



MAINTENANCE MANAGEMENT PLAN FOR THE WATERCOURSES WITHIN THE STEENBERG ESTATE AND GOLF COURSE (ERF 11193, ERF 12379, ERF 11039, ERF 10984, ERF 11111, ERF 12378, ERF 11072, ERF 12380 AND ERF 12910) CONSTANTIA

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DRAFT MAINTENANCE MANAGEMENT PLAN

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Please note: This MMP was prepared to comply with the content requirements of the “Information Document for the Development of a Maintenance Management Plan for a Watercourse” that was issued by the DEA&DP during March 2017, and as subsequently updated.

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DEFINITIONS AND ACRONYMS

DEFINITIONS:

"Activity" means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the Act as a listed activity or specified activity. Activity in this document refers to the activities as listed in Listing Notice 1, 2 and 3 of the Environmental Impact Assessment Regulations, 2014 (as amended).

"Bush Encroachment" means stands of plants of the kinds specified in column 1 of Table 4 of the Conservation of Agricultural Resources Act (Act No. 43 of 1983) where individual plants are closer to each other than three times the mean crown diameter.

"Diverting" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, cause the instream flow of water to be rerouted temporarily or permanently.

"Ecological Infrastructure" refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction.

"Emergency Situation" means a situation that has arisen suddenly that poses an imminent and serious threat to the environment, human life or property, including a 'disaster' as defined in section 1 of the Disaster Management Act, 2002 (Act No. 57 of 2002), but does not include an incident referred to in section 30 of this Act.

"Flood event" is the event where land is inundated by the overflowing of water from a river channel and where this event causes significant damage to infrastructure or results in watercourse erosion and/or sediment deposition.

"Flow-altering" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, alter the instream flow route, speed or quantity of water temporarily or permanently.

"General Authorisation" in this document refers to the General Authorisation in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) or Section 21(i) (GN. 509 of 26 August 2016).

"Impeding" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), means to, in any manner, hinder or obstruct the instream flow of water temporarily or permanently, but excludes the damming of flow so as to cause storage of water.

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"Indigenous vegetation" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

"Maintenance" means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

"Maintenance Management Plan" means a management plan for maintenance purposes defined or adopted by the competent authority.

"River Management Plans" as defined in the General Authorisation, in terms of section 39 of the National Water Act, 1998 (Act no 36 of 1998) for Water Uses as defined in Section 21(c) and 21(i) (GN. 509 of 26 August 2016), any river management plan developed for the purposes of river or storm water management in any municipal/metropolitan area or described river section, river reach, entire river or sub quaternary catchment that considers the river in a catchment context.

"River reach", a length of river characterised by a particular channel pattern and channel morphology, resulting from a uniform set of local constraints on channel form. A river reach is typically hundreds of meters in length.

"Stretch" a section of watercourse, delineated between two or more mapped coordinates, within which proposed maintenance activities are to take place as guided by a MMP.

"Thalweg" refers to the line of lowest elevation within a valley or watercourse.

"Watercourse" means:

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and

any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and a reference to a watercourse includes, where relevant, its bed and banks.

"Wetland" means, land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

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ACRONYMS:

BOCMA	Breede-Olifants Catchment Management Agency
CBA	Critical Biodiversity Area
CVB	Channelled Valley Bottom
DEA&DP	Department of Environmental Affairs & Development Planning
DWS	Department of Water & Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDL	Ephemeral Drainage Line
EIA	Environmental Impact Assessment
ESA	Ecological Support Area
GA	General Authorisation, in terms of the National Water Act, 1998 (Act No. 36 of 1998)
GN	Government Notice
HGM unit	Hydrogeomorphic unit
MEC	Member of Executive Council
MMP	Maintenance Management Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PES	Present Ecological State
PPP	Public Participation Process
REC	Recommended Ecological Category
RI	Rapid Intensification
RQO's	Resource Quality Objectives
SANParks	South African National Parks Authority
SCC	Species of Conservation Concern
WCBSP	Western Cape Biodiversity Spatial Plan
WUA	Water Users Association
WULA	Water Use Licence Application

1. BACKGROUND AND INTRODUCTION

1.1. Contextual Information

This report presents the Maintenance Management Plan (MMP) for the freshwater systems associated with the Steenberg Estate and Golf Course (herein after referred to as “Steenberg Estate” or “the estate”). The MMP has been prepared on behalf of Steenberg Estate Property Company (Pty) Ltd to provide a consistent framework for the periodic maintenance of the onsite freshwater systems and associated infrastructure, whilst ensuring compliance with the applicable environmental legislation and protecting the ecological functioning of these systems

The Steenberg Estate is located in Constantia, Cape Town, and was established in 1996 (Figure 1). The estate comprises a professionally managed, operational golf course integrated with residential properties, a clubhouse, and an on-site restaurant, forming a well-established mixed-use residential and recreational development.

The properties subject to this MMP comprise Steenberg Golf Course which includes Erf 11193, Erf 12379, Erf 11039, Erf 10984, Erf 11111, Erf 12378, Erf 11072, and Erf 12380 as well as Erf 12910 located at High Steenberg, as shown in Figure 2 & Figure 3. Collectively, these properties are hereafter referred to as the study area or site. This MMP applies to the watercourses within the study area and provides a framework for the periodic maintenance of the onsite watercourse as well as all existing infrastructure, in-stream dams and riparian areas associated with these watercourses.

A freshwater assessment of the study area was undertaken in May 2026 to identify and delineate the freshwater systems present within the Steenberg Estate and Golf Course. The assessment identified the following watercourses within the study area (refer to Figure 4):

- An Ephemeral Drainage Line (EDL) system that traverses the golf course through a series of artificial channels and in-stream dams before transitioning into the non-perennial Prinseskasteel Stream and its associated channelled valley-bottom wetland north of the study area.
- A second EDL associated with the in-stream dam on Erf 12910, which extends the study area where it transitions into a seep wetland and subsequently a channelled valley-bottom wetland.

In addition to the freshwater systems identified during the field assessment, the broader surrounding area contains a variety of mapped freshwater features, including seep wetlands, depression wetlands, channelled valley-bottom wetlands, rivers, artificial channels, and both in-stream and off-stream dams. These features collectively contribute to the hydrological and ecological connectivity of the catchment.

To ensure the continued safe and effective operation of the golf course & estate while maintaining the hydraulic capacity and ecological integrity of the onsite freshwater systems, Steenberg Estate proposes to undertake periodic maintenance of the watercourses and associated infrastructure within the study area. This MMP establishes the environmental management requirements for these maintenance activities and has been prepared in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998). The MMP will be submitted to the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) for adoption.

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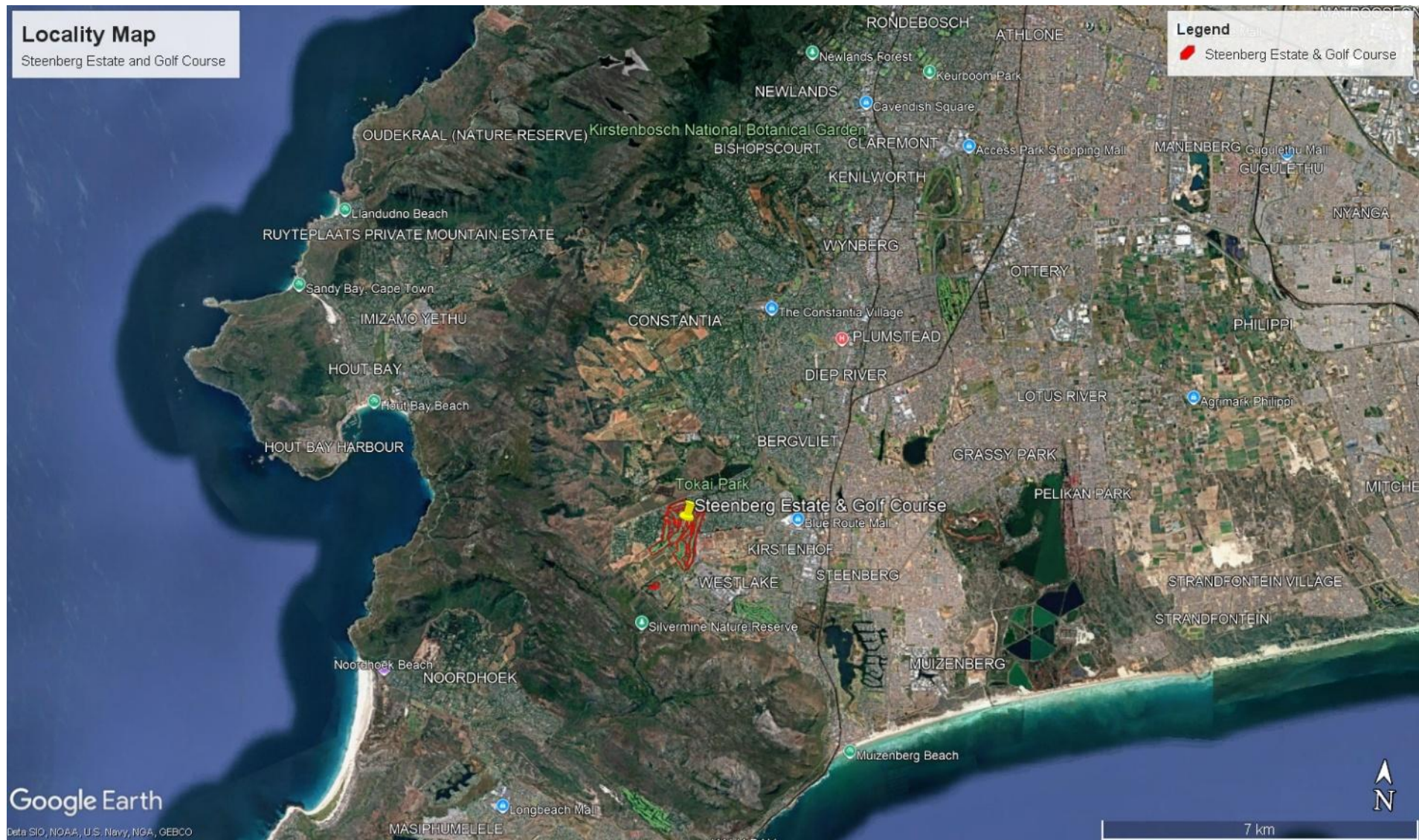


Figure 1: Steenberg Estate and Golf Course Locality Map (PHS Consulting, 2026)

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Figure 2: Properties subject to MMP and onsite dams (Map 1 of 2) (PHS Consulting, 2026)

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Figure 3: Properties subject to MMP and onsite dams (Map 2 of 2) (PHS Consulting, 2026)

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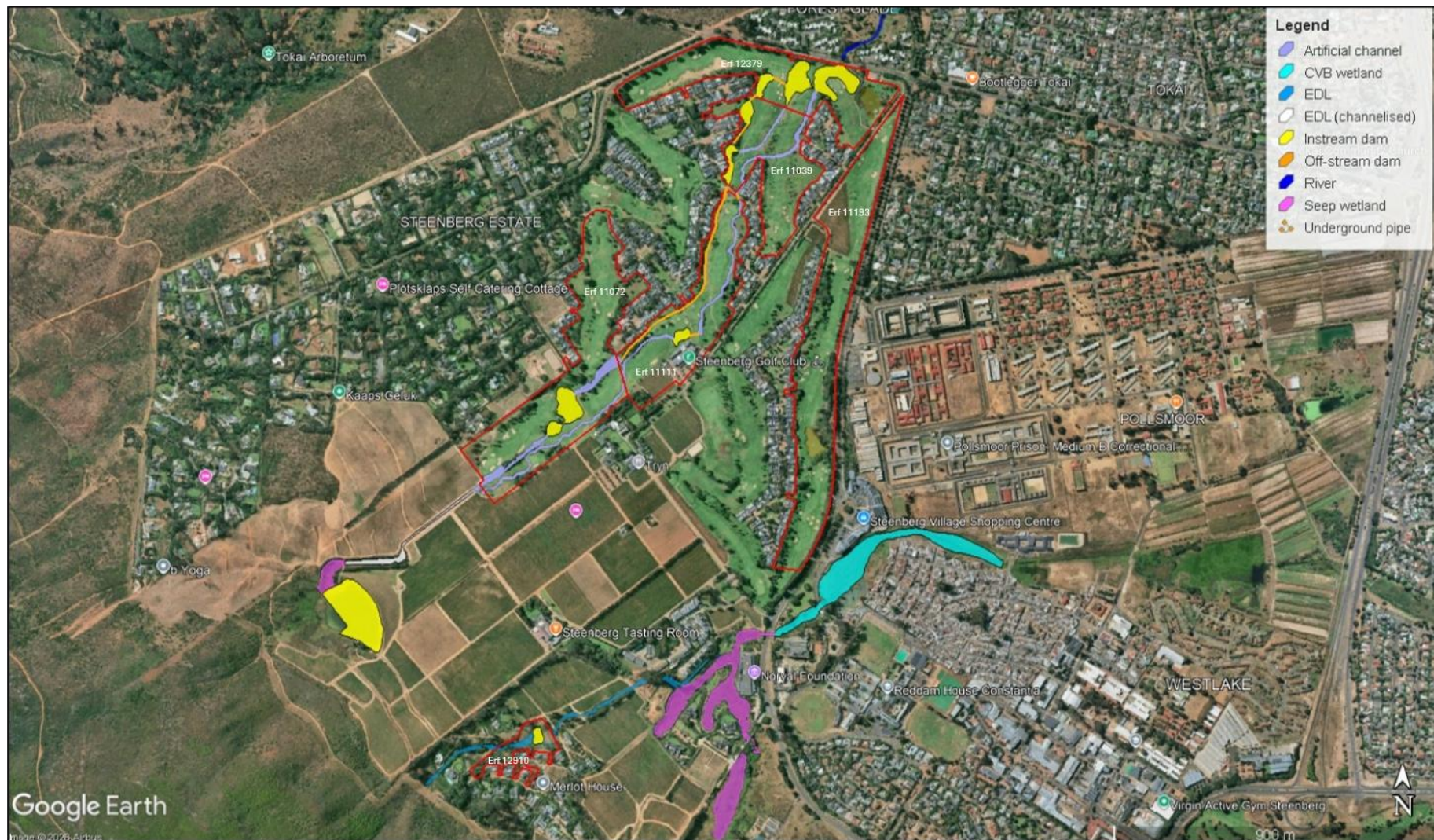


Figure 4: The delineated extent of the watercourses and artificial features associated with the Steenberg Estate and Golf Course (FEN, Freshwater and Aquatic Assessment, July 2025).

1.2. Purpose of this MMP

The purpose of this MMP is to provide a framework for the periodic maintenance of infrastructure, sediment, and vegetation within and adjacent to the watercourses on the Steenberg Estate and Golf Course. The MMP has been informed by a Freshwater and Aquatic Assessment (FEN, July 2026), which characterised the condition and sensitivity of the freshwater systems, identified aquatic fauna present within the study area, and informed the development of maintenance method statements and mitigation measures appropriate to the receiving environment. The plan aims to ensure that maintenance activities are undertaken in a controlled and environmentally responsible manner by identifying potential maintenance requirements and associated environmental risks, and prescribing measures to avoid, minimise, and mitigate adverse impacts. It also provides clear guidance to estate managers, maintenance personnel, and contractors to promote consistent implementation of best management practices, to improve the ecological condition and functioning of the watercourses where possible. By adopting a planned and ecologically informed approach, the MMP supports effective maintenance while safeguarding the long-term health and resilience of the relevant watercourses.

1.3. Activities Included in this MMP

The watercourses within the Steenberg Golf Course are predominantly bordered by landscaped areas and golf course fairways while the drainage line delineated on Erf 12910 is more natural although impacted by alien invasive vegetation. All onsite watercourses include a range of in-stream infrastructure designed to facilitate water management, stormwater conveyance, and access across the watercourses. This infrastructure requires routine inspection, maintenance, and repair to ensure its continued functionality while minimising impacts on the surrounding aquatic environment.

An inventory of the infrastructure located within and adjacent to the watercourses has been compiled and is provided in Annexure A. The inventory includes, but is not limited to, in-stream dams, bridges and crossing points, gabions, culverts, pipelines, boreholes, weirs, and stormwater discharge infrastructure.

The MMP applies only to maintenance activities associated with existing infrastructure within the study area and does not authorise the construction of new infrastructure or activities beyond the scope of routine maintenance.

The proposed maintenance activities include the following:

Vegetation Management

Vegetation management will be undertaken to maintain water conveyance, improve ecological functioning, and control invasive species. Activities include:

- Removal of alien invasive vegetation.
- Selective clearing or thinning of overgrown indigenous reeds, rushes, and other vegetation where it impedes water flow or infrastructure function.
- Trimming or removal of vegetation from areas where maintenance work is required
- Replanting and re-establishment of indigenous vegetation, where needed to promote bank stability and ecological integrity.

Sediment Management

Sediment management will be undertaken to maintain channel capacity, water flow, and the operational capacity of in-stream dams. Activities may include:

- Mechanical excavation, hydraulic removal or manual removal of accumulated sediment, litter and debris from watercourses, in-stream dams and drainage infrastructure.
- Temporary stockpiling of removed sediment in designated areas outside the watercourse prior to appropriate disposal or reuse.

Infrastructure Maintenance and Repair

Routine maintenance and repair of existing infrastructure within the watercourses may include:

- Maintenance and repair of weirs, culverts, bridges, crossing points, pipelines, discharge structures, gabions, aerators and other structures existing within and adjacent to onsite watercourses.
- Maintenance of dam inlets, outlets, spillways, and clay liners.
- Where necessary, the replacement of damaged infrastructure on a like-for-like basis to maintain its intended function.

Bank Stabilisation

Localised bank stabilisation may be undertaken where erosion threatens the stability of the watercourse or associated infrastructure. Activities may include:

- Repair and reinforcement of eroded banks on a like-for-like basis,
- Maintenance and or like-for-like replacement of existing gabions and other bank protection structures.
- Reprofiling and revegetation of disturbed banks using appropriate indigenous riparian vegetation

Depending on the infrastructure being maintained, one or more of the above-mentioned maintenance activities are regularly carried out.

1.4. Amendment of the MMP

Once approved, this MMP must form part of all contractual documents for maintenance projects in the future. The adoption of the MMP by DEA&DP will require that the applicant and all appointed contractors must comply with the requirements therein.

This MMP may be reviewed and updated to support adaptive management and ensure its continued relevance and effectiveness. Amendments may be required in response to changes in legislation, environmental conditions, organisational structures, roles and responsibilities, maintenance practices, or other matters identified by DEA&DP. Any amendments/ changes/ upgrades to the MMP will require submission of an amended MMP to and approval by DEA&DP prior to implementation. Any newly approved amended MMP will supersede the previous version.

2. ROLES AND RESPONSIBILITIES

2.1. MMP Process Project Team

Team member	Expertise	Role
Olivia Venter	Candidate Environmental Assessment Practitioner and Candidate SACNASP Natural Scientist	Compilation of MMP
Amanda Fritz-Whyte	Environmental Assessment Practitioner SACNASP Professional Natural Scientist	Review of MMP
Bianca Bleuler	SACNASP Professional Natural Scientist	Author of Freshwater Impact Assessment
Dr M. Ross	SACNASP Professional Natural Scientist	Author of Freshwater Impact Assessment
Amanda Milesen	SACNASP Professional Natural Scientist	Review Freshwater Impact Assessment
Craig Spowart	Steenberg Estate Management	Assistant Estate Manager

2.2. Parties Responsible for Implementing the MMP

Effective implementation of this MMP requires the involvement of several parties, each with clearly defined roles and responsibilities. The key role players include:

The Competent Authority

DEA&DP is the competent authority responsible for reviewing and adopting the MMP. Throughout this process they may define conditions relating to monitoring and reporting requirements, review and amendment procedures, the period for which the MMP is approved and compliance auditing requirements.

Upon adoption of the MMP, DEA&DP may undertake the following responsibilities:

- Review and monitor implementation of the MMP.
- Assess the applicant's compliance with the approved MMP.
- Undertake ad hoc compliance inspections.
- Enforce the relevant legal mechanisms in the event of non-compliance with the MMP.

The Applicant

The Applicant (or its appointed representative) is responsible for the implementation and ongoing management of this MMP. The Applicant remains ultimately accountable for ensuring that all maintenance activities are undertaken in accordance with the approved MMP and applicable environmental requirements. These responsibilities include:

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- Appointing a suitably experienced Environmental Control Officer (ECO) (and where necessary relevant specialists) to carry out monitoring and management requirements as specified in this MMP.
- Scheduling and conducting routine inspections of freshwater systems and associated infrastructure.
- Identifying and addressing issues that may adversely affect the ecological functioning of the onsite watercourses, including erosion, sediment accumulation, stormwater-related impacts, and unauthorised encroachment.
- Overseeing the removal of vegetation, debris, and sediment in a timely and environmentally responsible manner.
- Monitoring and controlling alien invasive species using appropriate methods.
- Implementing rehabilitation and remedial measures where degradation or impacts are identified
- Maintaining records of inspections, maintenance activities, incidents, and corrective actions undertaken in terms of this MMP (refer to Section 9 of this MMP).

The Applicant must establish and maintain appropriate management systems to oversee implementation of the MMP and ensure compliance. Where necessary, these responsibilities may be delegated to a Project Manager or suitably qualified contractors, provided that the Applicant retains overall accountability for compliance with the approved MMP.

Project Manager

The Project Manager shall act as the proponent's on-site implementing agent and be responsible for ensuring that all works are carried out in accordance with this MMP and all applicable environmental legislation and regulatory requirements.

Contractor / Maintenance Team

The maintenance works may be undertaken by the proponent's internal staff or by an appointed contractor.

The contractor / maintenance team lead (as applicable) is responsible for implementing all applicable requirements of this MMP and ensuring that maintenance activities are undertaken in an environmentally responsible manner. Where uncertainties or practical constraints arise regarding the implementation of this MMP, the contractor / maintenance team lead must consult with the Project Manager or ECO before proceeding with the works.

The Contractor / Maintenance Team Lead (as applicable) shall be responsible for:

- Complying with the requirements of this MMP, all relevant environmental legislation, and applicable environmental authorisations.
- Drafting of additional method statements where applicable (refer Section 8.4)
- Ensuring that all employees, subcontractors, and other personnel are familiar with the requirements of this MMP and their environmental responsibilities.
- Implementing approved method statements and environmentally responsible work practices throughout the maintenance works.

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- Undertaking maintenance works in accordance with best practice, the recommendations of the Freshwater Report, and the requirements of the ECO where applicable.
- Attending a pre-construction site meeting with the Project Manager and/or ECO to confirm work areas, no-go areas, environmental controls, and method statement requirements.
- Maintaining a copy of this MMP and all relevant environmental approvals on site at all times.
- Monitoring site activities to minimise environmental impacts and reporting any non-compliance or environmental incidents to the Project Manager and/or ECO without delay.
- Providing environmental awareness training to all personnel, including subcontractors, before commencing work on site.

The ECO

Where required by this MMP, a suitably qualified and experienced ECO must be appointed prior to the commencement of maintenance or repair activities.

The ECO shall be responsible for (where relevant):

- Approving the designated maintenance staging area before it is used,
- Demarcating the outer boundary of the authorised 5m maintenance right-of-way (RoW) and, where practicable, the applicable 10m and 15m ecological buffers prior to the commencement of works.
- Ensuring that the maintenance RoW and ecological buffers are clearly identified as no-go areas, with access limited to authorised personnel undertaking approved maintenance or rehabilitation activities.
- Determining the appropriate location of sediment traps.
- Monitoring the installation, effectiveness and maintenance of sediment control measures throughout the maintenance works.
- Providing environmental guidance to the Project Manager and Contractor and recommending corrective actions where required.
- Maintaining records of site inspections, non-compliances, corrective actions and photographic evidence of the maintenance works.
- Preparing Environmental Monitoring Reports, where required by the competent authority.

Frequency of ECO Inspections:

The frequency of ECO inspections shall be determined by the nature and risk of the maintenance activity. As a minimum, the ECO shall:

- Undertake a pre-maintenance site inspection to approve the maintenance staging and laydown areas (where applicable), demarcate the authorised 5m Maintenance Right of Way (RoW) and, where practicable, the applicable ecological buffers and determine the appropriate location of any temporary sediment control measures, where required.

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- Undertake site inspections at least weekly during high-impact maintenance activities (e.g. major infrastructure repairs, bank stabilisation, sediment removal requiring flow diversion, or other activities with a high risk of environmental impact).
- Where maintenance activities require temporary flow diversions, it is recommended that the ECO, together with a suitably qualified freshwater specialist, undertake site inspections at least twice a month to monitor the effectiveness of the flow diversion and sediment control measures, assess the condition of the freshwater ecosystem during the maintenance period, and verify successful reinstatement following the re-establishment of normal flows.
- Conduct additional site inspections where non-compliances are identified, following significant rainfall events, or where emergency maintenance activities are undertaken.

Routine long-term maintenance activities that do not involve in-stream works or other environmentally sensitive activities, do not require continuous ECO supervision and may be monitored by the routine maintenance contractor in accordance with this MMP.

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3. ADMINISTRATIVE DETAILS

REGION 1 (City of Cape Town Metropolitan and West Coast District) ☒	REGION 2 (Cape Winelands District, Overberg District) ☐	REGION 3 (Eden & Central Karoo District) ☐
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Name of person/authority who will undertake responsibility for the activity:	Steenberg Estate Property Company (Pty) Ltd		
Contact person (if other):	Walter Tarr		
Postal address:	Suite 4 Constantia House, Steenberg Office Park, Constantia		
Telephone:	083 453 2843	Postal code:	7800
Fax:	n/a	Cell:	083 453 2843
Email:	workman@steenberggolfclub.co.za		

Name of person who has prepared the MMP:	Amanda Fritz-Whyte (EAP) & Olivia Venter (Candidate EAP) Input from FEN Consulting (Freshwater specialists) and Craig Spowart (assistant estate manager)		
Contact Person (if other):	n/a		
Postal address:	PO Box 1752, Hermanus		
Telephone:	028 312 1734	Postal code:	7200
Fax:	n/a	Cell:	082 327 2100 (Amanda); 076 849 5969 (Olivia)
E-mail:	amanda@phsconsulting.co.za ; olivia@phsconsulting.co.za		
Expertise of EAP	Twenty-three years' experience in Environmental Impact Assessments, Public Participation, auditing, water resource management, WULA applications and compilation of EMPs and MMP.		
EAP Registrations/Associations	IAIAsa, Pri.Sci.Nat (118385), WISA fellow; Registered EAP - 2019/367 (EAPASA)		

Name of landowner(s) on whose behalf the plan has been developed:	Steenberg Estate Property Company (Pty) Ltd		
Contact person(s):	Walter Tarr		
Postal address:	Suite 4 Constantia House, Steenberg Office Park, Constantia		
Telephone:	083 453 2843	Postal Code	7800

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Fax:	n/a	Cell	083 453 2843
E-mail:	workman@steenberggolfclub.co.za		

Municipality for proposed project:	City of Cape Town Metropole
Farm name(s), erf(s) and portion number(s) etc*:	Erf 11193, Erf 12379, Erf 11039, Erf 11111, Erf 11072, and Erf 12910, Constantia
Magisterial District or Town:	City of Cape Town Metropole
Name(s) of watercourse(s) in question:	n/a - Refer to Figure 4

DECLARATION

The PERSON THAT WILL BE UNDERTAKING THE MAINTENANCE

I Walter Tarr, **duly authorised** by Steenberg Estate Property Company (Pty) Ltd thereto hereby declare that I/we:

- Request the MMP to be adopted by the Competent Authority;
- Regard the information contained herein to be true and correct for this Maintenance Management Plan;
- Am fully aware of my responsibilities in terms of the National Environmental Management Act of 1998 ("NEMA") (Act No. 107 of 1998) and that, notwithstanding the adoption of this MMP, I/we shall comply with any other statutory requirement applicable, which may include, but not limited to the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the National Water Act, 1998 (Act No. 36 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended) ("EIA Regulations"), in terms of NEMA;
- Am fully aware that the proposed maintenance constitutes a listed activity in terms of the NEMA EIA Regulations, 2014 (as amended) and that an environmental assessment for environmental authorisation may be required for any other listed activities not included as part of this MMP;
- Acknowledge that any activity undertaken that does not form part of the defined and adopted MMP, will be subject to the Section 24(F) of NEMA and that appropriate enforcement and compliance requirements will follow;
- Shall undertake only those tasks described in the MMP, failing which environmental authorisation will be required, where applicable;
- Shall provide the competent authorities with access to all information at my disposal that is relevant to this request;
- Shall be responsible for any costs incurred in complying with environmental legislation;
- Hereby indemnify the government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of, inter alia, any loss or damage to property or person as a consequence of undertaking this MMP; and
- Am aware that a false declaration is an offence in terms of Regulation 48(1)(a) GN No. R. 982 of 4 December 2014 (as amended).



Signature of the proponent:

11-08-2026

Date:

Steenberg Estate Property Company (Pty) Ltd

Name of institution/company:

4. LEGISLATIVE CONTEXT

The following is a list of the legislation that may be pertinent to the project and its long-term operational management. All activities on site must ensure compliance with the provisions of the legislation as applicable:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- National Environmental Management: Biodiversity Act, 2014 (Alien and Invasive Species Regulations, 2014);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA).

4.1. The Constitution of the Republic of South Africa, 1996

The Constitution provides the foundation for environmental regulation and policy. Section 24 makes provision for environmental protection for the benefit of present and future generations and the right to an environment that is not harmful to health and well-being. It is achieved through a strong legislative framework to prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources.

The South African legislation, guidelines, and standards in terms of environmental management are based on the National Environmental Management Act and its regulations.

This MMP supports the objectives of Section 24 of the Constitution by providing a framework for the environmentally responsible maintenance of existing in-stream infrastructure. This MMP is consistent with the Constitution of the Republic of South Africa by following the required authorisation processes, including the required public participation processes, and where required making amendments to the proposed project in order to incorporate I&AP or specialist input, in order to prevent pollution and enable sustainable development.

4.2. National Environmental Management Act, 1998

Under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), environmental authorisation is required for activities listed in the EIA Listing Notices. Certain listed activities make provision for the adoption of a Maintenance Management Plan (MMP) as an alternative mechanism for authorising routine maintenance activities.

If adopted by DEA&DP, this MMP will apply solely to the routine maintenance of existing infrastructure and associated watercourses within the study area and will provide for maintenance activities undertaken in accordance with the applicable listed activities set out below:

Listing Notice 1: Activity 19

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The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, 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;

(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;

(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;

(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or

(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.

Applicable maintenance activities: Removal of accumulated sediment from the onsite watercourses and instream dams, to maintain flow continuity and preserve adequate system capacity. Maintenance and repair of existing infrastructure (e.g. dam walls, gabions, bridges etc) and vegetation management will also be undertaken, which may involve associated sediment removal/infilling and localized disturbance.

Listing Notice 1: Activity 27

The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

(i) the undertaking of a linear activity; or

(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Applicable maintenance activities: The areas to be cleared from alien vegetation or excess indigenous vegetation growth impeding flow may, over time, constitute cumulatively more than 1ha of indigenous vegetation in total. As such a precautionary approach has been taken and this listed activity has been included in this MMP application.

This MMP must form part of all contractual documents for maintenance projects in the future. Following adoption of the MMP by DEA&DP, the applicant/landowner and all appointed contractors shall comply with the requirements of this MMP. Maintenance refers to actions undertaken to keep an existing structure or system functioning or in service on the same location, capacity, and footprint. A Maintenance Management Plan is a management plan defined or adopted by the competent authority to regulate such maintenance activities. It is essential that all maintenance activities are undertaken strictly in accordance with the provisions of this MMP to avoid triggering listed activities that may require separate environmental authorisation. Where uncertainty exists regarding whether a proposed activity falls within the scope of this MMP, a suitably qualified EAP must be consulted prior to the commencement of the activity.

Adoption of this MMP by DEA&DP does not absolve the applicant or landowners of their general duty of care in terms of Section 28(1) of the National Environmental Management Act, 1998 (Act No. 107 of 1998). Reasonable measures must continue to be taken to prevent, minimise, and remedy pollution or environmental degradation, in accordance with the duty of care and the environmental management principles set out in Section 2 of NEMA.

4.3. National Water Act, 1998

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) regulates the protection, use, and management of South Africa's water resources, including rivers, wetlands, and groundwater. As the proposed maintenance activities will take place within watercourses, they constitute water uses in terms of Sections 21(c) and 21(i) of the NWA, namely:

- Section 21(c): Impeding or diverting the flow of water in a watercourse.
- Section 21(i): Altering the bed, banks, course, or characteristics of a watercourse.

A risk assessment, undertaken by FEN (FEN, Freshwater and Aquatic Assessment, July 2025) in accordance with the DWS risk-based assessment protocol (2023), concluded that the proposed maintenance activities present a low risk to the aquatic environment. Accordingly, the activities are expected to be authorised under the General Authorisation for Section 21(c) and (i) water uses (Government Notice 4167 of 8 December 2023), rather than requiring a Water Use Licence. A linear General Authorisation registration will be submitted to DWS for the watercourse reaches covered by this MMP, prior to the start of any maintenance activities.

5. ENGAGEMENT PROCESS

The stakeholder engagement requirements of the NEMA EIA Regulations, 2014 (as amended) apply to applications subject to Basic Assessment or Scoping and Environmental Impact Assessment processes and do not prescribe a public participation process for the adoption of the MMP.

The stakeholder engagement undertaken for this MMP was therefore guided by DEA&DP's *Information Document for the Development of a Maintenance Management Plan for a Watercourse* (March 2017), the *Request for Adoption of a MMP* form (April 2024), and the specific objectives of this MMP.

5.1. Authority Engagement

The following authorities will be consulted to provide input on the proposed maintenance activities:

- DEA&DP: Development Management
- Catchment Management Agency (BOCMA)
- DEA&DP: Waste Management
- DEA&DP: Pollution and Chemicals Management
- CapeNature
- Local Municipality (City of Cape Town)
- Heritage Western Cape

All comments received will be recorded in a Comments and Responses Report, which will accompany the final MMP adoption request to DEA&DP. Any amendments arising from this process will be incorporated into the final MMP submitted to DEA&DP for approval.

5.2. Public Participation Process

This MMP will be made available to potential Interested and Affected Parties (I&APs) during the PPP by means of the following measures:

- Give written (via email or registered mail as applicable) notice to the owner or person in control of that land if the person undertaking the maintenance activity is not the owner or person in control of the land.
- Written notice (via email or registered mail as applicable) to adjacent landowners (up to 1km upstream and downstream from furthest upstream and downstream maintenance site and opposite side of the banks) of the development of the MMP.
- Written notice (via email) to any organ of state having jurisdiction in respect of any aspect of the activity(ies) proposed within the development of the MMP.
- Written notice to any specific interest groups or stakeholders.

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- Site notices (in English) will be placed at the two entrances to the Steenberg Estate for the duration of the public participation period.
- The draft MMP will be available for review and comments by IAPs for a minimum of 30 days
- Electronic copies of the draft MMP and supporting documents will be made available on the PHS website and instructions on how to access these documents will be provided to all IAPs as part of the written notification

All comments received will be recorded in a Comments and Responses Report, which will accompany the final MMP adoption request to DEA&DP. Any amendments arising from this process will be incorporated into the final MMP submitted to DEA&DP for approval.

6. DATA COLLECTION AND ASSESSMENT

6.1. Description of the Site

The following sections describe the information collected and specialist assessments undertaken to inform the preparation of this MMP. The content is presented in the order prescribed by the DEA&DP's *Information Document for the Development of a Maintenance Management Plan for a Watercourse*

PLEASE NOTE: The information provided in the following sub-sections is largely obtained from the Freshwater and Aquatic Assessment (FEN, July 2026) as provided in Annexure B of this report. The Risk Matrix for the S21 (c) and (i) activities is provided in the Freshwater Assessment and will be used for the water use applications and registrations associated with the maintenance activities.

6.1.1. Locality Map of the Project Area

Please refer to the following relevant locality maps in this report:

- Figure 1: Steenberg Estate and Golf Course Locality Map (PHS Consulting, 2026)
- Figure 2: Properties subject to MMP and onsite dams (Map 1 of 2)
- Figure 3: Properties subject to MMP and onsite dams (Map 2 of 2)
- Figure 4: The delineated extent of the watercourses and artificial features associated with the Steenberg Estate and Golf Course (FEN, Freshwater and Aquatic Assessment, July 2025)

6.1.2. GPS Coordinates

GPS coordinates the maintenance area is provided in Annexure C.

6.1.3. Catchment Context

The study area is located within the Southern Folded Mountains Ecoregion, the Berg/Bot/Potberg catchment, and the G22D quaternary catchment (Figure 5), which forms part of the Berg Water Management Area (WMA) and Greater Cape Town Sub-Water Management Area (Sub-WMA) (FEN, July 2026). The nearest assessed sub quaternary catchment reach is the Keyzers River (G22D-09294). The Keyzers River catchment is classified as being in a largely modified ecological condition (PES Category D). Despite this, the catchment supports relatively high aquatic biodiversity, with a diverse macroinvertebrate community and several indigenous fish species expected to occur (FEN, July 2026). The system has a Moderate Ecological Importance and High Ecological Sensitivity, reflecting the diversity of aquatic habitats and the sensitivity of aquatic biota to changes in flow, water quality, and habitat condition. Although sections of the riparian zone have been transformed, the catchment retains important ecological value and contributes to regional biodiversity conservation (FEN, July 2026).

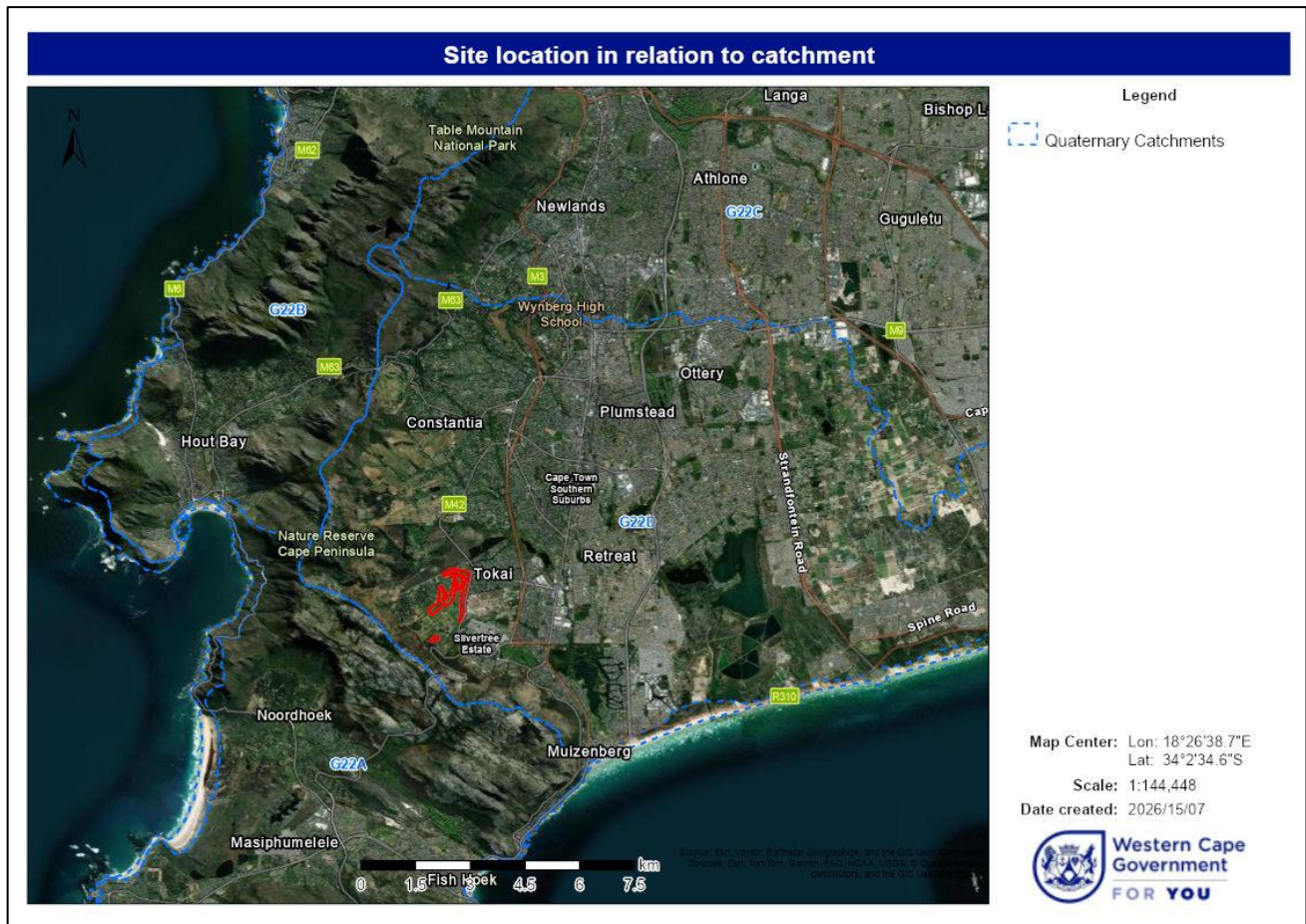


Figure 5: Location in relation to catchment (PHS Consulting, July 2026).

6.1.4. Resource Quality Objectives

The study area is located within Quaternary Catchment G22D, which forms part of the former Berg Water Management Area. Resource Quality Objectives (RQOs) have been established for the Berg Catchment, including the Keyzers River, which is the nearest assessed sub-quaternary catchment to the study area. The target ecological category for the Keyzers River is Present Ecological State Category D, with the applicable RQOs summarised in Table 1 below.

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Table 1: Resource Quality Objectives for Keyzers River (GN1179 of 2020 in terms of the NWA: National Water Act: Determination of classes of water resource and associated resource quality objectives for Berg Catchment)

Indicator	RQO Narrative	RQO Numeric																																																								
Maintenance of Low and High Flows	Flows sufficient to maintain the river in a D category	<table><tr><th colspan="14">Maintenance flows (million cubic metres)</th></tr><tr><th colspan="2">Months</th><th>Oct</th><th>Nov</th><th>Dec</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th></tr><tr><th>High</th><th>Low</th><td>0.012</td><td>0.001</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.027</td><td>0.068</td><td>0.139</td><td>0.026</td><td>0.051</td></tr><tr><td></td><td></td><td>0.038</td><td>0.024</td><td>0.014</td><td>0.011</td><td>0.009</td><td>0.009</td><td>0.012</td><td>0.019</td><td>0.035</td><td>0.056</td><td>0.066</td><td>0.054</td></tr></table>	Maintenance flows (million cubic metres)														Months		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	High	Low	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.027	0.068	0.139	0.026	0.051			0.038	0.024	0.014	0.011	0.009	0.009	0.012	0.019	0.035	0.056	0.066	0.054
Maintenance flows (million cubic metres)																																																										
Months		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep																																													
High	Low	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.027	0.068	0.139	0.026	0.051																																													
		0.038	0.024	0.014	0.011	0.009	0.009	0.012	0.019	0.035	0.056	0.066	0.054																																													
Phosphate (PO4-P)	Nutrient levels must be maintained in the river at a eutrophic or better condition.	≤ 0.125 milligrams/litre (50th percentile)																																																								
Total inorganic nitrogen (TIN)		≤ 3.0 milligrams/litre (50th percentile)																																																								
Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels	≤ 85 milliSiemens/metre (95th percentile)																																																								
pH range	pH, temperature, and dissolved oxygen are important for the maintenance of ecosystem health	6.5 ≤ pH ≤ 8.5 (5th and 95th percentiles)																																																								
Water temperature		2°C difference from ambient water temperature																																																								
Dissolved oxygen		≥ 6 milligrams litre (5th percentile)																																																								
Escherichia coli	Concentrations of waterborne pathogens should be maintained in a Tolerable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Acceptable, and then Ideal category for intermediate contact recreation.	≤ 4000 counts/100ml (95th percentile)																																																								
Riparian vegetation VEGRAI level 3 score.	Vegetation Condition	> 38% = D/E category																																																								

Fish FRAI score	Fish condition	> 62% = C category
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6.1.5. Regional and National Conservation Context

To establish a comprehensive regional and national conservation context, various national and provincial wetland and riparian databases were consulted during the desktop assessment of the site (FEN, July 2026). Key resources consulted included the NFEPA wetlands database (Figure 6 **Error! Reference source not found.**), the National Biodiversity Assessment (NBA, 2018) (Figure 7) the National Wetlands Map 6 (Figure 7), and the City of Cape Town Biodiversity Network (2023) (Figure 8 and Figure 9):

- According to the National Freshwater Ecosystem Priority Area (NFEPA) database, no natural wetlands occur within the study or investigation areas (Figure 6). However, several artificial unchannelled valley-bottom (UCVB) wetlands and an artificial channelled valley-bottom (CVB) wetland are mapped and are identified as dams in the National Biodiversity Assessment (NBA) artificial wetlands dataset (FEN, July 2026).
- According to the National Wetland Map 6 (NWM6), no natural wetlands occur within the study area; however, multiple CVB and seep wetlands occur within the surrounding investigation area (Figure 7). These wetlands are generally indicated to be in moderately to largely modified ecological condition (Present Ecological State (PES) Categories C/D) (FEN, July 2026).
- No rivers are mapped within the study area or investigation area by either the NFEPA or NBA river datasets (Figure 7). The Silvermine River is located south of the investigation area within a neighbouring quaternary catchment (FEN, July 2026).
- The site falls entirely within the Table Mountain Strategic Water Source Area (SWSA) for surface water and the Cape Peninsula and Cape Flats Strategic Water Source Areas for groundwater, highlighting the importance of the area for regional water security (FEN, July 2026).
- The City of Cape Town Biodiversity Network identifies numerous Other Ecological Support Areas, Critical Ecological Support Areas and Sand Fynbos depression wetlands within and surrounding the study area (Figure 8 & Figure 9). A Sand River Catchment watercourse is also indicated to traverse the site (according to the City of Cape Town database (CityMaps, 2026) (Figure 8), the Sand River Catchment watercourse is referred to as the 'Prinseskasteel Stream') (FEN, July 2026).

Furthermore, the Western Cape Biodiversity Spatial Plan (2023) does not indicate any Critical Biodiversity Areas (CBA's) or Ecological Support Areas (ESA's) within the extent of the properties subject to this MMP (Figure 10).

The proposed development site is also known to support breeding Western Leopard Toads (*Sclerophrys pantherine*) which is classified as an endangered species. More information on this species provided in Section 6.1.710.4 of this MMP.



Figure 6: NFEPA listed rivers and wetlands associated with the study and investigation areas as indicated by the NFEPA database (NFEPA, 2011) (FEN, July 2026).

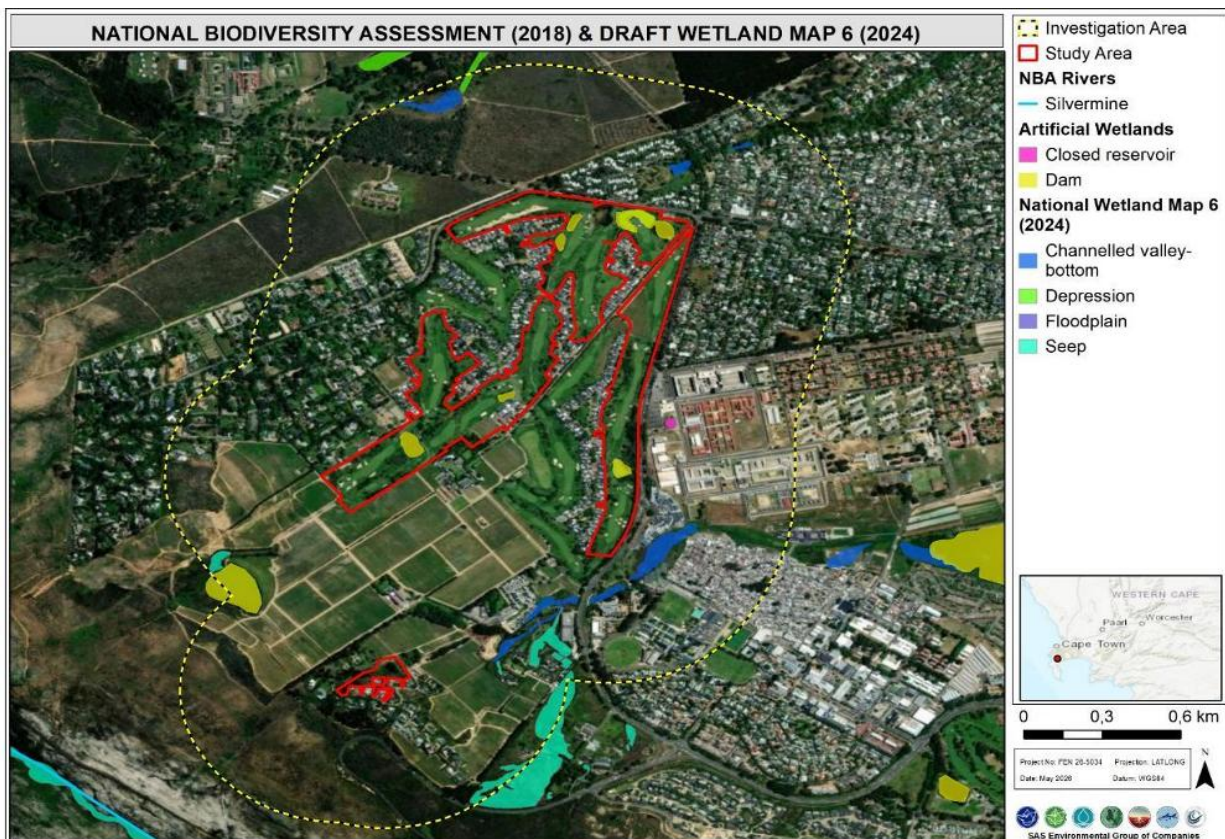


Figure 7: Different hydrogeomorphic (HGM) units associated with the study and investigation areas according to the National Biodiversity Assessment (NBA, 2018) and draft National Wetland Map 6 (2024) (FEN, July 2026).



Figure 8: Different hydrogeomorphic (HGM) units associated with the study and investigation areas according to the City of Cape Town Biodiversity Network (2023) (FEN, July 2026).

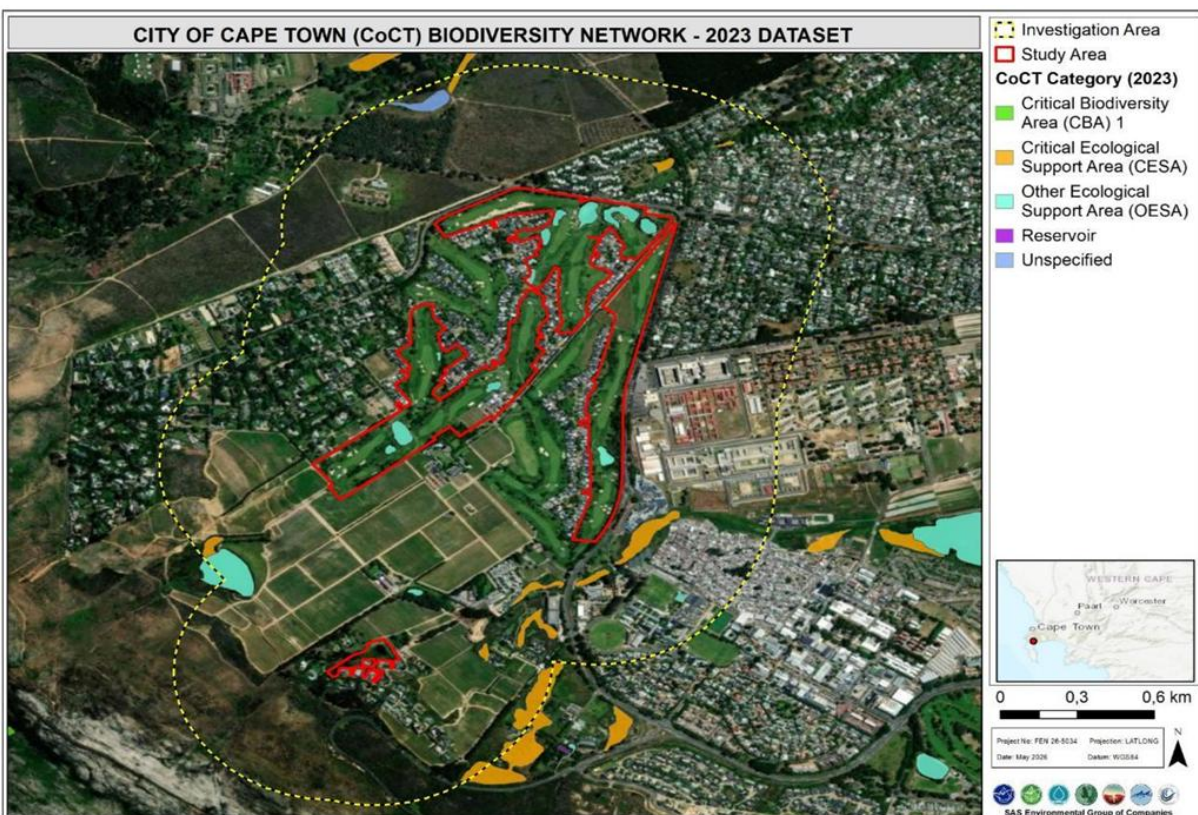


Figure 9: Areas of ecological importance associated with the study and investigation areas as indicated by the City of Cape Town Biodiversity Network (2023) (FEN, July 2026).

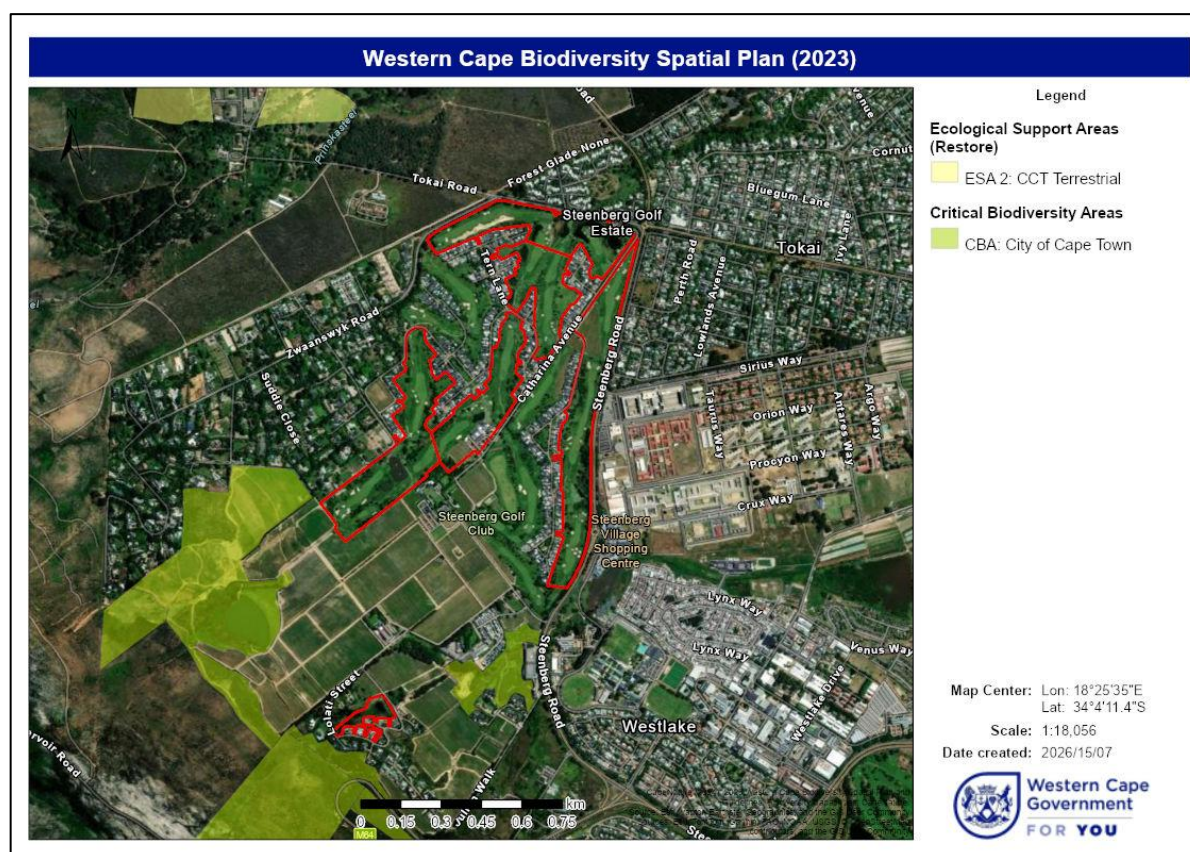


Figure 10: Western Cape Biodiversity Spatial Plan (2023) (PHS Consulting, July 2026).

6.1.6. Vegetation

The properties subject to this MMP are predominantly mapped as Southwest Sand Fynbos Wetland Vegetation, which is classified as Critically Endangered (CR). Portions of the surrounding investigation area also fall within the Southwest Granite Fynbos Wetland Vegetation (CR) and Southwest Sandstone Fynbos Wetland Vegetation (Endangered; EN) types (FEN, July 2026). However, the properties have been extensively transformed through historical cultivation and subsequent development as the Steenberg Estate and Golf Course. Consequently, the natural vegetation has largely been replaced by landscaped areas, with remnant riparian and wetland vegetation (where present) confined to the watercourses (FEN, July 2026).

The ephemeral drainage line associated with Erf 12910 retains areas of indigenous fynbos vegetation, although its ecological condition has been reduced by alien invasive plants, localised erosion, and historical disturbance. Dominant vegetation within and surrounding the instream dam includes *Phragmites australis* and *Cyperus papyrus*, along with ornamental plantings and opportunistic species commonly found in disturbed areas (FEN, July 2026).

The artificial channel traversing the golf course supports managed vegetation as part of the golf course landscape comprising a mixture of indigenous wetland species and ornamental landscaping. Indigenous aquatic species, including restios, shrubs characteristic of fynbos, and *Kniphofia* spp., have been incorporated into the landscaping. Vegetation composition within the artificial channel and in-stream dams include restios and shrubs synonymous with fynbos, *Typha capensis*, *C. papyrus*, *Juncus* sp. (including *J. effusus*), *Cyperus polystachyos*, *C. rotundus*, possibly *C. prolifer*, *Commelina erecta*, *Persicaria decipiens*, *Schoenoplectus scirpoides*, and possibly

Aristida junciformis. Dominant instream vegetation includes *Cynodon dactylon* (Bermuda grass), while invasive woody vegetation includes *Quercus* sp. (oaks), *Pinus* sp. (pines) and possibly *Dombeya* sp. (wild pear).

6.1.7. Fauna

The instream dams within the study area contain introduced fish populations. Species recorded include common carp (*Cyprinus carpio*) and mosquitofish (*Gambusia affinis*), both of which are exotic invasive species, as well as Mozambique tilapia (*Oreochromis mossambicus*) which is indigenous (FEN, July 2026) (Figure 11). The common carp and mosquitofish were introduced following construction of the impoundments and are recognised as pest species that can adversely affect aquatic ecosystems through habitat modification, increased water turbidity, and predation on the eggs and larvae of indigenous fish. Mozambique tilapia, although listed as Vulnerable due to threats from hybridisation with Nile tilapia (*Oreochromis niloticus*), is also known to proliferate in impoundments where favourable conditions exist.



Figure 11: Fish species present within the Steenberg Golf Course dams: (a) common carp (alien), (b) mosquitofish (alien) and (c) Mozambique tilapia (indigenous).

The freshwater systems within the study area also provide important habitat for the Western Leopard Toad (*Sclerophrys pantherina*), a species of conservation concern (Figure 12). Dam 7 on Erf 12379 has been identified as supporting the largest breeding population on site, with historical records of occurrence concentrated along Tokai Road where adult toads are most readily observed during seasonal breeding migrations. Breeding adults tend to recruit from lower down within the watercourses and not from above (i.e., upgradient). The toads therefore migrate in a generally upstream direction. When the froglets metamorphize and can migrate over land, it is assumed then that the majority move in a downstream direction rather than upstream.



Figure 12: Photos of (a) Western Leopard Toad and (b) Western Leopard Toad tadpoles (Western Leopard Toad Conservation Committee Website, August 2026).

Dam 7 which is associated breeding the Western Leopard Toad also supports an active population of Mozambique tilapia. Although there is a limited possibility of incidental predation on toad eggs or tadpoles,

Mozambique tilapia feed predominantly on detritus and algae and are not considered a significant threat to the toad population. Consequently, removal of the fish is not considered necessary. The presence of well-developed marginal vegetation provides important breeding and refuge habitat for the Western Leopard Toad, and the impoundments should therefore be managed to maintain and enhance these habitat features during maintenance activities.

6.2. Freshwater Assessment

6.2.1. Watercourses Associated with the Proposed Maintenance Area

Overview:

Field verification confirmed the presence of two freshwater systems within the maintenance area. The primary system comprises an ephemeral drainage line (EDL) that has been extensively modified through channelisation, impoundments, and underground pipelines within the Steenberg Golf Course (Figure 13) (FEN, July 2026). Artificial channels and in-stream dams provide hydraulic connectivity between the upstream EDL and the downstream Prinseskasteel Stream, which is a non-perennial river with reaches classified as channelled valley-bottom (CVB) wetlands (Figure 13)(FEN, July 2026). Although engineered, the artificial channels maintain hydrological connectivity and are therefore considered watercourses as defined by the National Water Act, 1998 (FEN, July 2026).

A second freshwater system comprises an EDL and associated in-stream dam which is located on Erf 12910. This EDL extends downgradient beyond the study area, where it transitions into a seep wetland and subsequently a CVB wetland (Figure 14) (FEN, July 2026).

The broader investigation area also contains mapped seep wetlands, depression wetlands, CVB wetlands, rivers, artificial channels, and in-stream and off-stream dams, all of which contribute to the hydrological connectivity of the catchment (Figure 13 & Figure 14). The freshwater assessment undertaken to inform this MMP focused on the EDL associated with Erf 12910, the artificial channel network within the golf course, and the downstream reaches of the Prinseskasteel Stream.

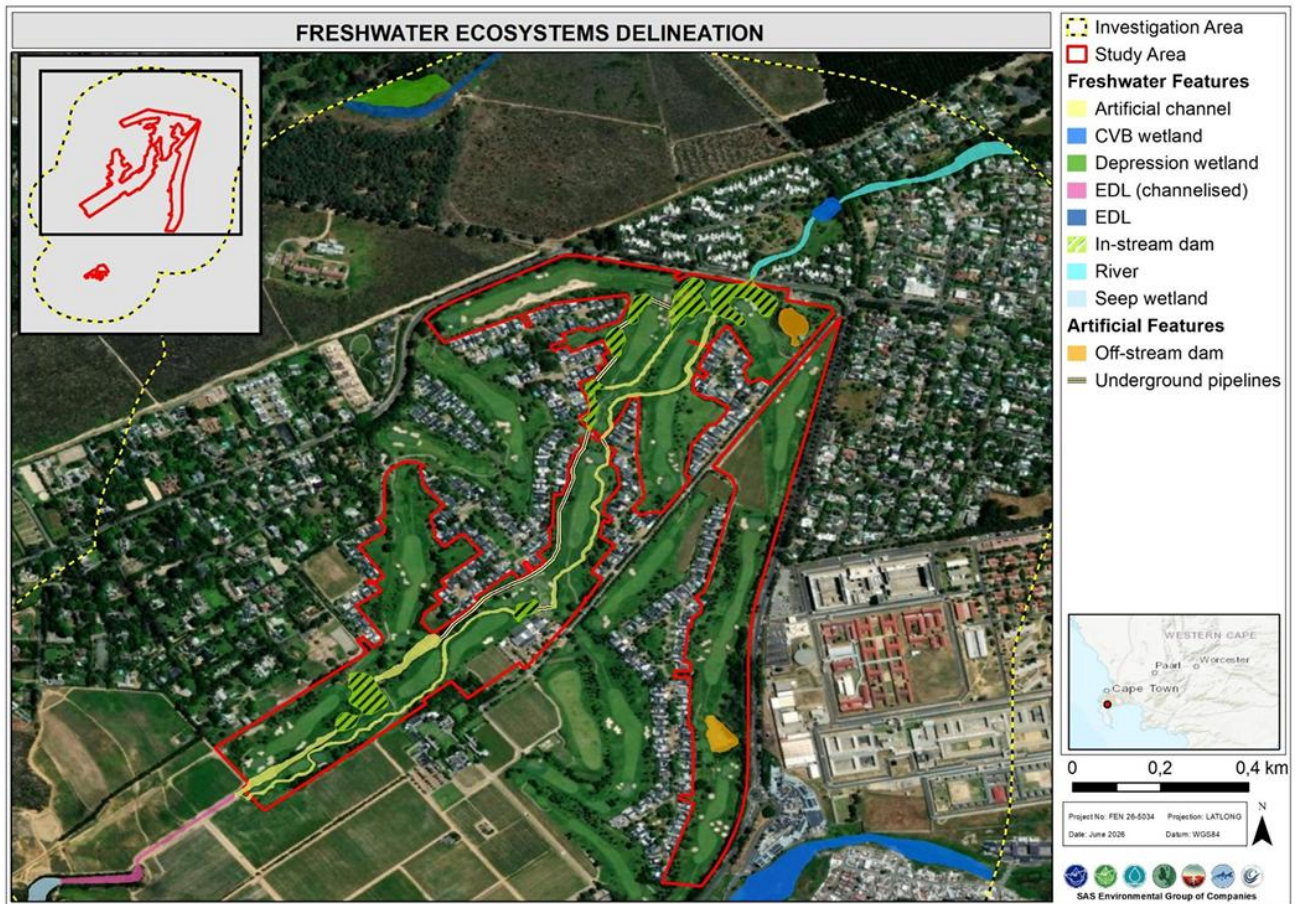


Figure 13: Map (1 of 2) depicting the delineated extent of the freshwater ecosystems associated with the study and investigation areas (FEN, July 2026).

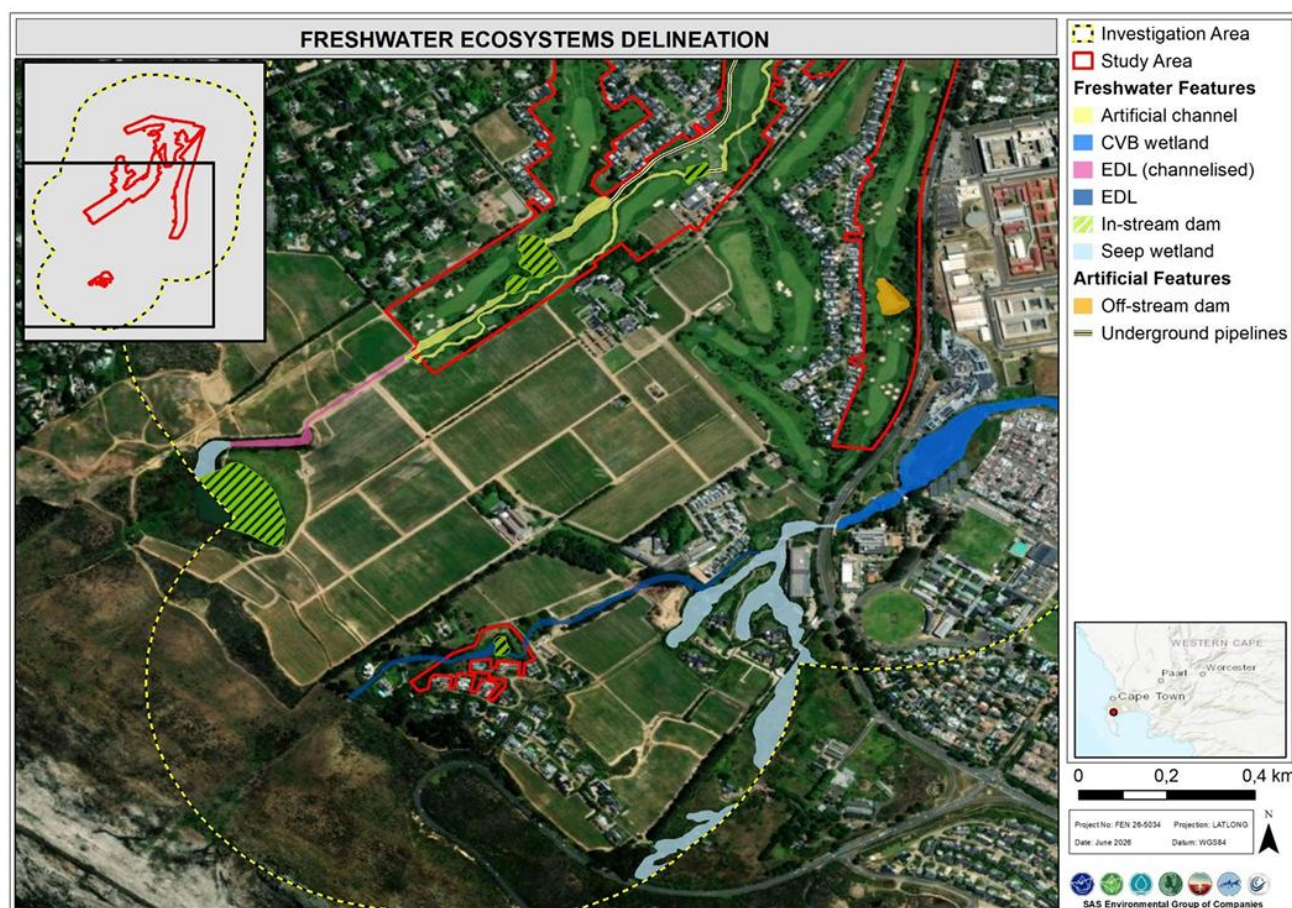


Figure 14: Map (2 of 2) depicting the delineated extent of the freshwater ecosystems associated with the study and investigation areas (FEN, July 2026).

EDL associated with Erf 12910 (FEN, July 2026):

The ephemeral drainage line (EDL) associated with Erf 12910 is a seasonal freshwater system that has been modified by an in-stream dam (Figure 15) and associated outlet structure but retains hydrological connectivity with downstream wetlands (Figure 16). The system is characterised by sandy substrates, seasonal flow, and localised bank erosion resulting in minor sediment mobilisation. Riparian vegetation is dominated by indigenous fynbos, although its ecological condition has been reduced by alien invasive plant encroachment and historical disturbance. The in-stream dam and its margins support dense stands of *Phragmites australis* and *Cyperus papyrus*, together with ornamental plantings and opportunistic species typical of modified freshwater environments (Figure 15).



Figure 15: Representative photograph of the in-stream dam to be maintained on Erf 12910. Indigenous fynbos, ornamental plants and alien and invasive plants (AIPs) are present on the dam embankments and in the terrestrial zone below the dam.



Figure 16: Representative photograph of the canalised dam outlet within the EDL. The yellow arrow indicates direction of flow.

Artificial Channel within the Steenberg Golf Course (FEN, July 2026):

The artificial channel network was constructed during the development of the Steenberg Golf Course to divert the original ephemeral drainage line. The system comprises a series of engineered channels (Figure 17) and in-

stream dams (Figure 18) that maintain hydraulic connectivity between the upstream drainage line and the downstream Prinseskasteel Stream. Hydrological functioning is influenced by the operation of the golf course dams and irrigation system, including the use of treated effluent for irrigation. Water quality measurements indicate that the system is generally in a suitable condition to support its current ecological functioning, with no evidence of significant water quality impairment at the time of assessment. The riparian zone is actively managed as part of the golf course landscape and supports a mixture of indigenous wetland species, ornamental plantings, and invasive alien vegetation. Although highly modified, the artificial channel continues to function as an important freshwater corridor connecting the upstream and downstream aquatic ecosystems.



Figure 17: Representative photographs of (A-C) the artificial channel and (D) piped reach of the EDL. Yellow arrows indicate direction of flow and black arrow indicates position of surface water drain (FEN, July 2026).



Figure 18: Representative photo of several of the onsite instream dams



Figure 19: Infrastructure where a portion of the artificial channel enters an underground pipe (downstream of Dam 2).

Non-perennial river (Prinseskasteel Stream) and associated CVB wetland (FEN, July 2026):

The downstream Prinseskasteel Stream and associated CVB wetland retain a relatively natural character despite hydrological modification from upstream impoundments and channelisation. The system is characterised by predominantly natural substrates, with only localised bank erosion and instability observed.

The riparian vegetation has been modified relative to its reference conditions largely due to invasive vegetation, historical disturbance from the upgradient catchment and altered riparian habitat structure. Nevertheless, the river corridor supports a well-developed riparian zone comprising indigenous woody and wetland vegetation interspersed with invasive species. Common indigenous species include *Salix babylonica* (Weeping Willow, invasive), *S. mucronata* (Cape Willow), *Rapanea melanophloeos* (Cape Beech), *T. capensis* (bulrush), possibly *Monopsis lutea* (Yellow Oneye), *Cyperus textilis* (Umbrella Sedge), rushes and the exotic grass *Avena* sp. (oats).

6.2.2. Watercourse Status Quo Assessment

Habitat Integrity Assessment:

The IHI assessment indicates that the EDL associated with Erf 12910 is in a largely natural to moderately modified condition. The main factors affecting habitat integrity are the presence of the in-stream dam and outlet structure, localised bank erosion, and alien invasive plant encroachment. Despite these modifications, the system retains much of its natural habitat and ecological functioning (FEN, July 2026).

Although an IHI assessment was not undertaken for the artificial channel network due to its engineered nature, the EIS, ecosystem service, and diatom assessments indicate that it is in a largely to seriously modified ecological condition (Present Ecological State Category D/E) (FEN, July 2026).

The IHI assessment indicates that the Prinseskasteel Stream is in a moderately modified ecological condition (Present Ecological State Category C). The principal drivers of modification are upstream flow regulation, historical catchment disturbance, and alien invasive plant encroachment within the riparian zone (FEN, July 2026).

Ecosystem Services:

The EDL on Erf 12910 provides a moderate level of ecosystem service provision, with biodiversity maintenance identified as its most important function due to the presence of indigenous fynbos vegetation and the role of the system in maintaining habitat connectivity. Carbon storage provides additional ecosystem service value, while most regulating services are of low importance. Historical modification, localised erosion and AIP encroachment constrain the system's ability to provide regulating services and reduce resilience to future disturbance (FEN, July 2026).

The artificial channel network provides a relatively low level of ecosystem service provision due to its engineered nature and modified hydrology. Its primary ecological value lies in maintaining hydraulic connectivity and supporting local biodiversity, particularly by providing habitat for the Endangered Western Leopard Toad (*Sclerophrys pantherina*), including breeding habitat within the downstream in-stream dams. Overall, the system has a limited capacity to provide ecosystem services beyond maintaining connectivity and supporting aquatic biodiversity (FEN, July 2026).

The Prinseskasteel Stream and associated channelled valley-bottom (CVB) wetland provide a moderate level of ecosystem service provision, with biodiversity maintenance identified as the primary ecosystem service. The system also contributes to flood attenuation, streamflow regulation, carbon storage, recreation, and habitat connectivity. Compared to the artificial channel network, the river and wetland have a greater capacity to provide ecosystem services that meet the ecological and social needs of the surrounding landscape (FEN, July 2026). Continued provision of these services is dependent on maintaining water quality, hydrological connectivity, and the integrity of the riparian and wetland habitats.

Ecological Importance and Sensitivity:

The EDL associated with Erf 12910 has an overall Moderate Ecological Importance and Sensitivity (EIS) rating. This reflects its role in providing habitat diversity, supporting remnant indigenous fynbos vegetation communities within the study area, and providing ecological connectivity within the catchment (FEN, July 2026). The system continues to contribute to downstream freshwater ecosystem functioning and remains sensitive to further changes in hydrology, habitat structure and vegetation composition.

The artificial channel attained a Low EIS rating, reflecting its engineered origin, limited habitat diversity and reduced ecological functionality. Although ecological importance is generally low, several of the in-stream dams

provide habitat for indigenous fish and amphibian species and contribute to maintaining hydraulic connectivity between upstream and downstream freshwater ecosystems (FEN, July 2026).

The Prinseskasteel Stream and associated CVB wetland have a Moderate to High Ecological Importance and Sensitivity (EIS) rating. This reflects the diversity of aquatic habitats, sensitivity to changes in hydrology and water quality, and their important role in maintaining ecological connectivity within the catchment (FEN, July 2026).

7. RISKS ASSOCIATED WITH NOT IMPLEMENTING THE MMP

The following risks were identified should the MMP not be implemented:

- Reduced hydraulic capacity of watercourses and in-stream dams due to the accumulation of sediment, debris, and excessive vegetation growth, increasing the risk of flooding and damage to surrounding infrastructure.
- Progressive bank erosion and channel instability resulting from unmanaged erosion, sedimentation, and inadequate maintenance of erosion protection measures.
- Deterioration or failure of instream infrastructure, including culverts, weirs, bridges, pipelines, gabions, spillways, and associated structures, leading to reduced functionality and increased repair costs.
- Proliferation of alien invasive vegetation, resulting in reduced ecological integrity and restricted water flow.
- Declining water quality due to the accumulation of sediment, organic material, litter, and other debris within the watercourse system.
- Uncoordinated, delayed or poorly managed maintenance activities, including inappropriate access, may result in channel instability, bank erosion, sediment accumulation, downstream siltation, deterioration in water quality and, in severe cases, channel failure.
- Increased long-term maintenance requirements and costs as a result of deferred maintenance, infrastructure deterioration, and more extensive rehabilitation requirements.
- Non-compliance with relevant environmental legislation, potentially resulting in enforcement action, fines, or directives from the competent authority.

8. MAINTENANCE AND MANAGEMENT FRAMEWORK

8.1. DEA&DP MMP Principles and Guidelines

The following are overarching principles to be used by landowners and managers when considering the development and implementation of an MMP:

- The anticipation and prevention of negative impacts and risks, then minimisation, rehabilitation or 'repair', where a sequence of possible mitigation measures to avoid, minimize, rehabilitate and/or remedy negative impacts is explicitly considered;
- Avoid and reduce unnecessary maintenance;
- Maintenance and management of a watercourse must be informed by the condition of the physical and ecological processes that drive and maintain aquatic ecosystems within a catchment, relative to the desired state of the affected system;
- Management actions must aim to prevent further deterioration to the condition of affected watercourses and, overall, be guided by a general commitment to improving and maintaining ecological infrastructure for the delivery of ecosystem services;
- Managers and organs of state must identify, address and, where feasible, eliminate the factors that necessitate intrusive, environmentally damaging maintenance; and
- A process of continuous management improvement be applied, namely Planning; Implementing; Checking (monitoring, auditing, determine corrective action) and Acting (management review).

8.2. General Mitigation Measures

The following measures provide general guidance to minimise the impact of the maintenance activities and are applicable to all method statements:

Planning and Timing:

- Except where emergency works are required, all routine maintenance activities must be undertaken between January and April, when stream flows are lowest and outside the Western Leopard Toad breeding and tadpole development period.
- Activities involving significant sediment disturbance should, where practicable, be undertaken in a phased manner to minimise deterioration in water quality and protect aquatic fauna, particularly Western Leopard Toad tadpoles.
- Where emergency works are required, the applicable legislative requirements must be followed, and the works must be undertaken under the supervision of the appointed ECO.

Ecological Buffers and Maintenance Right of Way (RoW):

- In accordance with the Freshwater Ecological Assessment (FEN, July 2026), 10m ecological buffers around the in-stream dams and 15m ecological buffers around the watercourses must be demarcated on site, where practicable, for the duration of the periodic maintenance activities (Figure 20 & Figure 21). These ecological buffers must be treated as no-go areas to minimise edge effects.
- However, as maintenance activities are required within the freshwater ecosystems, a 5m Maintenance Right of Way (RoW) at the maintenance locations has been allowed for. All maintenance activities and associated disturbance must be confined to this designated RoW. The outer boundary of the 5m maintenance RoW must be clearly demarcated using a suitable barrier or material by an ECO and both the buffer area and the maintenance RoW are to be marked as 'no-go' areas. No vehicles or personnel are permitted within this area.
- Only authorised personnel may be permitted to enter these 'no-go' areas as part of the maintenance and subsequent rehabilitation activities. Personnel, vehicles and machinery may only enter the Maintenance RoW for the purpose of actively undertaking the approved maintenance works. Upon completion of the works, all personnel, vehicles, machinery and equipment must be removed from the RoW.
- Maintenance staging areas, laydown areas, stockpiles, refuelling areas, equipment storage and all other ancillary activities must be located outside the ecological buffer.
- No maintenance-related disturbance may extend beyond the boundaries of the designated 5m Maintenance RoW.

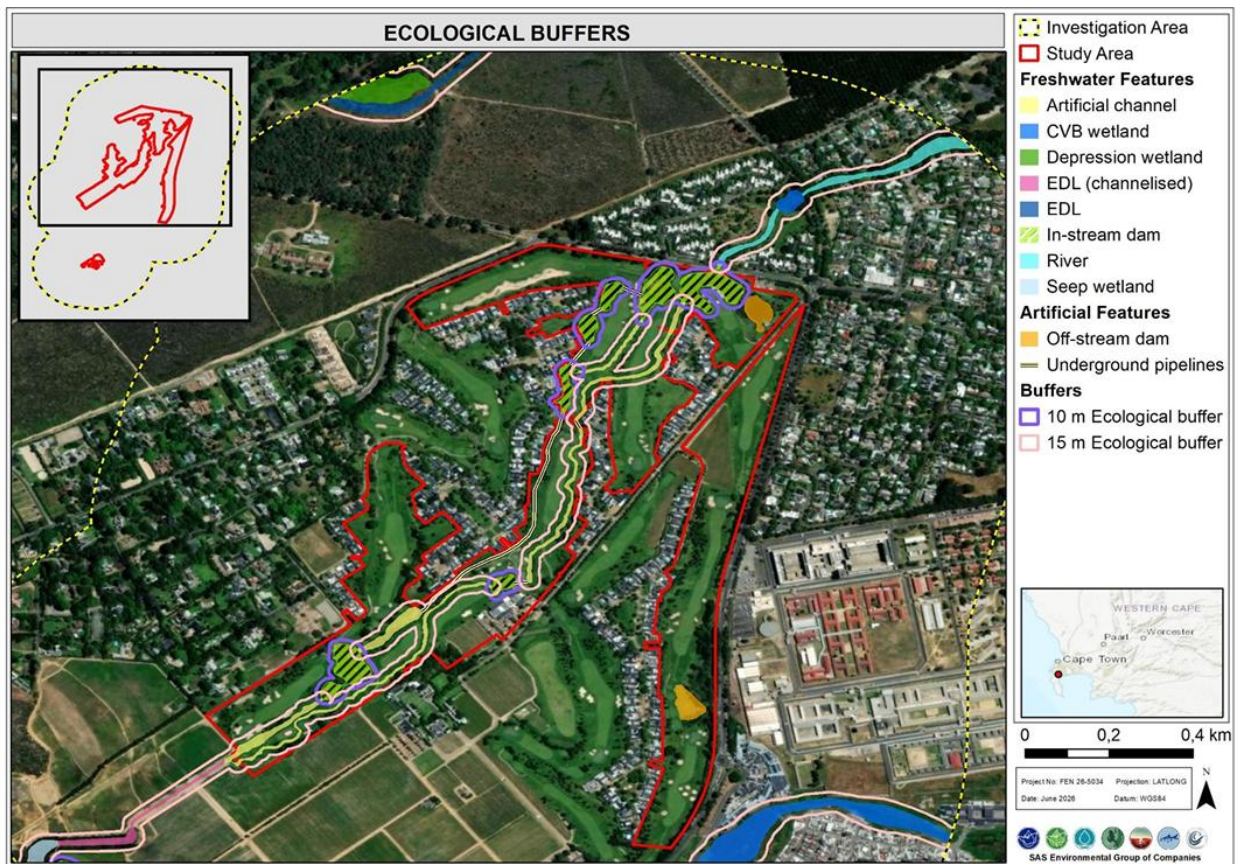


Figure 20: Freshwater ecosystems associated with the study and investigation areas, as well as the associated ecological buffer (Map 1 of 2) (FEN, July 2026).

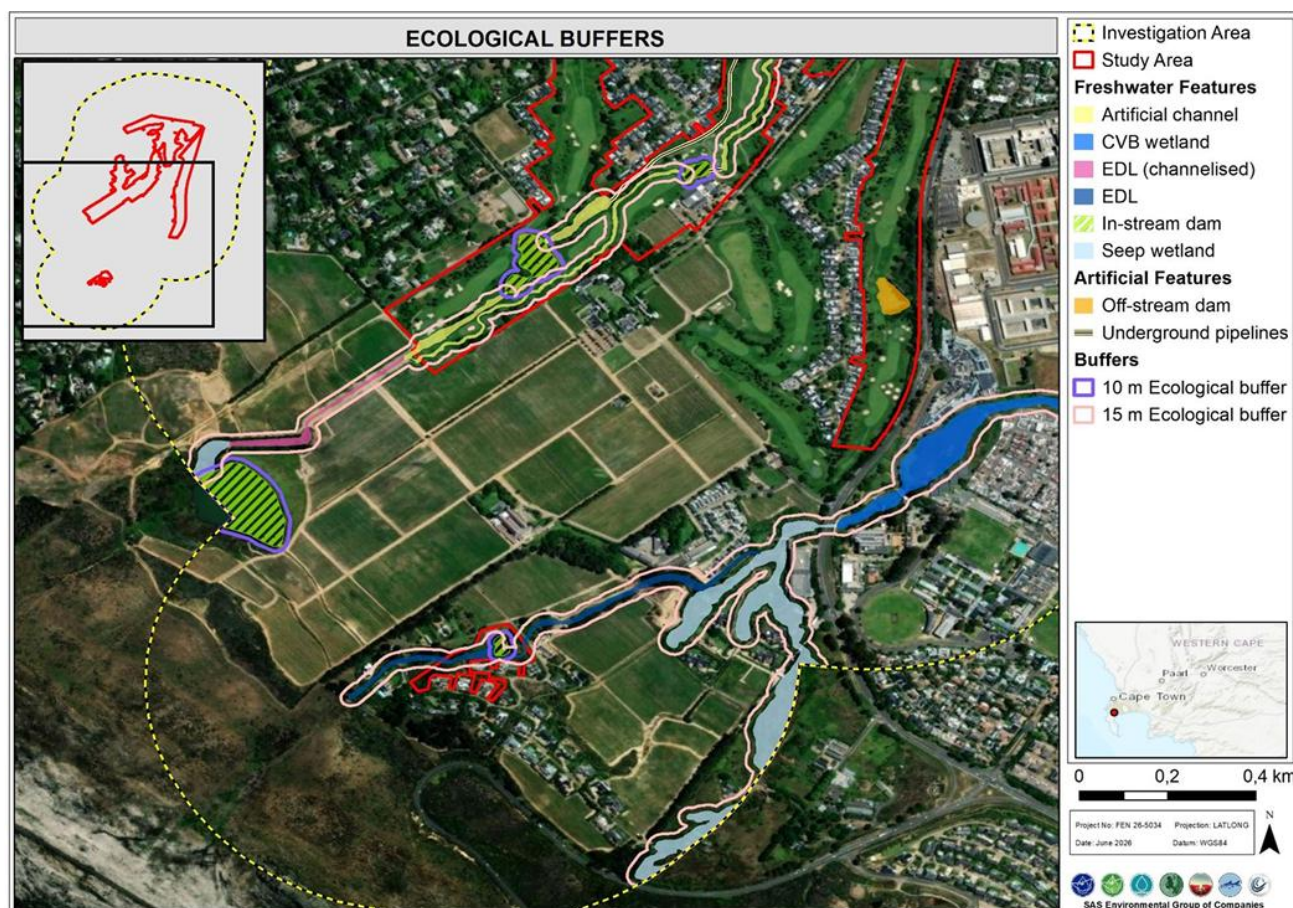


Figure 21: Freshwater ecosystems associated with the study and investigation areas, as well as the ecological buffer (Map 2 of 2) (FEN, 2026).

Maintenance Footprint & Access:

- Prior to commencing any maintenance activity, clearly demarcate the activity-specific maintenance footprint and designated access routes.
- The maintenance footprint must be limited to the relevant proposed activity footprint and 5m maintenance RoW (i.e. the authorised maintenance area) in accordance with the recommendations of the Freshwater Ecological Assessment (FEN, July 2026). The area outside the 5m maintenance RoW of the proposed periodic maintenance activities must be demarcated as a no-go area. No vehicles or personnel are permitted within this area.
- The extent of the authorised maintenance area and designated access routes must be clearly communicated to the contractor and all personnel prior to commencement of the works.
- Existing access routes must be used wherever practicable. In cases where none exist, a route should be created through the most degraded area avoiding sensitive/indigenous vegetation areas.
- Watercourses may only be accessed for the purpose of maintenance activities as assessed within this report. As far as possible, physical movement in the freshwater ecosystems by personnel must be limited.

- The extent of disturbance must be limited to the minimum area necessary to safely and effectively undertake the maintenance activity.
- Site clearing activities (including for maintenance staging areas, if required) are to remain within the authorised maintenance and management footprint.
- Avoid unnecessary trampling of vegetation irrespective of the vegetation being associated with the freshwater ecosystems or the surrounding terrestrial area.
- Retain as much indigenous vegetation as possible (wetland and terrestrial).

Site Establishment:

- Maintenance staging areas (where applicable), vehicle refuelling, and equipment and material storage facilities must remain outside of the 10m and 15m ecological buffer of the freshwater ecosystems and preferably the 32m NEMA ZoR, where possible. A designated maintenance staging and refuelling area must be approved by an independent ECO prior to use (please also refer to Section 8.4).
- Adequate waste management facilities and, where applicable, suitable sanitation facilities must be provided and maintained for the duration of the maintenance activities.

Machinery, Equipment and Construction Materials:

- Wherever possible, maintenance work should be conducted on foot and carried out using hand tools rather than heavy machinery.
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All hazardous chemicals as well as stockpiles should be stored on bunded surfaces and have facilities constructed to control runoff from these areas.
- Construction materials, particularly cement and fuel, must be stored and managed to prevent contamination of the watercourse, especially during storm events.
- Material stockpiles must be placed outside the delineated freshwater ecosystems, the associated ecological buffer and the 32m NEMA ZoR (the latter where practical). These stockpiles may not exceed a height of 2m and should be protected from wind and precipitation using tarpaulins or a suitable geotextile.
- All machinery must be inspected daily, prior to entering the maintenance footprint, for fuel, oil and hydraulic leaks before entering the maintenance area. Defective equipment must be repaired or removed from site immediately.
- In all events all machinery and vehicles used during maintenance must be maintained and equipped with drip trays to prevent oil, petrol or diesel leaks. If breakdowns occur these must be towed offsite to the designated areas/workshops.

- Vehicles, machinery and equipment must not be washed within the watercourse or where wash water could drain into the watercourse.
- All spills should they occur, should be immediately cleaned up and treated accordingly. All contaminated materials must be disposed of at a registered disposal facility
- Spill kits must be readily available during works within the freshwater ecosystems

Watercourse Protection:

- 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
- No indiscriminate movement of vehicles through the freshwater ecosystems may be permitted. All vehicles must remain outside of the 10m and 15m ecological buffer, unless required as part of specific maintenance activities for a short period of time.
- No new berms may be created.
- Dust suppression measures must be implemented (if required) throughout the maintenance phase to prevent excessive dust which may smother freshwater vegetation.
- Any alien invasive plants within the maintenance area must ideally be removed prior to the initiation of soil disturbing maintenance activities.
- Prior to undertaking any activities that will potentially result in bank destabilisation and an increase in bank incision and sedimentation of the freshwater ecosystem, temporary sediment control devices must be constructed in-situ prior to maintenance activities.

Protection of aquatic fauna:

- Conduct pre- maintenance phase amphibian searches and relocation by a suitably qualified specialist if required (FEN, July 2026).
- Undertake maintenance activities within dams in a phased manner, where practicable, to avoid large-scale disturbance of bottom sediments and minimise sudden deterioration in water quality.
- Schedule maintenance activities involving significant sediment disturbance during the site's designated maintenance window (January to April) to avoid the Western Leopard Toad breeding and tadpole development period.
- Minimise the extent and duration of sediment disturbance within dams to reduce the release of hydrogen sulphide and other substances associated with anoxic sediments that may adversely affect aquatic fauna.
- Where practicable, maintain or increase water circulation/flow-through during maintenance activities involving substantial sediment disturbance to improve water quality and assist with oxygenation.

- Where significant sediment disturbance is anticipated, consider the temporary installation of aerators or other appropriate measures to maintain dissolved oxygen concentrations within the water column during the maintenance period.
- Avoid disturbing larger areas of accumulated sediment than is necessary to safely complete the maintenance activity.

The fish species currently known to occur within the dams (e.g. Common Carp and Mozambique Tilapia) are relatively tolerant of poor water quality; however, maintenance activities must still be undertaken in a manner that minimises unnecessary impacts on aquatic fauna and habitat.

Post Maintenance Rehabilitation:

- Topsoil excavated (if any) must be stored separately and may not be contaminated. The topsoil is to be reused on completion of maintenance activities for rehabilitation.
- Upon completion of the maintenance activities, the impacted reaches of the freshwater ecosystems and the associated ecological buffers must be rehabilitated. This must include clearing of all alien invasive plants and reinstatement of indigenous freshwater vegetation within the disturbed footprint. Rehabilitation of the ecological buffer (where feasible considering the current operation of the golf course) would entail reinstatement of indigenous vegetation suitable for occasional inundation.
- On completion of the maintenance action, the condition of the site in terms of relative topography should be similar to the pre-damaged state (i.e. the shape of the riverbank should be similar or in a state which is improved to manage future damage).
- The preservation of cobble and gravel beds associated with flowing water habitats are important features for maintaining aquatic biodiversity. These features must be preserved during the proposed maintenance activities and reinstituted if maintenance activities have resulted in the loss of disturbance of such features.
- No deepening of the watercourse beyond the original, pre-damage determined thalweg, unless such deepening is directly related to the natural improved functioning and condition of such a watercourse.
- Any soil compacted during maintenance within the watercourse or adjacent terrestrial zones must be loosened and, where relevant, immediately revegetated with suitable indigenous species.
- Any remaining soil following the completion of the proposed periodic maintenance activities are to be spread out thinly in an area within the riparian zone to aid in the natural reclamation process.
- Areas of the system that are currently unvegetated, sparsely vegetated, or cleared of alien invasive plants during maintenance must be revegetated with locally indigenous vegetation to minimize erosion and improve the system's ecological condition.
- Once maintenance actions have been completed, all equipment, waste and surplus material must be removed from the site.

- Any remaining soil following the completion of the proposed periodic maintenance activities are to be spread out thinly in an area within the riparian zone to aid in the natural reclamation process

8.3. Method Statements

The following method statements provide activity-specific requirements for implementing maintenance and management activities within the areas subject to this MMP:

- 1) Clearing of Invasive Alien Vegetation
- 2) Clearing or thinning of overgrowth of indigenous vegetation
- 3) Removal of sediment from watercourses and in-stream dams.
- 4) Minor repairs to existing infrastructure.
- 5) Major repairs and like-for-like replacement of existing infrastructure.
- 6) Repairs to riverbanks and associated bank stabilisation infrastructure

8.3.1. Method Statement 1: Clearing of Invasive Alien Vegetation	
a)	Objective
Removal of alien invasive vegetation using appropriate mechanical and, where necessary, chemical control methods, and the revegetation of cleared areas with suitable indigenous species where required.	
b)	Location
This activity applies to the entire project area.	
c)	Method Statement & Mitigation Measures
- Identify the alien invasive plant species that need to be removed and clearly demarcate the relevant maintenance footprint. If unsure of the species, consult the appointed suitably qualified ECO for assistance. - Clear alien invasive vegetation in accordance with species-specific method and best practice guidance contained in <i>A Practical Guide to Managing Invasive Alien Plants: A Concise Handbook for Land Users in the Cape Floral Region</i> (Martens <i>et al.</i>, 2021; WWF South Africa, Cape Town). - As far as practically possible, vegetation should be removed using manual methods. Mechanical equipment should only be used where access and environmental conditions permit. - Wherever practical, clearing activities should commence at the upstream extent of the work area and progress in a downstream direction. - Remove all cut alien vegetation from the watercourse and associated ecological buffer. Large stumps of non-resprouting species, or stumps that have been appropriately treated, may be left in place. - Once all alien invasive vegetation clearing is completed, all alien invasive plant material and any removed excess material must be disposed of at a licensed refuse facility and may not be mulched and burned onsite. - After alien invasive plants have been removed, the soil surrounding these areas must be suitably loosened and revegetated with indigenous plant species. Planting should preferably take place at the start of the wet season, outside areas likely to be inundated or affected by flood flows. Where there is a risk of erosion, additional stabilisation measures such as ecologs or geojute can be implemented. - Regularly monitor cleared areas and remove any regrowth of alien invasive plants to prevent re-establishment. - Ensure alien invasive plants are managed throughout the operational lifetime of the project until suitable basal cover of indigenous vegetation is achieved. <u>Chemical Use:</u> - Chemical control may only be used where necessary (e.g. to treat resprouting species) and must be undertaken by suitably trained personnel using products that are not harmful to soil microorganisms, aquatic biota or freshwater systems in general. - Herbicides must not be applied within watercourses, stormwater channels, or within 100m thereof, except for the spot application of an appropriate herbicide to the cut stumps of felled alien invasive trees to prevent resprouting. - Where applicable for the AIPs, care must be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occur due to the herbicide used and that water contamination is avoided	

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• The type of herbicide used, application date, and treatment location must be recorded, and records must be stored electronically for at least two years post application. • Chemical application should be avoided on windy days and before heavy rains. • Herbicide use is not permitted during the winter season or within inundated areas; in these areas, only manual clearing methods may be employed. • Detailed herbicides/biological control recommendations are also provided on the Working for Water website: http://www.dwaf.gov.za/wfw/Control.	
d)	Access
The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.	
e)	Frequency & Timing
- Undertake alien invasive plant clearing at least twice annually during the initial control phase followed by annual follow-up clearing for a minimum of three years. Thereafter, clearing may be undertaken on an as-needed basis to maintain effective control. - Clearing must be undertaken during the site's designated maintenance window (January to April), with routine annual clearing preferably scheduled for March/April prior to the onset of the winter rainfall season.	
f)	Impacts & Risks
• Compaction of soil and loss of habitat as a result of ongoing disturbance • Impacts to water quality as a result of the application of herbicides • Disturbance of soil which could lead to erosion • Dust generation from exposed soil	

8.3.2. Method Statement 2: Clearing or thinning of overgrowth of indigenous vegetation**a) Objective**

To selectively manage excessive growth of indigenous vegetation. The primary species requiring management within the MMP area are Common Reed (*Phragmites australis*) and Bulrush (*Typha capensis*), both of which are indigenous and should be retained wherever practicable to continue providing their valuable ecological functions. *Phragmites* reed and *Typha* bulrush growth are known to experience excessive growth in watercourses within developed areas where the natural control measures such as floods or grazing have largely been removed and there is an elevated supply of nutrients. The removal of these plants should thus be periodically undertaken in order to maintain an open channel and ensure that high flows in the channel are unimpeded. These indigenous species provide important ecosystem services, including habitat for aquatic and riparian fauna, bank stabilisation, sediment retention, water quality improvement and flow regulation. As such, the objective is to control nuisance growth rather than eradicate these species. Control should only aim to remove excessive plant growth and build-up of material that limits the hydraulic capacity of the system.

b) Location

Overgrowth was observed within more permanently inundated areas, particularly at the inlets to in-stream dams and, in some instances, within the dams themselves. Dense stands of *Phragmites australis* were also observed between the treated effluent outfall and Dam 1.

c) Method Statement & Mitigation Measures

- Identify all sections of the watercourse where excessive growth of indigenous vegetation is impeding water flow or infrastructure function and requires selective clearing.
- Manage all indigenous vegetation exhibiting excessive growth in accordance with species-specific methods. Management methods for *Phragmites australis* and *Typha capensis* are provided below. Should additional indigenous species require management in future, the appointed suitably qualified ECO must advise on the appropriate management approach.
- Access the watercourse only through designated and demarcated entry points.
- Where practicable, clear indigenous instream vegetation by hand cutting or mowing. Mechanical equipment may only be used where access and environmental conditions permit. Avoid unnecessary disturbance of the channel bed, banks and surrounding vegetation.
- Wherever practical, clearing activities should commence at the upstream extent of the work area and progress in a downstream direction.
- Patches of reeds immediately upstream or downstream of stream crossings can be routinely cut prior to the rainfall period so as not to cause blockages at these critical points, particularly of pipes and culverts;
- Remove all cut vegetation from the watercourse and associated 32 m buffer. Do not stockpile or dispose of cleared material within the watercourse or riparian area; dispose of it at a suitable approved disposal site.

Removal of *Phragmites australis* & *Typha capensis*.

- Do not remove *Phragmites australis* by digging or hand-pulling, as their extensive root systems make these methods ineffective, increase water turbidity, and may promote further spread.
- Selectively cut *Phragmites australis* and *Typha capensis* by hand using machetes, loppers or similar tools. Stems should be cut as close to the water surface as practicable, preferably 5–10cm below the water surface where conditions allow, to suppress regrowth

- Cutting should preferably be done in March/April prior to the winter rains so that the cut stems become inundated as water levels rise.
- The reeds should be cut below the lowest leaf, and the remaining stump should not be longer than 15cm.
- Focus on creating or maintaining open flow channels through dense vegetation rather than clearing entire stands.
- Where *Typha capensis* seedlings are noted, these should be hand pulled.
- Given the ecology of these species, mechanical clearing is not recommended. Manual cutting prior to the onset of the winter rainfall season, allowing cut stems to become inundated as water levels rise, is the preferred method of controlling excessive growth while retaining the ecological functioning of the reed beds.

Mitigation:

- Removal of indigenous instream indigenous vegetation should be limited to nuisance growth of reeds, bulrushes and aquatic weeds.
- Clearing should be conducted during autumn, prior to the onset of the winter rainfall season and outside the breeding season for birds and amphibians.
- If a brush cutter is used, mowing should be no lower than 12cm from the ground to minimise impacts on small animals and indigenous plants
- If mowers are used, care should be taken that they do not damage banks or other indigenous vegetation such as sedges and rushes
- If banks are disturbed by the activity, follow-up revegetation should be undertaken
- Indigenous sedges and other grasses should be allowed to establish in cleared sections
- Any clearing works in the channel should not impede the movement of aquatic and riparian biota
- A minimum base flow should be maintained in the river channel at all times
- Remove all cut reeds, and aquatic weeds and cleared alien vegetation from the channel and riparian zone. Cut vegetation should ideally be taken to a green / garden waste facility and not sent to a landfill

d) Access

The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.

e) Frequency & Timing

- During the first year of implementation, selective thinning may be undertaken up to three times between January and May, preferably during January, March and early May, where excessive growth is restricting hydraulic capacity or infrastructure function
- Thereafter watercourses should be inspected annually, with selective thinning undertaken during March/April, where required, prior to the onset of the winter rainfall season.
- Where management of *Typha capensis* is required, two selective cuttings should be undertaken 1–2 weeks apart towards the end of the growing season (March/April), prior to winter inundation.

Note: Effective management of *Phragmites australis* and *Typha capensis* is achieved through a combination of selective cutting and subsequent inundation. Accordingly, cutting should be undertaken prior to the onset of the winter rainfall season so that the cut stems become submerged as water levels rise, helping to suppress regrowth while retaining the ecological function of the reed beds.

f) Impacts & Risks

- Disturbance of riparian and aquatic habitats.
- Potential water quality impairment.
- Increase potential of establishment of alien invasive vegetation within the cleared areas.
- Potential channel erosion due to reduced surface roughness.

8.3.3. Method Statement 3: Removal of sediment from watercourses and in-stream dams.

a) Objective

To remove excess accumulated sediment from watercourses and in-stream dams where it impedes water flow, reduces hydraulic or storage capacity, or affects the operation of existing infrastructure.

b) Location

Sediment, debris and litter are most likely to accumulate in areas where flow velocities decrease, including within in-stream dams, upstream of bridges and culverts, within weirs, and where dense reed beds or other in-stream vegetation promote sediment deposition.

c) Method

- Identify sections of the watercourse or in-stream dams where sediment, litter or debris has accumulated and where removal should be prioritised.
- Sediment removal within the active channel must be undertaken during the site's designated maintenance window (January to April), unless emergency works are required.
- Material removal should start at the downstream most point and work systematically upstream.
- Remove litter, debris and accumulated sediment using the least intrusive method practicable. Sediment may be removed manually, by mechanical excavation or by hydraulic pumping, depending on site conditions, sediment volume and accessibility. Manual labour should be implemented as the preferred approach as far as feasibly possible.
- Where hydraulic removal is undertaken, pumped sediment must be directed into appropriately sized dewatering bags to allow water to drain and sediment to settle before disposal or reuse.
- Where mechanical excavation is required, machinery must operate from the banks or existing access routes wherever practicable. Machinery should only enter the watercourse where no reasonable alternative exists and only within the approved maintenance footprint.
- Temporarily stockpile removed sediment in designated areas outside the watercourse and associated 32m buffer, where practicable. The location of stockpiles and the final reuse or disposal of sediment must be agreed with the ECO and must not result in impacts on terrestrial or aquatic habitats.
- Sediment may be reused on site where suitable or disposed of at an appropriate approved facility. Removed material must not be used to obstruct water flow or create berms along the channel banks.
- Cover temporary stockpiles with erosion protection (e.g. geotextile fabric secured with rocks or sandbags) to prevent erosion and the dispersal of material prior to reuse or disposal.
- Rehabilitate disturbed riverbanks with suitable indigenous vegetation and stabilise exposed soils where required to prevent erosion and sediment re-entering the watercourse.
- Minimise disturbance to the natural form and structural integrity of the watercourse. Avoid channelisation or canalisation during sediment removal and, where practicable, retain or restore natural bed features such as pools, riffles and shallow habitat areas to maintain physical and ecological diversity.

- Sand removal should not take place in the stream where there are eroded banks. Erosion should first be addressed.
- Regularly monitor disturbed areas following sediment removal and promptly remove any emerging alien invasive plant seedlings to prevent their establishment.

Mitigation:

- Do not regrade or level the riverbed to create a uniform channel. Where reshaping is required, retain or create a diverse bed profile with pools, shallow areas and raised features to reduce flow energy and provide a range of aquatic habitats.
- The overall topography of the stream, on completion of the maintenance activity, should be similar to that prior to the sedimentation event (the channel should not be made narrower, the banks higher or the river channel deeper than before).
- 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 used to enlarge the height, width or any extent of existing berms;
 - not be deposited anywhere within the watercourse where such action is not part of the proposed maintenance activity (ies). Material that cannot be used for maintenance purposes must be removed to a suitable stockpile location (>32m from the edge of the delineated watercourse) before being disposed of at suitably registered facility.
- Undertake maintenance activities within dams in a phased manner, where practicable, to avoid large-scale disturbance of bottom sediments and minimise sudden deterioration in water quality.
- Minimise the extent and duration of sediment disturbance within dams to reduce the release of hydrogen sulphide and other substances associated with anoxic sediments that may adversely affect aquatic fauna.
- Where significant sediment disturbance is anticipated, consider the temporary installation of aerators or other appropriate measures to maintain dissolved oxygen concentrations within the water column during the maintenance period.
- Where practicable, maintain or increase water circulation/flow-through during maintenance activities involving substantial sediment disturbance to improve water quality and assist with oxygenation.
- Avoid disturbing larger areas of accumulated sediment than is necessary to safely complete the maintenance activity.

d) Access

The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.

e) Frequency & Timing

- Based on the current condition of the on-site watercourses and in-stream dams, sediment removal should be prioritised as part of the initial maintenance programme. Thereafter, sediment and debris removal should be undertaken on an as-needed basis. Any removal must be undertaken during the site's designated maintenance window (January to April), unless emergency works are required.
- Sediment removal activities should be undertaken under the supervision of the appointed suitably qualified ECO.

f) Impacts & Risks

- Disturbance of riparian and aquatic habitats, creating conditions that promote the invasion and spread of alien plant species.
- Temporary sediment mobilisation and turbidity within the watercourse
- Potential water quality impacts.

8.3.4. Method Statement 4: Minor repairs to existing infrastructure.

a) Objective

To undertake routine maintenance and minor repairs to existing infrastructure within and adjacent to the watercourses (e.g. repairing concrete spalling, tightening bolts, treating corroded infrastructure, repairing aerators, patching or replacement of damaged pipe sections, repairing culvert headwalls, like-for-like replacement of minor infrastructure components). Works must be limited to maintenance, refurbishment or like-for-like replacement within the existing footprint and must not alter the design, capacity or function of the infrastructure. Any additions to infrastructure are, by definition, not within the scope of an MMP.

b) Location

Existing in-stream infrastructure within the MMP area requiring minor maintenance or repair.

c) Method Statement & Mitigation Measures

- Identify the maintenance requirements and determine the most appropriate, least invasive repair method to restore the infrastructure to its intended function.
- Schedule maintenance during the site's designated maintenance window (January to April).
- Clear vegetation, sediment or debris (in line with the relevant method statement) where necessary, to provide safe access to the infrastructure and facilitate the repair works. Cleared material must be removed from the watercourse and disposed of or reused appropriately.
- Existing indigenous riparian vegetation must be retained wherever practicable and only removed where necessary to facilitate the repairs.
- Undertake repairs using manual labour wherever practicable. Mechanical equipment should only be used where necessary and where environmental conditions permit.
- Where excavation is required, carefully remove and separately stockpile topsoil outside the watercourse and away from stormwater flow paths for use during rehabilitation.
- Carry out the required maintenance or repair works using like-for-like materials and methods that restore the original design, capacity and function of the infrastructure. The use of foreign materials (e.g. concrete, rubble or imported fill) must be limited to that required for the repair of existing infrastructure in a like-for-like manner.
- Sediment traps must be installed downstream of the footprint where maintenance works are being undertaken. Any sediment collected in sediment traps must be removed upon completion of the minor maintenance works and must be suitably reused or disposed of. Sediment may not be returned to the watercourses.
- The maintained infrastructure should not impact on the structural integrity of the water course nor result in any alteration to the flow- and sediment carrying-capacity of the river.
- Any cleared sediment, vegetation or spoil material associated with the maintenance activity should be removed out of the river channel and suitably used or disposed of offsite. Where temporary

stockpiling is required, stockpiles must be located at least 32m from the delineated edge of the watercourse and covered with erosion control blankets until reused or disposed of.

- Remove all equipment, waste materials and surplus construction materials from the maintenance area upon completion and dispose of or store them at an appropriate location.
- Rehabilitate all disturbed areas immediately following completion of the works. Replace stockpiled topsoil, loosen compacted soils where necessary, stabilise any erosion, reshape disturbed areas to match surrounding ground levels, and revegetate with suitable indigenous species where required.
- Monitor rehabilitated areas and remove any emerging alien invasive vegetation to encourage the re-establishment of indigenous vegetation.

Mitigation:

- Do not impede the movement of aquatic and riparian biota through construction of fences, walls or trenches within the riverine corridor.
- Conduct routine annual maintenance to minimize the risk of infrastructure failures that could necessitate more extensive work within regulated areas
- All reasonable measures should be undertaken to ensure that river maintenance activities minimise future erosion of the riverbed and banks
- Open excavations within or adjacent to the watercourse should not be left unattended for extended periods and should be backfilled or otherwise stabilised as soon as practicable following completion of the repairs.
- Drains, pipes and culverts must be inspected regularly for obstructions that, unless removed timeously, may cause major up-stream blockages and premature over- topping of structures by high flows that damage approaches and property downstream.
- Channels upstream and downstream of crossing structures must be kept clear of flood debris
- Banks and channels must be kept clear of alien plants that concentrate flow and contribute to erosion, sediment release and channel blockages

Control measures specific to concrete works:

Concrete and cement-related mortars can be toxic to aquatic life. Proper handling and disposal should minimise or eliminate discharges into the assessed freshwater ecosystems. High alkalinity associated with cement can dramatically affect and contaminate both soil and ground water. The following measures must be adhered to wherever concrete works will be undertaken:

- Where concrete is required, ready-mix concrete sourced from an approved supplier should be used where practicable.
- Fresh concrete and cement mortar should not be mixed near the freshwater ecosystems. Mixing of cement may be undertaken within a designated maintenance staging area, however it may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer.
- No mixed concrete shall be deposited directly onto the ground or within the freshwater ecosystems. All concrete must be brought in via a cement mixing truck which must remain within the footprint of the proposed periodic maintenance activities and associated 5m maintenance RoW, and cement must be piped down to the footprint area. Any areas that require manual application of cement require that a batter board or other suitable platform/mixing tray be used until it is deposited
- A washout area must be designated outside of the freshwater ecosystems, and wash water should be treated on-site or discharged to a suitable sanitation system;
- At no point may batter boards/mixing trays or cement trucks be rinsed off on site and run-off water be allowed into the freshwater ecosystems

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	- Cement bags (if any) must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and - Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.
d)	Access
	The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.
e)	Frequency & Timing
	- Minor repairs should be undertaken on an as-needed basis following routine inspections or where defects are identified. - Infrastructure should be inspected at least annually and after significant storm events to identify maintenance requirements. - Schedule maintenance during the site's designated maintenance window (January to April).
f)	Impacts & Risks
	- Dust generation - Potential soil destabilisation and downstream sedimentation - Potential proliferation or spread of alien invasive plants - Potential water quality impacts - Altered runoff patterns leading to erosion - Potential benthic disturbance and damage to aquatic biota - Potential soil compaction

8.3.5. Method Statement 5: Major repairs and like-for-like replacement of existing infrastructure.

a)	Objective
	To undertake major repairs or rehabilitation of existing infrastructure where significant deterioration or damage has occurred. Typical activities may include the reconstruction of sections of weirs, spillways, culverts, bridges, gabions, dam inlets and outlets, discharge structures, pipelines, or clay liners, where like-for-like replacement of substantial structural elements is required. Works must remain within the original footprint and design of the existing infrastructure and must not include the construction of new infrastructure or the expansion of existing infrastructure. Any additions to infrastructure are, by definition, not within the scope of an MMP.
b)	Location
	Existing in-stream infrastructure requiring major repairs or rehabilitation, including larger structures such as bridges, in-stream dams, weirs, culverts, spillways and erosion control structures.
c)	Method
	Unless otherwise specified below, all requirements contained in Method Statement 4 (Minor Repairs to Existing Infrastructure) shall also apply to major repair works. The following additional requirements / amendments apply specifically to major repairs:

- Prior to commencing works, prepare a site-specific maintenance work plan identifying the repair methodology, sequence of works, access routes, laydown areas, temporary flow management measures, erosion and sediment controls, and rehabilitation requirements.
- Identify and demarcate a suitable laydown area outside the watercourse for the temporary storage of equipment, machinery and construction materials during the maintenance works. The laydown area must be located to minimise environmental impacts and be rehabilitated upon completion of the works.
- Prior to commencing works, clearly define the maintenance footprint, access routes and the movement of personnel, vehicles and equipment to minimise disturbance to the surrounding aquatic and riparian environment.
- Install sediment traps around any activities located upgradient of the river (e.g. maintenance staging areas, stockpiles etc) to ensure that volumes of sediment entering the river are minimised.
- Stockpiles of erodible material associated with the maintenance works must be located at least 32m from the delineated edge of the watercourse and protected with suitable erosion control measures (e.g. erosion blankets or geotextile) to prevent sediment loss.
- Sediment traps must be installed either every 15m downstream for any works for a length of 100 m, or, if this is not feasible (due to flow volumes, channel width, or spatial restriction of the authorised area within which work may occur), then sediment traps must be installed around the downgradient boundary of the maintenance work. The determination of appropriate placement of such sediment traps may be at the discretion of the ECO.
- Inspect temporary sediment control measures daily during the maintenance works. Remove accumulated sediment as required (and at least weekly where sediment is accumulating) and reuse or dispose of it in accordance with the sediment management requirements of this MMP. Removed sediment must not be returned to the watercourse.
- The structural stability of adjacent infrastructure must not be compromised during excavation or repair works. Where required, temporary support must be installed.
- Prior to repairing clay liners, the water level within the affected dam should be lowered sufficiently to allow the works to be undertaken safely and effectively. Baseflows within the watercourse system must be maintained, and appropriate erosion and sediment control measures implemented to prevent the downstream transport of sediment.
- Replacement culverts must match the dimensions, invert level, alignment and hydraulic capacity of the existing culvert. Where practicable, the natural bed profile through the culvert must be reinstated to maintain aquatic habitat continuity.
- Although flow diversion is not anticipated, as repairs are intended to be undertaken during the low-flow season when the artificial channel is typically dry, the following measures must be implemented during the disturbance period should water be present during the proposed repair works
 - o Water must be diverted into the downstream reaches, around the maintenance area (similar in concept to the use of a coffer dam, although a coffer dam may not be required or implemented).
 - o Water must be allowed to recharge the downstream reaches at all times, although sediment traps must be installed around any activities located upgradient of the river (e.g. maintenance staging areas, stockpiles etc) to ensure that volumes of sediment entering the river are minimised.
 - o Sediment traps are to be inspected daily and accumulated sediment to be removed by hand on a weekly basis.
- Upon completion of the works, repaired infrastructure must be reinstated to its original levels, alignment and design to avoid altering flow patterns or the hydraulic capacity of the watercourse.

Unless otherwise specified, all mitigation measures contained in Method Statement 4 (Minor Repairs to Existing Infrastructure) shall also apply to major repair works. The following additional requirements apply specifically to major repairs: - Where flow diversion is required, ensure that the creation of the diversion through existing structures or otherwise does not result in a significant water level difference upstream or downstream of the maintenance activities. - It is recommended that a suitably qualified freshwater specialist and ECO monitor any flow diversions as well as sediment traps at least bi-monthly during maintenance work requiring flow diversion to monitor the conditions of the freshwater ecosystems during the maintenance period and after flows are re-directed through the new infrastructure. - Where culverts need to be replaced ensure that culvert inlets are positioned at or below the natural bed level to preserve the natural flow regime and allow for sediment passage	
d)	Access
The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.	
e)	Frequency & Timing
- Major repairs should be undertaken on an as-needed basis where routine inspections or storm damage identify significant deterioration or structural failure that cannot be addressed through routine, minor maintenance. - Existing in-stream infrastructure should be inspected at least annually and following significant storm or flood events to identify repair requirements. - Schedule maintenance during the site's designated maintenance window (January to April).	
f)	Impacts & Risks
- Dust generation - Potential soil destabilisation and downstream sedimentation - Potential proliferation or spread of alien invasive plants - Potential water quality impacts - Altered runoff patterns leading to erosion - Potential benthic disturbance and damage to aquatic biota - Potential soil compaction	

8.3.6. Method Statement 6: Repairs to riverbanks and associated bank stabilisation infrastructure

a)	Objective
To stabilise localised areas of bank erosion where the stability of the watercourse or existing infrastructure is threatened. Activities may include the repair of eroded banks, maintenance of existing gabions and other bank protection structures, reprofiling of disturbed banks, and the implementation of erosion control and revegetation measures using indigenous riparian vegetation.	
b)	Location

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Localised areas of bank erosion within the MMP area, typically where flow velocities are high, channels are confined or modified, gradients are steep, or along the outer bends of watercourses.	
c)	Method
	- Identify the extent and cause of the erosion and determine the most appropriate, least invasive stabilisation method. Repairs must be limited to the minimum extent necessary to restore bank stability. - Erosion can be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation. Use can also be made of rocks sustainably obtained from the surrounding area to infill any area prone to erosion, as a natural dispersal mechanism. - Identify the most suitable access routes to the work area. Existing access routes must be used wherever practicable. Prior to commencing works, clearly define the maintenance footprint, access routes and the movement of personnel, vehicles and equipment to minimise disturbance. - Where works are undertaken within the active channel, maintain a minimum baseflow and implement temporary flow diversion measures only where necessary. Temporary works must not impede the movement of aquatic or riparian fauna. - Retain existing indigenous riparian and marginal vegetation wherever practicable. Only vegetation that is essential to facilitate the works may be removed. - Undertake stabilisation works using the least invasive methods practicable. Manual labour should be used wherever feasible, with mechanical equipment limited to areas where environmental conditions and access permit. - Reprofile eroded banks to stable, gently sloping profiles that blend with the surrounding channel and avoid increasing channelisation or altering the natural flow characteristics of the watercourse. - Repair or reinforce existing gabions and other bank protection structures on a like-for-like basis. Imported fill or rock used for repairs must be clean, locally sourced where practicable, and free of alien invasive plant material and contaminants. - Stockpile construction materials and excavated material outside the watercourse and associated 32m buffer, where practicable. Removed material must not be placed within the active channel or used to obstruct flows. - Cover temporary stockpiles with erosion protection (e.g. geotextile fabric secured with rocks or sandbags) to prevent erosion and material loss. Remove all unused construction material from site upon completion of the works. - Upon completion of the works, stabilise disturbed areas using appropriate erosion control measures and revegetate with suitable indigenous riparian species where required. - Monitor rehabilitated areas and remove any emerging alien invasive vegetation until the disturbed areas have stabilised and indigenous vegetation has successfully re-established. - Monitoring of freshwater ecosystems, particularly after large rainfall events, is highly recommended. Any observed erosion must be rectified. - Should erosion gullies be observed outside the freshwater ecosystems which could indirectly negatively affect the functioning of the freshwater ecosystems, such gullies must be rectified as soon as practically possible;
d)	Access
	The sites should be accessed from existing established roads or make use of existing disturbed areas where possible. Areas comprising natural vegetation cover should be avoided. The watercourse should only be accessed through designated and demarcated entry points.

e)	Frequency & Timing
	- Bank stabilisation works should be undertaken on an as-needed basis, typically following storm events where erosion has occurred. - Schedule maintenance during the site's designated maintenance window (January to April).
f)	Impacts & Risks
	- Dust generation - Potential soil destabilisation and downstream sedimentation - Potential proliferation or spread of alien invasive plants - Potential water quality impacts - Altered runoff patterns leading to erosion - Potential benthic disturbance and damage to aquatic biota - Potential soil compaction

8.4. Additional Method Statements

In addition to the Method Statements specified in Section 8.3, the Contractor may be instructed by the Project Manager and/or the ECO to prepare further Method Statements for approval before any maintenance or repair works are undertaken.

Method Statements must be submitted to the Project Manager and/or ECO at least seven (7) business days prior to the commencement of the relevant works. Failure to submit the required Method Statements may result in the suspension of the associated activity until the necessary Method Statement has been submitted and approved.

In addition to the Method Statements recommended in Section 6.1, the Method Statements listed below may, as a minimum, be required where applicable to the proposed maintenance activities.

- Method Statement 6: Site Preparation and Establishment
 - The Contractor shall prepare and submit a Site Layout Plan detailing the proposed establishment of the Contractor's site camp and all temporary infrastructure required for the maintenance activities. This shall include the location of storage and stockpiling areas, waste storage areas, ablution facilities, and eating areas as well as any other facilities necessary for the execution of the works.
- Method Statement 7: Hazardous Substances and Emergency Procedures
 - The Contractor shall submit a Method Statement detailing the storage, handling, transportation, and disposal of all hazardous substances and materials (incl. concrete) that may be used or generated during the maintenance works. The Method Statement shall also include emergency response procedures for the containment and clean-up of fuel, oil, chemical, or other hazardous substance spills.
- Method Statement 7: Wastewater Control

- The Contractor shall submit a Method Statement detailing the collection, storage, treatment (where applicable), and disposal of wastewater generated during the maintenance works.

9. MONITORING AND REPORTING

8.1. Monitoring

The applicant, or its appointed representative, is responsible for overseeing the implementation and monitoring of this MMP. All management and maintenance activities undertaken within the areas subject to this MMP shall be implemented in accordance with the requirements of the plan. Regular monitoring is required to assess the condition of the managed areas, identify maintenance requirements, and ensure that the objectives of the MMP are being achieved.

The following minimum monitoring must be undertaken:

- **Infrastructure Monitoring:** Conduct annual inspections of all infrastructure located within 32m of the delineated on-site watercourses, including instream dams, inlets, outlets, culverts, weirs, gabions, walkways, golf cart tracks, stream crossing points, exposed pipelines, stormwater conduits, and any other associated infrastructure as per Appendix A. Identify infrastructure requiring maintenance and plan to undertake the necessary maintenance within the maintenance window (January–April).
- **Alien Invasive Species and Indigenous Vegetation Monitoring:** Conduct annual inspections to identify the presence, spread, or regrowth of alien invasive plant species, as well as the excessive or nuisance growth of indigenous vegetation where it may impede the functioning of infrastructure or watercourses. Implement follow-up clearing where required and monitor the recovery and establishment of indigenous vegetation in cleared or rehabilitated areas.
- **Litter, Waste and Sediment Monitoring:** Undertake quarterly inspections, and additional inspections following significant rainfall events, to identify and plan for the removal of litter, debris, vegetation blockages and excess sediment. Plan and implement the timely removal of identified material to maintain the ecological and hydraulic functioning of the system.
- **Erosion and Rehabilitation Monitoring:** Undertake quarterly inspections, and additional inspections following significant rainfall events, to identify erosion, stormwater impacts, vegetation loss and other signs of degradation. Monitor the effectiveness of rehabilitation measures and implement corrective actions where required.

Any activities undertaken outside the scope of this MMP may require separate environmental authorisation and shall remain subject to the applicable provisions of environmental legislation.

9.1. Record Keeping & Reporting

Detailed records must be kept for each maintenance activity undertaken in terms of the MMP. Forms A and B as provided in Annexure D serve as a guideline for recording the necessary details related to each maintenance activity. A copy of each completed Form A and B must be kept for records by the Proponent. DEA&DP may,

within a reasonable notice period, request to evaluate the maintenance activities and assess the maintenance sites as per the adopted MMP.

Form A: Pre-Maintenance Activity Recording

Form A in Annexure C must be completed by the relevant person(s) before maintenance activities are undertaken. Form A must be completed at least 7 working days prior to commencing the intended maintenance activity.

Information required in Form A:

- Type of the maintenance activity (as per the adopted MMP).
- Description of the planned maintenance.
- Location of the maintenance activity (including photo references).
- Two photographs required from different viewpoints (labelled A and B) looking at the site.
- Coordinates for each photo location.

Form B: Post-Maintenance Activity Recording

Form B in Annexure C must be completed by the relevant person(s) after a maintenance activity has been completed. Form B must be completed a minimum of 3 working days after the completion of the maintenance activity(ies).

Information Required in Form B:

- Type of the maintenance activity (as per the adopted MMP).
- Description of the completed maintenance.
- Location of the maintenance activity (including photo references).
- Reference the photographs included in Form A.

9.2. Environmental File

The Applicant is responsible for maintaining records of the maintenance activities and compliance monitoring stipulated in this MMP. It is recommended that all documentation detailed below is included in an Environmental File to be kept on site at all times and must be made available to the ECO or DEA&DP upon request. The Environmental File will form part of any environmental audits prescribed by the DEA&DP.

The Environmental File should include, but not be limited to, the following:

- A copy of the MMP adopted by the Competent Authority.
- Maintenance Form A & Form B Templates.
- A register of all maintenance activities undertaken in accordance with this MMP, including the corresponding Form A and/or Form B reference for each activity.

- A complaints register.
- Waste disposal slips/register.
- All Environmental Monitoring Reports compiled by the ECO.
- All Environmental Audit Reports.

10. REHABILITATION RECOMMENDATIONS

A key objective of this MMP is to support the ongoing protection and enhancement of the ecological integrity of the on-site watercourses and to prevent adverse impacts on downstream reaches. The Freshwater Ecological Assessment (FEN, July 2026) independently recommends targeted rehabilitation of the freshwater ecosystems and associated ecological buffers, particularly the watercourse located on Erf 12910, to maintain and where possible improve the Present Ecological State (PES) of these systems and to prevent deterioration resulting from periodic maintenance activities undertaken in terms of this MMP.

The following recommendations are made in support of the MMP. These recommendations are integral to the method statements provided for the various activities addressed in the MMP but are also highlighted in this section as key management principles that should be followed.

10.1. Remove Invasive Plants

Following completion of the proposed periodic maintenance activities, a suitable alien invasive plant management and rehabilitation plan (including a plant species list) must be developed by an appropriately qualified specialist and must be implemented accordingly to ensure that alien invasive plants do not become established within the areas disturbed by maintenance and/or rehabilitation activities.

The removal of alien invasive plants from the onsite watercourses and in-stream dams is required to improve the ecological condition of the freshwater ecosystems. Alien vegetation is often invasive, recruiting, growing, multiplying and dominating in disturbed areas. These plants outcompete indigenous species, make use of more water and provide little in terms of ecological services. These plants should be controlled throughout the estate wherever possible but particularly within and adjacent to the onsite waterways. Any mature plants will continue to release seed or vegetative parts and will potentially infest downstream areas. Once removed, the cut material must be completely removed from the site to avoid biomass accumulation and downstream blockages.

The primary alien invasive plant species recorded within and adjacent to the on-site watercourses include *Quercus* spp. (oaks), *Pinus pinaster* (cluster pine), *Salix babylonica* (weeping willow), *Callistemon* spp. (bottlebrush), *Schinus terebinthifolia* (Brazilian pepper tree), *Acacia saligna* (Port Jackson), *Pennisetum clandestinum* (kikuyu grass), and potentially *Arundo donax* (Spanish reed).

Woody alien invasive species should be removed mechanically. Resprouting species, such as *Acacia saligna*, should be treated with an appropriate herbicide immediately following cutting to prevent regrowth. Where practicable, seedlings should be hand pulled before they become established.

Dense infestations of *Pennisetum clandestinum* (kikuyu grass) occur within some sections of the watercourses, where they have formed extensive monocultures that suppress indigenous vegetation. In these areas, *Cynodon dactylon* (couch grass) may be hand-seeded into dense kikuyu stands where direct planting of indigenous species is not feasible. As *C. dactylon* establishes, it can outcompete kikuyu, reduce its dominance, and create opportunities for the re-establishment of indigenous riparian vegetation.

Arundo donax (Spanish reed) is an alien invasive species that should be eradicated wherever it occurs. It closely resembles the indigenous *Phragmites australis* (common reed or fluitjiesriet), which should be retained but managed where excessive growth affects the functioning of the watercourse. It is therefore important that these species are correctly identified prior to any management intervention. *Phragmites australis* generally has culms up to approximately 2.5 cm in diameter, grows to around 4 m in height, and has leaf blades 1–5 cm wide and up to 60 cm long. In contrast, *Arundo donax* has much thicker culms (up to 5 cm in diameter), typically grows up to 6 m tall, and has broader leaves measuring approximately 5–7 cm wide and up to 90 cm long.

10.2. Return Indigenous Vegetation

The re-establishment of locally indigenous vegetation throughout the on-site watercourses, and where practicable within the adjacent riparian areas, would provide significant ecological benefits by improving habitat quality, enhancing bank stability, reducing erosion, and increasing the resilience of the freshwater ecosystems. Portions of the on-site watercourses that are currently unvegetated, sparsely vegetated, dominated by *Pennisetum clandestinum* (kikuyu grass), or cleared of alien invasive vegetation during maintenance should be rehabilitated using locally indigenous riparian vegetation to restore ecological functioning and improve the long-term condition of the watercourses. Where revegetation is required, timing the work prior to the onset of winter rains will promote successful plant establishment through natural irrigation.

Indigenous riparian vegetation provides important bank protection from erosion during flood events, assists with the reduction of evaporation and provides habitat for biota. As such rehabilitation of the ecological buffer within the golf course (where feasible) and on Erf 12910 by reinstating indigenous vegetation suitable for occasional inundation is encouraged.

Indigenous species that can be used onsite include *Cynodon dactylon* (Bermuda grass), *Cyperus papyrus*, *Cyperus polystachyos*, *Cyperus rotundus*, *Cyperus proliifer*, *Juncus effusus* (common rush), *Juncus lomatophyllus* (broad-leaf rush), *Juncus capensis* (cape rush), *Persicaria decipiens* (knotweed), *Schoenoplectus scirpoides* (soft club rush), *Monopsis lutea*, *Cyperus textilis* (umbrella sedge), *Passerina corymbose*, *Rapanea melanophloeos* (Cape Beech) and *Salix mucronate* (Cape Willow).

10.3. Keep the river channel shape, diversity and roughness

The existing morphology of the onsite watercourses must be maintained, and the channels must not be straightened, widened, or further canalised. The natural variability of the river channel, including its pools, riffles, ridges, and bed irregularities, plays an important role in reducing flow velocities, minimising erosion, and providing a diversity of aquatic and riparian habitats that support ecological functioning.

Maintenance activities, including the use of machinery within watercourses and the removal of alien invasive vegetation, must therefore be undertaken in a manner that preserves the natural channel morphology. Activities must avoid creating a uniform, smooth, or flat channel bed, and all practicable measures should be taken to retain existing natural features that contribute to channel diversity and hydraulic roughness.

10.4. Western Leopard Toad Conservation

The in-stream dams and associated watercourses within the Steenberg Estate and Golf Course have been identified as important habitat for supporting a viable population of *Sclerophrys pantherina* (Western Leopard Toad). As maintenance activities authorised under this MMP have the potential to disturb breeding habitat and seasonal migration routes, they must be planned and implemented to avoid adverse impacts on the species wherever practicable.

The majority of breeding activity is understood to occur within Dam 7, which is the most downstream dam in the system before water exits the golf course and the channel transitions into the more natural Prinseskasteel Stream (Figure 2). The species undertakes seasonal breeding migrations, with adults moving *en masse* between terrestrial habitats and breeding water during the winter rainfall season, typically from July to September. Observations within the study area indicate that breeding adults generally migrate upstream into the golf course from downstream habitats, with Dam 7 serving as an important breeding destination. Following metamorphosis, juvenile toads (toadlets) disperse from breeding sites between October and December, generally moving downstream into surrounding terrestrial habitats. Consequently, the period from July to December represents the most sensitive time of year for maintenance activities that may disturb breeding habitat or impede migration.

The Western Leopard Toad is endemic to the south-western Cape and is listed as Endangered due to habitat loss, fragmentation and declining connectivity between populations (CapeNature, 2026). The freshwater ecosystems within Steenberg Estate therefore represent an important component of the regional conservation network and should be managed to maintain and, where possible, enhance the habitat characteristics that support the species.

Recommended management measures include the following:

- **Timing of Maintenance Activities:** Maintenance activities within or immediately adjacent to breeding habitats, including desilting, vegetation management, infrastructure repairs and other in-stream works, should be scheduled outside the Western Leopard Toad breeding and juvenile dispersal period (July to December), wherever practicable. Where emergency maintenance during this period cannot be avoided, a suitably qualified ECO or amphibian specialist should assess the site prior to commencement of works and implement appropriate mitigation measures.
- **Habitat loss and fragmentation:** Urban expansion, infrastructure development, and agricultural transformation have reduced and isolated suitable habitat. This should be taken into consideration when planning future developments within the study area.
- **Road Mortality:** Temporary warning signage should be erected along internal roads and golf cart paths during the migration and dispersal season (July to December) to alert staff, residents and visitors to the

presence of migrating toads and toadlets. Refer to Figure 22 for an example of signs currently used onsite. Where safe and appropriate, migrating toads encountered on roads may be carefully relocated in the direction in which they were travelling.

- **Awareness:** Awareness programmes should be implemented to educate estate staff, contractors and residents regarding the ecological importance of the species and appropriate responses when toads are encountered.
- **Water Pollution:** Stormwater runoff, pesticides, fertilizers, sewage spills, and swimming pool backwash degrade breeding habitat. The use of fertilisers and other agrochemicals should be carefully planned and controlled to ensure that surface water runoff does not result in contamination of the surface water features throughout the study area.
- **Invasive Species:** Predatory fish and invasive aquatic plants reduce breeding success and habitat quality. No more fish should be introduced into the impoundments. The use of fish for pest control (such as mosquito control) can be implemented but the choice of species must be carefully considered. Invasive aquatic vegetation should be managed in accordance with this Maintenance Management Plan while retaining sufficient indigenous aquatic vegetation required for breeding habitat.
- **Maintain Ecological Connectivity:** Migration corridors between downstream habitats and the breeding impoundments should remain unobstructed. Boundary fencing should be maintained in a frog-friendly manner, with electrified strands positioned clear of ground level to prevent mortality. The accessibility for migrating frogs at the outfall from the last impoundment to where it crosses Tokai Road should be improved so that migrating frogs from downstream are not faced with vertical obstacles, sediment traps or other such barriers. This is a key access point for breeding frogs to gain access to suitable breeding areas within the golf estate and therefore measures to improve on accessibility should be implemented.

While implementation of the above management measures will contribute to the conservation of the Western Leopard Toad within the study area, it is recommended that a Biodiversity Management Plan (BMP) for the Western Leopard Toad (Western Leopard Toad) should be developed in accordance with Section 43 of South Africa's National Environmental Management: Biodiversity Act (NEMBA), with the primary objective of ensuring the long-term and autonomous survival of the species.



Figure 22: Example of a temporary Western Leopard Toad warning sign erected within the Steenberg Estate

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