LORNAY
ENVIRONMENTAL CONSULTING

Maintenance Management Plan

Erf 1486, Vermont, Hermanus

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Consultant:

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Contents

1. Project Background

The development of 9 single residential erven, ranging from 600 m2 to 350 m2, 2 private internal roads and private open space of 7964 m2, is proposed for Erf 1486, Vermont. The Erf is located within the urban area and surrounded by similar development types. The site is partially impacted and contains internal access road and a large building.

1.1. Environmental Sensitivities and Specialist Assessments

Erf 1486 is bordered to the north by the R43 road and road reserve, to the west by the Hoek van der Berg Private Nature Reserve, to the south by a small residential housing estate and to the east by Lynx Road. The erf contains a gravel access road which enters the site from Lynx Road and terminates at the derelict buildings in the northwest corner of the site.

Wetland conditions are known to exist within the erf and were previously delineated by Job and Ratcliff (Freshwater Consulting Group, 2006), commissioned by the Overstrand Municipality. In 2018, Joshua Gericke conducted a freshwater screening assessment of the erf, to inform feasibility and layout of the current proposed project (EnviroSwift, 2018). Subsequently, the owner has decided to proceed with the Environmental Authorisation (EA) application process for the proposed project.

Following the Aquatic Biodiversity Screening assessment of the proposed site by Joshua Gericke on the 17th of August 2018, a natural Unchanneled Valley-Bottom (UVB) wetland was confirmed and delineated onsite (EnviroSwift, 2018). The wetland was confirmed, and an updated delineation was undertaken during a site assessment by Gericke and van Zyl (Delta Ecology, 2023) on the 30th of May 2023.

The wetland is part of a 1.4 km long wetland system that originates within the erf and ends at the Vermont Salt Pan to the southeast. A depression has been excavated towards the centre of the erf, with an overflow pipe that crosses beneath Lynx Road and flows into the wetland on the far side thereby creating a hydrological link between the wetlands within the erf and the greater wetland to the southeast. An additional stormwater outlet is found in the southeast corner of the erf, which discharges runoff from the neighbouring housing development into the wetland. The remainder of the 1.5 ha erf is extensively disturbed and characterised by a mixture of alien and indigenous vegetation.

Given the confirmed presence of a wetland which is likely to be impacted by the proposed residential development, the area was determined to be of “Very High” aquatic sensitivity. If the specialist determines that the Aquatic Biodiversity sensitivity is “Very High”, the GN320 of 2020 requires that a full aquatic biodiversity impact assessment must be submitted as set out by the National Environmental Management Act (NEMA) (Act No. 107 of 1998) Regulations of 2020 (as amended) (GN R. 320 of 2020).

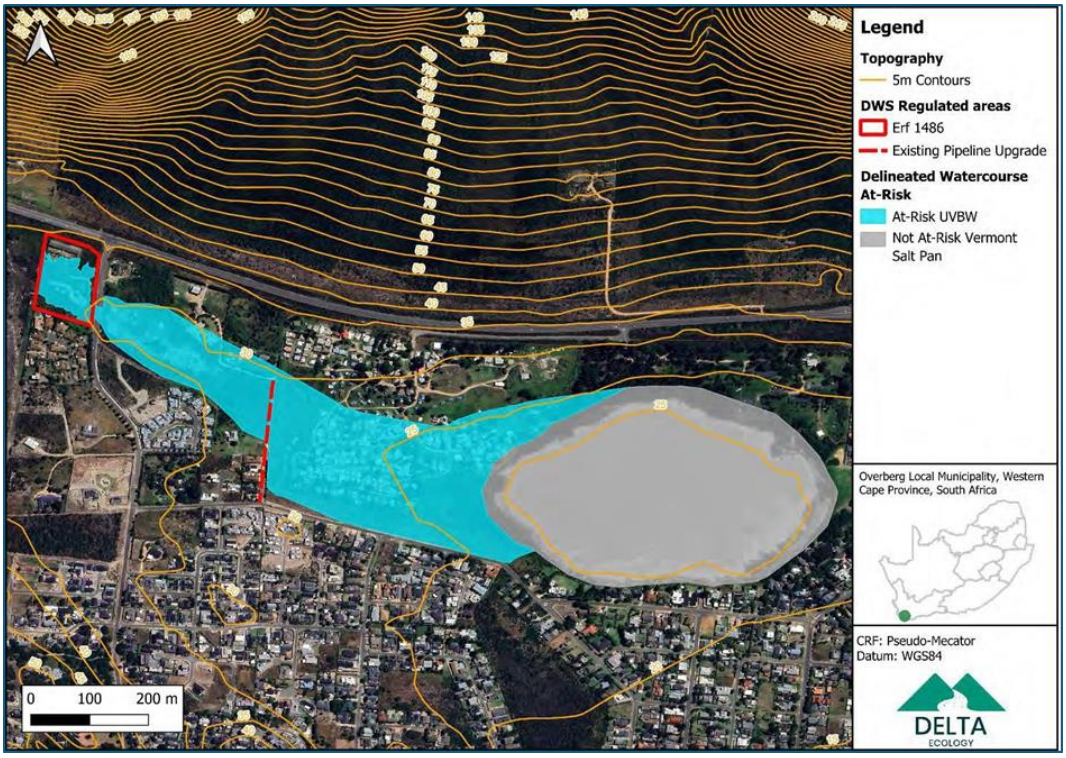


Figure 1. Location of the site and associated watercourses.

The applicable area for the MMP is mapped as follows:

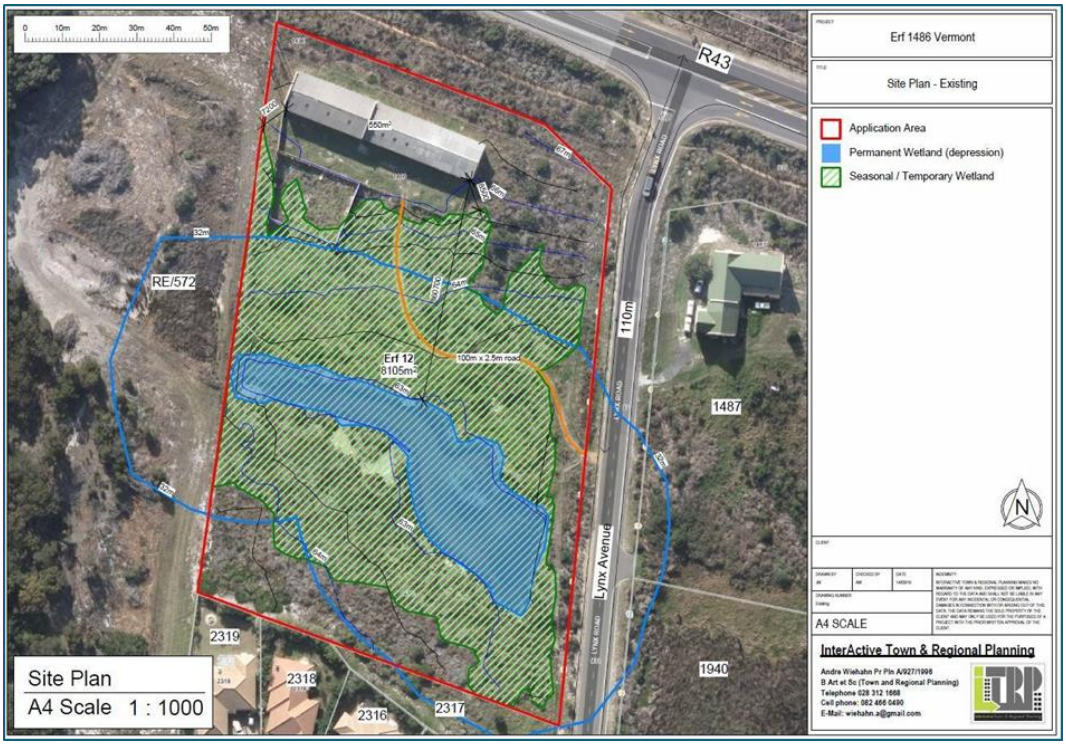
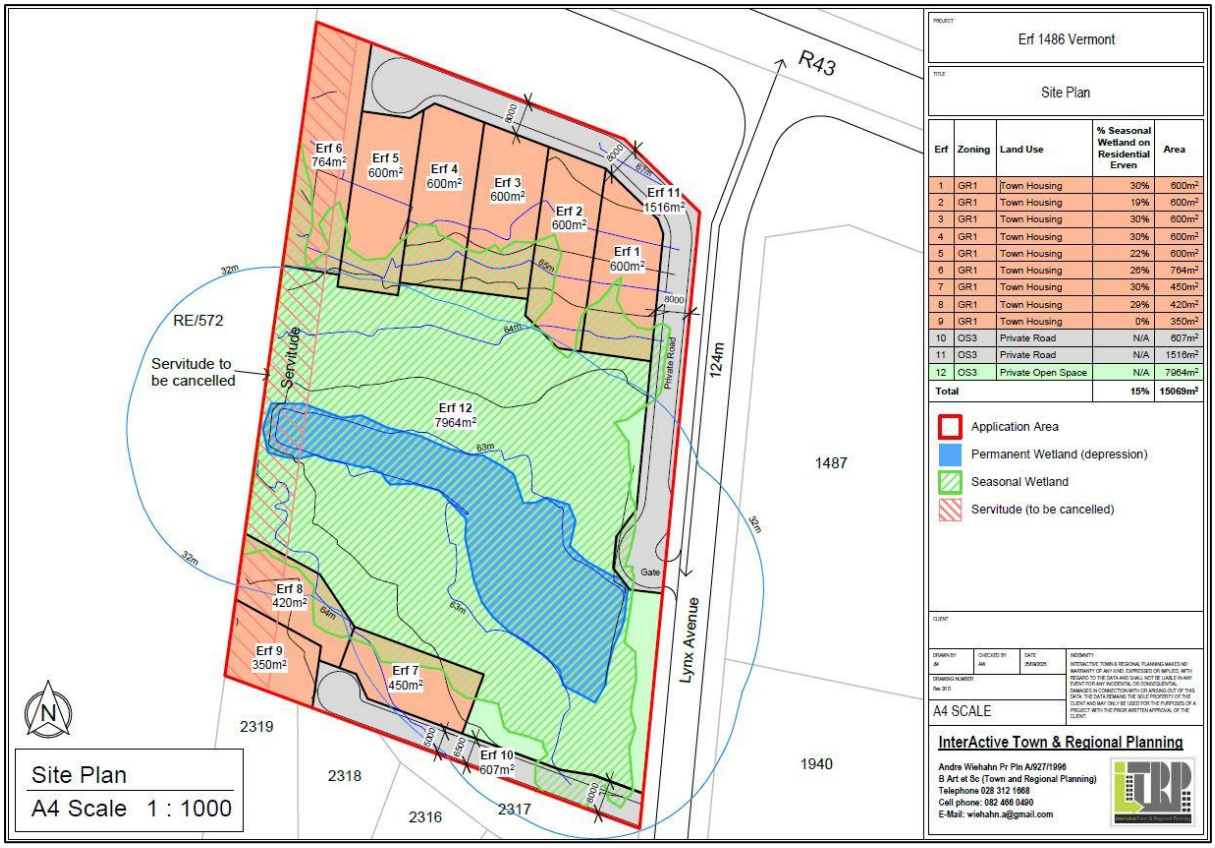


Figure 2. Applicable are for the implementation of the Maintenance Management Plan (MMP)

1.2. Preferred Layout Alternative

The final preferred layout evolved in line with specialist input and comments received during various rounds of public participation. The final layout sees all development outside of the permanent wetland areas, as well as the vast majority of the seasonal / temporary wetland area, with "no development" zones indicated for sections of residential erven which contain seasonal wetlands.



Erf	Zoning	Land Use	% Seasonal Wetland on Residential Erven	Area
1	GR1	Town Housing	30%	600m²
2	GR1	Town Housing	19%	600m²
3	GR1	Town Housing	30%	600m²
4	GR1	Town Housing	30%	600m²
5	GR1	Town Housing	22%	600m²
6	GR1	Town Housing	26%	764m²
7	GR1	Town Housing	30%	450m²
8	GR1	Town Housing	29%	420m²
9	GR1	Town Housing	0%	350m²
10	OS3	Private Road	N/A	607m²
11	OS3	Private Road	N/A	1516m²
12	OS3	Private Open Space	N/A	7964m²
Total			15%	15069m²

Figure 3. Alternative 3 – Final preferred layout.

2. Legal Requirements

The following are overarching principles to be used by landowners and managers when considering the development and implementation of a Maintenance Management Plan (MMP):

a) 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.
b) Avoid and reduce unnecessary maintenance.
c) 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.
d) Management actions must aim to prevent further deterioration of the condition of affected watercourses, and, overall, be guided by a general commitment to improving and maintaining ecological infrastructures for the delivery of ecosystem services.
e) Managers and organs of state must identify, address, and where feasible, eliminate the factors that necessitate intrusive, environmentally damaging maintenance; and
f) A process of continuous management improvement be applied, namely Planning, Implementing, checking (monitoring, auditing, determining corrective action) and Acting (management review).

Approval of this Maintenance Management Plan (MMP) does not absolve the owner, contractor or any other party of the general "duty of care" principle as set out in Section 28(1) of the NEMA, which states that "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment."

In terms of the NEMA EIA Regulations (2014), as amended, the applicant has applied for Environmental Authorisation for the development of the site. Given the sites location within the regulated area of a watercourse, a Maintenance Management Plan is required for the long-term management and maintenance of the site as outlined below:

Is there a watercourse on or adjacent to the property?	A UVB wetland has been delineated on the property
Has there been a history of flood damage or vandalism to the existing infrastructure or watercourse – erosion and/or sedimentation?	There is no documented history of flood damage, but flooding is possible, along with associated erosion and sedimentation, which will require periodic rectification and monitoring through engineering and ecological solutions.
Is there infrastructure or any community at risk of being damaged by flooding?	The design includes a 32 m wetland buffer and considers the 1:100- year flood line, which significantly reduces the risk to infrastructure or community assets. Limited risk is indicated under the current layout.
Is the design of infrastructure considered adequate in terms of managing the risk of flooding, erosion and/or sedimentation?	The implementation buffer zones and no development zones indicate planning has been included. The system does not display history of significant flooding and inundation of flowing water
Would you consider an improved design to existing infrastructure to reduce maintenance needs?	The development proposes the use of Low Impact Development (LID) strategies, including enhanced swale systems and permeable paving, which will assist with stormwater management. These systems may require maintenance after significant flood events.
Are there specific incidences where the watercourse is obstructed or blockages occur that alter the flow of the river during floods?	The flow from the UVB wetland is channelled beneath Lynx Road and continues into the Vermont Salt Pan. During flood events, sand and sediment deposition may cause blockages, which must be monitored and cleared regularly to ensure hydrological connectivity.
Is there an existing obstruction in the watercourse that has changed the flow of the river under normal conditions?	The site is not characterised by a river, but rather a UVB Wetland. The permanent wetland area has been affected by historical infilling, altering natural water flow. This condition will be addressed through rehabilitation measures and ongoing wetland management. In addition, the system is part of a broader watercourse between the Vermont Salt pan and Hoek van Der Berg and beyond. Lynx Road forms a direct impediment to the watercourse directly east of the site.
Is there a marked increase in the rate of erosion/sedimentation being experienced which threatens operations and assets?	There is no observed significant increase, but monitoring will be required following large storm events or changes in upstream vegetation.
Is there a presence of alien or bush encroachment vegetation within the watercourse and/or the presence of woody debris after flooding?	The specialist assessment identified the presence of moderate- density alien vegetation (e.g. *Acacia saligna, Kikuyu*). These species require ongoing removal and monitoring, which will be undertaken.

The following specific environmental legislation is applicable to this Maintenance Management Plan:

Listing Notice 1, Activity 13

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.

Listing Notice 3, Activity 12

The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan

The MMP, when accepted by the competent authority, will exclude landowners from requiring Environmental Authorisation prior to commencing with any river or infrastructure maintenance activities that trigger Activity 19 only. The landowners will however have to comply with the procedures and specifications of the MMP for any river and infrastructure maintenance in perpetuity. Failure to comply with the provisions of this MMP would render the activity as potentially unlawful and could result in prosecution.

2.1. MMP Content Requirements

In July 2017 an Information Document for the Development of Maintenance Management Plans for a Watercourse was adopted by the competent authority. The Information Document was prepared to ensure that the request for adopting MMP's for watercourses in the Western Province are undertaken to the sufficient standard and requirements of the competent authority. Specifically, the Information Document prescribes the following:

- → The purpose of the MMP is to allow for the maintenance of both new and natural infrastructure in a manner that either improves the current state of and/or reduces the negative impacts on a watercourse to ensure that ecosystem services are preserved/improved and to prevent further deterioration of the watercourse;
- → The MMP must provide a strategic overview of the Need for the MMP (i.e. indicate how the MMP will contribute to furthering sustainable practices and reducing and/or mitigating the need for maintenance).

3. Intention to apply for MMP

3.1. Types of maintenance activities

The maintenance activities can be classified into the following broad categories:

CATEGORY	TYPES OF MAINTENANCE ACTIVITIES
Category A: Sediment removal as a result of deposition or sediment deposition as a result of erosion	Periodic clearing of accumulated sediment, particularly within the wetland area, may be required to maintain hydrological connectivity and prevent blockages in the pipeline that facilitates flow towards the Vermont Salt Pan. Sediment removal may also form part of broader wetland rehabilitation efforts. The removal of invasive trees and infill material is expected to affect the flow patterns, which may lead to sediment redistribution that will require targeted intervention.
Category B: Emergency repairs – urgent action required to manage risk and damage to assets	With the recent and future expected rainfall patterns on the Western Cape, Emergency Repair to erosion of the watercourse or servicing infrastructure such as private roads may be required from time to time or after flood or other such events. This may include removal of materials which have built up in response to flooding and sedimentation as well as possible damage to any permanent infrastructure in the 32 m buffer. Management of the condition of flood protection berms, swales and existing structures such as gabions, canalized and stormwater systems is also included.
Category C: Managing alien invasive and bush encroachment plant species	This includes the removal of invasive alien plant species (e.g., *Eucalyptus spp., Acacia spp., Pennisetum clandestinum)* and the clearing of overgrown vegetation that may obstruct flow in water channels, culverts, and headwalls. In some instances, even dense indigenous vegetation such as Phragmites australis and Typha capensis may require management where it hinders hydrological flow. All clearing activities should be undertaken as needed and in compliance with environmental management guidelines.
Category D: Rehabilitation and restoration activities for maintaining ecological infrastructure	Active rehabilitation of the wetland is required to restore and enhance the functioning of the wetland system and stormwater detention features. This includes replanting with locally indigenous species, removal of fill material from the wetland, removing or reshaping berms or barriers that obstruct flow, and restoring degraded areas. These activities are essential to maintaining ecosystem services and the resilience of ecological infrastructure.

3.2. Method statements

The following details are applicable to the MMP and the following method statements are applicable for the long- term management and maintenance of the site within the regulated area of a watercourse:

REPORTING FOR INTENT TO UNDERTAKE MAINTENANCE ACTIVITIES				
Applicant details				
Name	**Surname**	**Farm No.**	**Erf No.**	**Today's Date**
Craig	Saunders	-	1486	22/05/2025
Section B: Details of the proposed maintenance activity				

Ref No.	Activity type:	Reference code (make reference to MMP)	Footprint area (m^2)	Volume of material (m^3)
DEADP Ref: 16/3/3/6/7/E2/40/15/25/22	Rehabilitation, stormwater response, Revegetation, maintenance of the LID (enhanced swales and permeable paving)	Pending	±7964m^2	Unknown
Equipment to be used	**Description of the method statement for the planned activity**			**Date when work will commence**

The Method Statement for the maintenance activities described above are outlined as follows:

- → **What** – needs to be done. A description of the work to be undertaken.
- → **How** – a description of the methods and materials.
- → **Where** – the locality of the work
- → **When** – the commencement and completion program for the work
- → **Who** – the person responsible
- → **Why** – The reason for the activity

The following Method statements are included in the MMP:

Method Statement 1: Clearance of alien vegetation and encroaching vegetation within the wetland area.

Impact, mitigation and Recommendations:

- → Damage to beds and banks of the watercourse and wetland during vegetation removal ().
- → Erosion from the bank as a result of above damage and deposition / sedimentation downstream.
- → Flow obstructed by branches/ leaves falling or being placed in the watercourse.
- → Flow obstruction by encroachment of reeds and bulrushes.
- → Limited open water
- → Change to exposure to sun and therefore increased temperature of the soil with no shade.
- → Change in flow regime with reduced abstraction due to transpiration of large trees

a) Cenchrus clandestinus (Kikuyu grass)

What?

- → It is recommended that the Kikuyu within the UVB wetland, and the immediate surrounds, should be removed from the property.

How?

- → The most effective method for Kikuyu removal is by the application of herbicide.
- → The plants should be removed by digging out all rhizomes / stolons.
- → Care should be taken to remove all rhizomes / stolons to prevent the kikuyu from re-sprouting.

Where?

- → The selective herbicide Focus Ultra, can be used to target the Kikuyu vegetation which is immediately surrounding the wetland and around the whole property without significantly affecting

non-target indigenous plant species.

When?

→ All large trees must be removed prior to the development of the property. The inclusion in the Operation EMP is relevant as invasive plants are an issue that will continue into the future.

→ Herbicide should not be applied in wet conditions / during winter. Herbicide should only be conducted during summer months under dry conditions.

Who?

→ Implemented by the appointed maintenance by the Applicant, property owner or Homeowners Association (HoA).

Why?

→ To prevent obstruction of flow within the wetland and stormwater system.

→ To reduce erosion and sedimentation risk caused by dense or invasive vegetation.

→ To enhance the ecological functioning of the wetland and facilitate hydrological connectivity.

→ To maintain open water areas, improve wetland biodiversity, and prevent excessive transpiration and shading from large alien trees.

b) *Cortaderia selloan* (Pampas grass)

What?

→ *Cortaderia selloana* (Pampas grass) poses a significant threat to aquatic ecosystems due to its classification as a NEMBA Category 1b invasive species. This classification mandates that pampas grass must be controlled and, wherever possible, removed and destroyed.

How?

→ Effective methods for the removal of pampas grass include manual removal or a combination of chemical and manual methods. When removing pampas grass manually, protective gear should be worn because the flowers may cause respiratory tract irritation, and the sharp leaves can cut the skin and cause irritation. The flower heads should be cut first and placed into a bag to prevent seed dispersal. The plant should then be cut down as close to the ground as possible, and the entire root system must be dug up to prevent resprouting.

Where?

→ It is recommended that the Pampas Grass within the UVB wetland and the immediate surroundings be removed, and appropriate management must be in place to prevent reestablishment.

When?

→ All large trees must be removed prior to the development of the property. The inclusion in the Operation EMP is relevant as invasive plants are an issue that will continue into the future.

Who?

→ Implemented by the appointed maintenance by the Applicant, property owner or Homeowners Association (HoA)

Why?

→ *Cortaderia selloana* (Pampas grass) poses a significant threat to aquatic ecosystems due to its classification as a NEMBA Category 1b invasive species. Pampas grass is a prolific seed producer and an aggressive colonizer that can outcompete indigenous wetland plant species.

***c) Acacia saligna* (Port Jackson) *and A. cyclops* (rooikrans)**

What?

→ Port Jackson Willow (*Acacia saligna*) appears similar to a Eucalyptus tree when young. Removal of this invasive species is not sufficient to ensure that an area is cleared of the plant. Restoration, replacing the removed plant with an appropriate indigenous plant, is more likely to be successful.

Acacia saligna and A. cyclops both grow as small, dense, spreading trees which colonize disturbed soils. *Acacia saligna* has the ability to grow in soil with low levels of nutrients, has an early reproductive maturity and large quantity of seeds are produced. The seeds survive fire and have the ability to germinate after cutting or burning.

How?

→ Hand pulling should be implemented as the preferred clearing technique as far as possible. When implemented correctly, this method is extremely effective, yet its application is limited to seedlings. Thus, regular monitoring and follow-up treatments are important to ensure successful and economical eradication using this technique. The procedure to be implemented is as follows:

- Wearing gloves, grip the plant firmly at the base of the stem and pull hard to remove the entire plant, including the rootstocks.
- If the roots of the plant break off during removal, use a spade to dig them out.
- Shake the plant to remove excess soils and dispose of the plant material at an appropriate waste disposal site.

Tree Popping

Use: Seedlings/Saplings with a stem diameter of approximately 5 cm

This technique is used for medium tree specimens and involves the use of an implement referred to as a "Tree-Popper". This tool consists of a base plate and a leaver that are joined to form a small pair of jaws (Figure A1). The tree is placed in the jaws of the tool and the leaver is used to pull the entire tree, including the roots, out. This tool is extremely useful for trees that are too large to be effectively removed by hand pulling yet are not yet large enough to require felling. The method to be used is similar as outlined for hand pulling, however the Tree-Popper is used instead of pulling.

Felling

Use: Trees with a stem diameter of >5 cm

Once the stems of trees reach a diameter of greater than 5 cm felling will need to be implemented to remove the individual. Felling can be undertaken using chain saws and bow saws. It is important that trees are cut with a neat straight cut to reduce the chance of resprouting and improve the effectiveness of stump herbicide treatment. Trees must be cut down as close to the ground as possible (between 5cm and 30cm above the ground). Felling must be undertaken by appropriately trained individuals that possess and make use of the required Personal Protective Equipment (PPE) for the task at hand.

Herbicide Stump Treatment

Use: Resprouting species that have undergone felling treatment

Port Jackson requires the use of poisan, whilst the Rooikrans usually dies when cut below the lowest branch. To prevent resprouting of Port Jackson, a herbicide treatment needs to be applied post felling. Once the tree has been cut down to create a smooth surface that exposes the outer rings of the stem where the trunk grows (the cambium) a 3% Tryclopyr herbicide solution must be applied to the freshly cut surface. All side branches should also be removed and treated with herbicide. The herbicide treatment should be applied as soon as possible after felling (preferably within 3 minutes) to ensure effective treatment. Where trees with a diameter of greater than 10cm are felled, only the outer rings need to be treated with herbicide. Due to the potentially hazardous nature of herbicides, the precautions outlined in the Foliar Treatment section above should also be applied during herbicide stump treatment.

Herbicides can kill indigenous plant species, and some are toxic to people and animals. It is therefore important to prevent environmental contamination with herbicide. The following measures are therefore recommended:

- Do not apply herbicide while it is raining and take care to prevent it from spilling, spraying, or spreading onto the ground or onto non-target species.
- Rain may wash herbicide into watercourses and spread it downstream, or across banks that need to be revegetated.
- Never wash herbicide equipment or dispose of waste spray mixture in or near

watercourses where contamination can occur.

The introduction of the acacia gall rust fungus (Uromycladium tepperianum) can be introduced onsite if the Port Jackson trees persist to be a problem. Consultation with a Botanist and/or Entomologist prior to introduction is recommended.

Where?

→ In the Private Open Space and Undevelopable areas, 32 m buffer including the wetland area.

When?

Every 6 months until the significance of the infestation is reduced and at the beginning of summer and the beginning of winter if water levels are not too high. These actions will need to continue into perpetuity.

Who?

Homeowners Association (HOA), landscaping team, management. Appropriately trained labour with the correct equipment and suitably supervised

Why?

This plant is a transformer species because it changes the functioning of the ecosystem it invades. It is also highly flammable and must be removed from proximity to buildings and infrastructure. It is responsible for the transformation of large areas of fynbos as it changes the nutrient levels in the soil.

Method Statement 2: Rehabilitation and restoration activities to maintain ecological infrastructure (wetland) onsite

Recommendations:

- → Use a spade to dig a square hole that is 1.5 times the depth and 2 times the width of the bag containing the plant.
- → Remove the plant from its container and carefully loosen the soil by hand, being careful to not damage the roots and maintain as much of the soil as possible.
- → Place the plant and associated soil in the hole.
- → Replace the soil originally removed and ensure that it forms a slight depression (1-3 cm below the level of the surrounding soil) with the plant in the centre of the depression.
- → Compress the soil firmly by hand.
- → For plants placed in the temporary zone watering should be done approximately once every three days for the first six months after planting unless rain has fallen within the preceding 24 hours. Rainfall during the winter months (June – August for the proposed site) can substantially reduce the required watering effort. However, given that revegetation within the onsite offset wetland needs to be undertaken as rapidly as possible planting should be initiated as soon as the infill has been removed from the wetland area, and the remnant wetland has been appropriately shaped along with sufficient watering efforts.
- → The best time for planting is autumn (March-May). This allows for the plants to establish roots before being subjected to heavy rains. Planting in autumn therefore reduces the risk of erosion / sedimentation, having plants wash away and will reduce watering requirements.

What?

Removal of fill material

Wetland infilling poses a direct threat to wetland habitat and function. Wetland infilling and the dumping of rubble and fill material buries hydric soils and causes aquatic habitat loss. Sections of the proposed development site has been historically impacted by infilling and currently contains foreign fill material.

To adequately restore wetland habitat and function, and to achieve PES targets, all foreign fill material (building rubble, fil material from dirt road etc.) must be removed from the onsite wetland prior to additional wetland rehabilitation interventions. The removal of infill must occur at the start of Summer, and not during the Winter rain season to prevent downstream sedimentation or erosion in this area. The substrate in the remnant wetland area should consist only of natural soils.

It is recommended that care must be taken to avoid disturbance of intact natural wetland habitat during the removal of rubble and infill and that removal should be overseen by a suitably qualified contractor. After the removal it is recommended that an aquatic biodiversity specialist should inspect the site to ensure all fill material has been removed.

All foreign fill material must be appropriately disposed of at a designated waste facility offsite. No building rubble/cleared plant material may be dumped within a natural area or within 200 m of any onsite watercourse. Once the fill material is removed from the wetland, reshaping and reprofiling should be done in the disturbed areas to ensure the wetland profile is stable and well-integrated. Once completed all cleared areas must be revegetated with appropriate indigenous species.
Revegetation

Revegetation must be undertaken under the guidance of a suitably qualified landscaper / professional. Vegetation is a key component of the functioning of wetland systems and affects not only habitat quality but also geomorphology, hydrology, and water quality. Revegetation is thus essential for successful wetland rehabilitation.

Procurement

Successful rehabilitation requires the use of healthy, genetically sound, and locally appropriate plant material. Seed and plants for rehabilitation purposes must be procured from nurseries with due regard for the source of the genetic stock. Specialists from nurseries should be able to advise on this. Bagged plants of appropriate genetic stock of the required species can be purchased in limited quantities either from the Kraaibosch Nursery (+27 44 889 0092), Fynbos Life Nursery (082 378 9445) or from the Kirstenbosch Botanical Gardens nursery (021 797 1305). Intaba, a company specializing in rehabilitation and indigenously landscaped gardens, also has a healthy indigenous plant nursery from which plants could potentially be obtained (087 943 4524).

The nurseries will require sufficient notice to secure the required plant material. Sufficient quantities of the required species should ideally be ordered at least 12 months (6 months minimum) prior to when planting is scheduled to commence.

Residential landscaping
Indigenous plant species must be used for residential landscaping; this promotes local biodiversity and protects the wetlands ecosystem. Residents are prohibited from utilising alien grasses, such as Kikuyu. Instead, indigenous grasses like Buffalo grass (*Bouteloua dactyloides*) should be used. Native species are better adapted to local climate conditions, require less water and maintenance, and support local wildlife.

Species for revegetation
A list of indigenous wetland plant species which should be used for revegetation of the onsite offset wetland has subsequently been compiled (Table 5). This species list was developed based on the wetland plant species identified within the Vermont salt pan which share the same wetland vegetation type as the onsite wetland, along with specialist knowledge of the wetland vegetation type (Table 5). Additional plant species can be obtained from the appointed landscaper.

A minimum of six species from this species list must be introduced to the wetland. Species selection can be guided by availability provided that species from all hydrological zones are represented. It should further be noted that although Typha Capensis occurs naturally in the region, this species can become problematic and should not be used for revegetation purposes.

Wetland species should be planted in the correct hydrological zones (temporary, seasonal, permanent). The remnant UVB wetland within Erf 1486 exhibits permanent zonation in the central depression onsite and seasonal / temporary zonation around the central depression. Rapidly growing species that tend to stabilise soil are best for areas vulnerable to erosion.

Table 5: List of indigenous plant species that can be introduced to the offset wetland

Family	Species	Status	General information	Wetland Plant Type	Hydrological zone
Asteraceae	*Senecio halimifolius*	LC	Indigenous	Facultative wetland	Temporary
Cyperaceae	*Bolboschoenus maritimus*	LC	Indigenous	Obligate wetland	Permanent
Cyperaceae	*Cyperus textilis*	LC	Endemic	Obligate wetland	Permanent/seasonal
Cyperaceae	*Cyperus thunbergii*	LC	Endemic	Obligate wetland	Seasonal/Temporary
Cyperaceae	*Hellmuthia membranaceae*	LC	Endemic	Facultative wetland	Permanent/seasonal
Cyperaceae	*Ficinia nodosa*	LC	Indigenous	Obligate wetland	Permanent/seasonal
Poaceae	*Pennisetum macrourum*	LC	Indigenous	Obligate wetland	Permanent/seasonal
Restionaceae	*Elegia capensis*	LC	Endemic	Obligate wetland	Permanent
Rosaceae	*Cliffortia strobilifera*	LC	Indigenous	Obligate wetland	Permanent/seasonal
Dennstaedtiaceae	**Pteridium aquilinum*	LC	Indigenous	Facultative wetland	Seasonal/temporary

How?

Planting and seeding techniques

To ensure adequate rehabilitation, planting must be done at a reasonable density of approximately 4 plants per square meter. Vegetation that has recently been planted is generally susceptible to being washed away until it has become well established. Transplanting of whole plants with well-established roots in a growing medium is one of the most reliable revegetation techniques. While several species suggested for revegetation can be grown from seeds and propagules, it is recommended that the majority of revegetation activities are focused on the introduction of whole plants, particularly into areas that are vulnerable to erosion.

The recommended general planting procedures are as follows:

→ Use a spade to dig a square hole that is 1.5 times the depth and 2 times the width of the bag containing the plant.
→ Remove the plant from its container and carefully loosen the soil by hand, being careful to not damage the roots and maintain as much of the soil as possible.
→ Place the plant and associated soil in the hole.
→ Replace the soil originally removed and ensure that it forms a slight depression (1-3 cm below the level of the surrounding soil) with the plant in the centre of the depression.
→ Compress the soil firmly by hand.

→ For plants placed in the temporary zone watering should be done approximately once every three days for the first six months after planting unless rain has fallen within the preceding 24 hours. Rainfall during the winter months (June – August for the proposed site) can substantially reduce the required watering effort. However, given that revegetation within the onsite offset wetland needs to be undertaken as rapidly as possible planting should be initiated as soon as the infill has been removed from the wetland area, and the remnant wetland has been appropriately shaped along with sufficient watering efforts.
→ The best time for planting is autumn (March-May). This allows for the plants to establish roots before being subjected to heavy rains. Planting in autumn therefore reduces the risk of erosion / sedimentation, having plants wash away and will reduce watering requirements.

Procedure for sowing seeds:

→ Use a rake to lightly disturb areas of bare soil.
→ Spread seeds from indigenous wetland plant species evenly across prepared soil.
→ The best time to sow the seeds is in autumn.
→ Conduct maintenance on the areas where the seeds were sown, carefully remove any weeds.

Procedure for planting propagules:

→ Obtain healthy adult plants with sufficient plant material to generate propagules.
→ Neatly cut the stem based on individual species requirements using pruning shears.
→ Plant propagules as per the general planting protocol. A 20 cm wide by 20 cm deep hole should be sufficient for the cutting. Ensure that approximately half of the cutting is below ground while the other half is above ground.

Where?

→ Wetland species should be planted in the correct hydrological zones (temporary, seasonal, permanent). The remnant UVB wetland within Erf 1486 exhibits permanent zonation in the central depression onsite and seasonal / temporary zonation around the central depression. Rapidly growing species that tend to stabilise soil are best for areas vulnerable to erosion.

When?

Inspection and Follow-up:

Prior to revegetation, the onsite offset wetland and UVB wetland must be inspected and photographed to serve as a record for the pre-planting condition of the area. Following the implementation of revegetation interventions, monitoring must be undertaken to determine the relative success of revegetation:

→ The wetland area must be inspected by a freshwater specialist after planting has been conducted and thereafter every 6 months until the required cover (80%) has been achieved. Photographs must be taken of the planted areas to document the revegetation process.
→ The site must be inspected by a SACNASP registered freshwater specialist 12 months after the revegetation plan has been completed to determine whether the required degree of cover (80%) has been achieved.
→ If the required 80% total cover has not been achieved, recommendations from the SACNASP registered freshwater specialist to improve cover must be provided.

Who?

Wetland rehabilitation has significant labour and specialist requirements, and the implementation of the wetland rehabilitation plan will require the collaboration of several role players. The responsibility of each entity is outlined in the table below.

The practical and financial aspects pertaining to the required offset activities are the responsibility of the Water Use Licence (WUL) holder, in this case, the owner of Erf 1486. Given the scale of the

proposed offset, several commercial entities are potentially available to conduct the required rehabilitation activities. It is the WUL holders' responsibility to ensure that they appoint appropriate implementing agents based on the size and level of project complexity for the site in question. The project must be managed by a suitably qualified freshwater specialist / landscaper with experience in wetland rehabilitation.

Responsibilities of key role players in wetland rehabilitation:

Role player	Responsibility
WUL Holder/ Applicant	Implementation of the wetland offset plan. Appoint appropriate implementing agents.
Construction Implementing Agent	Remove foreign fill material from the proposed offset wetland (where applicable).
Rehabilitation Implementing Agent (Suitably qualified freshwater specialist and landscaper with experience in wetland rehabilitation)	Plant, seed, and propagule procurement. Implement propagation, seeding and planting at appropriate plant densities.

Why?

The aim in terms of onsite offset wetland revegetation is to reach 80% total natural wetland vegetation cover within 8-12 months after revegetation interventions have been completed. The species and general techniques to be used for revegetation are outlined in the subsections below.

Method Statement 3: Sediment removal from the stormwater infrastructure within the wetland area.

Recommendations

- → Discharge stormwater from rooftops into rain harvesting tanks. This will limit the volumes of stormwater runoff that will reach the wetland. Where possible, water collected in rain harvesting tanks can be utilised for flushing of toilets, washing etc.
- → Vegetated swales must be utilised rather than concrete drains or underground stormwater pipes in order to encourage infiltration, particularly next to roadways.
- → Energy dissipaters / erosion protection measures (such as lining with stones, grass, reno-mattresses, or gabions) must be constructed where stormwater is released in order to reduce the runoff velocity and therefore erosion.
- → Sheet runoff from hardened surfaces must be intercepted and the treatment and infiltration of runoff must be promoted.
- → Sediment traps should be incorporated into stormwater drains / swales upstream of all discharge points into the wetland.
- → All stormwater draining into the wetland must receive basic filtering and treatment prior to its release.
- → Incorporate measures into the stormwater design to trap solid waste, debris and sediment carried by stormwater. Measures may include the use of curb inlet drain grates and debris baskets/bags.
- → Stormwater generated from areas with a higher risk of contamination such as parking areas and roads must receive basic filtering and treatment prior to its release into surrounding areas. Treatment methods may include sand filter traps and oil-water separators which will require maintenance.
- → The extent of hardened surfaces must be minimised. E.g. where required permeable paving must be used.
- → Homeowners must be encouraged to landscape their gardens with the use of indigenous species to decrease the area of hardened surface and increase infiltration.

- → Homeowners should store any potential pollutants in such a way that pollution will not occur to the wetland (such as any fuel, etc.). Potential pollutants should be stored in an adequately bunded area.
- → The use of herbicides, pesticides and any other poisons within private gardens must be strictly prohibited. The home owner's association must be responsible for ensuring that residents are compliant with this.
- → Backwashing of swimming pools directly into the wetland must be strictly prohibited. Backwash water can be collected in settling tanks where dirt and debris settle to the bottom. The cleaner water can then be reused for non-potable purposes or even filtered back into the pool system. Backwash water can be diverted to greywater tanks.
- → Monitor the proposed development and adjacent wetland for erosion and sedimentation after heavy rainfall events. Any erosion noted must be immediately addressed. Rehabilitation measures may include the removal of accumulated sediment by hand, filling of erosion gullies and rills, the stabilisation of gullies with silt fences, riprap, and the revegetation of stabilised areas.
- → Stormwater systems will require ongoing maintenance. Any build-up of silt or debris within stormwater drains or swales will need to be cleared to ensure the continued functioning of the systems.
- → Any damage to stormwater infrastructure, and any flaws identified in the functionality of stormwater infrastructure, must be rectified immediately.
- → Stormwater systems must be monitored and maintained into perpetuity and collections of debris and solid waste removed from grates and baskets. The developer must confirm who will be responsible for this monitoring and maintenance as well as their roles.
- → The stormwater system must be designed by a suitably qualified engineer with input from an aquatic specialist.

What?

Appropriate management of the stormwater management

This activity involves the regular inspection and removal of accumulated sediment from stormwater infrastructure, including the permeable paving system, enhanced vegetated swales, and stormwater drains within and adjacent to the delineated wetland area on Erf 1486. These interventions aim to ensure that the hydrological and ecological functionality of the wetland is maintained, and that stormwater is appropriately filtered before entering the sensitive UVB wetland system.

The proposed development may increase the extent of hardened surfaces, which in turn can elevate runoff volumes, erosion, and peak flow intensities. If not properly managed, this may result in sedimentation, water quality degradation, and habitat alteration within the wetland. Therefore, all stormwater control measures recommended in the aquatic specialist report and stormwater management plan must be strictly implemented.

Sedimentation as a result of erosion from within and from outside the property.

How?

<u>Monitoring and Inspection</u>

Permeable paving System

Inspection and Maintenance for Permeable Paving System:

Activity	Schedule
Ensure that the porous paver and outlet structures are free of sediment.	Monthly
Check that the system dewaters between storms	As needed, based on inspection
Ensure that contributing are and porous paver surface are clear of debris	As needed, based on inspection

Ensure that the contributing and adjacent area is stabilized and mowed with clippings removed	As needed, based on inspection
Vacuum sweep porous paver surface to keep free of sediment	Typically, three to four times a year
Inspect the surface for debris or spalling	Annually
Totally rehabilitate the porous paver system, including the top and base course as needed	Upon failure

Enhanced Swale System:

Schedule	Components	Actions
After Storms	Inflow points	Check for scouring channeling and erosion – Repair as necessary
	Slide slopes	Check for scouring channeling and erosion – Repair by adding soil and replanting as necessary
	Channel base	Check for scouring channeling and erosion – Repair by adding soil and replanting as necessary
	Plants C soil	Check stormwater is filtering through soil following storm events – Remove weeds
Monthly	Outlets	Check outlet for scouring or erosion – Repair as necessary
	Inflow points	Remove rubble and debris
	Channel base	If grassed – mow channel to shorter than 150mm Use catcher and remove clippings Re-seed bare patches of grass and water in dry conditions If planted – check plants are healthy, and growth is dense Remove weeds Replant gaps and water new plants in dry conditions
	Plants and soil	Check plants are healthy, and growth is dense. Remove weeds Replant gaps and water new plants until established
Two Yearly	Outlet	Remove rubble and debris from outlet grate or catchpit
	Channel base	Check for boggy patches and ponding of water Check soil is not compacted and aerated surface or top up dips to repair
	Grass, plants and soil	Remove weeds, rubble and debris

		Replant gaps and re-seed bare patches and water if required to establish Aerate soil to prevent natural compaction, similar to coring sports field and bowling greens Check stormwater is filtering through soil by either monitoring after storm runoff or by running water across swale

Monitor areas which may exacerbate erosion, especially during a storm events. Monitor how sedimentation affects the functioning of the ecosystem i.e reduced water flow, pooling, standing and stagnant water etc. Ensure that good cover of indigenous vegetation is maintained in wetland and Open Space.

Use appropriately sized machinery to remove sediment from the stream system after the storm.

- Small amount of sediment can be removed by hand with a shovel.
- Large amounts of sediment must be removed by a backhoe or bulldozer but use the smallest available plant for the work.

Do not dig out below the bed of the wetland into soil and clayey material below the sediment. Do not dig out below the thalweg (the lowest point of a cross section across the wetland). Do not create a pond or dam. Dump removed sediment where it will not wash back into the stream. It can be used as fill or to manage erosion. It may not be used to build berms. Do not drive heavy machinery through the wetland, or if this is the only option do not use multiple access routes and make good afterwards.

Where?

Within stormwater infrastructure zones, including:

→ Permeable paving areas
→ Enhanced vegetated swales
→ Drainage outlets and inlets
→ Identified areas with accumulated sediment or erosion, as confirmed and approved by the Environmental Control Officer (ECO).

When?

→ Late summer (February–April**)** is the optimal time for sediment removal to reduce ecological disturbance.
→ Inspections to occur:
  - Monthly (for sediment build-up, erosion, functionality)
  - Immediately after major storm events

Who?

Appropriately trained specialists, HOA / landscaping team, Plant must be operated by person experienced with working in a stream or wetland.

Why?

Sediment accumulation alters the hydrological regime of the wetland, reduces open water habitat, and negatively impacts faunal and floral biodiversity. It may also block stormwater infrastructure,

leading to backflow, flooding, and habitat degradation.

Furthermore, the development's proximity to the UVB wetland and downstream ecological receptors (such as the Vermont Salt Pan) necessitates robust stormwater and sediment management to prevent long-term impacts.

Method Statement 4: Flood damage

What?

Due to the increasing frequency and intensity of extreme weather events as a result of climate change, flooding within the Unchanneled Valley-Bottom (UVB) wetland and adjacent infrastructure on Erf 1486, Vermont is likely. Flooding can result in a number of impacts within the regulated zone, requiring prompt intervention to maintain ecological functionality and infrastructure safety:

- → Accumulation of debris (e.g., branches, tree trunks) at culverts or stormwater inlets
- → Damage to stormwater infrastructure, including vegetated swales, permeable paving, and polishing ponds
- → Debris and sediment build-up in roads, access points, and stormwater outlets
- → Flooding or mechanical failure of sewer pipelines, pumps, scour valves, and air valves
- → Impacts to private infrastructure such as boardwalks, gardens, and internal access roads
- → Changes in watercourse direction or erosion of wetland banks and swale channels

The Overstrand Municipality must be notified immediately if damage occurs to any municipal infrastructure (e.g., culverts or outfall structures), or if water flow is obstructed.

Repairs to stormwater attenuation features and flow paths should be prioritised, particularly if additional rainfall is forecasted.

How?

- → Flood damage inspection must be undertaken as soon as practically possible after the storm event.
- → Use appropriately sized lightweight machinery to remove debris, tree trunks, or damaged vegetation.
- → Larger items (e.g., trunks) may need to be cut up on-site before removal.
- → Follow the approved sediment removal protocol when clearing sediment from swales, stormwater drains, or within the 32 m wetland buffer.
- → Inspect and secure all sewer-related infrastructure, especially containment areas, for structural damage or leaks.
- → Avoid driving heavy equipment directly through the wetland. Where access is essential, use the smallest possible plant and restore all disturbed areas post-repair.
- → Document all damage and actions taken for compliance and post-storm audit purposes.

Where?

- → Within the delineated wetland and its associated 32 m buffer zone
- → Along the stormwater swale network, permeable paving systems, and stormwater outfalls
- → Around sewer pipelines and associated service infrastructure on Erf 1486

When?

As soon as possible after the storm event

Who?

The HOA will be able to identify that damage has been done, however this type of repair must only be undertaken under direction of suitably qualified professionals, especially if municipal infrastructure is damaged. The local authorities must be informed as soon as possible. Repair must be undertaken by suitably experienced contractor.

Why?

Flood events can alter hydrological flow patterns, damage stormwater and sewer systems, and degrade wetland functionality. Immediate action is essential to:

- → Prevent downstream flooding
- → Avoid long-term ecological degradation
- → Maintain water quality and hydrological balance
- → Protect infrastructure and reduce costs of future repair

Timely maintenance and rehabilitation after flood events is key to preserving the ecological integrity of the UVB wetland and ensuring long-term sustainability of the development on Erf 1486, Vermont.

Method Statement 5: Erosion Control

What?

Erosion may occur within the onsite Unchanneled Valley-Bottom (UVB) wetland on Erf 1486 due to increased stormwater runoff and peak flows. This method statement outlines the monitoring and corrective actions to address erosion impacts in a way that protects wetland functionality and ensures compliance with environmental best practices.

When?

- → Monthly inspections must be undertaken to detect signs of erosion.
- → Immediately after significant storm events, additional checks must be conducted.
- → Erosion repair actions must be implemented as soon as erosion is detected.

Where?

Along stormwater inflow points, swales, and outflow zones.
Within the delineated wetland area and its 32 m buffer zone, especially in areas with visible soil exposure or concentrated flow paths.

How?

Conduct a visual inspection to assess the extent and type of erosion (e.g., sheet erosion, rills, gullies, bank collapse). Photographic records should be maintained.
Stabilisation Measures:

- → Soft engineering techniques are preferred over hard structural methods. These include:
- → Geotextiles, coir fibre mats, erosion blankets
- → Brush mattresses, sandbags, live staking using rooted indigenous cuttings

→ Fascine bundles (woody cuttings) placed along erosion gullies
Vegetative Rehabilitation:
→ Place geotextile fabric over exposed areas, secure with stakes
→ Cut planting holes in the fabric
→ Use a mixture of recommended indigenous species (see Section 8.6)
→ Gradually remove fabric as vegetation establishes
Repair of Erosion Rills and Gullies:
→ Fill with rocks sized between 5 cm and 20 cm
→ Establish silt fences or fascines along the flow path for reinforcement
→ Monitor regularly to ensure stability during vegetation regrowth

Addressing Soil Compaction:

→ Loosen compacted areas to a depth of approximately 30 cm
→ This improves infiltration and reduces runoff concentration
→ Replant or reseed disturbed areas immediately

Who?

The Homeowners' Association (HOA) or its appointed maintenance team must carry out inspections and notify the Environmental Control Officer (ECO).
All erosion control work must be supervised or conducted under guidance from a freshwater specialist or rehabilitation ecologist.
Qualified contractors with experience in wetland rehabilitation must be appointed for moderate to severe erosion control works.

Why?
Unchecked erosion leads to:
→ Loss of topsoil and wetland structure
→ Sedimentation of wetland pools, degrading water quality and habitat
→ Disruption of the wetland's natural hydrology
→ Reduced biodiversity and ecological function

Implementing prompt and appropriate erosion control measures is essential to maintain the integrity of the wetland ecosystem and ensure that the stormwater management and rehabilitation goals for Erf 1486 are achieved.

Date of last flood event for site	Note any further damage and comments regarding the state of the site
N.A	The site, including the wetland area, is currently vegetated with a mix of indigenous species and some alien invasive plants. Evidence of ongoing
Section C: Photographs of activity location before maintenance	

Before A:

Coordinates 34° 24’

25.20” S ; 19° 8’ 51.29” E

4. Management Objectives

The aim of the MMP is to allow for the long-term management of the site which is located within the regulated area in terms of the National Environmental Management Act (NEMA). This includes both the Rehabilitation of the site as well as response to flood or storm events where actions may be required which may ordinarily trigger the need for Environmental Authorisation.

5. Implementation strategy

The Landowner, and the Homeowners Association will be responsible for the implementation of the Maintenance Management Plan and provisions thereof.

- → Landowners shall be responsible for ensuring the provisions of this MMP are implemented. More specifically the landowner must:
- → Either undertake maintenance works themselves or appoint Contractors on an ad hoc basis to repair damaged structures and remove and dispose of the sediment etc.
- → Ensure that each maintenance worker or any Contractor is informed of the requirements of this MMP and particularly the environmental procedures and specifications prescribed in the MMP.
- → Appoint on an ad hoc basis various professionals as required including a Civils Engineer and/or a Freshwater Ecologist to provide specialist input as prescribed in the original EA
- → Timeously notify the DEACDP in the event of significant damage to any structures or infrastructure or significant erosion as a result of heavy rainfall or floods and which would require actions in terms of the MMP
- → Transfer the legal obligation of ongoing environmental management of the site to any future property owners.

The landowner is expected to remain legally compliant with the relevant environmental legislation as well as the Environmental Authorisation, at all times. Compliance with the MMP's procedures and specifications does not absolve the landowner from compliance with any other legislation. If the landowner is undertaking the maintenance activity themselves then they have a duty to demonstrate respect and care for the environment in which they are operating. In such instances the landowner will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the MMP, environmental regulations and relevant legislation.

Various Contractors for the MMP Actions may need to be appointed by the Landowner / HOA. Each Contractor will be responsible for:

- → Informing all employees and Sub-contractors of their roles and responsibilities in terms of the MMP; and
- → Ensuring that all employees and Sub-contractors comply with this MMP.
- → The Contractor has a duty to demonstrate respect and care for the environment in which they are operating.
- → The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the MMP, environmental regulations and relevant legislation.

The Freshwater Specialist may need to be consulted from time to time. This professional must be a suitably qualified specialist in the field of freshwater ecology and, familiar with the requirements and objectives of the MMP and shall be responsible for providing ad hoc specialist advice including but not limited to the following:

- → The selection of plant species to be used for revegetation.
- → Advising on the appropriate repair and maintenance measures should major erosion arise as a result of heavy rainfall or floods.
- → Signing off of detailed engineering designs for repairs to gabion weirs bridges and the like.
- → Revision and approval of Method Statements, if required
- → Ensuring the provisions of the Wetland Offset and Rehabilitation are correctly implemented

The Civils Engineer shall be a qualified engineer or professional with the relevant expertise who is appointed by the landowner to provide specialist input on an ad hoc basis as follows:

- → Provide detailed designs for repair to infrastructure (e.g. pipelines, stormwater structures and stabilisation structures)
- → Provide on-site inspections during maintenance works to ensure that any Contractor appointed by the landowner is adhering to specified levels and construction processes.

This document should be read in conjunction with the Environmental Authorisation and Environmental Management Programme.