near Threatened), *Phyllica cuspidata var. cuspidata* (Vulnerable) and *Metalasia juniperoides* (Endangered).

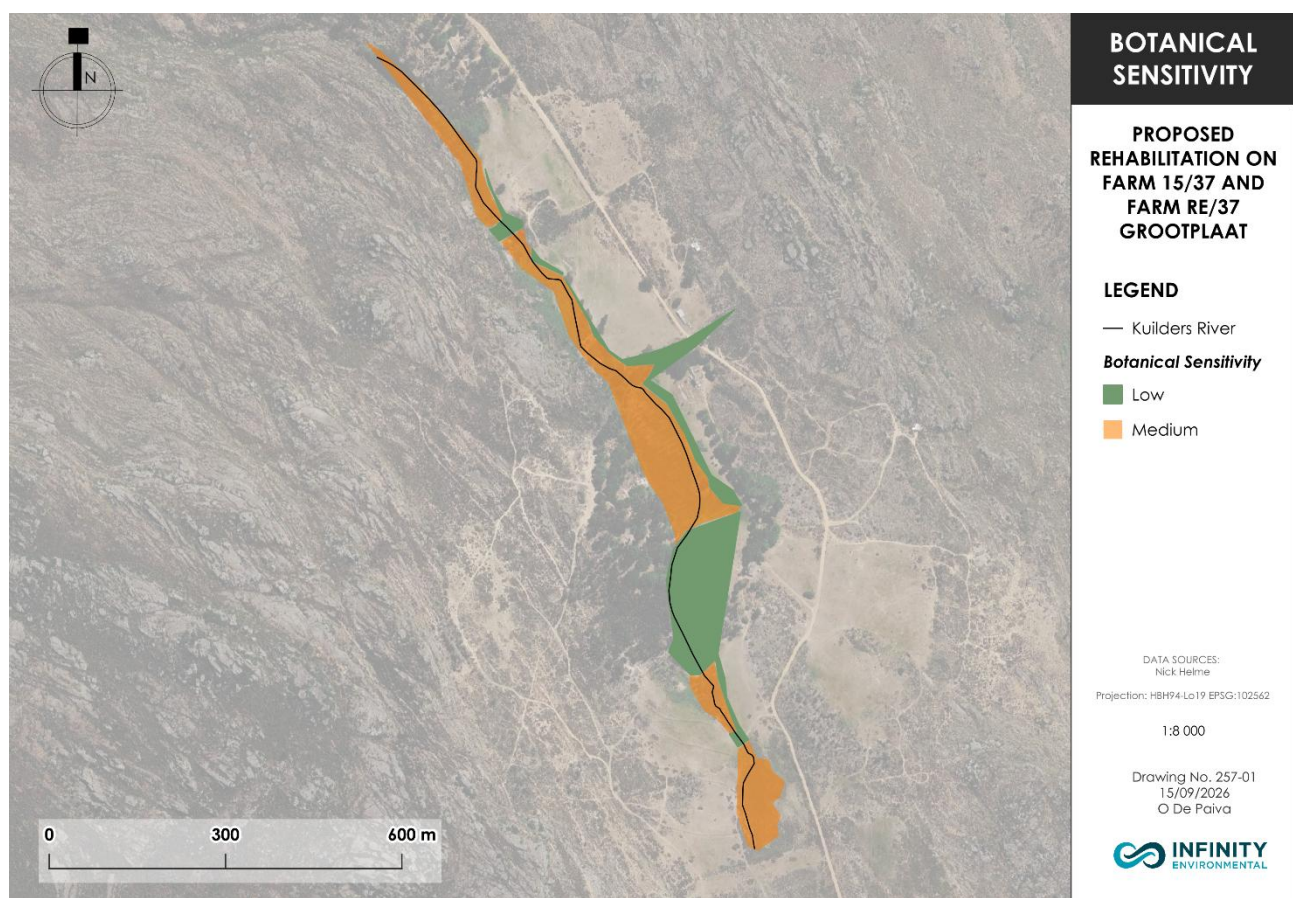


Figure 2-5: Botanical sensitivity map of the study area

## 2.6 Conservation importance

The site currently has good ecological connectivity to extensive upland areas to the south, and to the lower slopes to the north. No faunal Species of Conservation Concern are likely to be resident, although some (such as the Critically Endangered Black Harrier (*Circus maurus*) and the Vulnerable Verreaux's Eagle (*Aquila verreauxii*) may forage on the site.

The 2023 Western Cape Biodiversity Spatial Plan (WCBSP) (Cape Nature 2023) (Figure 2-6) shows most of the valley within the site as an Aquatic Ecological Support Area (ESA1), representing lower priority

but nevertheless important aquatic ecosystems, with the slopes selected as Critical Biodiversity Areas (CBA1). These areas include many mapped seeps / minor watercourses that drain off the steep rocky slopes and into the main stem of the Kuilders River below.

As noted in the 2023 WCBSP, CBAs are areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. They are required to be maintained in a natural or near-natural state, with no further loss of natural habitat. Only low-impact, biodiversity-sensitive land uses are appropriate in these areas.

In this context, it should be noted that all areas of remaining natural vegetation are expected to be retained intact on the site, and the EMPr envisages the re-establishment of fynbos on some of the previously cultivated areas. Any other infrastructure proposed in the fynbos areas surrounding the valley would be subject to its own impact assessments and authorisations.

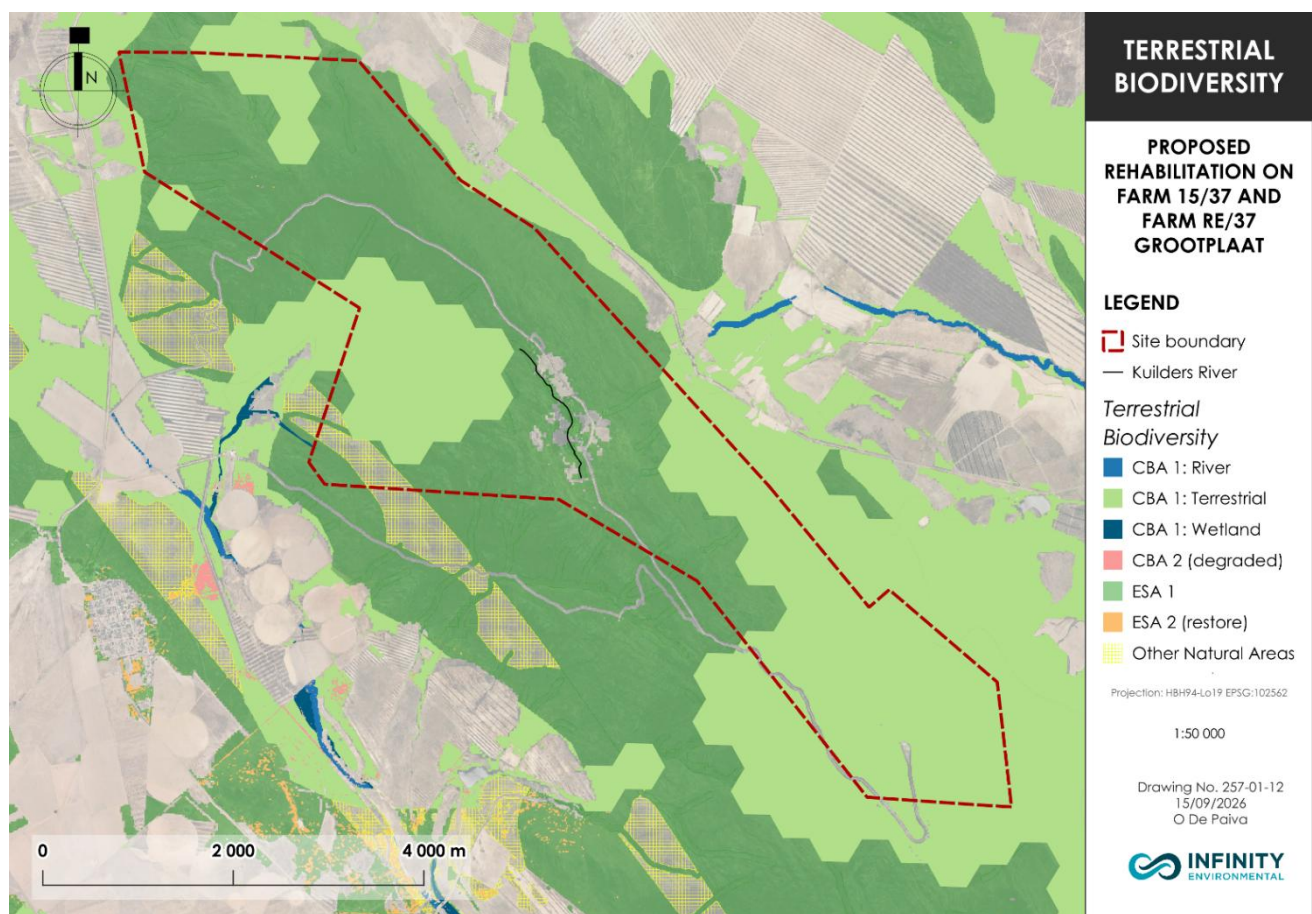


Figure 2-6: Site in the context of the 2023 Western Cape Biodiversity Spatial Plan (CapeNature 2023)

## 2.7 Aquatic features

### 2.7.1 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).

Resource Quality Objectives (RQOs) require that the minimum Recommended Ecological Condition (REC) for all rivers in the 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 RQOs 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).

### 2.7.2 Watercourse reference conditions

No descriptions were accessed of 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 / northeast.

### 2.7.3 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 2025a) 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 2-7 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.

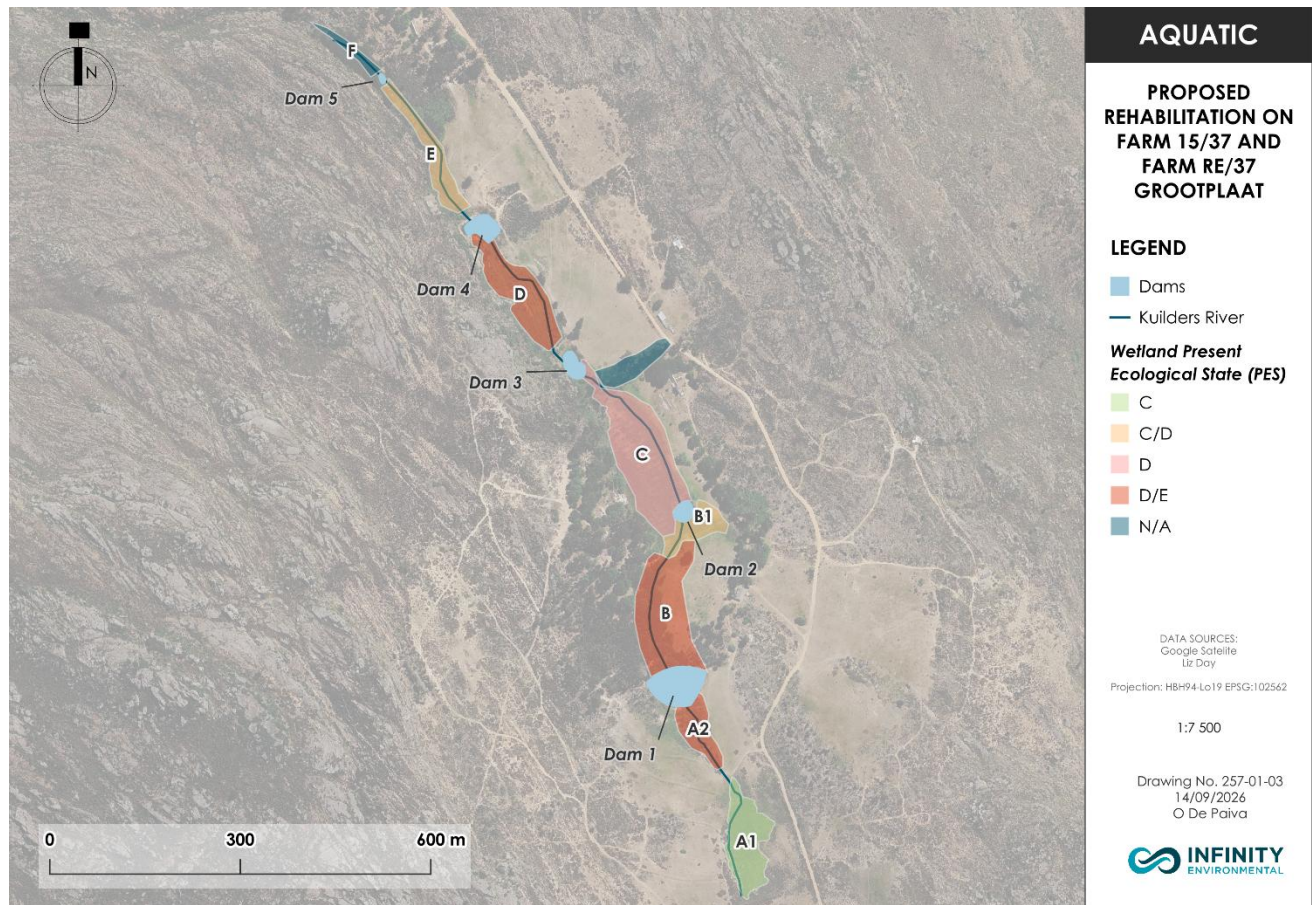


Figure 2-7: Wetlands and watercourses on the site

#### 2.7.3.1 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.

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 \*right 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;
- 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).

### 2.7.3.2 Dam 1

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

The dam 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. 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.

### 2.7.3.3 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. The wetland has however 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. 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 2-7 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 2-7. 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 2-7). 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. 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.

#### 2.7.3.4 Seep wetland B1

This seep has been briefly described in the previous section. 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.

#### 2.7.3.5 Dam 2

This dam is a relatively small dam 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 openwater 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.

#### 2.7.3.6 Wetland Reach C: 'Oak' channelled 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). The delineated wetland was marked by scattered *Merxmüllera* 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.

#### 2.7.3.7 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.

#### 2.7.3.8 Wetland Reach D: 'Bracken' channelled 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.

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.

#### 2.7.3.9 Dam 4

This dam 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 northeastern 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.

#### 2.7.3.10 Wetland Reach E: Channelled 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 and with the understanding that hydrology has been significantly impacted by upstream impoundment as well as by alien invasion.

#### 2.7.3.11 Dam 5

This dam/ impoundment, created by a concrete weir, was completely infilled with sediment at the time of the April 2026 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.

#### 2.7.3.12 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.

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 mainstream 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 Kleynhans (1999) (Southern Waters 2000) 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.

### 2.7.4 **Summary of watercourse EIS and PES**

The protocol for assessment of Ecological Importance and Sensitivity (EIS) is provided in Appendix A of the Aquatic Impact Assessment. Overall, the watercourses assessed in this report, considered as one inter-connected 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.

With regard to watercourse condition, 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.

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.

### 2.7.5 Watercourse bioregion and threat status

The 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 2025b). 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 mapped 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 dataset<sup>1</sup>) 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.

---

<sup>1</sup> Data sourced from [https://nba.sanbi.org.za/content/freshwater/fw\\_wet\\_epl.html](https://nba.sanbi.org.za/content/freshwater/fw_wet_epl.html)

## 2.8 Rehabilitation objectives and principles

This EMP has been compiled with a view to facilitating 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 should be used in the development, planning and implementation of the REMP for aquatic ecosystems, namely:

- **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;
- **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;
- 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 2-7) and 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;
- 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;
- 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 (Figure 2-8), 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;
- 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.

## 2.9 Impacts identified during the EIA

Implementation of the rehabilitation activities proposed in this EMP, which have been spelled out in detail in rehabilitation interventions designed and outlined by Vula Environment Consulting, would be associated with some environmental (and associated financial) risks, which should be considered and mitigated against in project planning and implementation. The most significant of these comprise:

- Risks of large scale erosion as a result of alien clearing or earthworks, following by heavy rainfall / flooding before new indigenous plant cover has established – this aspect is difficult to manage but the risk can be lowered through early propagation of plants for planting into vulnerable areas; the use, where necessary, of materials such as biojute, coir logs or blankets and other products designed to achieve short-term stabilisation during plant establishment; the propagation of sufficient plant material for planting, prior to clearing of large areas; and attention to the timing of clearing of areas, particularly those requiring mechanical earthworks, such that the risk of large rainfall events is low;
- Risks of dam destabilisation as a result of measures to ensure the passage of wet season baseflows into downstream areas – this risk can be reduced by allowing for engineering input into the design of these interventions;
- Risks of pollution of watercourses through the inappropriate use of herbicides in alien or other invasive plant control – the use of herbicides should be minimised, but where necessary to achieve effective control, it should be used only by trained operators; the herbicides should be appropriate for use near watercourses; and their application should be by direct painting onto stems rather than spraying across large areas;
- Re-invasion of alien cleared areas – this must be managed by implementation of a long-term maintenance clearing programme.

The below table highlights the impacts identified in the Aquatic Impact Assessment. It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the EMP.

**Table 2.1. Key Impacts identified during the EIA process**

| Specialist study                                                      | Impacts identified and assessed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aquatic Impact Assessment: Design</b>                              | <p><i>The below information is summarised from the Aquatic Impact Assessment (Appendix G2):</i></p> <p>The proposed rehabilitation interventions would 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 in this document are implemented. These should thus be requirements of any authorisation for these interventions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Aquatic Impact Assessment: Construction (Rehabilitation Phase)</b> | <p>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).</p> <p>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.</p> |
| <b>Aquatic Impact Assessment: Operational (Maintenance Phase)</b>     | <p><i>The below information is summarised from the Aquatic Impact Assessment (Appendix G2):</i></p> <p>Maintenance 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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Ongoing manual clearing of invasive alien vegetation from watercourses;</li> <li>• Repairs to gabion baskets, reno mattresses, spillways, dam walls;</li> </ul>                                                                                                                                                                                                                       |

| Specialist study | Impacts identified and assessed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <ul style="list-style-type: none"> <li>• Periodic (mechanical or manual) sediment removal from dams;</li> <li>• Erosion repair, through (mechanical or manual) re-shaping of eroded areas, with the potential introduction of additional gabion weirs or protection devices as required;</li> <li>• Replacement of eroded, dead or senescent watercourse and riparian plants;</li> <li>• Repairs to boardwalks;</li> <li>• Repairs / adjustments to dam outlet mechanisms (in line with providing wet season flows into downstream watercourses to sustain high quality watercourse vegetation.</li> </ul> |

## 2.10 Mitigation of impacts

**This EMPr gives effect to the mitigation measures prescribed in the environmental impact assessment.**

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.

**Table 2.2. Key mitigation measures prescribed during the EIA process**

| Specialist study                         | Specialists' mitigation measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aquatic Impact Assessment: Design</b> | <p>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:</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> <li>• 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: <ul style="list-style-type: none"> <li>○ 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;</li> <li>○ The dates on which flows begin releasing into the downstream reaches should be noted, along with the duration of flows;</li> <li>○ The outlet pipe "fullness " should be roughly noted during discharge periods (full, half, quarter, trickle) to gauge efficacy of release mechanisms;</li> <li>○ 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;</li> <li>○ 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;</li> </ul> </li> <li>• 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;</li> <li>• 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,</li> </ul> |

| Specialist study                                                             | Specialists' mitigation measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | <p>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;</p> <ul style="list-style-type: none"> <li>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.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Aquatic Impact Assessment: Construction (Rehabilitation Phase)</b></p> | <ul style="list-style-type: none"> <li>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); 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;</li> <li>Revegetation and planting should be aligned with the autumn-winter rainfall period to maximise establishment success;</li> <li>Best practice measures should be in place that ensure that: <ul style="list-style-type: none"> <li>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);</li> <li>Such stockpiles or waste piles are removed as quickly as possible;</li> <li>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;</li> <li>Alien plants removed during construction should be disposed of outside of any sensitive watercourse area;</li> <li>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 (<i>Stuckenia pectinata</i>));</li> </ul> </li> <li>Where sedimentation, erosion or damage to infrastructure occurs in watercourses during the construction phase, measures (including</li> </ul> |

| Specialist study                                                         | Specialists' mitigation measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                          | <p>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.</p> <p><b>Recommended additional measures: Establishment of ecological buffers</b></p> <p>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.</p> <p>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.</p> <p>This recommendation considers:</p> <ul style="list-style-type: none"> <li>• Minimum setbacks recommended in Macfarlane et al (2015), for (worst case) agricultural areas (20m)</li> <li>• Low certainty regarding wetland delineation in some areas, where wetlands have been impacted by decades of alien invasion and other disturbance;]</li> <li>• The rural nature of the area;</li> <li>• The added conservation benefits of provision of strong ecological corridors through the site.</li> </ul> <p>Ecological buffer areas would need to be managed such that:</p> <ul style="list-style-type: none"> <li>• They are vegetated with locally indigenous (terrestrial) vegetation;</li> <li>• Alien vegetation including kikuyu grass is kept out of these area, where feasible;</li> <li>• With the exception of limited boardwalks / pathways, hardened areas are minimised (e.g. no paving or buildings);</li> <li>• 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)).</li> </ul> |
| <p><b>Aquatic Impact Assessment: Operational (Maintenance Phase)</b></p> | <ul style="list-style-type: none"> <li>• The mitigation measures recommended in the Construction Phase would be applicable in this instance as well, although it is assumed that they would in practice be undertaken at much lower frequencies.</li> <li>• 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.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## 2.11 Summary of Environmental Sensitivities

The following environmental sensitivities have been identified within or adjacent to the proposed implementation areas:

| <b>Sensitivity</b>                       | <b>Description and Location</b>                                                                                                                                                                                                                                               |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Wetlands and riparian areas</b>       | Multiple wetland systems including the main Kuilders River drainage line extend north-south through the property.                                                                                                                                                             |
| <b>Dams and impoundments</b>             | Five dams occur along the main drainage line.                                                                                                                                                                                                                                 |
| <b>Indigenous terrestrial vegetation</b> | Remnant semi-intact fynbos occurs within MU3 and MU7. Undisturbed fynbos occurring outside the cultivated areas should be considered a sensitive area and retained intact.                                                                                                    |
| <b>Soil erodibility</b>                  | Exposed and compacted soils in degraded agricultural areas are susceptible to erosion during rainfall events.                                                                                                                                                                 |
| <b>Threatened species</b>                | A number of plant species of conservation concern are known to occur in the undisturbed fynbos bordering the farm. The site is also likely to support threatened raptor species (notably Verreaux' Eagle and Black Harrier), though not providing any known breeding habitat. |
| <b>CBA / ESA designations</b>            | Most of the agricultural areas on the site are designated as Ecological Support Areas. Natural vegetation is designated as Critical Biodiversity Area.                                                                                                                        |

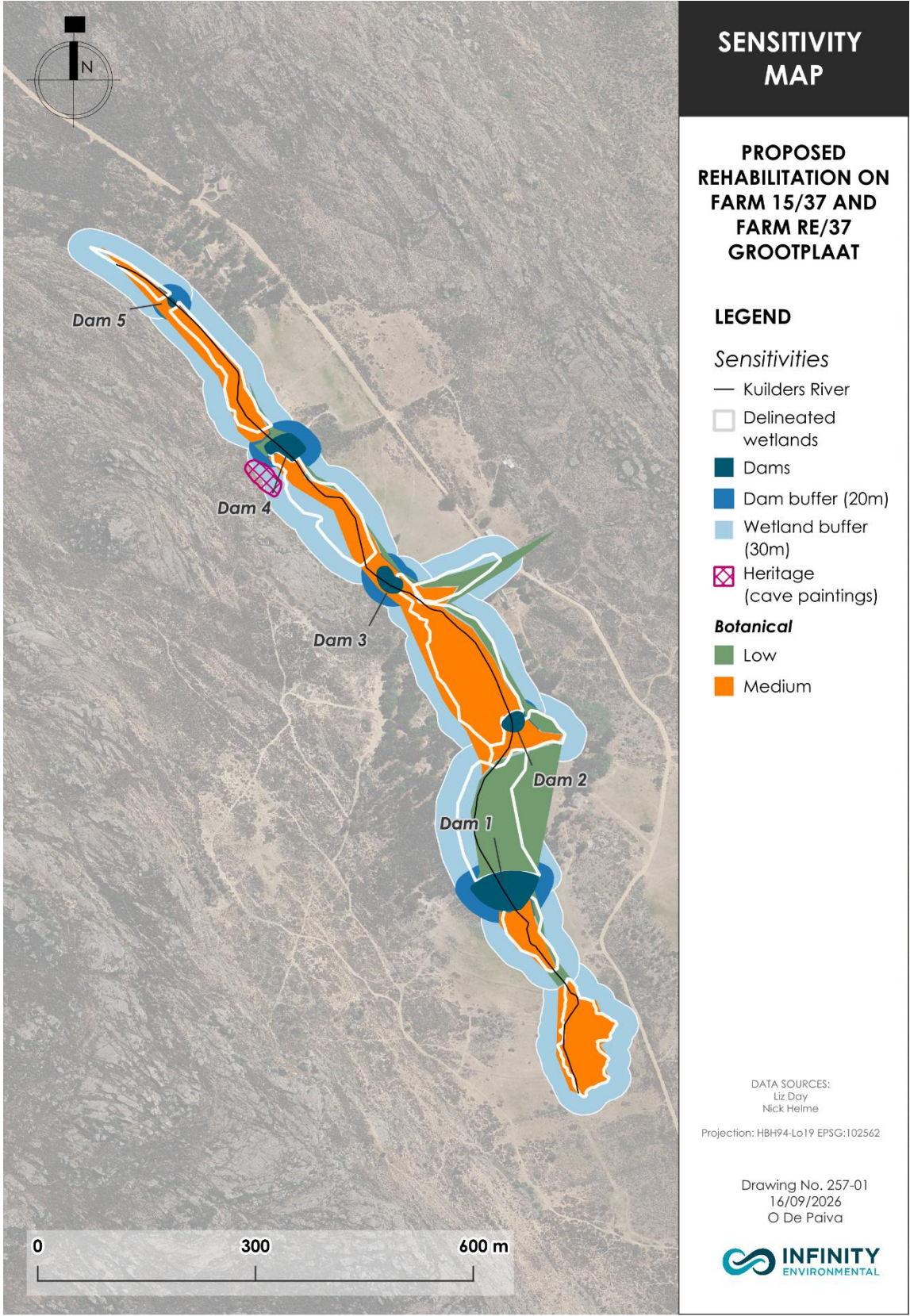


Figure 2-8. Site sensitivity map

## 2.12 Authors of the EMPr

This EMPr has been compiled by the Environmental Assessment Practitioner (EAP) Infinity Environmental (Pty) Ltd. and aquatic specialist Liz Day Consulting (Pty) Ltd, with input from Vula Environmental (Pty) Ltd based on best practice environmental management requirements. Details of the EAP and consultants who prepared the EMPr are as follows:

**Table 3: Authors of the EMPr**

| Authors                | Qualification          | Professional registrations                          | Years of experience | Relevant expertise                                                                             |
|------------------------|------------------------|-----------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------|
| <b>Jeremy Rose</b>     | B.Sc Hons              | Reg E.A.P.<br>#2019/1116,<br>Pr.Sci.Nat. 120148     | 12+                 | More than 50 EIAs or EMPrs                                                                     |
| <b>Liz Day</b>         | BA, BSc, BSc Hons, PhD | IAIASA; WISA;<br>Pr.Sci.Nat 004806.                 | 30+                 | More than 900 technical and Environmental Impact Assessment reports on rivers and/or wetlands. |
| <b>Kelly Gilmour</b>   | MSc.                   | Cand E.A.P<br>#2024/8037,<br>Cand.Sci.Nat<br>169880 | 2+                  | Project support on 4+ EIA's and EMPrs                                                          |
| <b>Olivia De Paiva</b> | MSc.                   | Cand E.A.P<br>#2024/8454,<br>Cand.Sci.Nat<br>169424 | 2+                  | Project support on 4+ EIA's and EMPrs                                                          |

**Jeremy Rose** (Infinity Environmental) has 12 years' experience in the field of environmental management and impact assessment and has prepared over 100 environmental impact assessments and related instruments. He is registered as an Environmental Assessment Practitioner (EAPASA 2019/1116) and a professional natural scientist in the field of Environmental Science.

**Qualifications:** BSc Hons. **Registrations and associations:** EAPASA; Pr.Sci.Nat. (Reg No 120148); IAIASA;

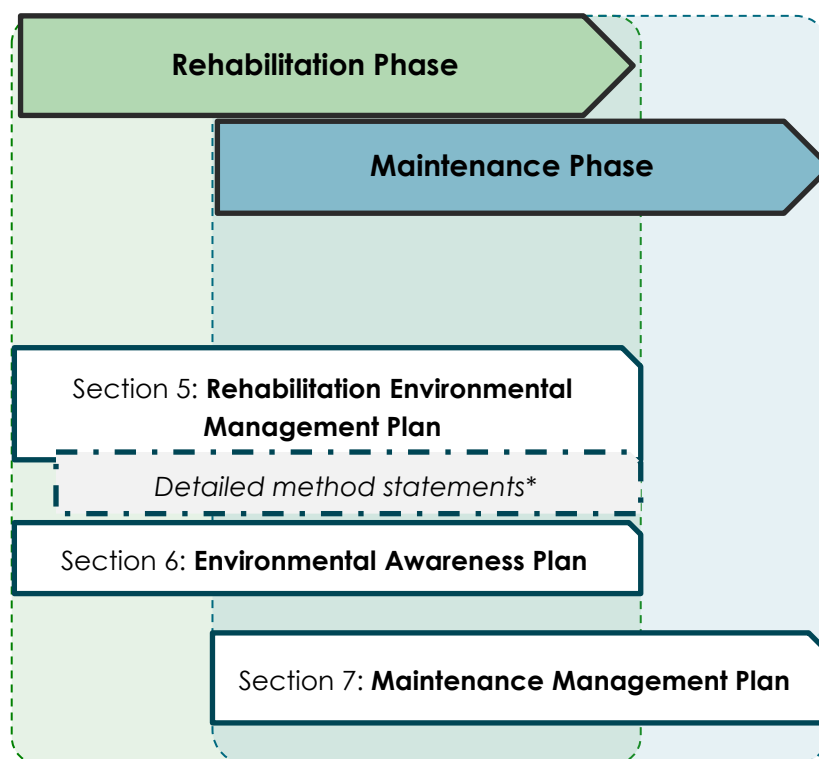
**Dr Elizabeth (Liz) Day** (Liz Day Consulting (Pty) Ltd) has worked as a freshwater ecologist for the past 30+ years, primarily in the Western Cape, and has produced over 900 technical and Environmental Impact Assessment reports on rivers and/or wetlands. She is registered as a professional natural scientist in the fields of Aquatic Science, Biological Science, Ecological Science and Zoological Science.

**Qualifications:** BA, BSc, BSc Hons, PhD. **Registrations and associations:** IAIASA; WISA; Pr.Sci.Nat. (Reg No 004806).

## 3 APPROACH AND STRUCTURE OF THE EMPr

### 3.1 Structure of EMPr

The EMPr is structured as a set of nested environmental management plans, as shown in Figure 3-1. Aspects of these will be supplemented by more detailed levels of planning as and when the proposed development is implemented, as indicated.



**Figure 3-1. Schematic of EMPr content and structure**

Aspects indicated with \* may be prepared subsequent to environmental authorisation

### 3.2 Legislative compliance

A key objective of the EMPr is to satisfy the requirements of Appendix 4 of the amended NEMA EIA Regulations published in Government Notice No. R 326 of 7 April 2017. These regulations prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the competent authority. An overview of where the requirements are addressed in this EMPr is presented in Table 4.

**Table 4: Compliance with EIA Appendix 4 Requirements**

| <b>Appendix 4 of EIA Regulations</b>                                                                                                                                                                                                                                                  |                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| 1. An EMPr must include-                                                                                                                                                                                                                                                              | Section 2.12 of EMPr                                      |
| (a) details of-                                                                                                                                                                                                                                                                       |                                                           |
| (i) the EAP who prepared the EMPr; and                                                                                                                                                                                                                                                |                                                           |
| (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;                                                                                                                                                                                                      |                                                           |
| (b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;                                                                                                                                                      |                                                           |
| c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;                                    | Section 1 and sections 5 to 7: 1st column of table        |
| (d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- | Figure 2-8                                                |
| (i) planning and design;                                                                                                                                                                                                                                                              |                                                           |
| (ii) pre-construction activities;                                                                                                                                                                                                                                                     |                                                           |
| (iii) construction activities;                                                                                                                                                                                                                                                        |                                                           |
| (iv) rehabilitation of the environment after construction and where applicable post closure; and                                                                                                                                                                                      |                                                           |
| (v) where relevant, operation activities;                                                                                                                                                                                                                                             |                                                           |
| e) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to                                                                 | Sections 5 to 7: 2nd column of table                      |
| (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;                                                                                                                                                       |                                                           |
| (ii) comply with any prescribed environmental management standards or practices;                                                                                                                                                                                                      |                                                           |
| (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and                                                                                                                                                                                       |                                                           |
| (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;                                                                                                                                                                        |                                                           |
| (f) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);                                                                                                                                                                       |                                                           |
| g) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);                                                                                                                                                                     | Sections 5 to 7: 3rd column of table                      |
| (h) an indication of the persons who will be responsible for the implementation of the impact management actions;                                                                                                                                                                     | Sections 5 and 7: 4th column of table                     |
| (i) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;                                                                                                                                                                    | Sections 5 and 7: 5th column of table                     |
| j) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);                                                                                                                                                                          | Section 4 and Sections 5 and 7: 6th column of table       |
| (k) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;                                                                                                                                                                     | Sections 4 and 6, responsible parties noted in Section 3. |

|                                                                                                                                                                                                                                                                                                        |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| l) an environmental awareness plan describing the manner in which—<br>(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and<br>(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and | Section 6      |
| m) any specific information that may be required by the competent authority                                                                                                                                                                                                                            | Not applicable |

### 3.3 Content of the EMPr

This EMPr is compiled for the proposed rehabilitation of watercourses on Farm 15/37 and Farm RE/37 (Grootplaat). Therefore, it does not follow the typical structure of an EMPr with design, construction, operational and decommissioning phases. Rather, the EMPr is divided as follows:

- The Rehabilitation Environmental Management Phase, which begins with commencement of physical activities on site and ends when the major earthworks, construction of associated infrastructure and works within the watercourses have been implemented; and
- The Maintenance Management Phase, which includes maintenance management measures after the major earthworks and associated rehabilitation measures within the watercourses are concluded.

The EMPr includes the findings and recommendations of the EIA Process and specialist studies and or compliance statements. The EMPr may be updated with additional information or actions during the various phases if applicable. A standardised approach is followed, in which outcomes are set, followed by management actions aimed at achieving the objectives. Management actions are accompanied by monitoring requirements, responsibilities, and targets where applicable. A tabular format is used for ease of reference.

Key terms used in the EMPr include:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated (as appropriate) to a desired state
- **Outcomes (objectives):** The desired state after mitigation or management
- **Management Actions:** The actions needed to achieve the objectives of enhancing, mitigating or eliminating impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring:** The key monitoring actions required to check whether the outcomes are being achieved, taking into consideration methodology, frequency and responsibility.

### 3.4 Overarching objective

The overarching objective, from which the detail contained in this EMPr flows, is **to construct and operate the project in a manner that -**

- **Reduces** the risk of pollution or damage to ground or surface water, ecosystems, soils and air.
- **Minimises** nuisance and disruption to people residing in, working in or moving through the area.
- **Adheres** to all relevant environmental legislation.

### 3.5 Amendment of this EMPr

- » Amendments shall be made as and when required to keep this EMPr up to date, and to provide for adaptive management in support of the management outcomes set out in the approved EMPr and the EIA.
- » The EMPr may be amended due to:
  - Legislative changes;
  - Changes to the roles and organisational structure set out in chapter 4;
  - Amendments to the environmental authorisation;
  - Audits of the EMPr carried out in terms of the EIA Regulations;
  - Based on the annual reviews as set out below; or
  - Whenever deemed necessary by the competent authority.
- » Amendments will be numbered sequentially (e.g. Amendment 001, Amendment 002, Amendment 003 etc.). The status of a particular page shall be reflected in the appropriate space of each page. Each amendment shall also have an effective date (the date on which the amendment was made).
- » Amendments to the impact management **actions** may be effected immediately by the authorisation holder and must be reflected in the next environmental audit report submitted to the competent authority in terms of regulation 34 of the EIA Regulations. The record of revisions must be updated accordingly, and the revision number and status of a particular page shall be reflected in the appropriate space of each page.
- » Amendments to the impact management **outcomes** stipulated in this EMPr are subject to an application for amendment to the competent authority, which must be submitted for approval by the authorisation holder and may require public participation. Such an amendment shall only become effective once approved by the competent authority.

### 3.6 Review of this EMPr

- The EMPr should be reviewed if and when deemed necessary.
- The Authorisation Holder will keep a record of all dates of review, even if review did not necessitate an amendment to the EMPr.
- The review may take the form of an internal audit or may form part of the external audit conducted in terms of regulation 34 of the EIA Regulations.
- The main aims of a review of the EMPr for purposes of a revision will, among other things, be to determine the following:
  - Ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis
  - Conformity and adherence to the minimum legislative requirements;
  - Simplicity and clarity of the content and text; or
  - The incorporation of practical experience gained during implementation

## 4 PROJECT ROLES AND STRUCTURE

The general roles to be defined are those of the:

- Authorisation holder
- Environmental Control Officer
- Aquatic Ecologist
- Contractor (Principal Contractor / Project Manager); and
- Environmental Auditor

The specific titles referred to may vary, but the intent of this section is to broadly define expectations and responsibilities for key role players in the implementation of the EMPr.

### 4.1 Authorisation Holder

The holder of the Environmental Authorisation, should it be issued, will be responsible for ensuring that the conditions of such authorisation are fully adhered to. It is expected that the authorisation holder will appoint the Environmental Control Officer and Contractor during the rehabilitation phase. The responsibility for the implementation of this EMPr lies with the Authorisation Holder. Commonly, responsibilities borne by the Authorisation Holder are delegated to a project manager.

Key responsibilities include ensuring that:

- The ECO is provided with the necessary information in order to adequately undertake their responsibilities.
- This EMPr is included in the contractual agreements with all contractors and subcontractors,
- Method Statements requested by the ECO are provided timeously.
- Corrective action is implemented as required; and
- Appropriate records and information regarding compliance with the EMPr requirements are maintained and made available to the ECO.

### 4.2 Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed for the duration of the stage of the rehabilitation phase that includes bulk earthworks and construction of new infrastructure within the watercourses to ensure compliance with the EMPr and conditions of the EA. The ECO's role also includes monitoring compliance with other environmental legislation, the monitoring of environmental impacts, and the keeping of accurate records.

The ECO shall update the EMPr when necessary and shall compile a monitoring checklist or protocol based on the EMPr. The ECO's role includes the following aspects:

- Periodic environmental audits during the rehabilitation phase of the proposed project to monitor and record environmental impacts and nonconformances, and to monitor site activities to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist.
- Maintain a record of site visits and audits, a copy of the environmental authorisation (should it be granted) and other permits and licenses, a register of non-conformances, and a copy of previous environmental audits.
- Prior to commencement, the ECO must meet on site with the Contractor representative to confirm designated development and no-go areas and to confirm the method statements required.

- Request, review and approve Method Statements from the contractor and sub-contractors prior to the commencement of the activities concerned.
- Ensure that the contractors and sub-contractors and their employees have received the appropriate environmental awareness training.
- Meet with the contractors to discuss the implementation of this document.
- Identify appropriate corrective measures if transgressions occur.
- Keep a register of monitoring activities and results
- Assist in finding environmentally acceptable solutions to implementation problems.
- Identify and make amendments to the EMPr where appropriate.
- Conduct an environmental inspection on completion of the implementation period and prepare a close-out report.

### 4.3 Aquatic Ecologist

An independent aquatic ecologist must be appointed for the duration of any rehabilitation works that involve structures or bulk earthworks in watercourses, to advise the implementing agent and monitor the works and their environmental impacts.

### 4.4 Contractor

The role of the contractor is as follows:

- The Contractor shall ensure that all employees, contractors and sub-contractors are made aware of the EMPr and their responsibilities.
- Prior to commencement, the Contractor must meet on site with the ECO representative to confirm designated development and no-go areas and to confirm the method statements required.
- Liaise with the ECO and Authorisation Holder (or representative) and ensure that works on site are conducted in an environmentally sensitive manner in accordance with this EMPr.
- Maintain on site a copy of this EMPr and all environmental authorisations and licenses pertinent to the development on site.
- Ensure that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage because of a contravention of the specifications contained in the EMPr, to the satisfaction of the Project Owner's ECO.
- Ensure that all employees (permanent and temporary) and all sub-contractors that work on the site for longer than two days, receive environmental awareness training within one week of being on site.
- Designate an Environmental Officer (or employ a designated suitably qualified individual to fulfil the role of an Environmental Officer) to monitor and report on the daily activities on-site during the implementation period. The Contractor and individual contractors may designate Environmental Officers to liaise with the ECO on environmental matters.

### 4.5 Environmental Auditor

An independent Environmental Auditor must be appointed for the duration of the rehabilitation phase that includes major earthworks and interventions within the watercourses who will be responsible for assessing the ECO's and subsequently the Contractor's compliance with environmental regulations, policies, and standards as stipulated in the EMPr and ECO Reports.

The Environmental Auditor's role includes the following aspects:

- Periodic environmental audits (biannual) to perform comprehensive audits to evaluate the environmental performance of an organisation. This includes site inspections, reviewing

documentation (i.e) EMPr, ECO Reports and other documentation contained in the Contractor's file.

- Conducting follow-up audits to ensure that corrective actions have been implemented and to verify ongoing compliance.
- Preparing detailed audit reports that summarise findings, including areas of compliance and non-compliance, and providing actionable recommendations for improvement.

## 5 REHABILITATION ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable to the rehabilitation phase of the project.

| Environmental aspect or impact                                                                      | Impact Management Outcomes                                                                                                                                                                                                                                                                                            | Impact Management Actions                                                                                                                                                                                                                | Monitoring Actions                                                                                           |                                                         |                      |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------|
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                          | Method                                                                                                       | Frequency                                               | Responsibility       |
| <b>5.1 Clearance of invasive alien plants and vegetation management within all Management Units</b> | Target species (not all of which are listed invasive alien species) to be removed include Populus spp. (poplars), Eucalyptus spp. (gums), Quercus spp. (oaks), Sesbania punicea (sesbania), Pinus spp. (pines), Pteridium aquilinum (bracken fern), Various agricultural weed species within former cultivated areas. | 5.1.1 <b>Identify and demarcate no-go areas and environmentally sensitive zones before commencement</b>                                                                                                                                  | Demarcation of no-go areas and/or environmentally sensitive zones                                            | Prior to commencement                                   | ECO and Contractor   |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.2 <b>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.</b> | Routine site inspections to verify compliance with method statements                                         | As needed                                               | ECO and Contractor   |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.3 <b>Cleared biomass must be managed on-site through chipping, composting, reuse as erosion control material, or temporary stockpiling in approved areas.</b>                                                                        | Monitor alien vegetation regrowth and follow-up clearing requirements at appropriate intervals post-clearing | Throughout active rehabilitation                        | ECO and Contractor   |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.4 <b>No uncontrolled burning of biomass unless specifically authorised; fire-fighting equipment to be available during high risk activities</b>                                                                                      |                                                                                                              | Post active rehabilitation associated with this project | Authorisation holder |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.5 <b>Alien plants removed during construction should be disposed of outside of any sensitive watercourse area;</b>                                                                                                                   | Monitor stump treatment success and record coppicing or regrowth at treated stumps                           | Throughout active rehabilitation                        | ECO and Contractor   |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.6 <b>Manage seed-bearing invasive material separately; bag or contain propagule-bearing material to prevent spread</b>                                                                                                               |                                                                                                              |                                                         |                      |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.7 <b>Biomass stockpiles to be placed in approved areas only; not to obstruct drainage lines, wetland systems, or access routes</b>                                                                                                   | Confirm biomass stockpiles do not obstruct drainage lines, wetland systems, or access routes                 |                                                         |                      |
|                                                                                                     |                                                                                                                                                                                                                                                                                                                       | 5.1.8 <b>Manage stockpile heights to reduce fire and safety risk</b>                                                                                                                                                                     | Monitor for unintended spread of invasive propagules from cleared material                                   |                                                         |                      |

| Environmental aspect or impact     | Impact Management Outcomes                                                                     | Impact Management Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Monitoring Actions                                                                                                                                    |                                                   |                                                    |
|------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------|
|                                    |                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Method                                                                                                                                                | Frequency                                         | Responsibility                                     |
|                                    |                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Photographic monitoring at fixed photo-points                                                                                                         | Before and after clearing in each management unit | ECO and Contractor                                 |
|                                    | All indigenous vegetation outside of the approved clearing areas is to be preserved            | 5.1.9 <b>Use existing access routes where feasible; restrict disturbance footprints to approved work areas only</b><br>5.1.10 <b>Exposed soils resulting from clearing to be stabilised progressively to prevent erosion</b><br>5.1.11 <b>Clearly identify target species prior to clearing to avoid accidental removal of retained indigenous vegetation</b><br>5.1.12 <b>Retain all indigenous vegetation outside approved clearing areas</b><br>5.1.13 <b>Do not damage mature indigenous trees identified for retention</b>                                                                                                 | Inspect cleared areas for erosion, soil instability, or excessive disturbance<br><br>Record all non-compliance incidents and corrective actions taken | Throughout active rehabilitation                  | ECO and Contractor                                 |
|                                    | Coppicing of invasive alien vegetation prevented using herbicides treatment (if/when required) | 5.1.14 <b>Apply cut-stump herbicide treatment as soon as practicable after cutting; reapply to regrowth as required</b><br>5.1.15 <b>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</b><br>5.1.16 <b>No herbicide to be applied within 5 m of open water, drainage lines, or wetland systems unless specifically authorised</b><br>5.1.17 <b>Herbicide mixing to be performed off-site where possible; only pre-mixed, labelled containers to be brought to the work area</b> | Inspect herbicide storage, mixing areas, and application records<br><br>Record all non-compliance incidents and corrective actions taken              | Throughout active rehabilitation                  | ECO and Contractor                                 |
| <b>5.2 Watercourse degradation</b> | Restored hydrological functionality, improved ecological integrity, and                        | 5.2.1 <b>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.</b><br>5.2.2 <b>Demarcate wetland boundaries and buffer areas on the ground</b>                                                                                                                                                                                                                                                                                                                                                                                            | Demarcation of wetland boundaries, buffer areas, and designated work areas                                                                            | Prior commencement to                             | ECO and Contractor (overseen by aquatic ecologist) |

| Environmental aspect or impact       | Impact Management Outcomes | Impact Management Actions                                                                                                                                             | Monitoring Actions                                                                                |                                                                                                                       |                                                    |
|--------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                      |                            |                                                                                                                                                                       | Method                                                                                            | Frequency                                                                                                             | Responsibility                                     |
| stabilised degraded wetland systems. |                            | 5.2.3 <b>Restrict earthworks and structural works to designated work areas; avoid over-excavation and unnecessary disturbance beyond the approved footprint</b>       |                                                                                                   |                                                                                                                       |                                                    |
|                                      |                            | 5.2.4 <b>Rehabilitation method statements to be compiled by the Contractor and approved by the Aquatic Ecologist per wetland</b>                                      | Compilation of method statements for each wetland                                                 | Prior to commencement                                                                                                 | ECO, Aquatic Ecologist and Contractor              |
|                                      |                            | 5.2.5 <b>Reshaping (i.e. disturbance of watercourse soils during excavation and shaping) and removal of sediment from dams (and potentially Reach D)</b>              | Compilation of method statements for each wetland                                                 | Dry season only (September to early March)                                                                            | ECO and Contractor (overseen by aquatic ecologist) |
|                                      |                            | 5.2.6 <b>Reshaping should be followed immediately by planting of appropriate densities of locally indigenous plants suited to the target zone</b>                     | Monitoring of weather forecast prior to commencement of earthworks                                | Prior to earthwork activities                                                                                         |                                                    |
|                                      |                            | 5.2.7 <b>Where significant rainfall events outside of the “normal” wet season occur, earthworks and sediment removal should be avoided</b>                            |                                                                                                   |                                                                                                                       |                                                    |
|                                      |                            | 5.2.8 <b>Restrict earthworks and structural works to designated work areas; avoid over-excavation and unnecessary disturbance beyond the approved footprint</b>       | Routine inspections of wetland rehabilitation areas and buffer zones                              | Weekly                                                                                                                | ECO                                                |
|                                      |                            |                                                                                                                                                                       |                                                                                                   | At least once every 2 months                                                                                          | Ecologist                                          |
|                                      |                            | 5.2.9 <b>Retain existing indigenous wetland vegetation where feasible</b>                                                                                             | Monitor vegetation establishment and survival rates within revegetated wetland and riparian areas | Throughout active rehabilitation                                                                                      | ECO and Contractor (overseen by aquatic ecologist) |
|                                      |                            | 5.2.10 <b>Remove woody alien vegetation and accumulated debris incrementally to minimise disturbance and allow progressive stabilisation</b>                          |                                                                                                   | Revegetation and planting should be aligned with the autumn-winter rainfall period to maximise establishment success; |                                                    |
|                                      |                            | 5.2.11 <b>Stabilise disturbed wetland margins and wetland surfaces progressively following any intervention; do not leave bare soils exposed for extended periods</b> | Assess erosion and stability of disturbed areas following intervention                            |                                                                                                                       |                                                    |
|                                      |                            | 5.2.12 <b>Revegetate disturbed areas around dam margins with indigenous wetland and riparian species following structural works</b>                                   | Monitor for invasive alien plant regrowth within cleared wetland and                              |                                                                                                                       |                                                    |

| Environmental aspect or impact | Impact Management Outcomes                                            | Impact Management Actions                                                                                                                                                                                                                           | Monitoring Actions                                                                                                    |                                |                                                    |
|--------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------|
|                                |                                                                       |                                                                                                                                                                                                                                                     | Method                                                                                                                | Frequency                      | Responsibility                                     |
|                                |                                                                       | 5.2.13 Newly revegetated areas to be protected from trampling and unnecessary disturbance during the establishment period                                                                                                                           | riparian areas and schedule follow-up clearing accordingly                                                            |                                |                                                    |
|                                |                                                                       | 5.2.14 Retain existing indigenous riparian vegetation adjacent to dam systems wherever feasible                                                                                                                                                     | Monitor hydrological response within rehabilitated wetland areas, including water retention and flow path restoration |                                |                                                    |
|                                |                                                                       | 5.2.15 Unless for the purposes of rehabilitation within wetland areas, avoid machinery access within saturated wetland areas wherever possible; where unavoidable, use low ground-pressure equipment and limit access to approved crossing points   | Record all non-compliance incidents, spill events, and corrective actions taken                                       |                                |                                                    |
|                                |                                                                       | 5.2.16 Compost and soil amendment materials to be free of invasive species propagules before application within wetland buffer zones                                                                                                                | Photographic monitoring at fixed photo-points within wetland systems                                                  |                                |                                                    |
|                                |                                                                       | 5.2.17 Only indigenous and site-appropriate species to be used for revegetation of wetland and riparian areas                                                                                                                                       | Before, during, and after intervention                                                                                |                                |                                                    |
|                                |                                                                       | 5.2.18 Irrigation where required to be undertaken in a controlled, water-efficient manner                                                                                                                                                           |                                                                                                                       |                                |                                                    |
|                                | Establishment of indigenous aquatic vegetation and macroinvertebrates | 5.2.19 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 ( <i>Stuckenia pectinata</i> )); | Planting of the appropriate aquatic vegetation (if needed)                                                            | After excavation work in dams  | ECO and Contractor (overseen by aquatic ecologist) |
|                                | Sediment mobilisation prevented/minimised                             | 5.2.20 Minimise sediment mobilisation into downstream systems throughout all activities; install temporary sediment control measures (brush packs, jute matting) where required                                                                     | Assess sediment movement following interventions                                                                      | During and after interventions | ECO and Contractor (overseen by aquatic ecologist) |
|                                |                                                                       | 5.2.21 Avoid works during periods of elevated flow, saturated conditions, or heavy rainfall where there is an increased risk of sediment mobilisation or environmental damage                                                                       | Monitor sediment movement and downstream water quality impacts during sediment removal and reshaping activities       |                                |                                                    |
|                                |                                                                       | 5.2.22 Prevent excessive sediment release into downstream wetland systems during                                                                                                                                                                    |                                                                                                                       |                                |                                                    |

| Environmental aspect or impact                           | Impact Management Outcomes                                                                                                                                                            | Impact Management Actions                                                                                                                                                                                                                                                                                                                                                                                                                                  | Monitoring Actions                                                                                                                                                                                                                      |                                        |                                                    |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------|
|                                                          |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Method                                                                                                                                                                                                                                  | Frequency                              | Responsibility                                     |
|                                                          |                                                                                                                                                                                       | <b>sediment excavation and dam reshaping activities</b>                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                         |                                        |                                                    |
|                                                          | Hydrological connectivity and flow from dams are improved                                                                                                                             | 5.2.23 <b>Minimise disruption to flow during implementation wherever feasible</b>                                                                                                                                                                                                                                                                                                                                                                          | Monitor dam water levels and outflow performance following adjustment of syphon (or other) outflow structures                                                                                                                           | During and after interventions         | ECO and Contractor (overseen by aquatic ecologist) |
|                                                          |                                                                                                                                                                                       | 5.2.24 <b>Assess hydrological connectivity between dam system and associated wetland areas following outflow rehabilitation.</b>                                                                                                                                                                                                                                                                                                                           | Monitor soil and surface water levels in the dams. via a combination of monitored soil and surface water levels in the dams and downstream.<br><br>Installation of monitoring piezometers for these purposes is recommended.            | Before, during and after interventions | ECO and Contractor (overseen by aquatic ecologist) |
|                                                          |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Photographic monitoring at each dam.                                                                                                                                                                                                    | Before, during and after intervention  | ECO and Contractor                                 |
| <b>5.3 Erosion and destabilisation due to earthworks</b> | Earthworks and structural stabilisation activities support hydrological restoration, erosion control, and slope stabilisation within degraded or erosion-prone areas of the property. | 5.3.1 <b>Obtain engineering input into structure designs (weirs), to reduce the risk of failure</b>                                                                                                                                                                                                                                                                                                                                                        | Detailed design of rehabilitation methods and associated method statements to be provided                                                                                                                                               | Prior to commencement                  | ECO and Contractor                                 |
|                                                          |                                                                                                                                                                                       | 5.3.2 <b>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</b> | Routine inspections of earthworks areas for erosion, instability, or excessive disturbance<br><br>Inspect gabion baskets, reno mattresses, retaining structures, and log retaining structures for structural integrity and performance. | Throughout active rehabilitation       | ECO and Contractor (overseen by aquatic ecologist) |

| Environmental aspect or impact              | Impact Management Outcomes        | Impact Management Actions                                                                                                                                                                                                 | Monitoring Actions                                                                                                                                                                                 |                                                |                    |
|---------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------|
|                                             |                                   |                                                                                                                                                                                                                           | Method                                                                                                                                                                                             | Frequency                                      | Responsibility     |
|                                             |                                   | 5.3.3 <b>Allow for rehabilitation of disturbed areas following structural installation which may need to include further earthworks, bank shaping, replanting</b>                                                         | Monitor sediment movement and downstream impacts<br><br>Photographic monitoring at earthworks and structural installation locations                                                                | Before, during and after earthworks activities |                    |
|                                             |                                   | 5.3.4 <b>Restrict earthworks to designated work areas; machinery operators to remain within approved access routes where possible</b>                                                                                     | Inspect drainage lines and rehabilitated hydrological features for blockage or instability                                                                                                         | Throughout active rehabilitation               | ECO and Contractor |
|                                             |                                   | 5.3.5 <b>Avoid excessive disturbance of intact vegetation surrounding installation areas</b>                                                                                                                              |                                                                                                                                                                                                    |                                                |                    |
|                                             |                                   | 5.3.6 <b>Cease earthworks during unsafe or environmentally unsuitable weather conditions</b>                                                                                                                              | Monitor vegetation establishment and stabilisation success in areas surrounding structural works                                                                                                   |                                                |                    |
|                                             |                                   | 5.3.7 <b>Avoid machinery access within saturated wetland areas wherever feasible</b>                                                                                                                                      |                                                                                                                                                                                                    |                                                |                    |
|                                             |                                   | 5.3.8 <b>Place geotextile materials beneath gabion and reno mattress installations where required to prevent scour and undermining</b>                                                                                    | Record all non-compliance incidents, and corrective actions taken                                                                                                                                  |                                                |                    |
|                                             |                                   | 5.3.9 <b>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> | 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. | Throughout active rehabilitation               | ECO and Contractor |
|                                             |                                   | 5.3.10 <b>Such stockpiles or waste piles are removed as quickly as possible;</b>                                                                                                                                          |                                                                                                                                                                                                    |                                                |                    |
|                                             |                                   | 5.3.11 <b>Structural works not to unnecessarily obstruct natural flow path</b>                                                                                                                                            |                                                                                                                                                                                                    |                                                |                    |
|                                             |                                   | 5.3.12 <b>Stabilise and revegetate disturbed areas progressively following completion of structural installation</b>                                                                                                      |                                                                                                                                                                                                    |                                                |                    |
|                                             |                                   | 5.3.13                                                                                                                                                                                                                    |                                                                                                                                                                                                    |                                                |                    |
| 5.4 <b>Disturbance to watercourses as a</b> | Waste is managed appropriately to | 5.4.1 <b>A waste management plan prepared by the contractor must be implemented.</b>                                                                                                                                      | Method statement for stockpiling and waste                                                                                                                                                         | Prior to commencement.                         | ECO and Contractor |

| Environmental aspect or impact | Impact Management Outcomes                             | Impact Management Actions                                                                                                                                                                                                                                                                              | Monitoring Actions                                                                                                                                                                                          |                                  |                    |
|--------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|
|                                |                                                        |                                                                                                                                                                                                                                                                                                        | Method                                                                                                                                                                                                      | Frequency                        | Responsibility     |
| result of waste and pollution  | avoid harming or polluting the surrounding environment | 5.4.2 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.                                                                                                                                                      | management must be approved.                                                                                                                                                                                |                                  |                    |
|                                |                                                        | 5.4.3 Designate a waste management area, which should be an area of hardstanding with a roof and sides, or consist of separate bins and skips.                                                                                                                                                         | Waste removal and disposal to be monitored via site audits (disposal slips and waybills).<br><br>Monitor visually for waste in the no-go areas and record noncompliance, incidents and corrective measures. | Throughout active rehabilitation | ECO and Contractor |
|                                |                                                        | 5.4.4 Litter and construction waste should be collected on site by the end of each day and stored in bins, skips, or other suitable storage area.                                                                                                                                                      |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.5 Food waste must be stored in bins or skips that are covered and cannot be accessed by animals (including flies, rodents or baboons).                                                                                                                                                             |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.6 Waste should be separated into hazardous, general, and recyclable waste streams, with clearly designated bins and skips for each waste type.                                                                                                                                                     |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.7 No waste burning will occur unless specifically authorised by the relevant authority.                                                                                                                                                                                                            |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.8 No waste material will be disposed of within wetland systems or drainage lines.                                                                                                                                                                                                                  |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.9 If the volumes of waste stored exceed 80m3 for hazardous waste and/or 100m3 for general waste the National Environmental Management: Waste Act (NEM:WA) National Norms and Standards for the Storage of Waste in terms of Government Notice (GN) No. 926 of 29 November 2013 must be adhered to. |                                                                                                                                                                                                             |                                  |                    |
|                                |                                                        | 5.4.10 Proof of disposal (waybills or waste disposal slips) must be retained and kept on file for auditing purposes.                                                                                                                                                                                   |                                                                                                                                                                                                             |                                  |                    |

| Environmental aspect or impact                                                                   | Impact Management Outcomes | Impact Management Actions                                                                                                                                                                                                                                                                                                                                                                               | Monitoring Actions                                                                                  |                                                                   |                    |
|--------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|
|                                                                                                  |                            |                                                                                                                                                                                                                                                                                                                                                                                                         | Method                                                                                              | Frequency                                                         | Responsibility     |
| Hazardous waste is managed appropriately and prevented from entering the surrounding environment |                            | 5.4.11 <b>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;</b> | Ensure Method Statement for handling and storage of hazardous material is in place and implemented. | Prior to establishment and storage of hazardous material on site. | ECO and Contractor |
|                                                                                                  |                            | 5.4.12 <b>Hazardous wastes, including materials contaminated with oils and hydrocarbons, must be removed from site by a suitably licensed contractor and manifests provided</b>                                                                                                                                                                                                                         | Monitor and record all non-compliance incidents and corrective actions taken                        | Throughout active rehabilitation                                  | ECO and Contractor |
|                                                                                                  |                            | 5.4.13 <b>Refuelling and fuel storage to occur outside wetland areas and drainage lines; drip trays to be used beneath stationary machinery</b>                                                                                                                                                                                                                                                         | Monitor and record non-compliance and incidents and corrective actions.                             | Throughout active rehabilitation                                  | ECO and Contractor |
|                                                                                                  |                            | 5.4.14 <b>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</b>                                                                                                                                                                                                           |                                                                                                     |                                                                   |                    |
|                                                                                                  |                            | 5.4.15 <b>Areas where construction vehicles / machinery are refuelled or serviced must be clearly demarcated on the site and on site plans; should be located outside of the delineated wetland buffers; should be covered and bunded, so as to minimize the risk of runoff of fuels into extant or planned watercourses.</b>                                                                           |                                                                                                     |                                                                   |                    |
|                                                                                                  |                            | 5.4.16 <b>Faulty or leaking machinery to be repaired immediately or removed from site</b>                                                                                                                                                                                                                                                                                                               |                                                                                                     |                                                                   |                    |

| Environmental aspect or impact                                                 | Impact Management Outcomes                                                                                                                                                        | Impact Management Actions                                                                                                                                                   | Monitoring Actions                                                                                                                    |                                  |                    |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|
|                                                                                |                                                                                                                                                                                   |                                                                                                                                                                             | Method                                                                                                                                | Frequency                        | Responsibility     |
| <b>5.5 Construction-related impacts associated with boardwalk installation</b> | Formalising existing uncontrolled crossings causing ongoing erosion, compaction, and vegetation disturbance while maintaining necessary site access for rehabilitation operations | 5.5.1 <b>Limit boardwalk alignments strictly to the footprint of existing informal crossing points; no new crossing points to be created</b>                                | Inspect installed boardwalk crossings and support structures for stability and integrity at regular intervals                         | Throughout active rehabilitation | ECO and Contractor |
|                                                                                |                                                                                                                                                                                   | 5.5.2 <b>Mark out the approved alignment and confirm with the Ecologist before commencement of any ground preparation</b>                                                   |                                                                                                                                       |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.3 <b>Minimise ground preparation and excavation within the wetland crossing footprint; use hand tools where feasible to reduce soil disturbance</b>                     | Monitor surrounding wetland vegetation and hydrological conditions for evidence of disturbance or impeded flow following installation |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.4 <b>Installation within wetland areas to minimise hydrological disruption; boardwalk design to allow natural water and small faunal movement beneath the structure</b> |                                                                                                                                       |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.5 <b>Structures to be raised so that the undersides of the boardwalks allow at least 300 mm between the structure and ground level</b>                                  | Assess revegetation success in disturbed areas surrounding crossing installations                                                     |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.6 <b>Retain existing indigenous vegetation adjacent to crossing alignments where feasible</b>                                                                           |                                                                                                                                       |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.7 <b>Rehabilitate and revegetate disturbed areas surrounding the installation zone progressively following completion</b>                                               | Monitor informal tracks that have been replaced to confirm they are closed, stabilised, and recovering                                |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.8 <b>Manage construction waste and surplus materials; no waste to be disposed of within wetland systems or drainage lines</b>                                           | Record all non-compliance incidents and corrective actions taken                                                                      |                                  |                    |
|                                                                                |                                                                                                                                                                                   | 5.5.9 <b>Restrict vehicle access to approved routes during installation; no heavy machinery within wetland areas unless specifically approved by the Ecologist</b>          | Photographic monitoring at each crossing location                                                                                     |                                  |                    |
|                                                                                | Cement and/or concrete (and any other construction materials) are                                                                                                                 | 5.5.10 <b>Method statements regarding the handling and disposal of construction-related materials such as cement or concrete should be prepared by the contractor</b>       | Method statement for cement/concrete handling must be approved                                                                        | Prior to commencement.           | ECO and Contractor |

| Environmental aspect or impact            | Impact Management Outcomes                                                 | Impact Management Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Monitoring Actions                                                                                                 |                                  |                    |
|-------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|
|                                           |                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Method                                                                                                             | Frequency                        | Responsibility     |
|                                           | managed appropriately prevented from polluting the surrounding environment | 5.5.11 <b>The use of cement or concrete on site should be carefully controlled; should not be allowed to spill onto on soil or vegetated surfaces that are not ear-marked for boardwalk installation, and should be carried out such that no contaminated runoff passes into any watercourse or drainage system.</b>                                                                                                                                                                                                                                                                                                            | Monitor and record non-compliance and incidents and corrective actions.                                            | Throughout rehabilitation active | ECO and Contractor |
| <b>5.6 Fire prevention and management</b> | Uncontrolled wildfires are prevented on the property                       | 5.6.1 <b>No open fires will be permitted within rehabilitation areas unless authorised</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Monitor and record non-compliance and incidents and corrective actions.                                            | Throughout rehabilitation active | ECO and Contractor |
|                                           |                                                                            | 5.6.2 <b>Biomass accumulation from vegetation clearing will be managed to reduce excessive fire load</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                    |                                  |                    |
|                                           |                                                                            | 5.6.3 <b>Fire-fighting equipment will be available during all machinery operations and high-risk activities</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                    |                                  |                    |
|                                           |                                                                            | 5.6.4 <b>Workers must be briefed on fire response procedures prior to commencement of high-risk works</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                    |                                  |                    |
| <b>5.7 Faunal impact</b>                  | Minimise disturbance and mortality of animals                              | 5.7.1 <b>Avoid direct contact with any animals entering or found within the works area, allowing them to move off on their own. If relocation is required, reserve staff must be notified and consulted to provide guidance on the appropriate approach and relocation method.</b><br>5.7.2 <b>Clearly display contact information for reserve management and ensure they are notified of any animals within the works area.</b><br>5.7.3 <b>Maintain a register of any animal relocations and incidents during the construction period including details of the animal moved, the person responsible, and the final state.</b> | Inspect site camp for display of contact information.<br><br>Inspect register on a regular basis for completeness. | During each inspection           | ECO and Contractor |

| Environmental aspect or impact | Impact Management Outcomes | Impact Management Actions                                                                                                                                                               | Monitoring Actions                                       |                            |                            |
|--------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------|----------------------------|
|                                |                            |                                                                                                                                                                                         | Method                                                   | Frequency                  | Responsibility             |
|                                |                            | 5.7.4 <b>Minimise the time during which excavations and trenches are left open.</b>                                                                                                     | Inspect register on a regular basis for completeness.    | During regular inspections | During regular inspections |
|                                |                            | 5.7.5 <b>Inspect open excavations and trenches daily and relocate any trapped amphibians, reptiles, or mammals as per item 5.7.1.</b>                                                   |                                                          |                            |                            |
|                                |                            | 5.7.6 <b>Maintain a register of trench inspections on a daily basis recording the name of the person responsible and the details of any animals found (species, number, condition).</b> |                                                          |                            |                            |
|                                |                            | 5.7.7 <b>Provide training and awareness on terrestrial animals for all site staff and workers prior to construction and/or before an individual may work on site.</b>                   | Inspect training material and registers for completeness | During regular inspections | ECO                        |

## 6 ENVIRONMENTAL AWARENESS TRAINING PLAN

This section outlines the training by which the authorisation holder (via its appointed contractor during the construction phase) will inform its employees of environmental risks and the manner in which risks must be dealt with to avoid pollution or degradation of the environment. It may be adapted as needed to suit the circumstances in which it is implemented.

| Course                                                                 | Required attendees                                                                                                                                                                                                                                                                            | Presented by                                  | Course content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Timing                                      | Records to be kept                                                                                                                                                                   |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction phase Environmental Awareness Training for manager</b> | <ul style="list-style-type: none"> <li>Project Manager appointed by the authorisation holder</li> <li>Principal contractor's contract manager, site agents, and assistant site agents (as applicable)</li> <li>Contractor's designated environmental officer or SHE representative</li> </ul> | ECO                                           | <ul style="list-style-type: none"> <li>Overview of environmental authorisations and permits granted</li> <li>Basic environmental law</li> <li>Roles of the ECO, authorisation holder, project manager, and contractor</li> <li>Purpose and content of method statements</li> <li>Site sensitivities, including locations and sensitivity of wetland areas and conservation area</li> <li>Management actions and measures for the construction phase as detailed in this EMPr</li> <li>Record keeping requirements</li> <li>Emergency procedures</li> <li>Reporting and compliance monitoring</li> </ul> | Prior to commencement of construction       | <ul style="list-style-type: none"> <li>Declaration of adherence to Construction phase EMPr, signed by Contractor's representative</li> <li>Register of attendance</li> </ul>         |
| <b>Environmental Awareness Training for site personnel</b>             | <ul style="list-style-type: none"> <li>All site staff and personnel, including temporary staff and visitors to site</li> <li>Maximum of 20 attendees at any one session</li> </ul>                                                                                                            | Contractor's designated environmental officer | Environmental do's and don'ts, including: <ul style="list-style-type: none"> <li>Access to work areas, location and identification of no-go areas</li> <li>Damage to or picking of vegetation</li> <li>Managing animals found on site</li> <li>Smoking and fires</li> <li>Storing and handling fuels and oils</li> </ul>                                                                                                                                                                                                                                                                                | Before any staff member begins work on site | <ul style="list-style-type: none"> <li>Register of attendance, identifying all attendees by name and ID number, the topics covered, the presenter, and the date and time.</li> </ul> |

| Course | Required attendees | Presented by | Course content                                                                                                                                                                                                                                                                                                                                                                                                              | Timing | Records to be kept |
|--------|--------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------|
|        |                    |              | <ul style="list-style-type: none"> <li>• Storing and handling chemicals</li> <li>• Management of cement, cement bags, slurry, and wash water</li> <li>• Dust and noise</li> <li>• Water wastage</li> <li>• Waste management and litter</li> <li>• Waste site management</li> <li>• Ablution facilities</li> <li>• Plant and machinery maintenance and load management</li> <li>• Accident and incident reporting</li> </ul> |        |                    |

## 7 MAINTENANCE MANAGEMENT PLAN

### 7.1 Background and Introduction

Please see section 1.1 of the EMPr for a description of the proposed rehabilitation project. The maintenance of rehabilitated areas may include activities listed in terms of the National Environmental Management Act, 1998 and the Environmental Impact Assessment Regulations, 2014 (as amended).

An Environmental Impact Assessment process in terms of the National Environmental Management Act (107 of 1998), a Water Use Authorisation Application in terms of the National Water Act (36 of 1998) and various specialist studies have been undertaken for the proposed development. This Maintenance Management Plan (MMP) forms part of the Environmental Management Programme for the development and should be implemented after the major earthworks, boardwalk installation and rehabilitation interventions within the watercourses are completed. Maintenance activities within the site boundaries will be implemented by Grootplaat (Pty) Ltd.

#### 7.1.1 Scope

This Maintenance Management Plan (MMP) is intended to govern the implementation of maintenance activities in and around watercourses in such a way as to prevent, minimise or mitigate negative impacts and risks. Maintenance activities are, as defined in the EIA Regulations of 2014 (as amended), *actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint*. This MMP is applicable to the maintenance activities related to the development on Farm 15/37 and the remainder RE/37. These activities are anticipated to include:

- Maintenance of road crossings within wetlands on the site;
- Maintenance of wetland areas, including selective clearing of vegetation, reshaping of wetlands, and rehabilitation with locally indigenous species

Maintenance activities as listed above may constitute listed activities identified in terms of the NEMA EIA Regulations, 2014 (as amended), namely

- Activity 19, Listing Notice 1: The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development setback; [or] (b) is for maintenance purposes undertaken in accordance with a maintenance management plan
- Activity 12, Listing Notice 3: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a MMP.

#### **i. Western Cape**

- ii. Within critical biodiversity areas identified in bioregional plans

This MMP has been prepared principally in compliance with the guidelines for the preparation of Maintenance Management Plans provided by the Western Cape Government Department of Environmental Affairs and Development Planning (dated July 2017). The purpose of the MMP is to maintain infrastructure in a manner that either improves the current state of, and/or reduces negative impacts to ensure that ecosystem services are preserved/improved and to prevent further deterioration of the watercourse.

### 7.1.2 Author

**Jeremy Rose** (Infinity Environmental) has 12 years' experience in the field of environmental management and impact assessment and has prepared over 100 environmental impact assessments and related instruments. He is registered as an Environmental Assessment Practitioner (EAPASA 2019/1116) and a professional natural scientist in the field of Environmental Science.

**Qualifications:** BSc Hons. **Registrations and associations:** EAPASA; Pr.Sci.Nat. (Reg No 120148); IAIASA;

**Dr Elizabeth (Liz) Day** (Liz Day Consulting (Pty) Ltd) has worked as a freshwater ecologist for the past 30+ years, primarily in the Western Cape, and has produced over 900 technical and Environmental Impact Assessment reports on rivers and/or wetlands. She is registered as a professional natural scientist in the fields of Aquatic Science, Biological Science, Ecological Science and Zoological Science.

**Qualifications:** BA, BSc, BSc Hons, PhD. **Registrations and associations:** IAIASA; WISA; Pr.Sci.Nat. (Reg No 004806).

### 7.1.3 Legal status

This MMP forms part of the Environmental Management Programme compiled for the EIA and WULA processes. This MMP should be read in conjunction with the remainder of the Environmental Management Programme. The MMP may also be defined or adopted by the competent authority in terms of the EIA Regulations. Any other applicable statutory requirement must also be complied with, including any obligations under the National Water Act, 1998 (Act 36 of 1998).

## 7.2 Terms and acronyms

|       |                                       |                  |      |                                                                          |
|-------|---------------------------------------|------------------|------|--------------------------------------------------------------------------|
| BOCMA | Breede-Olifants Management Website    | Catchment Agency | EMPr | Environmental Management Programme                                       |
| CCT   | City of Cape Town                     |                  | DFFE | Department of Forestry Fisheries and the Environment                     |
| EAP   | Environmental Assessment Practitioner |                  | MMP  | Maintenance Management Plan                                              |
| ECO   | Environmental Control Officer         |                  | NEMA | National Environmental Management Act, (Act No. 107 of 1998), as amended |
| EA    | Environmental Authorisation           |                  |      |                                                                          |
| EIA   | Environmental Impact Assessment       |                  | WUL  | Water Use Licence                                                        |

## 7.3 Site Location and Description

The Grootplaat rehabilitation project is focused on the watercourses on Farm 15/37 and the remainder RE/37 near Aurora within the Bergrivier Municipality, Western Cape. The property extends across approximately 2 146 ha and is situated within the upper catchment of the Kuilders River system. The site is a high plateau historically used for agriculture, with a valley-bottom watercourse and various associated habitats. The property has been subject to historical agricultural activities, hydrological modification and associated infrastructure development. Over time, these activities, together with the proliferation of invasive alien plant vegetation, altered hydrological processes, drainage modifications, channelisation, erosion and sedimentation, have

resulted in prolonged degradation of watercourses and their associated freshwater ecosystems, which reduced the hydrological connectivity, ecological functioning of these aquatic system.

The project seeks to restore and enhance the hydrological functioning, ecological integrity and increase the resilience of the landscape through targeted rehabilitation interventions. Key rehabilitation interventions include the clearing and management of invasive vegetation, rehabilitation of degraded wetland and riparian habitats, hydrological rehabilitation of dam systems, installation of erosion control structures where required, revegetation with indigenous species, rehabilitation of historically cultivated areas, soil amelioration and formalisation of wetland crossings to minimise future impacts on sensitive aquatic environments. The rehabilitation approach is informed by detailed wetland delineations, freshwater and terrestrial biodiversity assessments which identified priority areas for intervention and informed the design of rehabilitation measures.

## 7.4 Aquatic features

The watercourses which may be impacted on by the proposed activities are described below. Figure 7-1 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.

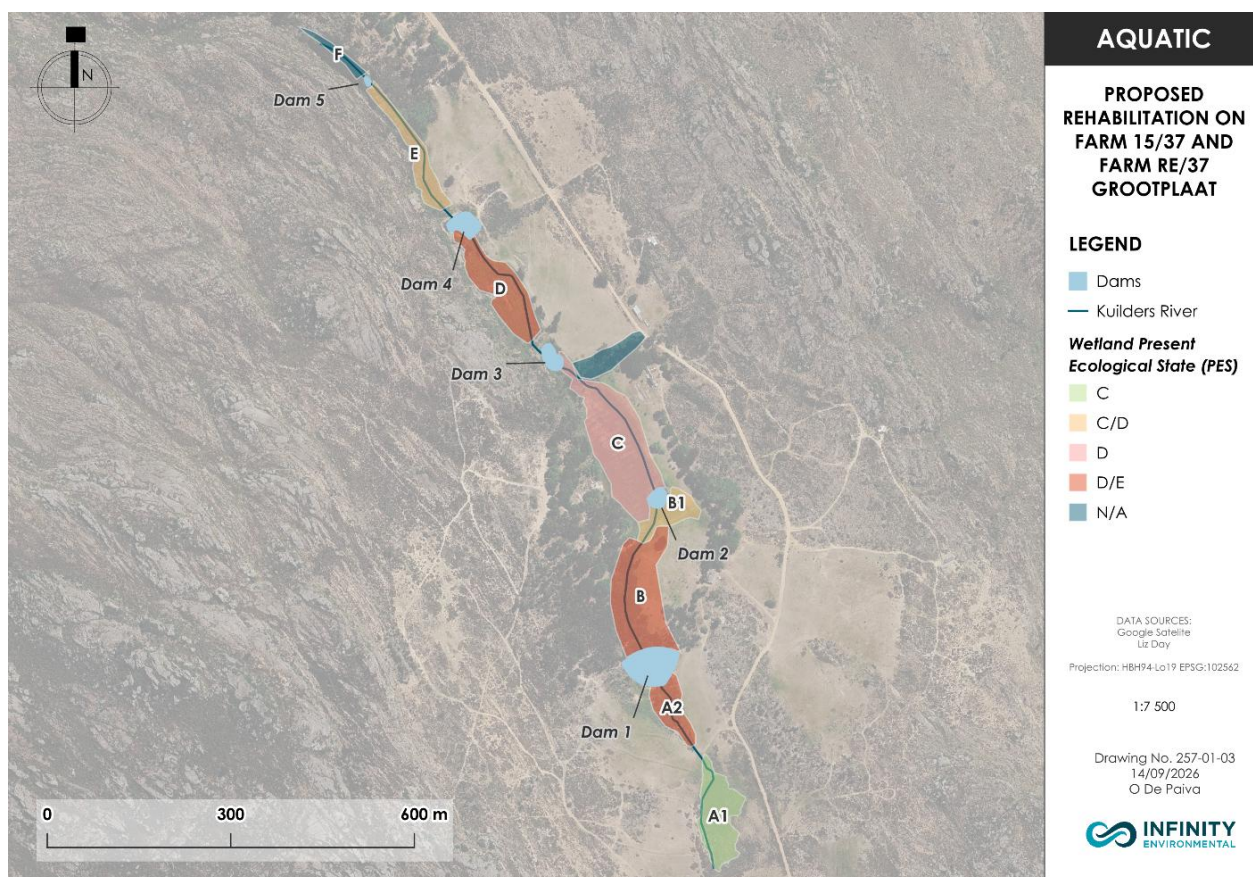


Figure 7-1: Wetland delineation map of watercourses

### 7.4.1 Wetland Reach A1

This is a headwater seep wetland that forms part of the source area of the Kuilders River system. It is characterised by seasonally saturated soils, wetland vegetation (*Centella sp.*, *Juncus capensis* and sparse *Cenchrus macrourus*) and diffuse surface and subsurface flows. The seep is wide and was disturbed by past land-use impacts that include agriculture evident with ploughing in sections of the property and disturbed vegetation bands within the delineated seep. The north-east to southwest running dirt road interrupts the flow of the seep and resulted in the historic concentration of flows from the seep, particularly during flood conditions into an incised channel that leads into Dam 1.

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).

#### 7.4.2 Dam 1

This is an artificial instream depression comprising an earth-wall structure with a high-level overflow on its eastern side. At present, the dam wall is structurally compromised by large trees including invasive alien species. The lower parts of the dam are periodically deeply inundated and support limited plants, with few plant species able to survive the conditions from deep inundation to seasonal drought. The dam has altered the natural flow regime by impounding water that would historically have flowed downstream into wetlands.

#### 7.4.3 Wetland Reach B

A formerly unchanneled valley bottom wetland that has been modified by flow reduction upstream at Dam 1, channelisation, alien vegetation invasion and hydrological alteration. Within this reach, there is a small hillslope seep wetland that contributes seasonal discharge into wetland reach B. 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.

#### 7.4.4 Seep Wetland B1

This wetland enters the main valley bottom wetland (Wetland Reach B) just upstream of Dam 2. 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.

#### 7.4.5 Dam 2

Relatively small dam located within the valley bottom wetland system which developed due to the buildup of water in dam and upslope of its surrounding berms and other flow impediments. The

dam provides open-water habitat and contributes the local wetland formation upstream of the dam.

#### 7.4.6 Wetland Reach C

This reach (downstream of dam 2) is a valley bottom wetland that has become channelled due to upstream impoundment, flow modification and historical disturbance. It is influenced by seepage from adjacent slopes and supports wetland vegetation.

Alien vegetation; loss of indigenous vegetation and changes in wetland / river channel morphology are 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.

#### 7.4.7 Dam 3

A sump installed within the dam allows the passage of accumulated water to downstream reaches. The dam supports wetland vegetation around its margins but has substantially altered natural flow processes. The dam also 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.

#### 7.4.8 Wetland Reach D

This reach is characterised by a deeply incised and channelised valley bottom wetland, which has resulted in drainage of the surrounding wetland and lowering of the water table. It is dominated by bracken fern (*Pteridium aquilinum*). 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.

#### 7.4.9 Dam 4

This dam comprises an in-channel dam, with a concrete spillway and eight pipe outlets onto the concrete spillway overflow area. The dam contains limited open water and supports indigenous wetland vegetation around wetter margins. The dam continues to alter the hydrology of the downstream system.

#### 7.4.10 Wetland Reach E

This reach remains channelised and supports indigenous wetland vegetation despite impacts from hydrological modification and historical alien invasion. 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.

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 and with the understanding that hydrology has been significantly impacted by upstream impoundment as well as by alien invasion.

#### 7.4.11 Dam 5

This dam/ impoundment, created by a concrete weir, was completely infilled with sediment at the time of the April 2026 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.

#### 7.4.12 Reach F

This reach represents the transition from wetland habitat to a foothill stream with a defined channel and bedrock-controlled geomorphology. Although affected by upstream dams and past alien invasion, it retains good ecological functioning.

This reach of the watercourse has been assessed as PES Category C, using a modified version of the Habitat Integrity rating of Kleynhans (1999) (Southern Waters 2000) 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.

### 7.5 Vegetation

The study area lies within the Core Cape Subregion (CCR) of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The study area is also part of the Fynbos biome and is located within the Northwest Fynbos bioregion. This bioregion has a fairly distinct and very rich flora, with a particularly high number of locally and regionally endemic plant species, as well as plant Species of Conservation Concern (Raimondo et al 2009).

The entire study area falls within what is mapped as Piketberg Sandstone Fynbos (Mucina & Rutherford). This vegetation type is listed as being of Least Concern on a national basis (Government of South Africa 2022). Some 82% of the original total extent of this vegetation unit still remains, <1% is formally conserved, and the conservation target is 29% of total extent (Rouget et al 2004). 2023).

Indigenous vegetation cover in the study area ranges from 5-100%. Habitat diversity is high. Some areas are permanent wetland with near intact flora and others are floodplain and seep that have been heavily disturbed and support almost no indigenous species currently. The areas fringing the actual study area are characterised by exposed sandstone bedrock, and support a high diversity of plant species, including all the SoCC recorded in the immediate area. Many different alien invasive plant species are present, ranging from mature pines, gums, poplars and oak trees to annual herbs and grasses. Many of the woody alien invasives (*Quercus*, *Pinus*, *Eucalyptus*, *Acacia* and *Populus*) have already been largely removed from the actual project area, but some of the smaller woody species still remain (*Acacia mearnsii*, *A. longifolia*, *A. saligna*, *Eucalyptus* sp., *Sesbania punicea*).

Notable indigenous species seen in the wetland areas in the study area include *Fuirena hirsuta*, *Zantedeschia aethiopica*, *Cyperus glomerata*, *Athanasia crithmifolia*, *Halleria lucida*, *Pteridium aquilinum*, *Senecio halimifolius*, *Cliffortia ruscifolia*, *Aponogeton distachyos*, *Psoralea* sp., *Anatherum eucomum*, *Laurembergia repens*, *Juncus lomatophyllus*, *Capeochloa cincta*, *Nidorella ulmifolia*, and *Cotula turbinata*.

No plant Species of Conservation Concern (SoCC) were recorded within the proposed project area, and none are likely to occur here. Some of the many SoCC recorded (even during this brief survey) within 1000m of the project footprint area include *Leucospermum profugum* (Vulnerable), *Leucadendron discolor* (Vulnerable), *Geissorhiza adriaanii* (not yet assessed; known only from this property), *Adenandra marginata* ssp. *mucronata* (Rare), *Babiana lineolata* (Endangered), *Aspalathus pendula* (Near Threatened), *Leucadendron loranthifolium* (Near Threatened), *Muraltia arachnoidea* (Near Threatened), *Phyllica cuspidata* var. *cuspidata* (Vulnerable) and *Metalasia juniperoides* (Endangered).

### 7.5.1 Vegetation sensitivity

The botanical sensitivity in the project area is all Low and Medium at a regional scale (see Figure 7-2). This is in line with the Screening Tool which maps the whole area as Medium sensitivity for Plant Species.

The Low sensitivity is informed by the underlying vegetation type being widespread and of Least Concern, the heavy previous soil disturbance in these areas, the absence of plant Species of Conservation Concern, the lack of habitat diversity, the absence of high sensitivity rocky and well developed gravelly areas, and low indigenous plant cover and low plant diversity, being dominated by widespread, weedy or alien species.

Medium sensitivity areas also lack any recorded plant SoCC, but have a higher habitat and indigenous plant diversity and a lower percentage of alien invasive species (at least since initial alien clearing), due to lower levels of soil disturbance in these areas.

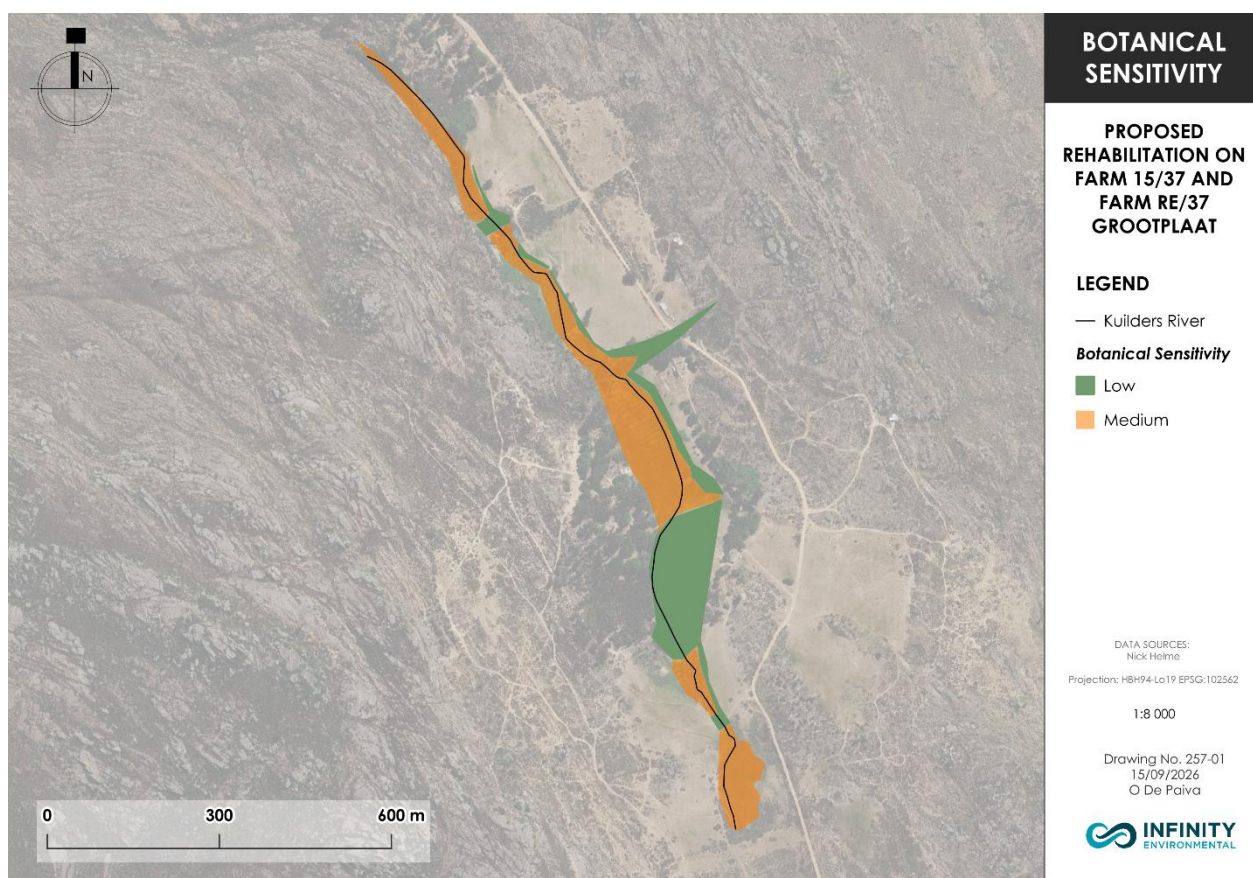


Figure 7-2: Botanical sensitivity map of the study area

## 7.6 Objectives and terms of reference

The terms of reference for this MMP are as follows:

- Describe the site sensitivities based on the botanical and aquatic specialist assessments undertaken
- Identify the environmental risks associated with the maintenance management and rehabilitation activities;
- Identify the measures that can be implemented to avoid or reduce the impacts of maintenance activities on watercourses; and
- Compile a MMP which meets the requirements of the DEA&DP Maintenance Management Plan Guidelines.

## 7.7 Description of maintenance activities

Maintenance work in watercourses or indigenous vegetation on the site is anticipated to include the following activities:

- 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).
- Rehabilitation and restoration works
- Emergency repairs in the event of flood damage or vandalism



## 7.8 Roles and responsibilities

The **Authorisation Holder** (or its successor in title) will be responsible for the maintenance work and appointment of a suitable Contractor. The Authorisation Holder will also ensure, as a signatory to the MMP, that the Contractors fulfil their obligations in terms of this MMP.

The **Contractor** will adhere to the conditions of this MMP and ensure that all of its subcontractors, employees, suppliers, agents and so forth, for whom the Contractor is fully responsible for their actions on site, are fully aware of this MMP, its requirements and the consequences of any breach of the requirements of this MMP. The Contractor is fully responsible for implementing the MMP. The Contractor will ensure that works on site are conducted in an environmentally responsible manner and in accordance with the requirements of this MMP.

## 7.9 Environmental awareness

Before work is done in accordance with this MMP, persons who will be conducting the work must undergo environmental awareness training as outlined in section 5 of the EMPr. Attention should be focused on the following areas of sensitivity:

- Removal/disturbance of riparian vegetation;
- Aquatic habitat disturbance;
- Soil erosion and sedimentation; and
- Water quality degradation due to siltation and debris

## 7.10 General best management practices

The following general management practices mitigation measures should be implemented where required during the maintenance management activities:

### 7.10.1 Site boundaries and no-go areas

The Contractor must demarcate the and sensitive areas and boundaries of the site or area scheduled for maintenance during maintenance management activities as required. The minimum area scheduled for the maintenance activities should be demarcated. Access to the site during maintenance activities must be restricted to ensure to only the required personnel in order to gain access via the designated, controlled access points.

Where at all possible, existing access routes should be used. In cases where none exist, a route should be created through the most degraded area avoiding sensitive/indigenous vegetation areas.

### 7.10.2 Timing of works in watercourses

Repairs and maintenance should be undertaken within the dry season, except for emergency maintenance works or rehabilitation works within wetland areas.

### 7.10.3 Machinery and chemical management

Handling and storage of any pollutants may not take place near the watercourse.

When machinery is used in maintenance works, ensure effective operation with no leaking parts and refuel at a safe distance from the watercourse to manage any accidental spillages and pose no threat of pollution.

### 7.10.4 Flow and habitat maintenance

At no time should the flow of the watercourse be blocked (temporary diversions may be allowed) nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions.

#### 7.10.5 Top soil and rehabilitation

In circumstances which require the removal of any top soil, this must be sufficiently restored through sustainable measures and practices.

Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation.

The build-up of debris/sediment removed from a maintenance site may:

- be utilised for the purpose of in-filling or other related maintenance actions related to managing erosion, which form part of an adopted MMP;
- not be deposited anywhere within the watercourse or wetland buffer area where such action is not part of the proposed maintenance activities. Material that cannot be used for maintenance purposes must be removed out of the riparian area to a suitable stockpile location or disposal site.
- The use of foreign material, such as concrete, rubble, woody debris and/or dry land based soil, is strictly prohibited in maintenance actions, unless for the specific purpose of repairs to existing infrastructure, coupled with appropriate mitigation measures.
- On completion of the maintenance action, the condition of the site in terms of relative topography should be similar to the natural state.

### 7.11 Rehabilitation and restoration measures

The maintenance activities should not typically require rehabilitation measures if implemented in a responsible manner.

The following general measures should be applied where maintenance activities have caused disturbance of the environment:

- The Contractor must be responsible for rehabilitating (including replanting, hydroseeding, etc. where applicable) all areas disturbed during the maintenance activities.
- Any replanting must use indigenous species that are endemic to the region.
- Any invasive alien plants within the disturbed area should be removed.
- Any soil and vegetation cover removed during the maintenance activities should be replaced at the original level.
- All areas where temporary services or access were installed are to be rehabilitated.
- Any rubble or waste associated with the maintenance activities should be removed to an approved disposal site after the maintenance activity is complete.
- Burying or burning rubble or waste on the site is prohibited.
- The site is to be cleared of all litter following the completion of maintenance activities.
- All surfaces are to be checked for waste products from maintenance activities and cleared.

## 7.12 Method statements describing proposed maintenance activities

The following sections are generic method statements for the types of maintenance activities anticipated to occur in and around watercourses after the major earthworks and interventions within the watercourses have occurred. The method statements are applicable to multiple sites. It is anticipated that the restoration ecologist or aquatic ecologist will provide guidance to the Contractor on the mitigation of specific impacts. **Note that the watercourse maintenance measures and actions included in the below tables are largely generic and are subject to change and refinement depending on the environmental context at the time and desired rehabilitation outcomes.**

### 7.12.1 Inspections and monitoring of watercourses

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>Description of maintenance activity</b> | Site inspections of the watercourse, for visual inspections and water quality monitoring if required                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| <b>Applicable sites</b>                    | All                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |
| <b>Responsible person(s)</b>               | Authorisation holder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| <b>Actions</b>                             | <ul style="list-style-type: none"> <li>Undertake regular visual inspections to ensure that               <ul style="list-style-type: none"> <li>Flows are not blocked by sediment buildup, debris, alien invasive vegetation, or indigenous nuisance vegetation</li> <li>Erosion of the wetland and surrounding area has not occurred</li> <li>Litter and waste have not built up in the channel</li> </ul> </li> <li>Undertake water quality monitoring in accordance with the management plan and EMPr (if required).</li> </ul> |                            |
| <b>Impacts</b>                             | Negligible disturbance to vegetation during the inspection                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                            |
| <b>Significance of impacts</b>             | Disturbance to vegetation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Negligible with mitigation |
| <b>Mitigation measures</b>                 | Access to the wetland areas should cause minimal disturbance and avoid known highly sensitive areas.                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| <b>Remedial measures</b>                   | None applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |
| <b>Time period for maintenance actions</b> | Regularly, as well as after significant rainfall events and just prior to the winter rainfall period.                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |

### 7.12.2 Clearing of alien invasive vegetation

|                                            |                                                                                                                                                                                                                                                                                                                                         |  |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Description of maintenance activity</b> | Control of all alien and invasive vegetation on the site, including in watercourses such as <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), and various agricultural weed species within former cultivated areas.              |  |
| <b>Applicable sites</b>                    | All                                                                                                                                                                                                                                                                                                                                     |  |
| <b>Responsible person(s)</b>               | Authorisation holder, government agencies or appointed contractor                                                                                                                                                                                                                                                                       |  |
| <b>Actions</b>                             | <b>Woody alien invasive plant species</b> <ul style="list-style-type: none"> <li>Woody alien invasive plant species occurring on site should be cut with a chainsaw or loppers and their stumps treated with an appropriate herbicide (as described in the EMPr).</li> <li>Cut material should be removed from the wetlands.</li> </ul> |  |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                            | <ul style="list-style-type: none"> <li>Stumps should not be removed by machinery.</li> <li>Hand-pull young plants using gloves or with a puller / popper tool, taking care to remove the entire root system.</li> <li>Cut the larger trees, smaller trees and pull juveniles with an appropriate tool depending on the size of the plants. Apply herbicide containing a colorant onto the standing remainder of the cut stumps and stems immediately after cutting or at very longest within 2 hours after felling or cutting.</li> <li>The herbicide is to be applied with a brush or appropriate device, ensuring no spillage occurs onto the surrounding vegetation or onto the ground. No general foliage herbicide spray must be used for the control of the woody species.</li> <li>Keep disturbance of surrounding vegetation and soil at a minimum during maintenance works</li> </ul> <p><b>Annual and herbaceous species</b></p> <ul style="list-style-type: none"> <li>Herbaceous invasive species within wetland areas should be treated with an appropriate herbicide.</li> <li>Spraying may occur only when surface water levels are low, and may not occur if plants are under stress, such as on very hot days or in very dry or dusty conditions.</li> <li>Surfactants may not be used in wetland areas.</li> </ul> |                          |
| <b>Impacts</b>                             | <ul style="list-style-type: none"> <li>Minor disturbance to the local indigenous vegetation within the aquatic habitats as a result of removal of alien invasive plants.</li> <li>Clearance of alien vegetation from the area and subsequent improvement in the ecological health where construction and rehabilitation has taken place within aquatic habitats</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <b>Significance of impacts</b>             | Minor disturbance to the local vegetation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Very low with mitigation |
|                                            | Alien vegetation clearance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Positive impact          |
| <b>Mitigation measures</b>                 | Removal of the invasive alien plants should be according to the guidelines in the Rehabilitation and Maintenance Plan and any Invasive Species Control Plan prepared for the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |
| <b>Remedial measures</b>                   | N/a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |
| <b>Time period for maintenance actions</b> | Initial clearing to occur during the bulk earthworks and watercourse interventions during the rehabilitation phase. Follow up control of the woody plant species should take place towards the end of winter and again in spring, with six-monthly follow-ups until the invasive species are controlled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                          |

### 7.12.3 Management of indigenous species categorized as nuisance vegetation, to improve hydrological flow and reduce associated flooding impacts

|                                            |                                                                                                                                                           |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of maintenance activity</b> | Periodic removal of bracken fern <i>Pteridium aquilinum</i> in ecosystems where this species obscures large parts of valley bottom wetland (if required). |
| <b>Applicable sites</b>                    | All                                                                                                                                                       |
| <b>Responsible person(s)</b>               | Authorisation holder, local or provincial authorities, invasive clearing implementation agencies                                                          |
| <b>Actions</b>                             | <ul style="list-style-type: none"> <li>Use existing access routes where feasible; restrict disturbance footprints to approved work areas only</li> </ul>  |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
|                                | <ul style="list-style-type: none"> <li>Identify and demarcate no-go areas and environmentally sensitive zones before commencement</li> <li>Clearly identify target species prior to clearing to avoid accidental removal of retained indigenous vegetation</li> <li>Retain all indigenous vegetation outside approved clearing areas</li> <li>Do not damage mature indigenous trees identified for retention</li> <li>Apply cut-stump herbicide treatment as soon as practicable after cutting to prevent coppicing; reapply to regrowth as required</li> <li>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</li> <li>No herbicide to be applied within 5 m of open water, drainage lines, or wetland systems unless specifically authorised</li> <li>Herbicide mixing to be performed off-site where possible; only pre-mixed, labelled containers to be brought to the work area</li> <li>Manage seed-bearing invasive material separately; bag or contain propagule-bearing material to prevent spread</li> <li>Biomass stockpiles to be placed in approved areas only; not to obstruct drainage lines, wetland systems, or access routes</li> <li>Manage stockpile heights to reduce fire and safety risk</li> <li>Refuelling to occur outside wetland areas and drainage lines; drip trays to be used beneath stationary machinery</li> <li>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</li> <li>Exposed soils resulting from clearing to be stabilised progressively to prevent erosion</li> <li>No uncontrolled burning of biomass unless specifically authorised; fire-fighting equipment to be available during high-risk activities</li> </ul> |                            |
| <b>Impacts</b>                 | <ul style="list-style-type: none"> <li>Minor disturbance to indigenous vegetation as a result of accessing the site</li> <li>Disturbance of the watercourse banks due to removal of sediment, debris and nuisance plant growth</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                            |
| <b>Significance of impacts</b> | Minor disturbance to indigenous vegetation as a result of accessing the site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Negligible with mitigation |
|                                | Disturbance of the watercourse banks due to removal of sediment, debris and nuisance plant growth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Very low with mitigation   |
| <b>Mitigation measures</b>     | <ul style="list-style-type: none"> <li>The disturbance of aquatic habitats associated with the maintenance works should be limited (both temporal and spatial extents) as far as possible.</li> <li>Removal of indigenous instream indigenous vegetation should be limited to nuisance growth vegetation;</li> <li>The remaining indigenous wetland fringe vegetation should not be cleared. The disturbance of the wetland and surrounding when undertaking clearing activities should also be limited as far as possible, using existing access points;</li> <li>If mowers are used, care should be taken that they do not damage banks or other indigenous vegetation such as sedges and rushes;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                            |

|                                            |                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            | <ul style="list-style-type: none"> <li>Nuisance plant growth removed from wetlands should not be dumped within the immediate areas surrounding the aquatic habitats or any indigenous vegetation removed from the site.</li> </ul>                                                                                                                                      |
| <b>Remedial measures</b>                   | If banks are disturbed by the activity, follow-up revegetation should be undertaken                                                                                                                                                                                                                                                                                     |
| <b>Time period for maintenance actions</b> | <ul style="list-style-type: none"> <li>The maintenance management activity should be undertaken as required and in particular prior to the onset of the winter rainfall period. The maintenance management activity will last for approximately 1-2 days.</li> <li>Mechanical clearing should be less frequent than annually and should be limited in extent</li> </ul> |

#### 7.12.4 Rehabilitation of riparian zones and watercourses through planting of locally indigenous species

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of maintenance activity</b> | Planting of wetland areas and buffers with indigenous plant species where required                                                                                                                                                                                                                                                                                                                                                          |
| <b>Applicable sites</b>                    | Wetland areas and their buffers                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Responsible person(s)</b>               | Authorisation holder                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Actions</b>                             | <ul style="list-style-type: none"> <li>Plant indigenous vegetation in wetlands and buffer areas as recommended by the aquatic ecologist</li> <li>Replacement of eroded, dead or senescent watercourse and riparian plants</li> <li>Avoid using machinery in wetland areas while planting and placing topsoil</li> <li>Replant any large exposed areas adjacent to wetlands by hydroseeding with a mixture of indigenous grasses.</li> </ul> |
| <b>Impacts</b>                             | Rehabilitation of wetlands and buffers (positive impact)                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Significance of impacts</b>             | Low positive                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Mitigation measures</b>                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Remedial measures</b>                   | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Time period for maintenance actions</b> | As required.                                                                                                                                                                                                                                                                                                                                                                                                                                |

#### 7.12.5 Repairs to erosion along watercourses and in stormwater management infrastructure

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of maintenance activity</b> | <p>Infilling of eroded areas and revegetation</p> <p>Installation of erosion protection structures such as gabions, reno mattresses, or riprap (only where essential to prevent severe erosion)</p>                                                                                                                                                                                                                                                                                 |
| <b>Applicable sites</b>                    | All                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Responsible person(s)</b>               | Authorisation holder, provincial and local authorities                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Actions</b>                             | <ul style="list-style-type: none"> <li>Assess potential extent of erosion repairs and consult with ECO / aquatic ecologist for guidance on specific impacts and mitigations</li> <li>Erosion repair, through (mechanical or manual) re-shaping of eroded areas, with the potential introduction of additional gabion weirs or protection devices as required</li> <li>Plan works for low flow periods wherever possible</li> <li>Delineate no-go areas and working areas</li> </ul> |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                     |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
|                                            | <ul style="list-style-type: none"> <li>• Install flow diversions if required to ensure that work area is dry</li> <li>• Where possible undertake works by hand and without driving machinery into aquatic habitats</li> <li>• Utilise temporary erosion protection measures such as silt fencing, slope covering, and berms to prevent sedimentation of the watercourse</li> <li>• Reinstall natural channel and banks and revegetate on completion of works</li> </ul>                                                                                                                                                                                                                                                 |                                                     |
| <b>Impacts</b>                             | Minor disturbance to the local indigenous vegetation as a result of accessing the site<br>Disturbance to the bed and banks due to erosion repair works                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                     |
| <b>Significance of impacts</b>             | Minor disturbance to the local indigenous vegetation as a result of accessing the site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Very low if all mitigation measures are implemented |
|                                            | Disturbance to the wetland bed and banks due to erosion repair works                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Very low if all mitigation measures are implemented |
| <b>Mitigation measures</b>                 | <ul style="list-style-type: none"> <li>• The disturbance of aquatic habitats associated with the erosion repair and protection works should be limited in both temporal and spatial extents as far as possible</li> <li>• Care should be taken to minimize the sedimentation that would be caused downstream of the works</li> <li>• Work should preferably be undertaken by hand with no machinery driven into aquatic habitats</li> <li>• Activities associated with the maintenance work should be undertaken during the low flow period before the onset of the winter high flows</li> <li>• All waste material associated with the works should be removed from the channel after the work is completed</li> </ul> |                                                     |
| <b>Remedial measures</b>                   | If damage to vegetation and habitat is unavoidable, revegetation and reinstatement must be undertaken                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     |
| <b>Time period for maintenance actions</b> | As required when infrastructure is damaged or degraded. Maintenance activities should be planned where possible for the dry season and carried out as quickly as practical.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                     |

### 7.12.6 Sediment, debris and litter removal

|                                            |                                                                                                                                                                                                      |                                                     |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>Description of maintenance activity</b> | Removal of sediment build up or debris from the watercourses                                                                                                                                         |                                                     |
| <b>Applicable sites</b>                    | All                                                                                                                                                                                                  |                                                     |
| <b>Responsible person(s)</b>               | Authorisation holder                                                                                                                                                                                 |                                                     |
| <b>Actions</b>                             | Excessive buildup of debris or sediment in the watercourses should be removed by hand.<br>Particular attention should be given to areas upstream of structures in wetlands (e.g. gabion structures). |                                                     |
| <b>Impacts</b>                             | Minor disturbance to the local indigenous vegetation as a result of accessing the site<br>Disturbance to the wetland bed and banks due to erosion repair works                                       |                                                     |
| <b>Significance of impacts</b>             | Minor disturbance to the local indigenous vegetation as a result of accessing the site                                                                                                               | Very low if all mitigation measures are implemented |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                     |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
|                                            | Disturbance to the bed and banks due to sediment and debris removal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Very low if all mitigation measures are implemented |
| <b>Mitigation measures</b>                 | <ul style="list-style-type: none"> <li>Periodic (mechanical or manual) sediment removal from dams</li> <li>The disturbance of aquatic habitats associated with the sediment and debris removal should be limited in both temporal and spatial extents as far as possible</li> <li>Care should be taken to minimize the sedimentation that would be caused downstream of the works</li> <li>Work should preferably be undertaken by hand with no machinery driven into aquatic habitats</li> <li>Activities associated with the maintenance work should be undertaken during the low flow period before the onset of the winter high flows</li> <li>Soil, debris and nuisance plant growth removed from the wetland and associated areas should not be dumped within the immediate areas surrounding the aquatic habitats or any indigenous vegetation removed from the site. Removed soil could be used to fill eroded areas</li> </ul> |                                                     |
| <b>Remedial measures</b>                   | If damage to vegetation and habitat is unavoidable, revegetation and reinstatement must be undertaken to the satisfaction of the ECO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                     |
| <b>Time period for maintenance actions</b> | The maintenance management activity should be undertaken on a regular basis (six monthly) and in particular prior to the onset of the winter rainfall period. The maintenance management activity will last for approximately 1-2 days.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                     |

### 7.12.7 Repairs to or replacement of damaged infrastructure

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description of maintenance activity</b> | Repairs of flood damage or degraded/damaged structures in watercourses (e.g. Gabion structures and board walks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Applicable sites</b>                    | All                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Responsible person(s)</b>               | Authorisation holder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Actions</b>                             | <ul style="list-style-type: none"> <li>Assess potential extent of replacement and consult with aquatic ecologist for guidance on specific impacts and mitigations</li> <li>Plan works for low flow periods wherever possible</li> <li>Delineate no-go areas and working areas</li> <li>Install flow diversions if required to ensure that work area is dry</li> <li>Where possible undertake works by hand and without driving machinery into aquatic habitats</li> <li>Utilise temporary erosion protection measures such as silt fencing, slope covering, and berms to prevent sedimentation of the watercourse</li> <li>Reinstate natural channel and banks and revegetate on completion of works</li> <li>Repairs to gabion baskets, reno mattresses, spillways, dam walls and board walks</li> <li>Repairs / adjustments to dam outlet mechanisms (in line with providing wet season flows into downstream watercourses to sustain high quality watercourse vegetation).</li> </ul> |
| <b>Impacts</b>                             | <p>Disturbance to vegetation as a result of accessing the sites</p> <p>Disturbance to the wetland bed and banks during works in the watercourse</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                                            | Sedimentation and erosion of downstream watercourses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
| <b>Significance of impacts</b>             | Disturbance to vegetation as a result of accessing the sites                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Low if area of disturbance is minimised                                              |
|                                            | Disturbance to the wetland bed and banks during works in the watercourse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Low if area and time of disturbance is minimised and mitigation measures implemented |
|                                            | Sedimentation and erosion of downstream watercourses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Low with mitigation measures below.                                                  |
| <b>Mitigation measures</b>                 | <ul style="list-style-type: none"> <li>• The disturbance of aquatic habitats associated with the erosion repair and protection works should be limited in both temporal and spatial extents as far as possible</li> <li>• Care should be taken to minimize the sedimentation that would be caused downstream of the works</li> <li>• Work should preferably be undertaken by hand with no machinery driven into aquatic habitats</li> <li>• Activities associated with the maintenance work should be undertaken during the low flow period before the onset of the winter high flows</li> <li>• All waste material associated with the works should be removed from the channel after the work is completed</li> </ul> |                                                                                      |
| <b>Remedial measures</b>                   | If damage to vegetation and habitat is unavoidable, revegetation and reinstatement must be undertaken                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                      |
| <b>Time period for maintenance actions</b> | As required when infrastructure is damaged or degraded. Maintenance activities should be planned where possible for the dry season and carried out as quickly as practical.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |

## 8 LIST OF APPENDICES

| Appendix No. | Contents | Revision date | Revised by | Effective Date |
|--------------|----------|---------------|------------|----------------|
| A            | EAP CV   | NA            | NA         | September 2026 |
|              |          |               |            |                |