LORNAY
ENVIRONMENTAL CONSULTING

Environmental Management Programme

Proposed Residential Development on Erf 1486, Vermont

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Consultant:

Michelle Naylor | Senior Env. Consultant **|** M.Sc., Pr. Sci. Nat., EAPASA
cell: 083 245 6556 **|** michelle@lornay.co.za **|** www.lornay.co.za

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ISSUED BY: **Lornay Environmental Consulting (Pty) Ltd**
Unit 5(1)F, Hemel & Aarde Wine Village
Hermanus
7201
Tel: 083 245 6556
www.lornay.co.za

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STATEMENT OF INDEPENDENCE

Lornay Environmental Consultants nor any of the authors of this report have any material present or contingent interest in the outcome of this report, nor do they have any financial or other interest which may affect the independence of the author(s) or Lornay Environmental Consulting. The consultant fees paid to Lornay Environmental Consulting for the completion of this report is in line with standard professional fees and daily rates. The settling of the professional fee is not dependent on the outcome of the report.

DETAILS OF THE AUTHOR(S)

EAP ORGANISATION:	Lornay Environmental Consulting (Pty) Ltd
AUTHOR(S):	Michelle Naylor
EAP REG. NO.:	EAPASA (2019/698)
SACNASP REG. NO.:	Pr. Sci. Nat (400327/13)
EAP QUALIFICATIONS:	Bachelor of Science (Hons); Master of Science (Rhodes University), EAPASA., SACNASP., IAIASA., cand. APHP
AUTHOR(S):	Njabulo Magoswana
EAP REG. NO.:	CAND. EAPASA 2021/3178
EAP QUALIFICATIONS:	BSc Hons., Environmental Geography

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KEY TERMS AND ABBREVIATIONS

BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
EA	Environmental Authorisation
ECA	Environment Conservation Act (Act No. 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEM:BA	National Environmental Management Biodiversity Act (Act No. 10 of 2004)
NEM:WA	National Environmental Management Waste Act (Act No. 59 of 2008)
PPE	Personal Protective Equipment
SDS	Safety Data Sheets
SHE	Safety Health and Environmental

Basic Assessment - Process followed to receive Environmental Authorisation from the Competent Authority, necessitated by NEMA. The Basic Assessment Report (BAR) is drafted in line with the legislation.

Competent authority - The Department of Environmental Affairs and Development Planning (DEA&DP)

Contractor - the main or specialised contractors as appointed by the developer / applicant for the execution of the works, including all sub-contractors

Developer / Applicant – as per EA

Environmental Control Officer (ECO) - a suitably qualified person to be appointed by the Developer / Applicant, to oversee the implementation of the EMP and environmental agreement until the completion of works on the site

Environmental Management Plan / Programme (EMP/r) - this document, approved by the competent authority, to control the implementation of the works on the site in such a way as to ensure that they do not result in undue or reasonably adverse impacts on the environment.

General waste - Waste that does not pose an immediate hazard or threat to health or to the environment, and includes domestic waste, building and demolition waste, business waste and inert waste

Hazardous waste - Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Project manager - Overall responsible and accountable person for the site during the construction, operation and decommissioning of the facility.

Project Management team - The responsibility of the EMP implementation resides with this team. This team includes a Project Manager and appointed contractors and consultants.

Safety, Health and Environmental Officer (SHE Representative) – Applicant / developer will appoint one Safety Health and Environmental Officer, assisting the construction manager on Safety, Health and Environmental aspects of the project on the construction site.

Site Manager **–** the employee of the main contractor responsible for the day to day control of all activities and operation on site.

Sub-contractor and Contractor - Any provider of services, goods or people to the Applicant / Developer, for the construction, operation or decommissioning.

LEGISLATIVE REQUIREMENTS

A Basic Environmental Assessment process is applicable in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) regulations (2014) (as amended). Appendix 4 of the NEMA EIA Regulations (GN. R982) sets out the minimum requirements for the drafting of an Environmental Management Plan (EMP). This EMP has been created in fulfilment of these prescribed requirements for the construction and post-construction phase of the activity applied for. The implementation of this EMP will be a condition of approval of the Environmental Authorisation (EA). Failure by the applicant, to comply with this EMP, will therefore constitute an offence, and the applicant and / or the appointed contractors can be held liable for penalties and / or legal action. It is therefore important that a copy of this EMP be issued to each contractor, preferably at the appointment stage, in order to allow for the costs of implementing the EMP, to be included in cost proposals. This will also ensure that the contractor is aware of his responsibilities prior to appointment and commencement. Each appointed contractor involved in the project, as well as the project manager (as applicable), will be required to sign for and thereby acknowledge contents of, the approved EMP and therefore abide by the specifications of the document and any amendments thereto.

Other applicable legislation

The Constitution of The Republic of South Africa (Act 108 of 1996)

The Constitution of the Republic of South Africa states that everyone has a right to a non-threatening environment and that reasonable measures are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the relevant competent authorities. NEMA is a National Act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Western Cape to the Department of Environmental Affairs and Development Planning (DEA&DP).

National Environmental Management: Biodiversity Act (Act 10 of 2004)

Chapter 4 of the National Environmental Management: Biodiversity Act, 2004 (NEMBA) deals with threatened and protected ecosystems and species. The need to protect listed ecosystems is addressed (Section 54). Section 73 deals with Duty of Care relating to invasive species, while Section 76(2) calls for development of invasive species monitoring, control and eradication plans by all organs of state in all spheres of government, as part of environmental management plans required in terms of Section 11 of NEMA.

National Environmental Management: Waste Act (Act No. 59 of 2008)

The National Environmental Management: Waste Act (NEM:WA) provides for specific waste management measures (disposal and storage) and the remediation of contaminated land.

National Environmental Management: Air Quality Act (Act No. 39 of 2004)

Section 32 provides provision for the control of dust, section 34 provides provision for the control of noise and section 35 provides provision for the control of offensive odours, all which may be experienced during the construction or operation of an applicable development.

Environment Conservation Act (Act No. 73 of 1989)

The Environment Conservation Act (ECA) provides provision for the prevention of littering by employees and subcontractors during construction and the maintenance phases of development.

Occupational Health and Safety Act (Act No. 85 of 1993)

Section 8 outlines the general duties of employers to their employees and section 9 outlines the general duties of employers and self-employed persons, to persons other than their employees.

Hazardous Substances Act (Act No. 5 of 1973)

This Act provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.

1. INTRODUCTION

Lornay Environmental Consulting (Pty) Ltd has been appointed by Elephant Ventures Africa CC (hereafter referred to as "the applicant") to facilitate compliance with the National Environmental Management Act (NEMA, Act 107 of 1998), as amended, and the Environmental Impact Assessment (EIA) Regulations of 2014, as amended. This appointment relates to the application for environmental authorisation of listed activities associated with the proposed residential development on Erf 1486, located in Vermont, Hermanus, Western Cape.

The Environmental Management Programme (EMPr) presented in this document is a legally binding instrument applicable to the applicant, all successors in title, and any future developers or property owners, whether they assume ownership of the whole or any portion of the development. This EMPr governs the proposed residential development on Erf 1486 as outlined in this application, including any future amendments to the approved layout or development plan. It further extends to all property owners within the development, ensuring a consistent and enforceable framework for environmental management.

This EMPr has been prepared and submitted as part of the Basic Assessment process, in accordance with the requirements of NEMA and its associated regulations. It serves as a comprehensive guideline for managing environmental impacts during both the construction and post-construction phases of the project. The scope of the development includes the establishment of roads, bulk services, residential homes, and associated infrastructure on Erf 1486. The document is prescriptive in nature, detailing mitigation measures and assigning specific responsibilities to individuals or organizations tasked with implementing actions during the construction and post-construction phases.

The primary objective of this EMPr is to minimise or, where possible, entirely avoid potential environmental impacts arising from the proposed development. It addresses key activities such as vegetation clearing, civil works, residential construction, rehabilitation plans and the installation of services, while promoting sustainable development practices. As a dynamic document, the EMPr is designed to be adaptable, allowing for periodic updates to reflect changing site conditions or project requirements. While it is compiled as an integral component of the Basic Assessment process, this EMPr becomes legally enforceable upon approval by the Competent Authority, Department of Environmental Affairs and Development Planning (DEADP). It should be read in conjunction with the attached Stormwater Management Plan and Wetland Offset, Rehabilitation and Management Plan, which provides additional context of the site and specifications for the development.

Compliance with the EMPr is critical throughout the construction and post-construction phases, particularly during activities such as vegetation clearing and the installation of civil services, road construction, and residential units. Upon completion of the construction phase, a completion audit is anticipated to be required, as may be stipulated in the Environmental Authorisation (EA). This audit will verify adherence to the EMPr and ensure that all environmental management commitments have been met.

This EMPr has been drafted in strict accordance with Section 24N of the National Environmental Management Act (NEMA, Act 107 of 1998), ensuring alignment with statutory requirements and best practices in environmental management. It reflects a commitment to balancing the developmental needs of the proposed residential project with the imperative to protect and preserve the natural environment of Erf 1486 and its surroundings.

2. DEVELOPMENT PROPOSAL

The preferred site for the proposed development is Erf 1486, situated in Vermont, Hermanus, Western Cape. This property represents one of the last remaining undeveloped residential erven in the area, offering a unique opportunity for sustainable residential expansion. Erf 1486 spans an area of approximately 15069 m² and benefits from existing access road (Lynx avenue) that will connect to the proposed internal private roads. The development proposal entails the subdivision and development of Erf 1486 to establish nine new residential erven, designated open space area, and two private roads. An existing building located along the R43 boundary will be demolished to accommodate the new residential erven and associated dwellings, ensuring optimal use of the site while adhering to the planned layout. Below are the components of the proposed development.

Residential erven

The residential component of the development will occupy an area of approximately 4982 m², designated for a residential erven. This allocation is designed to offer diverse housing options while maintaining a compact and efficient development footprint, consistent with the residential development structure of Vermont and its surrounding areas. To mitigate potential environmental risks, such as flooding, the building plans incorporate the use of raft foundations rather than conventional foundations. This design choice enhances the resilience of the development against foreseeable natural impacts related to flooding events by incorporating stormwater management plan, ensuring long-term structural integrity and safety of the buildings as well as the protection of the wetland ecosystem on site.

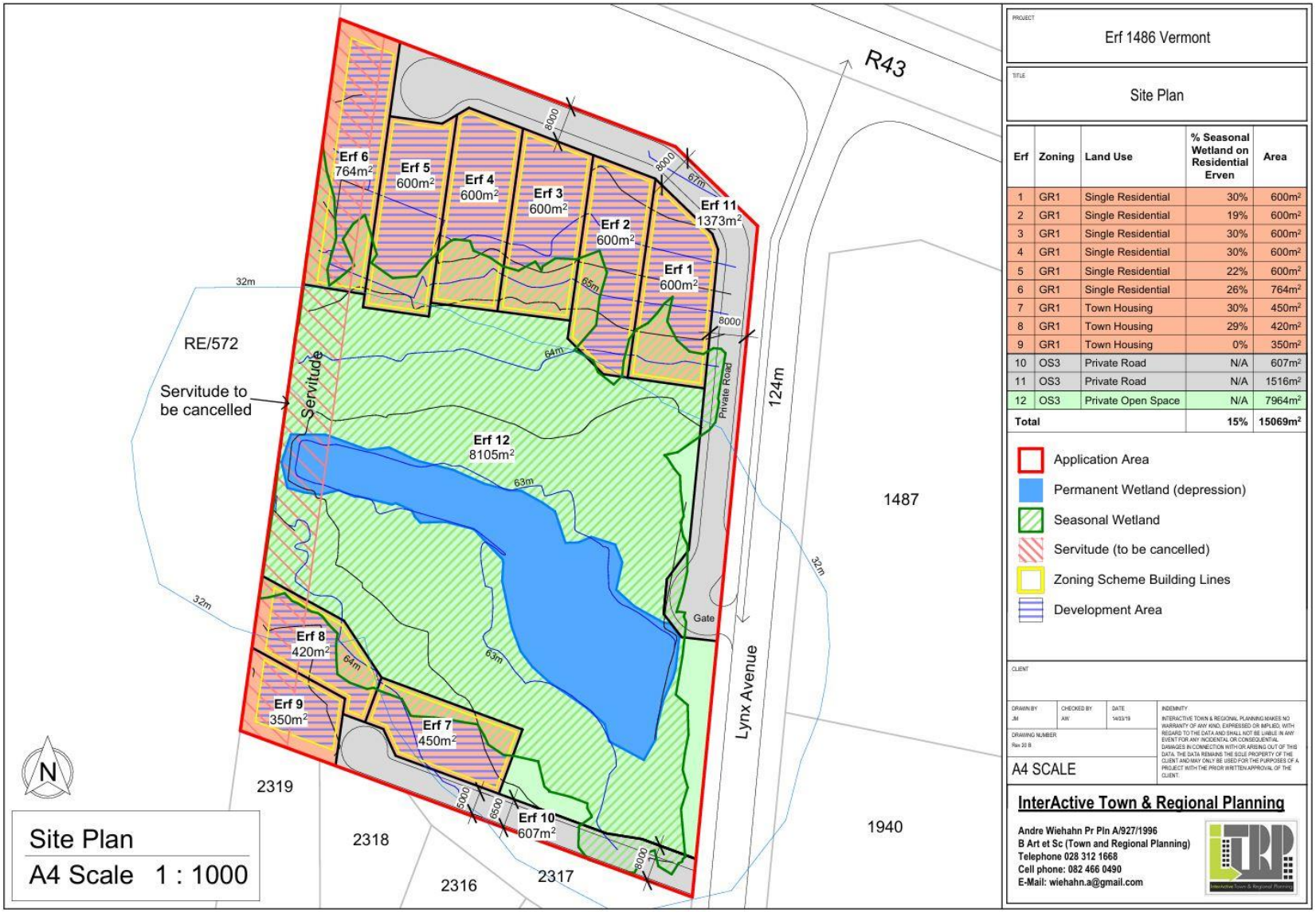
Private Roads

Two private roads are proposed to facilitate access and connectivity within the residential development. The roads will extend from Lynx Avenue, providing a direct link to the residential erven. The second road will complement this access, ensuring efficient circulation throughout the site. The road layout has been carefully designed to integrate with the existing access from the Lynx avenue and to minimize disturbance to the surrounding environment, including adjacent sensitive areas.

Open Space (Conservation area)

A significant portion of the site, covering approximately 7964 m², will be allocated as open space (No-go). This area is intended to serve multiple purposes, including the preservation of local biodiversity and the enhancement of ecological corridors. The open space will support the functioning of the site's ecological infrastructure, mainly the wetland, contributing to the overall environmental sustainability of the development.

The proposed development on Erf 1486 reflects a balanced approach to meeting residential needs while incorporating measures to protect and enhance the natural environment. The layout optimizes the use of available land, integrates essential infrastructure, and ensures compliance with environmental management objectives.



PROJECT
Erf 1486 Vermont

TITLE
Site Plan

Erf	Zoning	Land Use	% Seasonal Wetland on Residential Erven	Area
1	GR1	Single Residential	30%	600m²
2	GR1	Single Residential	19%	600m²
3	GR1	Single Residential	30%	600m²
4	GR1	Single Residential	30%	600m²
5	GR1	Single Residential	22%	600m²
6	GR1	Single Residential	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**

Application Area
Permanent Wetland (depression)
Seasonal Wetland
Servitude (to be cancelled)
Zoning Scheme Building Lines
Development Area

CLIENT

DRAWN BY	CHECKED BY	DATE
JM	AW	14/03/19

DRAWING NUMBER
Rev 20 B

A4 SCALE

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InterActive Town & Regional Planning
Andre Wiehahn Pr Pln A/927/1996
B Art et Sc (Town and Regional Planning)
Telephone 028 312 1668
Cell phone: 082 466 0490
E-Mail: wiehahn.a@gmail.com

Figure 1: Proposed site development plan

3. TERMS OF REFERENCE

The primary objective of this Environmental Management Programme (EMPr) is to identify, manage, and mitigate any potential negative environmental impacts that may arise during the construction and post-construction phases of the proposed residential development and associated infrastructure. The EMPr serves as a guiding document to ensure that the construction and post-construction phases of the development are carried out in an environmentally responsible manner, in compliance with relevant legislation and best practices.

3.1. Scope of Application:

- This EMPr applies to all construction and post-construction / operational activities associated with the proposed development, including site preparation, building construction, driveways, and any associated infrastructure.
- It must be made available to all contractors, subcontractors, and relevant stakeholders involved in the project, ensuring that it forms an integral part of all tender documentation and contracts.

3.2. Binding Requirements:

- The provisions of this EMPr are binding on the applicant/owner, all contractors, subcontractors, and any third parties acting on their behalf.
- The applicant/owner is responsible for ensuring that all contractors and subcontractors are fully informed of the environmental requirements contained within this document.
- Failure to comply with the EMPr's requirements by any party involved in the construction will result in appropriate penalties, and the contractor will be obligated to remedy any environmental damage caused by their actions or the actions of their subcontractors.

3.3. Responsibilities and Accountability

- The contractor is accountable for the environmental performance of the site and must ensure that all activities are conducted in accordance with the environmental standards and guidelines set out in the EMPr.
- The contractor must also take proactive steps to prevent environmental damage and address any environmental issues that may arise during construction.
- In the event of environmental harm or non-compliance, the contractor will be required to restore the affected areas and bear any costs associated with remediation or penalties imposed.

3.4. Implementation and Compliance Monitoring

- Regular site inspections and audits will be conducted to monitor compliance with the EMPr. Any non-compliance will be recorded, and corrective actions will be mandated to mitigate environmental risks.
- Contractors and subcontractors are required to cooperate fully during audits and inspections, and all personnel must receive appropriate environmental training to ensure adherence to the EMPr’s guidelines.

4. ENVIRONMENTAL CONTROL ON SITE

4.1. Approach

The Table below illustrates the various approaches to be undertaken to manage potential scenarios as a result of the activity on site:

Table 1: Impact management

Avoidance	Avoiding activities that could result in adverse impacts and/or resources or areas considered sensitive.
Prevention	Preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having negative impacts.
Preservation	Preventing any future actions that might adversely affect an environmental resource.
Minimisation	Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project.
Mitigation	Measures taken to minimise adverse impacts on the environment.
Enhancement	Magnifying and/or improving the positive effects or benefits of a project.
Rehabilitation	Repairing affected resources, such as natural habitats or water resources.
Restoration	Restoring affected resources to an earlier (possibly more stable and productive) state, typically, 'background' or 'pristine' condition. These resources may include soils and biodiversity
Compensation	Compensating for lost resources, and where possible, the creation, enhancement or protection of the same type of resource at another suitable and acceptable location.

4.2. Organisational Structure and Responsibilities

The Applicant and their appointed contractors will be responsible for the construction phase of each house, internal and access roads and associated infrastructure. All construction related staff are to be briefed on the requirements of the EA and EMP and copies of these documents are to be kept on site during all phases of construction. Long term management will be required in the post construction / operational phase and this will be done in conjunction with the Home Owners Association.

4.3. Environmental Control Officer

Due to the sensitivity of the site, it is recommended that an ECO be appointed for the construction phase of the development. ECO site visits should take place for the duration of the construction phase as per the conditions of the Environmental Authorisation. This will ensure that the additional conditions contained in the EA, EMP and BAR are implemented.

It will be the ECO's responsibility to ensure that the mitigation / rehabilitation measures and recommendations referred to in the EA (still to be issued) are implemented and complied with by the owner.

The applicant (owner/holder) will be responsible for the remuneration of the ECO and any other expenses encountered in the process of environmental monitoring of the construction.

Roles and Responsibilities of an ECO

The responsibilities of the ECO during the construction and operational phase of the project, will include, but not be limited to, the following:

- → Ensure compliance with the EMPr at all times during the pre-construction and construction phase;
- → Ensure compliance with relevant management conditions of the EA during the preconstruction and construction phase;
- → Meet with the contractors to set out the environmental parameters within which they must work (pre-construction and construction phase);
- → To environmentally educate and raise the awareness of the Contractors and their staff and to target responsible individuals as key players for environmental education and to facilitate the spread of the correct environmental attitude during the contract work.
- → Approve the previously disturbed areas set out;
- → Indicate where all no-go areas are to be demarcated and to ensure adherence to these delimitations at the induction session BEFORE any construction or site clearance commences on-site (pre-construction phase).
- → Must inspect the construction footprint on a weekly basis during construction of these elements of the development; and must take immediate measures to address unforeseen disturbances to the estuary and its associated buffer area.
- → Must check the non-perennial stream as well as the recommended buffer area for erosion damage and sedimentation weekly and after every heavy rainfall event.
- → To review method statements and to determine the most environmentally sensitive options
- → To oversee the implementation of environmental procedures set out in this document
- → Indicate where plant rescue may be necessary, and what species should be rescued on this site (pre-construction phase)
- → Advise on rehabilitation/landscaping measures to be implemented
- → Ensure that the correct earthworks practices are adhered to; e.g. no encroachment into the surrounding vegetation, separation of topsoil and subsoil, correct stockpiling and stripping of topsoil);
- → To attend site contractor's meetings, as required and report on environmental issues
- → To receive notices and minutes of all site meetings.
- → To maintain an open and direct channel of communication with the construction team and site manager
- → To take immediate action on site where clearly defined no-go areas are violated, or in danger of being violated, and to inform the site manager immediately, of the documents and the action taken.
- → To keep an up-to-date record of works on site, as they relate to environmental issues in the site diary.
- → To be contactable by the public regarding matters of environmental concern during the construction phase.
- → The ECO is to submit a completion report to the competent authority (DEADP) and applicant upon completion of the construction phase and before the EA lapses.

4.4. Project Manager

In addition to the ECO, the Project Manager will be responsible for the following:

- → All activities relating to the construction phase
- → Delegate activities in accordance with the EMP
- → Communicate design changes and technical issues to the team timeously
- → Ensure that all contractors are managing their team adequately and abiding by the conditions of the EMP and EA
- → Ensuring that the Contractors are aware of the conditions of the EMP and EA

4.5. Contractor

The Contractor (including sub-contractors) will be responsible for:

- Familiarising themselves with the EIA and EMP
- Complying with the EMP and EA commitments and any other legislative requirements as applicable
- Adhering to any instructions issued by the Project Manager or the Safety, Health and Environmental (SHE) Officer, if applicable
- Submitting an environmental report at designated site meetings on the environmental incidents that have occurred, if applicable
- Arranging that all employees and those of the subcontractors receive appropriate training prior to the commencement of construction, taking cognisance of this EMP and EA

4.6. Site Documentation and Reporting

Site logbook

A logbook should be kept on a construction site for the purposes of recording on-site instructions and as a general record of environmental issues. The logbook should be kept for a minimum of two years after the activity is completed for the relevant authority to review if deemed necessary. A photographic record of before and after construction should also be kept for visual reference purposes. The logbook should also contain the following sections:

Environmental Site Instruction

The Environmental Site Instruction section will be used for the recording of general site instructions relating to the protection of environmentally sensitive or potentially impacted areas or features on the site as applicable, by the ECO / site manager / construction team.

Site Diary

The purpose of this section will be to record the comments of the ECO / site manager / contractor etc., as they relate to activities on the site. The diary should also hold the complaints register, received from onsite personnel and the general public, Environmental Incident Register, disposal certificates for waste and sewage, non-conformance information, and written corrective active instructions.

Monitoring Section

The purpose of this section will be to record the comments of the ECO / site manager / contractor, during construction, relating to the implementation of the mitigation measures as well as waste, recycling, landscaping

and renewable energy measures used during the construction. The findings of all inspections and internal audits should be structured into instructive reporting, providing information to all responsible personnel. Corrective actions must be clearly defined where required. Within the reporting function a structured review component will be enforced. This review function will assist in prescribing necessary corrective actions. During construction, the ECO / Project management team, will be responsible for onsite monitoring to ensure that the contractor abides by the conditions of the EA and EMP.

The Environmental Authorisation (EA) as well as a copy of the approved Environmental Management Plan (EMP) for Construction, should also be accessible on site at all times.

4.7. Homeowners association

A Homeowners Association or similar structure is required to implement and manage the long-term management actions required on site.

5. CONDITIONS OF AUTHORISATION

The Environmental Authorisation (EA), once issued, will be included here and will be mandatory for all contractors, sub-contractors, agents, consultants, and construction personnel working on the property.

6. ENVIRONMENTAL AWARENESS

It is important to ensure that the contractors and employees associated with the proposed activity receive the appropriate level of training and awareness to ensure that continual environmental due diligence and conservation is applied at all levels of work carried out on site. Employees, contractors and sub-contractors must be made aware of their responsibilities in terms of relevant legislation, guidelines, as well as this EMP and EA.

The environmental conditions should be included in the contracts issued to the contractors, making them aware of the potential environmental impacts and risks associated with the proposed development as well as what measures are expected of them whilst conducting work on site. The importance of implementing the conditions in the EMP and the necessity of good housekeeping practices, will be made known to the contractors and employees.

6.1. Aim of the Environmental Awareness Plan

- Promote environmental education and conservation on site
- Inform employees and contractors on the applicable environmental procedures and plans

6.2. Environmental Awareness Training and content

- All personnel should undergo induction, which as a minimum should include Safety, Health and Environmental awareness
- All attendees should sign an acknowledgement register upon receiving and understanding the induction
- Construction and operational staff should be trained on the implementation of emergency procedures where applicable
- Definitions as used in this EMP should be provided

- How and why environmental protection is necessary, should be explained
- Management measures required to prevent environmental impacts should be outlined
- Emergency and spills response procedures should be outlined

Environmental conditions in the induction should focus on the following:

- Good house-keeping practices
- Air quality (Dust)
- Waste Management
- Odour/vermin Control
- Proper use of sanitation facilities; and
- Chemicals and materials storage, use and handling.

Environmental training should be implemented at the onset of the construction and can be done verbally or in written format. Proof of training should be kept on record.

7. CONSTRUCTION PHASE IMPACTS AND MITIGATIONS

7.1 Aquatic Biodiversity Impacts

The Aquatic Biodiversity Assessment identified the following key potential impacts as well as mitigations measures for the management of impacts on aquatic ecosystems during the construction phase:

***Potential impacts**:*

→ Areas of the onsite UVBW will be lost (i.e. complete loss in flow regime, water quality, vegetation, and geomorphic structure) as a result of the private road construction (Minor loss of approximately 0,024 ha (3 %) of the 0,90-ha wetland).
→ Habitat disturbance within the UVBW may occur due to the construction of residential housing and the upgrade of the sewer pipeline.
→ Alteration of the flow regime of the UVBW during construction of the residential housing.
→ Water quality impairment due to increased sediment input, potential spillage, or release of potentially contaminated runoff into the UVBW during construction of the residential housing and the upgrade of the sewer pipeline.

Management of impacts and Mitigation measures:

Wetland Loss in the delineated UVBW

→ An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist.

Disturbance of Wetland Habitat

→ Designate the UVB wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). Clearly demarcate the construction footprint (including construction camp, access roads, stockpile areas and working servitudes) with orange hazard tape, fencing or similar prior to the commencement of any activity, and strictly prohibit the movement of construction vehicles and personnel outside of the demarcated areas.
→ Locate site camps, laydown areas, stockpile areas, construction material, equipment storage areas, vehicle parking areas, bunded vehicle servicing areas and re-fuelling areas in designated areas of already hardened surface or disturbed areas located outside of the No Go area. These areas should preferably

be located on level ground in a previously disturbed area of vegetation approved by the Environmental Control Officer (ECO). Cut and fill must be avoided where possible during the set-up of the construction site camp.

- → Demarcation of the construction footprint/working servitude must be signed off by an ECO (or similar). Demarcation should not be removed until construction is complete, and rehabilitation (if applicable) has taken place.
- → Limit access into the construction footprint to existing access roads.
- → Prohibit the dumping of excavated material, building materials or removed vegetation within the No Go area. Building material must be stored at the designated storage area located outside of the no-go area. Spoil material must be appropriately disposed of at a registered waste disposal facility.
- → Undisturbed topsoil and subsoils removed from the construction footprint must be stored separately at the designated stockpile area for future rehabilitation.
- → Vegetation clearance should be restricted to the relevant development components and indigenous vegetation cover should be maintained as far as practically possible.
- → Vegetation which is considered suitable for rehabilitation activities after construction (such as indigenous grasses and other herbaceous species) should be carefully removed from the construction footprint and stored at an appropriate facility for use in later rehabilitation activities.
- → Clear and remove any rubble or litter that may have been accidentally deposited into the no-go area because of construction activities and dispose of at an appropriate registered facility.
- → An ECO must inspect the construction footprint on a weekly basis and must take immediate measures to address unforeseen disturbances to the wetland. Any disturbed / compacted areas falling outside of the demarcated construction footprint must be immediately rehabilitated. Depending on the extent of damage the method of rehabilitation may require input from an aquatic specialist / suitably qualified contractor.
- → Once construction has been completed, orange hazard fences as well as all construction waste, rubble, and equipment must be removed from the construction footprint.
- → In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent.
- → An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist. Rehabilitation must take place as soon as possible after construction is completed, and monitoring of rehabilitated areas must be undertaken. A suitably qualified professional must supervise the rehabilitation and monitoring activities.

Altered flow regime

- → Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline).
- → The status quo in terms of hydrological connection from Erf 1486 to the downstream system must be maintained / should not be impacted because of the proposed development.
- → If possible, conduct construction activities of dwellings, associated stormwater infrastructure and any rehabilitation activities during summer months (November to March).
- → Ensure that effective stormwater management measures are implemented during construction. Stormwater management must ensure that no runoff, which will impair the water quality and lead to increased sedimentation, may enter the downstream wetland area. Additionally, clean SW which does enter the downstream wetland system should do so in a manner that ensures no erosion occurs, specifically during storm events, such as through vegetated swales.
- → Appropriately designed raft foundations for residential dwellings may significantly reduce the impact on subsurface flow and therefore reduce this impact / risk.

- → Rainwater harvesting schemes may reduce runoff intensity and thereby mitigate the impact of catchment hardening.
- → The alien invasive vegetation present within the wetland area must be removed and replanted with indigenous wetland vegetation.
- → An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist.

Water Quality Impairment

- → Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline).
- → The site manager / ECO must check the No Go area for pollution/spills, erosion damage and sedimentation weekly and after every heavy rainfall event. Should pollution, erosion or sedimentation be noted, immediate corrective measures must be undertaken.
- → Fuel, chemicals, and other hazardous substances should preferably be stored offsite, or as far away as possible from the no-go area. These substances must be stored in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding, or storm damage.
- → Inspect all storage facilities, vehicles, and machinery daily for the early detection of deterioration or leaks and strictly prohibit the use of any vehicles or machinery from which leakage has been detected.
- → Mixing and transferring of chemicals or hazardous substances must take place outside of the No Go area, and must take place on drip trays, shutter boards or other impermeable surfaces.
- → Drip trays must be utilised at all fuel dispensing areas; and during the maintenance of existing sewer flow as possible.
- → Vehicles and machinery should preferably be cleaned off site. Should cleaning be required on site it must only take place within designated areas outside of the No Go area and should only occur on bunded areas with a water/oil/grease separator.
- → Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site.
- → Avoid the use of infill material or construction material with pollution / leaching potential. Where possible, in situ earthen materials must be used during construction to reduce the risk of leachate from imported materials contaminating the wetland area.
- → Concrete should preferably be imported as “ready-mix” concrete from a local supplier. Should onsite concrete mixing be required it must not be done on exposed soils. Concrete must be mixed on an impermeable surface in an area of low environmental sensitivity identified by the ECO outside of the no-go area. Surplus or waste concrete must be sent back to the supplier who will dispose of it.
- → Construct temporary bunds around areas where cement is to be cast in situ.
- → Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Disposal of any of these waste materials into the No Go area is strictly prohibited.
- → Washout must not be discharged into the no-go area. A washout area should be designated, and wash water should be treated on-site.
- → Clean up any spillages immediately with the use of a chemical spill kit and dispose of contaminated material at an appropriately registered facility.
- → Provide portable toilets where work is being undertaken (1 toilet per 10 workers). These toilets must be located within an area designated by the ECO outside of the no-go area and should preferably be located on level ground. Portable toilets must be regularly serviced and maintained.
- → Provide an adequate number of bins on site and encourage construction personnel to dispose of their waste responsibly.
- → Waste generated by construction personnel must be removed from the site and disposed of at a registered waste disposal facility on a weekly basis.

7.2 Terrestrial Biodiversity and Plant Species

The construction phase ecological impact of the proposed subdivision and development would be permanent loss of all of the existing natural and partly natural vegetation and faunal habitat in the development footprints (gazetted as a Critically Endangered vegetation type). No plant Species of Conservation Concern were recorded within the actual proposed footprints, and there is a moderate chance of at least one being present (*Disa hallackii*; Endangered). At least two Endangered birds may occasionally use the study area to forage (*Circus ranivorus* and *Circus maurus*), and the development would thus have a minor negative impact on these two species, but they do range widely and would never spend much time in such a small area anyway, and especially one so close to other human impacts. The Cape Dwarf Chameleon (*Bradypodion pumilum*) is listed as Vulnerable and may occur on site.

Mitigation measures recommended by the specialist

- → No erven should intrude significantly into the seasonal wetland portions of the site that support mostly habitat of High ecological sensitivity.
- → No pipelines, cabling or infrastructure should be installed across the High sensitivity areas or wetlands.
- → Any boundary fencing used must be permeable to small animals at ground level.
- → The authorised erf and road boundaries should be surveyed and pegged out and fenced on site prior to any site development.
- → No areas of natural or partly natural vegetation should be disturbed outside the pegged/fenced out and authorised erven. No vehicular activity or dumping of material may take place outside the authorised erven or roads.
- → All alien invasive vegetation should be removed from within the natural portions of the project area, prior to any authorised development. Removal of the alien vegetation must be undertaken by a trained and licensed alien vegetation removal team and must be undertaken using methodology outlined in the Best Practise Guidelines (see Martens et al 2021).
- → In order to try and safeguard the ecological integrity of the No Go wetland areas on Erven 1-8 (also shown in Figure 1) these areas that should not be altered, developed, gardened, covered, excavated, drained, infilled or disturbed in any way. Landowners and the HoA must be made aware of these constraints both prior to and after purchase. Alien invasive plant species should be removed from these areas on an annual basis, as part of the management actions required for the adjacent Private Open Space.

7.3 Terrestrial Animal Site Sensitivity Verification Report and Species Specialist Assessment Report

Potential impacts:

The clearance of indigenous vegetation on site for the proposed development will likely result in permanent loss of suitable habitat (beeding and foraging) used by terrestrial fauna, particularly Cape dwarf chameleon (*Bradypodion pumilum*).

Mitigation measures as recommended by the specialist:

- → During the construction phase the construction area should be clearly demarcated and blocked off from the 'private open space' area to avoid damage and pollution.
- → Pre and post construction site preparation should include rehabilitation of the 'private open space' by removing current building rubble and litter from this area.
- → Long term maintenance of ecological integrity of the 'private open space' is critical. Therefore, measures should be put in place for constant removal of alien vegetation, cleanup of litter and

prevention of illegal dumping. Clear legal responsibility for the maintenance of the space should be entrenched to be the responsibility of the homeowners association.

→ The fence traversing the ecological corridor should always be permeable to allow for movement of small sized animals e.g. small antelope, genets, mongoose between the nature reserve and wetland system.

→ Search and Rescue of chameleons and other slow-moving animals is feasible due to the presence of the adjacent nature reserve where they can be released. A search and rescue effort should be implemented before and during construction where animals that are found are released in the adjacent nature reserve. The necessary permission and permits should be attained before this is done.

→ Pets (especially domestic cats) should not be allowed to free-roam the 'private open space'.

8 POST-CONSTRUCTION PHASE IMPACTS AND MITIGATIONS

8.1 Aquatic Biodiversity Assessment

Potential impacts:

Habitat disturbance due to the use of the wetland as a public open space; and any maintenance associated with the sewer pipeline.

Alteration of the flow regime of the UVBW once the housing development is complete, due to potential flow diversion / increase in storm flows.

Water quality impairment due to the release of potentially contaminated stormwater (hydrocarbons) into the UVBW; and potential leakage associated with the sewer pipeline and maintenance thereof.

Mitigation measures recommended by the specialist

Disturbance of wetland Habitat

→ Prohibit littering and dumping within the wetland area. Clear and remove any rubble or litter that may have been accidentally deposited into the wetland and dispose of at an appropriate registered facility. Monitoring of litter/dumping within the wetland must be managed by a Homeowners Association (HoA).

→ In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent.

→ Vegetation which needs to be re-planted (if applicable) within each northern Erf (Figure 7-1 of the Aquatic Biodiversity Assessment) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings).

Altered flow regime

→ Vegetation which needs to be re-planted (if applicable) within each northern Erf (Figure 7-1) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings).

→ Runoff from the proposed development must not increase from the pre-development to the post-development scenario.

→ The status quo in terms of hydrological connection from Erf 1486 to the downstream system must be maintained / should not be impacted because of the proposed development.

- → Discharge stormwater from rooftops into rain harvesting tanks. This will limit the volumes of stormwater runoff that will reach the wetland area. Where possible, water collected in rain harvesting tanks can be utilized for flushing of toilets, washing etc.
- → Stormwater runoff should preferably be discharged as diffuse flow into well vegetated areas outside of the wetland.
- → Energy dissipaters / erosion protection measures (such as lining with stones, grass, reno-mattresses, or gabions) must be constructed where stormwater is released 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 any discharge points.
- → Monitor the wetland area 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.
- → Appropriately designed raft foundations for residential dwellings may significantly reduce the impact on subsurface flow and therefore reduce risk.
- → Rainwater harvesting schemes may reduce runoff intensity and thereby mitigate the impact of catchment hardening.

Water quality impairment

- → Design a SWMP which will allow for the infiltration and treatment of stormwater. All stormwaters 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 (as applicable) must receive basic filtering and treatment prior to its release into surrounding areas.
- → 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 (likely HoA).
- → Operational phase mitigation implemented during the design/construction phase:
    - Construct sewage pipelines in accordance with the relevant SANS / SABS specifications.
    - Design the pipelines to accommodate the operating and surge pressures.
    - Provide surge protection e.g. air valves.
    - Allow for scour valves along pipelines to ensure sewage pipelines can be emptied in a controlled manner if required.
    - Allow for surcharge containment and emergency storage of 2 hours of peak flow at manholes located within areas upslope of the wetland. Containment/emergency storage may include a concrete box or earthen bund surrounding the manholes. The backup storage capacity of manholes may also be improved by raising the manholes by one meter.
- → The sewage system must be monitored and maintained into perpetuity. The developer must confirm who will be responsible for this monitoring and maintenance as well as their roles.

→ The wetland area must be regularly inspected for waste. Any waste or litter noted must be immediately removed and disposed of at a registered waste disposal facility. The developer must confirm who will be responsible for this monitoring of the wetland area (HoA).

8.2 Terrestrial Biodiversity and Plant Species

Operational phase impacts will take effect as soon as any of the natural vegetation and faunal habitat on the site is lost or disturbed, and will persist in perpetuity, or as long as those areas are not rehabilitated. Operational phase impacts include loss of current levels ecological connectivity across the site (essentially only W-E connectivity), and associated habitat fragmentation. This will affect fauna and flora.

Mitigation measures recommended by specialist

→ No erven should intrude significantly into the seasonal wetland portions of the site that support mostly habitat of High ecological sensitivity
→ No pipelines, cabling or infrastructure should be installed across the High sensitivity areas or wetlands.
→ Any boundary fencing used must be permeable to small animals at ground level.
→ The authorised erf and road boundaries should be surveyed and pegged out and fenced on site prior to any site development.
→ No areas of natural or partly natural vegetation should be disturbed outside the pegged/fenced out and authorised erven. No vehicular activity or dumping of material may take place outside the authorised erven or roads.
→ All alien invasive vegetation should be removed from within the natural portions of the project area, prior to any authorised development. Removal of the alien vegetation must be undertaken by a trained and licensed alien vegetation removal team and must be undertaken using methodology outlined in the Best Practise Guidelines (see Martens et al 2021).
→ In order to try and safeguard the ecological integrity of the No Go wetland areas on Erven 1-8 (also shown in Figure 1) these areas that should not be altered, developed, gardened, covered, excavated, drained, infilled or disturbed in any way. Landowners and the HoA must be made aware of these constraints both prior to and after purchase. Alien invasive plant species should be removed from these areas on an annual basis, as part of the management actions required for the adjacent Private Open Space.

8.3. Terrestrial Animal Site Sensitivity Verification Report and Species Specialist Assessment Report

Potential fauna impacts during the post-construction phase may include the continued loss of fauna due to introduction of domestic animals on the developed residential erven.

Mitigation measures:

→ During the construction phase the construction area should be clearly demarcated and blocked off from the 'private open space' area to avoid damage and pollution.
→ Pre and post construction site preparation should include rehabilitation of the 'private open space' by removing current building rubble and litter from this area.
→ Long term maintenance of ecological integrity of the 'private open space' is critical. Therefore, measures should be put in place for constant removal of alien vegetation, cleanup of litter and prevention of illegal dumping. Clear legal responsibility for the maintenance of the space should be entrenched to be the responsibility of the homeowners association.
→ The fence traversing the ecological corridor should always be permeable to allow for movement of small sized animals e.g. small antelope, genets, mongoose between the nature reserve and wetland system.

→ Pets (especially domestic cats) should not be allowed to free-roam the 'private open space'.

Table 2. Activity specific impacts and mitigations

PRE-CONSTRUCTION/ CONSTRUCTION PHASE AND POST-CONSTRUCTION PHASE			
IMPACT	**DESCRIPTION**	**MITIGATION MEASURES**	**RESPONSIBLE PERSONS**
Wetland loss in the delineated UVBW	*Construction* At present, areas of the onsite UVBW will be lost (i.e. complete loss in flow regime, water quality, vegetation, and geomorphic structure) as a result of the private road construction associated with the residential development (minor loss of approximately 0,024 ha (3 %) of the 0,90-ha wetland). The remaining delineated wetland area will be set aside for Private Open Space. The UVBW has a PES score in the D category (Largely Modified), however still offers ecosystem services of moderate importance and exhibits Moderate EIS. The wetland vegetation type is CR and although the fynbos onsite is considered senescent, there could potentially be SoCC. There is also hydrological connection to the Vermont Salt Pan downstream which is an NFEPA designated wetland area.	An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist.	Applicant Contractor ECO
Disturbance of Wetland Habitat	*Construction* Disturbance of wetland habitat within the UVBW may occur due to the proximity of	- Designate the UVB wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). Clearly demarcate the construction footprint (including construction	Applicant Contractor ECO

	the proposed residential development, including but not limited to vegetation clearing, infilling, and construction of the housing; as well as the upgrade of the existing sewer pipeline.	camp, access roads, stockpile areas and working servitudes) with orange hazard tape, fencing or similar prior to the commencement of any activity, and strictly prohibit the movement of construction vehicles and personnel outside of the demarcated areas. - Locate site camps, laydown areas, stockpile areas, construction material, equipment storage areas, vehicle parking areas, bunded vehicle servicing areas and re-fuelling areas in designated areas of already hardened surface or disturbed areas located outside of the No Go area. These areas should preferably be located on level ground in a previously disturbed area of vegetation approved by the Environmental Control Officer (ECO). Cut and fill must be avoided where possible during the set-up of the construction site camp. - Demarcation of the construction footprint/working servitude must be signed off by an ECO (or similar). Demarcation should not be removed until construction is complete, and rehabilitation (if applicable) has taken place. - Limit access into the construction footprint to existing access roads. - Prohibit the dumping of excavated material, building materials or removed vegetation within the No Go area. Building material must be stored at the designated storage area located outside of the no-go area. Spoil material must be appropriately disposed of at a registered waste disposal facility. - Undisturbed topsoil and subsoils removed from the construction footprint must be stored separately at the designated stockpile area for future rehabilitation. - Vegetation clearance should be restricted to the relevant development components and indigenous vegetation cover should be maintained as far as practically possible. - Vegetation which is considered suitable for rehabilitation activities after construction (such as indigenous grasses and other herbaceous species) should be carefully removed from	

		the construction footprint and stored at an appropriate facility for use in later rehabilitation activities. - Clear and remove any rubble or litter that may have been accidentally deposited into the no-go area because of construction activities and dispose of at an appropriate registered facility. - An ECO must inspect the construction footprint on a weekly basis and must take immediate measures to address unforeseen disturbances to the wetland. Any disturbed / compacted areas falling outside of the demarcated construction footprint must be immediately rehabilitated. Depending on the extent of damage the method of rehabilitation may require input from an aquatic specialist / suitably qualified contractor. - Once construction has been completed, orange hazard fences as well as all construction waste, rubble, and equipment must be removed from the construction footprint. - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. - An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist. Rehabilitation must take place as soon as possible after construction is completed, and monitoring of rehabilitated areas must be undertaken. A suitably qualified professional must supervise the rehabilitation and monitoring activities.	
Altered flow regime	*Construction* Site clearance, infilling, and compaction will result in alteration of the flow regime of wetland area on the site. Hardened catchment area would result in increased stormwater runoff, velocity and increased flood peaks within the wetland and would	- Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). - The status quo in terms of hydrological connection from Erf 1486 to the downstream system must be maintained / should not be impacted because of the proposed development. - If possible, conduct construction activities of dwellings, associated stormwater infrastructure and any rehabilitation activities during summer months (November to March).	Applicant Contractor ECO

	also likely result in sedimentation and erosion. *Post-construction* Site clearance, infilling and compaction will result in alteration of the flow regime for the UVBW. Site clearance, infilling, and compaction will result in alteration of the flow regime of wetland area. Hardened catchment area would result in increased stormwater runoff, velocity and increased flood peaks within the wetland and would also likely result in sedimentation and erosion.	- Ensure that effective stormwater management measures are implemented during construction. Stormwater management must ensure that no runoff, which will impair the water quality and lead to increased sedimentation, may enter the downstream wetland area. Additionally, clean SW which does enter the downstream wetland system should do so in a manner that ensures no erosion occurs, specifically during storm events, such as through vegetated swales. - Appropriately designed raft foundations for residential dwellings may significantly reduce the impact on subsurface flow and therefore reduce this impact / risk. - Rainwater harvesting schemes may reduce runoff intensity and thereby mitigate the impact of catchment hardening. - The alien invasive vegetation present within the wetland area must be removed and replanted with indigenous wetland vegetation. - An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist.	
Water quality impermeant	*Construction* Accidentally spilled cement, construction chemicals, sewage during the upgrade of the pipeline, or petrochemicals from construction vehicles may find their way into the wetland area. Additionally, litter and dumping may occur due to the proximity of the proposed development to the wetland area. *Post-construction* Vegetation which needs to be re-planted (if applicable) within each northern Erf (Figure 7-1 of the Aquatic Biodiversity	- Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). - The site manager / ECO must check the No Go area for pollution/spills, erosion damage and sedimentation weekly and after every heavy rainfall event. Should pollution, erosion or sedimentation be noted, immediate corrective measures must be undertaken. - Fuel, chemicals, and other hazardous substances should preferably be stored offsite, or as far away as possible from the no-go area. These substances must be stored in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding, or storm damage. - Inspect all storage facilities, vehicles, and machinery daily for the early detection of deterioration or leaks and strictly prohibit the use of any vehicles or machinery from which leakage has been detected.	Applicant Contractor ECO

	Assessment) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings). Pollutants may enter the wetland via stormwater or sewage leaks (although highly unlikely). However, with the inclusion of stormwater design measures which allow for the infiltration and treatment of stormwater this impact can be greatly reduced.	- Mixing and transferring of chemicals or hazardous substances must take place outside of the No Go area, and must take place on drip trays, shutter boards or other impermeable surfaces. - Drip trays must be utilised at all fuel dispensing areas; and during the maintenance of existing sewer flow as possible. - Vehicles and machinery should preferably be cleaned off site. Should cleaning be required on site it must only take place within designated areas outside of the No Go area and should only occur on bunded areas with a water/oil/grease separator. - Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. - Avoid the use of infill material or construction material with pollution / leaching potential. Where possible, in situ earthen materials must be used during construction to reduce the risk of leachate from imported materials contaminating the wetland area. - Concrete should preferably be imported as “ready-mix” concrete from a local supplier. Should onsite concrete mixing be required it must not be done on exposed soils. Concrete must be mixed on an impermeable surface in an area of low environmental sensitivity identified by the ECO outside of the no-go area. Surplus or waste concrete must be sent back to the supplier who will dispose of it. - Construct temporary bunds around areas where cement is to be cast in situ. - Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Disposal of any of these waste materials into the No Go area is strictly prohibited. - Washout must not be discharged into the no-go area. A washout area should be designated, and wash water should be treated on-site.	

		- Clean up any spillages immediately with the use of a chemical spill kit and dispose of contaminated material at an appropriately registered facility. - Provide portable toilets where work is being undertaken (1 toilet per 10 workers). These toilets must be located within an area designated by the ECO outside of the no-go area and should preferably be located on level ground. Portable toilets must be regularly serviced and maintained. - Provide an adequate number of bins on site and encourage construction personnel to dispose of their waste responsibly. - Waste generated by construction personnel must be removed from the site and disposed of at a registered waste disposal facility on a weekly basis.	
Disturbance of Wetland Habitat	*Post-construction phase* Disturbance of wetland habitat within the wetland area due to the proximity of the proposed development to the wetland area. During the operational phase, foot traffic, along with littering and dumping in the wetland area may result in disturbance of wetland habitat.	- Prohibit littering and dumping within the wetland area. Clear and remove any rubble or litter that may have been accidentally deposited into the wetland and dispose of at an appropriate registered facility. Monitoring of litter/dumping within the wetland must be managed by a Homeowners Association (HoA). - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. - Vegetation which needs to be re-planted (if applicable) within each northern Erf (Figure 7-1) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings).	Applicant Contractor ECO
Plant Species/ Terrestrial Biodiversity	*Construction phase*: The construction phase ecological impact of the proposed subdivision and development would be permanent loss of all of the existing natural and partly natural vegetation and faunal habitat in the development footprints (gazetted as a	- No erven should intrude significantly into the seasonal wetland portions of the site that support mostly habitat of High ecological sensitivity. - No pipelines, cabling or infrastructure should be installed across the High sensitivity areas or wetlands. - Any boundary fencing used must be permeable to small animals at ground level.	Applicant Contractor ECO

	Critically Endangered vegetation type). No plant Species of Conservation Concern were recorded within the actual proposed footprints, and there is a moderate chance of at least one being present (*Disa hallackii*; Endangered). At least two Endangered birds may occasionally use the study area to forage (*Circus ranivorus and Circus maurus*), and the development would thus have a minor negative impact on these two species, but they do range widely and would never spend much time in such a small area anyway, and especially one so close to other human impacts. The Cape Dwarf Chameleon (*Bradypodion pumilum*) is listed as Vulnerable and may occur on site. *Post-Construction Phase:* Operational phase impacts will take effect as soon as any of the natural vegetation and faunal habitat on the site is lost or disturbed, and will persist in perpetuity, or as long as those areas are not rehabilitated. Operational phase impacts include loss of current levels ecological connectivity across the site (essentially only W-E connectivity), and associated habitat fragmentation. This will affect fauna and flora.	- The authorised erf and road boundaries should be surveyed and pegged out and fenced on site prior to any site development. - No areas of natural or partly natural vegetation should be disturbed outside the pegged/fenced out and authorised erven. No vehicular activity or dumping of material may take place outside the authorised erven or roads. - All alien invasive vegetation should be removed from within the natural portions of the project area, prior to any authorised development. Removal of the alien vegetation must be undertaken by a trained and licensed alien vegetation removal team, and must be undertaken using methodology outlined in the Best Practise Guidelines (see Martens et al 2021). - In order to try and safeguard the ecological integrity of the No Go wetland areas on Erven 1-8 (also shown in Figure 1) these areas that should not be altered, developed, gardened, covered, excavated, drained, infilled or disturbed in any way. Landowners and the HoA must be made aware of these constraints both prior to and after purchase. Alien invasive plant species should be removed from these areas on an annual basis, as part of the management actions required for the adjacent Private Open Space.	

Terrestrial Animal Species	*Construction phase* The clearance of indigenous vegetation on site for the proposed development will likely result in permanent loss of suitable habitat (beeding and foraging) used by terrestrial fauna, particularly Cape dwarf chameleon (Bradypodion pumilum). *Post-construction* Potential fauna impacts during the post-construction phase may include the continued loss of fauna due to introduction of domestic animals on the developed residential erven.	- During the construction phase the construction area should be clearly demarcated and blocked off from the 'private open space' area to avoid damage and pollution. - Pre and post construction site preparation should include rehabilitation of the 'private open space' by removing current building rubble and litter from this area. - Long term maintenance of ecological integrity of the 'private open space' is critical. Therefore, measures should be put in place for constant removal of alien vegetation, cleanup of litter and prevention of illegal dumping. Clear legal responsibility for the maintenance of the space should be entrenched to be the responsibility of the homeowners association. - The fence traversing the ecological corridor should always be permeable to allow for movement of small sized animals e.g. small antelope, genets, mongoose between the nature reserve and wetland system. - Search and Rescue of chameleons and other slow-moving animals is feasible due to the presence of the adjacent nature reserve where they can be released. A search and rescue effort should be implemented before and during construction where animals that are found are released in the adjacent nature reserve. The necessary permission and permits should be attained before this is done. - Pets (especially domestic cats) should not be allowed to free-roam the 'private open space'.	ECO, Contractor Applicant
Dust	*Construction* Dust generated from site clearing and site preparation *Post-construction*	- Maintain ground cover for as long as possible to reduce the total surface area exposed to wind. Do not clear entire plots and rather clear building sites only - Ensure vehicle speed limits on site are kept to a minimum. - Delivery vehicles to keep loads covered. - Cover fine material stockpiles.	ECO, Contractor Applicant

		- Wet dry and dusty surfaces using non-potable water. - Staff to wear correct PPE if dust is generated for long periods. - Road surfaces to be swept and kept clean of sand and fine materials	
Noise	*Construction* Noise generated from vehicles and machinery during the construction phase.	- Limit noise levels (e.g. install and maintain silencers on machinery). - Provide protective wear for workers i.e. ear plugs. - Ensure that construction vehicles and machinery are maintained regularly to reduce noise generation. - Restrict construction to normal working hours	ECO, Contractor Applicant
Visual impacts	*Construction* Visual impacts of construction site and construction activities. *Post-construction* Typical Visual impacts associated with the operational phase of a residential dwelling or group of residential dwellings that may lead to changes in sense of place of the individual from what was there and to what has now changed.	- Good housekeeping of construction site and working areas. - Screen the visual elements of the site camp with netting. - Locate the site camp in a transformed area. - Site officer to walk the site on a daily basis to check for visual impacts and general site aesthetics, particularly prior to weekends and holidays - Officer to ensure that waste and batching areas are correctly screened and secured to prevent spread by wind, rain or animals. - Implement landscaping strategies to minimize the visual impact of construction and operational activities. - Incorporate green design principles into the development to enhance aesthetics and mitigate negative visual effects. - Communicate with the community to ensure understanding and acceptance of the changes in the visual character. - Consider the use of native vegetation in landscaping to maintain a natural feel and reduce visual disruptions.	ECO, Contractor Applicant
Socioeconomic impacts	*Construction* Job creation during the development /construction phase of the Erven	- Ensure labour force is sourced locally as far as possible. - A gender balance to be considered during employment.	

	Post-construction Access to employment for the community during the operational phase, Job creation, Provision of residential erven in response to provincial demand, investment in the area.		

9 GENERAL CONSTRUCTION PHASE IMPACTS AND REQUIREMENTS

9.1 Contractors camp

Responsibility – Contractor / ECO / owner

The contractor shall comply will all relevant laws and regulations concerning water provision, sanitation, wastewater discharge and liquid and solid waste handling and disposal during the construction phase. The contractor is referred to the requirements of the NEMA and the NEM:WA and related regulations. The contractor shall not locate the camp, or sanitation facilities, in any areas that can cause nuisance or safety hazards to surrounding land users, inhabitants or the general public. Suitable temporary toilet facilities should be provided to the construction team. These facilities should be emptied and cleaned on a regular basis by a registered contractor and the waste is to be removed by contractor to a registered facility. The contractor shall at all times carefully consider the machinery required for the desired task while minimizing the extent of environmental damage. The contractor shall keep construction campsites clean and tidy at all times. The contractor shall not leave domestic waste uncontained, and temporary storage shall be enclosed to keep out people and animals. No permanent domestic waste disposal shall be permitted. All domestic refuse is to be removed to an existing licensed landfill site. The contractor shall take specific measures to prevent the spread of veld fires, which may be caused by activities at the camp. These measures may include appropriate instruction of employees about the fire risks and the construction of firebreaks around the site perimeter, as required. The contractor shall prevent accelerated erosion from the construction campsite and shall not discharge polluted runoff into the environment. Adequate firefighting equipment shall be made available and maintained on site. the contractors camp should be located in area proposed for development, in order to reduce impacting undisturbed areas. No overnighting will be permitted at the contractors camp, unless specifically arranged or required. Decommissioning of the campsite will involve removal of all compacted platforms, equipment machinery, tools, waste, etc.

9.2 Health and Safety

Responsibility - Project Manager / Contractor / ECO / owner

Correct Personal Protective Equipment (PPE) must be worn at all times by the personnel on site. Personnel must be trained on the use of PPE. The applicant will appoint one safety officer for the activities. Suitable warning and information signage should be erected at the commencement of construction. The handling of hazardous materials should only be done by trained personnel. Safety Data Sheets (SDSs) must be readily available for all hazardous substances on site and employees should be aware of the risks associated with any hazardous materials used. All provisions of the Occupational Health and Safety Act (Act No. 85 of 1993) must be complied with. In the event of an emergency relating to a hazardous substance, procedures detailed in the SDSs should be immediately implemented.

9.3 Fire risk management

Responsibility - Project Manager / Contractor / ECO / owner

The Applicant / Project manager / contractor should identify a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Fire Officer shall ensure that there is basic fire-fighting equipment available on site at all times. Any fires should be reported to the fire officer immediately.

9.4 Fuels and hazardous materials

Responsibility - Project Manager / Contractor / owner

Fuels and flammable materials are to be suitably stored, inside the contractor's camp or as appropriate. Impervious materials are to be used in these storage areas to prevent contamination of the ground in the event of spillages or leaks. Quantities of fuels and hazardous materials stored on site should be appropriate to the requirement for these substances on site.

Bulk fuel depots, if required, should be placed within bunded areas to prevent soil contamination in the event of leaks of spills. Bunded areas are to have a holding capacity equal to 110% of the largest fuel container. The relevant Health and Safety requirements for the hazardous materials and fuels should be kept on site in the event of an emergency.

9.5 Emergencies protocol

Responsibility - Project Manager / Contractor / owner

Fire: The fire officer / suitable other person should be notified of any fires. Employees should be aware of the procedure to be followed in the event of a fire.

Hydrocarbon (fuel & oil) leaks and spillages: Employees should be aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the project manager / contractor. All vehicles leaking fuel or other liquids should immediately be removed to the maintenance area and repaired. In the event of a hydrocarbon spillage, the soil must be excavated and treated and adequately disposed. The necessary materials and equipment for dealing with spills and leaks are present on site at all times. The clean-up of sewerage spills and any damage caused by the spill or leak shall be for the applicant's account. The applicant shall ensure that the Health and Safety officer is available for the duration of the construction period.

Raw Sewerage spills (from portable toilets): Employees are to be aware of the procedure to be followed for dealing with spills and leaks. All the necessary materials and equipment for dealing with spills and leaks are present on site at all times. The clean-up of sewerage spills and any damage caused by the spill or leak shall be for the Applicant's account or applicable contractor.

Sudden illness in member of team: emergency numbers should be readily available on site in case of a sudden illness or injury to a construction team member.

Snake bite: Emergency contact numbers must be kept on site in case of a snake siting or snakebite.

9.6 Site Demarcation

Responsibility - Project Manager / Contractor / ECO / owner

Prior to any construction commencing, the boundaries of the site and / or the footprints of each dwelling should be appropriately indicated or fenced off by the contractor. Natural areas that should be retained should also be indicated at this stage. Following this, all construction works, as well as the storage or preparation of any materials must be within the demarcated boundaries of the construction zone. No Go areas are to also be demarcated at this stage. The permanent delineated wetland must be clearly demarcated and made a no-go area, this should apply to the temporary wetland zones too, as far as possible.

9.7 Stockpiles

Responsibility - Project Manager / Contractor / ECO / owner

The contractor and / or project manager should identify sites for the stockpiling of building materials and excavated material. Stockpile sites should preferably be in areas with a gentle gradient. Stockpiles should be stabilised as required and monitored for dust blow and runoff / erosion.

9.8 General Wastes

Responsibility - Project Manager / Contractor / ECO / owner

Refuse refers to all construction debris (cement bags, rubble, timber, cans, nails, wire, spilt bitumen, glass, packaging, plastic, organic matter, etc.). Refuse generated during the construction phase should be stored in an appropriate area on site, should be water tight and wind proof, and removed on a regular basis for disposal at a permitted disposal site. Waste bins should be labelled for their designated use. No burning or burying of general refuse on site should be permitted. Recycling and sorting of waste, at the source, is encouraged. Disposal certificates should be kept.

9.9 Recreational / Eating areas

Responsibility - Project Manager / Contractor / ECO / owner

If construction workers are permitted to eat on the development site, other than within the contractor's camp, the Contractor shall provide adequate refuse bins at all such places and ensure that they are used. Bins are to be cleared on a daily basis. No rest areas are to be permitted in No Go areas.

9.10 Construction water

Responsibility - Project Manager / Contractor / ECO / owner

All cement effluent from mixer washings and run-off from batching areas, as well as other work areas, should be contained in suitable manner, these areas should be lined and allowed to dry from time to time in order to remove the solid materials. Care should be taken to prevent the runoff of construction water, to other areas on site or onto adjacent sites.

9.11 Equipment maintenance

Responsibility - Project Manager / Contractor / ECO / owner

All mechanical equipment and work vehicles which are present on site during construction, are to be stored, serviced and refuelled only at designated areas or within the contractor's camp. Within these areas drip trays and other impervious materials, for example plastic or metal sheeting, must be used to prevent contamination of the ground. The project manager may order the removal of equipment that is causing continual environmental damage, until such equipment has been repaired.

9.12 Stormwater Management

Responsibility - Project Manager / Contractor / ECO / owner

Due to the small-scale nature of the construction, a Stormwater Management Plan is not required. however, Stormwater should be monitored regularly to ensure no environmental risk or unmanageable load to the existing infrastructure. The contractor must take suitable measures to prevent erosion resulting from a diversion,

restriction or increase in flow of stormwater caused by construction. The open space erf will be used for stormwater retention.

9.13 Topsoil Removal and Stockpiling

Responsibility - Project Manager / Contractor / ECO / owner

Where services are to be extended or houses erected, topsoil is to be removed from the work areas, stockpiled separately from subsoil, and must be stabilised within a day of stockpiling. In general, stockpiles should be convex at the top to promote run- off, so that water is not able to accumulate and result in leaching of nutrients from the soil. Stockpiling areas should be determined in consultation with the ECO and only for short term.

9.14 Erosion Control

Responsibility - Project Manager / Contractor / ECO / owner

Action should be taken to prevent erosion of soils on the construction site. Should any erosion be detected on site, the cause of such erosion should be identified, and appropriate remedial action must be immediately implemented.

9.15 Dust Control

Responsibility - Project Manager / Contractor / ECO / owner

Appropriate action should be taken to minimise the generation of dust on the site. This can be done by applying appropriate stabilisation materials, such as straw or mulch or watering of exposed areas. Suppression methods not involving water, are preferred as far as possible.

9.16 Construction Traffic Management

Responsibility - Project Manager / Contractor / ECO / owner

All construction vehicles which carry construction materials, must use sheeting or a suitable cover, to prevent loss of load during travelling or due to wind or rain. Any spills should be cleaned immediately.

9.17 Architecture / Design

Responsibility - Project Manager / Contractor / ECO / owner

The architecture and design of the dwellings will be done in line with the general trend of the area. The houses should be designed to be in line with the surrounding architecture and cape vernacular style common to the area. Neutral colour palettes should be used which blend into the surrounds.

9.18 Sustainable Building Guidelines and materials

Responsibility - Project Manager / Contractor / ECO / owner

The houses should be designed in such a way as to create a sustainable living area. Ensure materials and orientation allow for an environmentally friendly design with lower operating costs, i.e natural ventilation, correct orientation, correct colours and roofing etc. Use recycled materials as far as possible.

Energy efficiency is also an important consideration and the following actions should be considered:

- North orientation to ensure that as many well-used spaces face north as possible. Sun control is more difficult on East and West facing windows

- Use of good insulation in the roof and walls to keep the inside temperature warm in winter or cool in summer
- Solar water heaters to be included in the design phase
- Suitable roof overhangs to let in the lower winter sun but provide shade from the summer sun
- Sensible fenestration – let in the light and catch the winter sun, but not too much window area so that warmth or cool cannot be retained inside when needed. They can be combined with shading and reflecting devices - such as overhangs, screens, shutters, awnings, trees, planting and different glass types which will aid to control the amount, quality and time of daylight entering the building
- Suitable ventilation for fresh air and cool breezes
- Natural lighting through windows and light wells

Water conservation should be a priority in design of the dwelling. Rainwater tanks are recommended as far as possible. Optimally designed systems for grey water reuse should also be explored during the design phase in order to prevent the expense of retrofitting a system. Water wise and indigenous landscaping is recommended and will reduce the water costs associated with maintaining gardens. Permeable paving is to be used in areas where paving is required. Low flow shower and heads and dual flushing systems should be fitted. Aerators on taps should also be fitted to reduce overall water demand.

Construction activities such as watering, mixing and cleaning should avoid water wastage. Dry brushing and trigger spray nozzles should be used. Reuse of construction water should also be implemented.

9.19 Site Clean Up and Rehabilitation

Responsibility - Project Manager / Contractor / ECO/ owner

The following actions should be implemented once construction has concluded:

- The construction footprint should be restored to the natural contours of the ground and shall allow normal surface drainage, as far as possible
- No foreign matter such as rubble, waste or hazardous material will be mixed with the topsoil or used to backfill excavation.
- All temporary works within the construction footprint, including fences, access, roads etc. disturbed by construction, should be restored to their original condition, as far as practical.
- Compacted soils within the construction footprint should be loosened by means of a plough or scarified to aid revegetation
- Runoff and erosion, as a result of the construction phase, should be suitably managed to prevent long term impacts
- All structures, equipment, materials and facilities used or created on site for or during construction activities are removed once the project has been completed
- Vegetation cover (using species appropriate to the local area) in all areas disturbed by the works should be reintroduced, as required.

10 COMPLIANCE AND MONITORING

10.1. Non-compliance

The Environmental Authorisation (EA) stipulates that, *"Non-compliance with a condition of this Environmental Authorisation and the EMP may render the holder liable to criminal prosecution."* It is therefore important that the conditions are adhered to as outlined in the EA and EMP. A Penalties scheme can be used during construction for transgressions.

Transgressions relate to actions by the contractor whereby damage or harm is inflicted upon the environment or any feature thereof and where any of the conditions or specifications of the EMP and EA have been infringed upon. In the instance of environmental damage, the damage is to be repaired and rehabilitated using appropriate measures, as far as possible and as directed by appropriate specialists, if required. These remedial actions are for the account of the contractor or other guilty party as identified by the Project Manager, applicant or ECO. Where non-repairable damage is inflicted upon the environment or non-compliance with any of the EMP / EA obligations is registered, then the Contractor may face a monetary penalty to an amount specified by the Project manager / ECO. The Project manager / ECO reserves the right to implement a first offence warning.

If excessive infringement with regard to any of the specifications is registered, the applicant / project manager / owner reserves the right to terminate the contractor's contract.

Table 3. Penalties Scheme – to be reviewed by ECO if required

Infringement	Description	Penalty
Hydrocarbon / fuel spill	Penalty to be issued when remediations not implemented timeously	R 5000
Disturbance beyond approved footprint	Disturbance to vegetation beyond approved areas	R 5000
Waste management	Inappropriate waste management	R 3000 dependent of extent
Not adhering to conditions of EA	Not attending to specific EA conditions	R 3000 + per condition

10.2. Environmental Control Sheets

Environmental Control Sheets should be used by the ECO on a weekly basis to monitor construction activities to ensure compliance with recommendations. The ECO should familiarise themselves with the full set of recommendations proposed by the specialists for the site and reasons for these recommendations, as well as understand the site and constraints analysis and be able to identify the constraints / No Go areas.

Table 3. Environmental Control Sheets

					RECORD OF PERFORMANCE		
TASK	**ACTION REQUIRED / MITIGATION & METHOD FOR IMPLEMENTATION**	**FREQUENCY**	**TARGET / OUTCOME**	**RESPONSIBILITY**	**COMPLETED YES/ NO**	**DATE**	**COMMENT**
PRE-CONSTRUCTION							
Procurement	- EA and EMP to be distributed to contractor at tender stage to include costing incurred due to compliance with EA and EMP METHOD: Distribute with tender documents	As required	Contractors are aware of requirements in terms of NEMA and can budget accordingly	Developer Project Manager			
Environmental File	- To include EA, EMP, site diary, public complaints section - To be updated on a regular basis - Public complaints register - Kept on site at all times METHOD: Issue all applicable documents to site manager	As required	Construction team(s) and general public can access relevant information f and when required	ECO Project Manager			
Environmental Awareness training and induction	- All contractors to attend briefing prior to commencement of site works - Register to be signed as proof of attendance METHOD: Briefing to be undertaken by project manager and / ECO	As required	Construction team(s) informed of all requirements in terms of EMPr and EA	ECO Project Manager			

Method Statements	- Contractors to submit MS seven working days prior to commencement on site - MS to contain clear methods for pollution control measures during construction including hazardous waste, run off, general waste etc. METHOD: Request for method statements to be contained in tender documents	As required	ECO and project manager to be well informed in terms of methods for construction	Contractor			
Site definition and demarcation	- Site survey and pegging - Site demarcation and fencing (mark construction areas – all other areas are No Go) - Access roads for construction vehicles to be clearly indicated, consideration to be given to turning circles - Review of specialist input to familiarise with mitigation measures - Buffer areas to be indicated and demarcated as No Go METHOD: Demarcation methods to be undertaken as outlined in EMP, suitable to the environment and semi-permanent to last as long as possible during construction phase, to be checked on a regular basis	As required and to be repeated on a regular basis in the event that demarcations shift or disturbed by operators, weather etc.	A well demarcated site Well-defined No-Go areas Well defined construction zones	ECO Project Manager Contractor			
Construction traffic	- All construction vehicles carrying materials must use cover sheeting to prevent loss of loads due to wind or rain - Maximum speed to be enforced	Duration of Construction	A safe working environment with minimal impact on No Go areas, minimal dust impact, minimal loss of load and minimal general public impact	Project Manager Contractor			

	- Movement of construction vehicles must be limited to approved haul and access routes and existing tracks METHOD: To be monitored by ECO and project manager as well as construction team leaders						
Emergencies protocol	- Staff to be aware of actions to be taken in the event of a natural or medical emergency - Applicable Health and Safety required in terms of OH&S Act METHOD: OH&S officer to be appointed, appropriate signage to be implemented	Duration of Construction	A safe working environment with minimal incidences	Project Manager Contractor			
Fire	- Fire Management recommendations to be implemented - Required firefighting equipment is available on site, and in working order - No open fires are lit on site without approval of the ECO and Site Manager METHOD: To be checked by the ECO and project manager and implemented by the contractor	Duration of Construction	A safe working environment with minimal incidences Action plan in the event of a fire	Project Manager Contractor			
Contractors camp	- Contractor's Camp is located at the most suitable site as identified by the ECO and Site Manager, preferably in areas to be developed or used (i.e roads or house footprints) or already transformed areas	Duration of Construction	A well placed and functional contractors camp to minimise impacts on other areas on site	Project Manager Contractor			

	- Contractor team to be briefed regarding Do's and Don'ts of camp and site in general - Suitable toilet facilities are provided for all staff - Ablutions are to be restricted to the facilities provided - Toilets are to be kept in a hygienic condition and emptied regularly - Recommendations by Freshwater specialist will be implemented METHOD: Site to be determined in conjunction with project manager and ECO, to be well demarcated with appropriate signage, serviced and cleaned on a regular basis, checked by ECO						

CONSTRUCTION							
TASK	**ACTION REQUIRED / MITIGATION & METHOD FOR IMPLEMENTATION**	**FREQUENCY**	**TARGET / OUTCOME**	**RESPONSIBILITY**	**COMPLETED YES/ NO**	**DATE**	**COMMENT**
Topsoil removal and stockpiling	- Replaced immediately after works where required - Topsoil which is required to be removed from direct work areas, should be stockpiled separately from subsoil and reused as far as possible - Stockpiles should be suitably shaped to prevent leaching of nutrients, and stabilized, or dispersal by wind or rain - Stockpiles to be monitored for dispersal by rain and wind METHOD: Implement conditions outlined in EMP for stockpiling and topsoil removal	Duration of Construction	Reusable sand and soil stockpiles to facilitate rehabilitation of the site	Project Manager Contractor			
Earthworks	- Works to be restricted construction area only - Bulldozer/ heavy machinery operators to be under constant supervision particularly at onset of works	Duration of Construction	Minimal disturbance to sensitive zones, minimal disturbance to vegetation	Project manager Contractor ECO			

	- Use and excessive movement of heavy machinery to be avoided in areas of environmental sensitivity or high erosion potential - Trenching to be undertaken in a phased manner - Fill material to be replaced in same work area from which it originated - Fill material to be compacted to its approximate original density METHOD: Construction zone to be clearly demarcated, instruction for stockpiling to be implemented, operators to be briefed prior to works						
Material handling, dispatching and storage	- Fuels and hazardous materials to be stored in suitably equipped storage areas in the Contractor's camp and approved by the ECO - Strict measures to be put in place for the use and storage of hazardous materials on site - Disposal to licenced facility only - These areas shall comply with fire safety requirements - Impervious materials are to be used to prevent contamination of the ground in the event of spillages or leaks - Construction materials spilled on public or private roads to be immediately cleaned - No storage other than contractor camp METHODS: Undertake regular inspections of areas and procedures	Duration of Construction	Minimal disturbance to sensitive zones including non-perennial drainage line Minimal incidences	Project Manager Contractor			

Stockpiles	- Sites for stockpiling as identified by the Contractor are to be marked on a plan, and approved by the ECO and Site Manager - Stockpiles must be suitably stabilized where necessary METHODS: Undertake regular checks of stockpiles to ensure methods outlined in the EMP and Dune EMP are implemented	Duration of Construction	Reusable sand and soil stockpiles to facilitate rehabilitation of the site	Project Manager Contractor ECO			
Waste management	- All waste to be stored in an appropriate contained area on site, and protected against wind, rain and animal dispersal - Waste to be removed on a weekly basis for disposal at a permitted disposal site - No burning or burying of refuse on site is allowed - Eating areas must be demarcated and provided with suitable refuse collection areas METHOD: Waste areas to be designed correctly and be wind and weatherproof and emptied on a regular basis	Duration of Construction	A clean waste collection point which is serviced on a regular basis	Project Manager Contractor ECO			
Construction wastewater	- Careful runoff management will be required particularly during construction. No contaminated water should be allowed to seep into the ground or runoff the construction site - All runoff from batching plants, work areas and mixer washings to be contained in sedimentation ponds, which are suitably lined	Duration of Construction	A clean site post construction	Project Manager Contractor ECO			

	- Ponds must be allowed to dry out regularly, and solid waste removed and disposed of at a site approved by the local authority. METHOD: Wastewater areas to be suitably designed and inspected on a regular basis						
Maintenance of equipment	- All mechanical equipment and work vehicles to be stored, serviced and refuelled at designated areas in the contractor's camp - Major services to take place off site - Drip trays or impervious materials to be used to prevent contamination of ground METHOD: Regular inspections undertaken	Duration of Construction	A clean site post construction	Project Manager Contractor ECO			
Stormwater	- Suitable measures must be in place to prevent erosion resulting from diversion, restriction or increase in stormwater runoff - Measures must be taken to prevent stormwater from flowing from excavated areas or stockpiles - Stormwater containing harmful substances to be contained, and removed from site METHOD: Regular inspections undertaken	Duration of Construction	A clean site post construction, avoiding additional impact on surrounds	Project Manager Contractor ECO			
Erosion	- Stormwater channels are to be kept clear from soil and debris - Erosion or stormwater damage resulting from Contractor's operations to be suitably repaired	Duration of Construction	A clean site post construction, avoiding additional impact on surrounds	Project Manager Contractor ECO			

	- Suitable stabilization measures are to be implemented wherever works are taking place as outlined in this document - Where erosion is detected, suitable mitigation methods are to be employed as soon as possible METHOD: Regular visual inspections undertaken						
Dust	- Sand stockpiles are to be covered with Hessian, shade cloth or DPC plastic - Stockpiles are to be located in sheltered areas and the useable face to be orientated away from the prevailing wind - Excavation and transporting erodible material during high wind conditions - water dampening measures or cessation of activities should be required - If necessary, certain components of the work should be stopped until conditions are more favourable - Vehicles must not exceed 40 km/h along gravel roads - If roads generate unacceptable levels of dust, suppression measures should be introduced - If water is used only the critical areas should be watered by cart or hand to avoid unnecessary run-off, erosion or misuse METHOD: Areas and activities of possible dust generation to be	Duration of Construction	A clean site post construction, avoiding additional impact on surrounds, avoidance of impacts on general public	Project Manager Contractor ECO			

	inspected on a regular basis, as well as strategies to address dust						
Site clean-up and rehabilitation	- All structures, equipment materials and facilities are to be removed from site on completion of the project - Construction site shall be cleared and cleaned to the ECO's satisfaction - Site / Area Rehabilitation to be conducted in line with recommendations herein - Specialist advice to be sort where required - No waste or remaining materials to be buried on site - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. An AIPS control plan must therefore be compiled which includes measures to control and prevent the proliferation of AIPS during the construction phase. METHOD: Inspected upon site closure / suspension of works, rehabilitation methods contained in EMP and Dune EMP to be implemented	Duration of Construction	A functional ecosystem post construction, suitably rehabilitated as required	Project Manager Contractor Applicant ECO			

Alien Clearing	- An AIPS control plan must be compiled which includes measures to control and prevent the proliferation of AIPS during the operational phase. - 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. - 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. - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. An AIPS control plan must therefore be compiled which includes measures to control and prevent the proliferation of AIPS during the construction phase. METHOD: Regular monitoring of rehabilitation progress, alien plant	Construction and Post-construction phase	Long term ecological integrity and restoration of vegetation onsite.	Project Manager Applicant Contractor ECO			

	regrowth, and any faunal presence should be conducted during and after the construction phase. Adaptive management practices should be applied to address emerging issues and ensure that the long-term ecological integrity of the site is maintained.						
Freshwater Specialist	- An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist. - Designate the UVB wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). Clearly demarcate the construction footprint (including construction camp, access roads, stockpile areas and working servitudes) with orange hazard tape, fencing or similar prior to the commencement of any activity, and strictly prohibit the movement of construction vehicles and personnel outside of the demarcated areas. - Locate site camps, laydown areas, stockpile areas, construction material, equipment storage areas, vehicle parking areas, bunded vehicle servicing areas and re-fuelling areas in designated areas of already hardened surface or disturbed areas located outside of the No Go area. These areas should	Construction and Post-construction phase	Long term ecological integrity and rehabilitation of the site.	Project Manager Applicant Contractor ECO			

	preferably be located on level ground in a previously disturbed area of vegetation approved by the Environmental Control Officer (ECO). Cut and fill must be avoided where possible during the set-up of the construction site camp. - Demarcation of the construction footprint/working servitude must be signed off by an ECO (or similar). Demarcation should not be removed until construction is complete, and rehabilitation (if applicable) has taken place. - Limit access into the construction footprint to existing access roads. - Prohibit the dumping of excavated material, building materials or removed vegetation within the No Go area. Building material must be stored at the designated storage area located outside of the no-go area. Spoil material must be appropriately disposed of at a registered waste disposal facility. - Undisturbed topsoil and subsoils removed from the construction footprint must be stored separately at the designated stockpile area for future rehabilitation. - Vegetation clearance should be restricted to the relevant development components and indigenous vegetation cover						

	should be maintained as far as practically possible. - Vegetation which is considered suitable for rehabilitation activities after construction (such as indigenous grasses and other herbaceous species) should be carefully removed from the construction footprint and stored at an appropriate facility for use in later rehabilitation activities. - Clear and remove any rubble or litter that may have been accidentally deposited into the no-go area because of construction activities and dispose of at an appropriate registered facility. - An ECO must inspect the construction footprint on a weekly basis and must take immediate measures to address unforeseen disturbances to the wetland. Any disturbed / compacted areas falling outside of the demarcated construction footprint must be immediately rehabilitated. Depending on the extent of damage the method of rehabilitation may require input from an aquatic specialist / suitably qualified contractor. - Once construction has been completed, orange hazard fences as well as all construction waste, rubble, and equipment must be						

	removed from the construction footprint. - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. - An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist. Rehabilitation must take place as soon as possible after construction is completed, and monitoring of rehabilitated areas must be undertaken. A suitably qualified professional must supervise the rehabilitation and monitoring activities. - Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). - The status quo in terms of hydrological connection from Erf 1486 to the downstream system must be maintained / should not be impacted because of the proposed development. - If possible, conduct construction activities of dwellings, associated stormwater infrastructure and any rehabilitation activities during						

	summer months (November to March). - Ensure that effective stormwater management measures are implemented during construction. Stormwater management must ensure that no runoff, which will impair the water quality and lead to increased sedimentation, may enter the downstream wetland area. Additionally, clean SW which does enter the downstream wetland system should do so in a manner that ensures no erosion occurs, specifically during storm events, such as through vegetated swales. - Appropriately designed raft foundations for residential dwellings may significantly reduce the impact on subsurface flow and therefore reduce this impact / risk. - Rainwater harvesting schemes may reduce runoff intensity and thereby mitigate the impact of catchment hardening. - The alien invasive vegetation present within the wetland area must be removed and replanted with indigenous wetland vegetation. - An Offset, Rehabilitation and Management Plan must be drafted by a suitably qualified specialist.						

	- Designate the wetland area as a No Go for construction activities (for both the residential development and the replacement / upgrade of the sewer pipeline). - The site manager / ECO must check the No Go area for pollution/spills, erosion damage and sedimentation weekly and after every heavy rainfall event. Should pollution, erosion or sedimentation be noted, immediate corrective measures must be undertaken. - Fuel, chemicals, and other hazardous substances should preferably be stored offsite, or as far away as possible from the no-go area. These substances must be stored in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding, or storm damage. - Inspect all storage facilities, vehicles, and machinery daily for the early detection of deterioration or leaks and strictly prohibit the use of any vehicles or machinery from which leakage has been detected. - Mixing and transferring of chemicals or hazardous substances must take place outside of the No						

	Go area, and must take place on drip trays, shutter boards or other impermeable surfaces. - Drip trays must be utilised at all fuel dispensing areas; and during the maintenance of existing sewer flow as possible. - Vehicles and machinery should preferably be cleaned off site. Should cleaning be required on site it must only take place within designated areas outside of the No Go area and should only occur on bunded areas with a water/oil/grease separator. - Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. - Avoid the use of infill material or construction material with pollution / leaching potential. Where possible, in situ earthen materials must be used during construction to reduce the risk of leachate from imported materials contaminating the wetland area. - Concrete should preferably be imported as “ready-mix” concrete from a local supplier. Should onsite concrete mixing be required it must not be done on exposed soils. Concrete must be mixed on an impermeable surface in an area of low environmental sensitivity						

	identified by the ECO outside of the no-go area. Surplus or waste concrete must be sent back to the supplier who will dispose of it. - Construct temporary bunds around areas where cement is to be cast in situ. - Dispose of concrete and cement-related mortars in an environmental sensitive manner (can be toxic to aquatic life). Disposal of any of these waste materials into the No Go area is strictly prohibited. - Washout must not be discharged into the no-go area. A washout area should be designated, and wash water should be treated on-site. - Clean up any spillages immediately with the use of a chemical spill kit and dispose of contaminated material at an appropriately registered facility. - Provide portable toilets where work is being undertaken (1 toilet per 10 workers). These toilets must be located within an area designated by the ECO outside of the no-go area and should preferably be located on level ground. Portable toilets must be regularly serviced and maintained. - Provide an adequate number of bins on site and encourage						

	construction personnel to dispose of their waste responsibly. - Waste generated by construction personnel must be removed from the site and disposed of at a registered waste disposal facility on a weekly basis. - Prohibit littering and dumping within the wetland area. Clear and remove any rubble or litter that may have been accidentally deposited into the wetland and dispose of at an appropriate registered facility. Monitoring of litter/dumping within the wetland must be managed by a Homeowners Association (HoA). - In line with the NEMBA, all AIPS listed under the amended AIPS Lists (DEFF: GN1003, 2020) must either be removed or controlled on land under the management of the proponent. - Vegetation which needs to be re-planted (if applicable) within each northern Erf (Figure 7-1) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings). - Vegetation which needs to be re-planted (if applicable) within each						

	northern Erf (Figure 7-1) should be planted with indigenous vegetation, which would be considered an adequate buffer during operational phase considering the nature of development (single residential dwellings). - Runoff from the proposed development must not increase from the pre-development to the post-development scenario. - The status quo in terms of hydrological connection from Erf 1486 to the downstream system must be maintained / should not be impacted because of the proposed development. - Discharge stormwater from rooftops into rain harvesting tanks. This will limit the volumes of stormwater runoff that will reach the wetland area. Where possible, water collected in rain harvesting tanks can be utilized for flushing of toilets, washing etc. - Stormwater runoff should preferably be discharged as diffuse flow into well vegetated areas outside of the wetland. - Energy dissipaters / erosion protection measures (such as lining with stones, grass, reno-mattresses, or gabions) must be constructed where stormwater is						

	released 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 any discharge points. - Monitor the wetland area 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. - Appropriately designed raft foundations for residential						

	dwellings may significantly reduce the impact on subsurface flow and therefore reduce risk. - Rainwater harvesting schemes may reduce runoff intensity and thereby mitigate the impact of catchment hardening. - Design a SWMP which will allow for the infiltration and treatment of stormwater. All stormwaters 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 (as applicable) must receive basic filtering and treatment prior to its release into surrounding areas. - 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 (likely HoA).						

	- Operational phase mitigation implemented during the design/construction phase: - Construct sewage pipelines in accordance with the relevant SANS / SABS specifications. - Design the pipelines to accommodate the operating and surge pressures. - Provide surge protection e.g. air valves. - Allow for scour valves along pipelines to ensure sewage pipelines can be emptied in a controlled manner if required. - Allow for surcharge containment and emergency storage of 2 hours of peak flow at manholes located within areas upslope of the wetland. Containment/emergency storage may include a concrete box or earthen bund surrounding the manholes. The backup storage capacity of manholes may also be improved by raising the manholes by one meter. - The sewage system must be monitored and maintained into perpetuity. The developer must confirm who will be responsible for this monitoring and maintenance as well as their roles. - The wetland area must be regularly inspected for waste. Any waste or litter noted must be immediately						

	removed and disposed of at a registered waste disposal facility. The developer must confirm who will be responsible for this monitoring of the wetland area (HoA). -						
Terrestrial Biodiversity Specialist	- The Homeowners Association (HoA, or similar) for the proposed development must ensure that all alien invasive vegetation (as per NEMBA legislation) is removed from the Public Open Space area on an annual basis by qualified contractors, using methodology as prescribed in Martens et al (2021; see below for reference). The HoA must ensure that there is adequate funding for this every year. - No erven should intrude significantly into the seasonal wetland portions of the site that support mostly habitat of High ecological sensitivity. - No pipelines, cabling or infrastructure should be installed across the High sensitivity areas or wetlands. - Any boundary fencing used must be permeable to small animals at ground level. - The authorised erf and road boundaries should be surveyed and pegged out and fenced on site prior to any site development.	Construction and Post-construction phase	Long-term ecological integrity and restoration of indigenous vegetation.	Project Manager Applicant Contractor ECO			

	- No areas of natural or partly natural vegetation should be disturbed outside the pegged/fenced out and authorised erven. No vehicular activity or dumping of material may take place outside the authorised erven or roads. - All alien invasive vegetation should be removed from within the natural portions of the project area, prior to any authorised development. Removal of the alien vegetation must be undertaken by a trained and licensed alien vegetation removal team and must be undertaken using methodology outlined in the Best Practise Guidelines (see Martens et al 2021). - In order to try and safeguard the ecological integrity of the No Go wetland areas on Erven 1-8 (also shown in Figure 1) these areas that should not be altered, developed, gardened, covered, excavated, drained, infilled or disturbed in any way. Landowners and the HoA must be made aware of these constraints both prior to and after purchase. Alien invasive plant species should be removed from these areas on an annual basis, as part of the management actions						

	required for the adjacent Private Open Space.						
Terrestrial Animal Site Sensitivity Verification Report and Species Specialist Assessment	- During the construction phase the construction area should be clearly demarcated and blocked off from the 'private open space' area to avoid damage and pollution. - Pre and post construction site preparation should include rehabilitation of the 'private open space' by removing current building rubble and litter from this area. - Long term maintenance of ecological integrity of the 'private open space' is critical. Therefore, measures should be put in place for constant removal of alien vegetation, cleanup of litter and prevention of illegal dumping. Clear legal responsibility for the maintenance of the space should be entrenched to be the responsibility of the homeowners association. - The fence traversing the ecological corridor should always be permeable to allow for movement of small sized animals e.g. small antelope, genets, mongoose	Construction and Post-construction	To preserve the ecological corridor that facilitates the movement of ground-dwelling species and maintains hydrological connectivity between the Hoek van der Berg Private Nature Reserve, the onsite wetlands (UVBW), and the Vermont Salt Pan.	Project Manager Applicant Contractor ECO			

	between the nature reserve and wetland system. - Search and Rescue of chameleons and other slow-moving animals is feasible due to the presence of the adjacent nature reserve where they can be released. A search and rescue effort should be implemented before and during construction where animals that are found are released in the adjacent nature reserve. The necessary permission and permits should be attained before this is done. - Pets (especially domestic cats) should not be allowed to free-roam the 'private open space'.						
Terrestrial Animal Specialist	- During the construction phase the construction area should be clearly demarcated and blocked off from the 'private open space' area to avoid damage and pollution. - Pre and post construction site preparation should include rehabilitation of the 'private open space' by removing current building rubble and litter from this area. - Long term maintenance of ecological integrity of the 'private open space' is critical. Therefore, measures should be put in place for constant removal of alien vegetation, cleanup of litter and	Construction and Post-construction phase	Long term ecological integrity, restoration of the site biodiversity features and rehabilitation.	ECO Applicant Contractor HOA			

	prevention of illegal dumping. Clear legal responsibility for the maintenance of the space should be entrenched to be the responsibility of the homeowners association. - The fence traversing the ecological corridor should always be permeable to allow for movement of small sized animals e.g. small antelope, genets, mongoose between the nature reserve and wetland system. - Search and Rescue of chameleons and other slow-moving animals is feasible due to the presence of the adjacent nature reserve where they can be released. A search and rescue effort should be implemented before and during construction where animals that are found are released in the adjacent nature reserve. The necessary permission and permits should be attained before this is done. - Pets (especially domestic cats) should not be allowed to free-roam the 'private open space'.						
Stormwater management plan	- Permeable Paving (South of Wetland): 2114 m² area, reduces runoff (e.g., Q100: 3.10 m³/s) and treats water (50% TP, 65% TN, 60% heavy metals reduction).	Construction and Post-construction phase	To reduce the post development runoff to equal or less than the pre-development recurrence interval storm.	Eco Applicant Contractor HOA			

	- Enhanced Swale (North of Wetland): 5283 m² area, further reduces runoff and matches water quality targets. - Culvert Management: Control runoff from CA1 through a 2x900 mm pipe or 1.3x0.7 m trapezoidal channel to prevent flooding. The following mitigation measures should be incorporated into the stormwater management design and implementation: - 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. **Inspection and Monitoring:** *Permeable Paving system* - Ensure that the porous paver and outlet structures are free of sediment. - Check that the system dewaters between storms						

	- Ensure that contributing are and porous paver surface are clear of debris - Ensure that the contributing and adjacent area is stabilized and mowed with clippings removed - Vacuum sweep porous paver surface to keep free of sediment - Inspect the surface for debris or spalling - Totally rehabilitate the porous paver system, including the top and base course as needed. *Enhanced swale system* - Check for scouring channeling and erosion – Repair as necessary - Check for scouring channeling and erosion – Repair by adding soil and replanting as necessary - Check for scouring channeling and erosion – Repair by adding soil and replanting as necessary - Check stormwater is filtering through soil following storm events – Remove weeds - Check outlet for scouring or erosion – Repair as necessary						

	- Remove rubble and debris
	- <u>If grassed</u> – mow channel to shorter than 150mm
	  o Use catcher and remove clippings
	  o Re-seed bare patches of grass and water in dry conditions
	<u>If planted</u> – check plants are healthy, and growth is dense
	  o Remove weeds
	  o Replant gaps and water new plants in dry conditions
	- Check plants are healthy, and growth is dense.
	- Remove weeds
	- Replant gaps and water new plants until established
	- Remove rubble and debris from outlet grate or catchpit
	- Check for boggy patches and ponding of water
	- Check soil is not compacted and aerated surface or top up dips to repair
	- 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						
Rehabilitation and revegetation of the UVBW areas onsite	- 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	Post-construction	To improve and reinstate the range of wetland habitat and function to resemble semi-natural conditions and achieve the required increase in PES. 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.	Applicant Construction Implementing Agent Rehabilitation Implementing Agent (Suitably qualified freshwater specialist and landscaper with experience in wetland rehabilitation)			

	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. **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.						

11. DECOMMISSIONING PHASE

Not Applicable to this development.

12. ENVIRONMENTAL AUDITS

The purpose of auditing is to determine and monitor compliance with the EMP and EA and measure its effectiveness in mitigating environmental impacts. In terms of Regulation 34 of the NEMA EIA Regulations, 2014, the holder of the EA must conduct environmental audits in order to determine compliance with the conditions of the EA and EMP. Environmental Audit Reports should be submitted to the Competent Authority or as stipulated in the EA. The audit reports should be prepared by an independent person. The audit report should also provide recommendations regarding the need to amend the EMP.

The objective of the environmental audit report is to:

- Report on the level of compliance with the conditions of the EA and the EMP
- Report on the extent to which the avoidance, management and mitigation measures outlined in the EMP, achieve the objectives and outcomes of the EMP
- Identify and assess any new impacts and risks as a result of the activity
- Evaluate the effectiveness of the EMP
- Identify shortcomings in the EMP
- Identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMP

An environmental audit report should contain the following:

- Details and expertise of the independent person who prepared the environmental audit report
- A declaration that the auditor is independent
- An indication of the scope of, and the purpose for which, the environmental audit report was prepared
- A description of the methodology adopted in preparing the environmental audit report
- An indication of the ability of the EMP to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity as well as to ensure compliance with the provisions of environmental authorisation and EMP.
- A description of any assumptions made, and any uncertainties or gaps in knowledge
- A description of any consultation process that was undertaken during the course of carrying out the environmental audit report if required
- A summary and copies of any comments that were received during any consultation process
- Any other information requested by the competent authority.

13. MAINTENANCE MANAGEMENT PLAN

Given the proximity of the site and proposed development to watercourses, a Maintenance Management Plan (MMP) is required for the post-construction maintenance and repair actions which will need to take place from time to time, and which may have required Environmental Authorisation. See **Attached I** of the Basic Assessment for the standalone Maintenance Management Plan.

13.1. Introduction

The following are overarching principles to be used by landowners and managers when considering the development and implementation of a 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, determine 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."

13.2. Need for MMP on Erf 1486, Vermont

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.

13.3. Applicable legislation

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

- → The MMP will be approved in terms of the NEMA EIA Regulations 2014 (as amended) and relates to the following listed activities
  - Listing Notice 1, Activity 19
  - Listing Notice 3, Activity 12
- → The requirements of the National Water Act 36 of 1998 (as amended);
- → The requirements of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) in terms of:
  - National list of ecosystems that are threatened and in need of protection (GN 1002 of 9 December 2011).
  - Alien and invasive species list 2016 (GN R. 864 of 29 July 2016).

13.4. Applicable area

The development of Erf 1486, Vermont was proposed. As part of the NEMA process an Unchanneled Valley Bottom wetland (UVB) wetland was delineated on the site by the Aquatic Specialist, as per the figure below. The watercourse on the subject properties links with a broader system towards both the east and west. These delineations were conducted in accordance with the Department of Water and Sanitation's standard methodology for wetland assessment.

The delineated areas include:

- A permanent wetland zone, historically modified by infilling and the presence of alien vegetation;
- A surrounding seasonal (temporary) wetland zone, supporting variable moisture levels and wetland vegetation during the rainy season; and
- A drainage pathway forming part of a broader Unchanneled Valley Bottom (UVB) wetland system, which facilitates surface and sub-surface water flow from the Hoek van die Berg Nature Reserve towards the Vermont Salt Pan.

These wetland features are shown in the figure below and have been a key factor in informing the development layout, particularly the placement of infrastructure and the designation of conservation servitudes and no-go areas. The final preferred layout (Alternative 4) ensures that all proposed development is located outside the permanent wetland and avoids intrusion into the functional seasonal wetland zones as far as practicable.

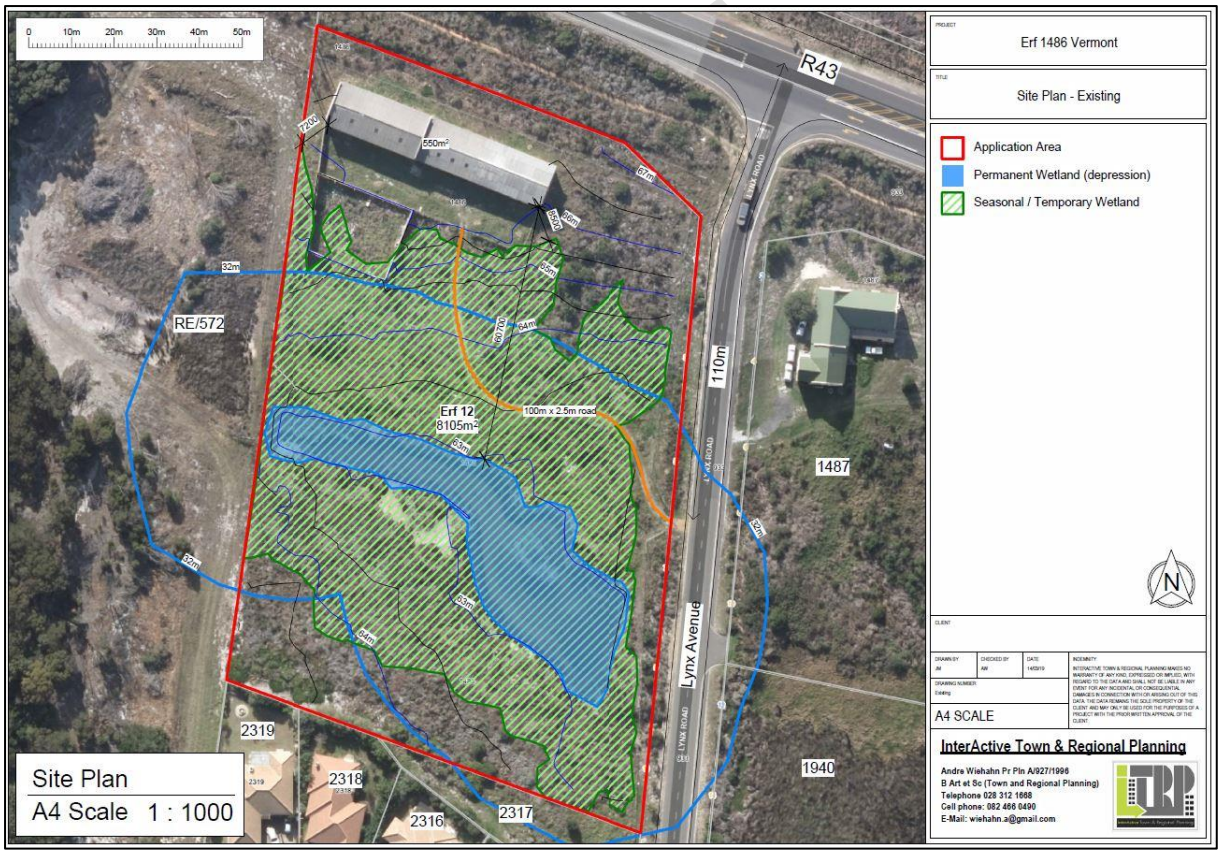
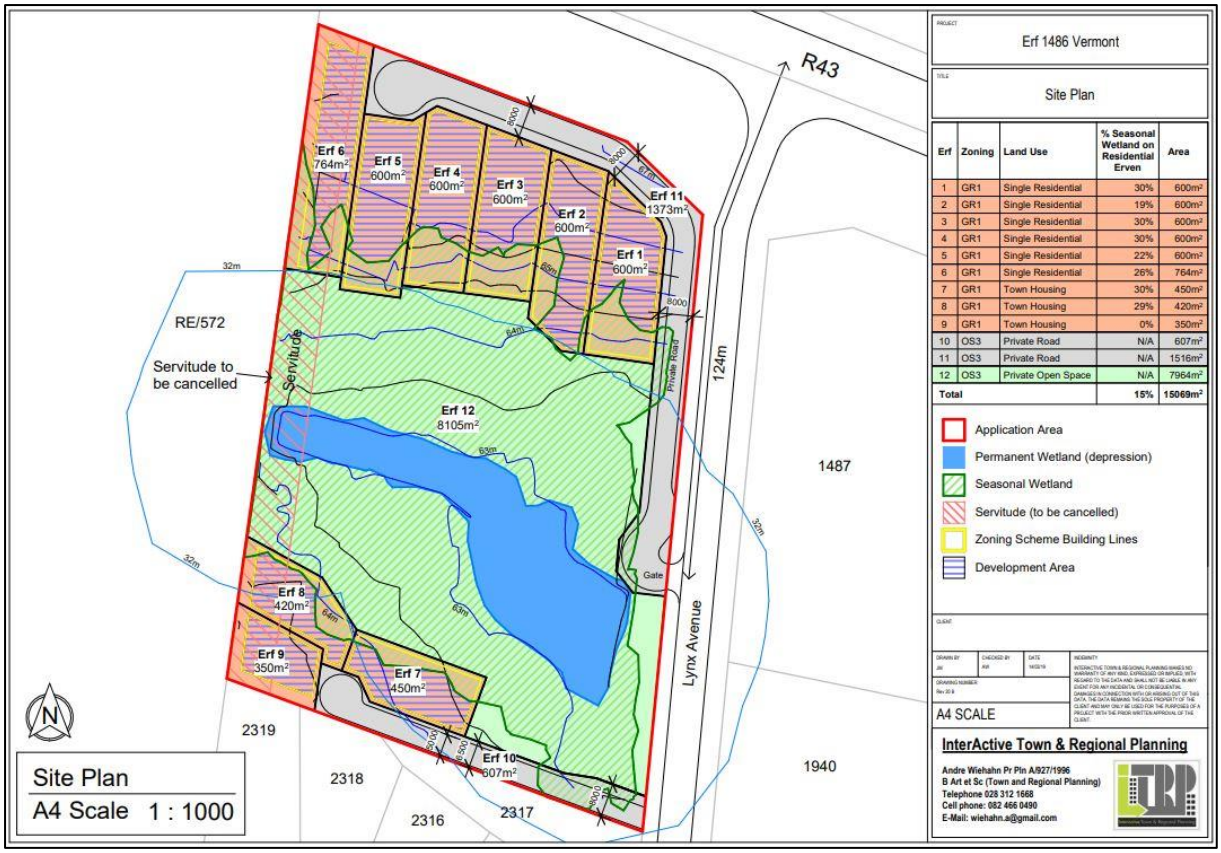


Figure 2: Delineated watercourse and wetlands on site.



Erf	Zoning	Land Use	% Seasonal Wetland on Residential Erven	Area
1	GR1	Single Residential	30%	600m²
2	GR1	Single Residential	19%	600m²
3	GR1	Single Residential	30%	600m²
4	GR1	Single Residential	30%	600m²
5	GR1	Single Residential	22%	600m²
6	GR1	Single Residential	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: Area applicable to the Maintenance Management Plan (MMP). The 32m buffer zone, UVB Wetland.

13.5. Maintenance Categories

The following activities have been identified for the possible long-term maintenance and management actions which may be required from time to time on the subject property:

Table 4. Maintenance categories appropriate to the property

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.

13.6 Method Statement

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 this 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 and will continually need to be removed.

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 person / company or 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 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 specialising 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.

Table 6: 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?

Monitoring and Inspection

Permeable paving System

Table 7: 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

Table 8*: Enhanced Swale System*

Schedule	Components	Action
After Storms	Inflow points	Check for scouring channeling and erosion – Repair as necessary
	Side 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 & soil	Check stormwater is filtering through soil following storm events – Remove weeds
Monthly	Outlet	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 nay occur. 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 forecast.

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.

14. CONCLUSION

An EMP has been developed as part of the Basic Assessment process to ensure that mitigation and management measures are enforced during the construction phase of the development, and that the conditions of the EA are upheld. The EMP should guide all phases of the project to minimize possible negative impacts and assign responsibility for environmental controls. The EMP provides a tool to recognise the needs of the environment and is intended to be utilised in conjunction with the Environmental Authorisation.

15. DECLARATION OF CONTRACTOR'S ACCEPTANCE

I, _____ (name), representing _____ (company name), have read and understood the above Environmental Management Plan and hereby acknowledge its contents and requirements as a framework for my company's environmental performance during the applicable development.

Signed: _____ Date: _____