LORNAY
ENVIRONMENTAL CONSULTING

Environmental Management Programme

Proposed Residential Development on Erf 1486, Vermont

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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.

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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 – Elephant Ventures Africa CC

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 (DEA&DP). 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 an opportunity for 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 access road. The development proposal entails the subdivision and development of Erf 1486 to establish six new residential erven, designated open space area, and a internal road. 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.

Components of the Development

Residential Erven

- Six (6) erven will be developed for residential purposes.
- Total residential footprint: approximately **4 253 m².**

Private Road

- One internal access road will serve the residential erven and connect to Lynx Road to the east.
- Total road footprint: approximately **1 456 m².**
- Erf 7: approximately 180 m × 8 m, including the road reserve.

Open Space

- Total area: approximately **9 361 m².**
- The open-space area includes the wetland and associated buffer zones.
- This area forms part of the on-site wetland offset and will be protected through a registered conservation servitude.

Associated Infrastructure:

Electricity Supply

- Electrical services will be supplied via a connection to the existing municipal electricity network. The installation will be done in line with the requirements and specifications of the Overstrand Municipality.

Water Supply

- Potable water will be sourced from the Preekstoel Water Treatment Plant, via an existing 200 mm diameter pipeline located along Lynx Avenue. A new connection point will be established, and internal reticulation infrastructure will be constructed in accordance with municipal engineering standards. The Overstrand Municipality has confirmed sufficient capacity to accommodate the additional demand from the development (see attached **Appendix K**).

Sewer and Effluent Management

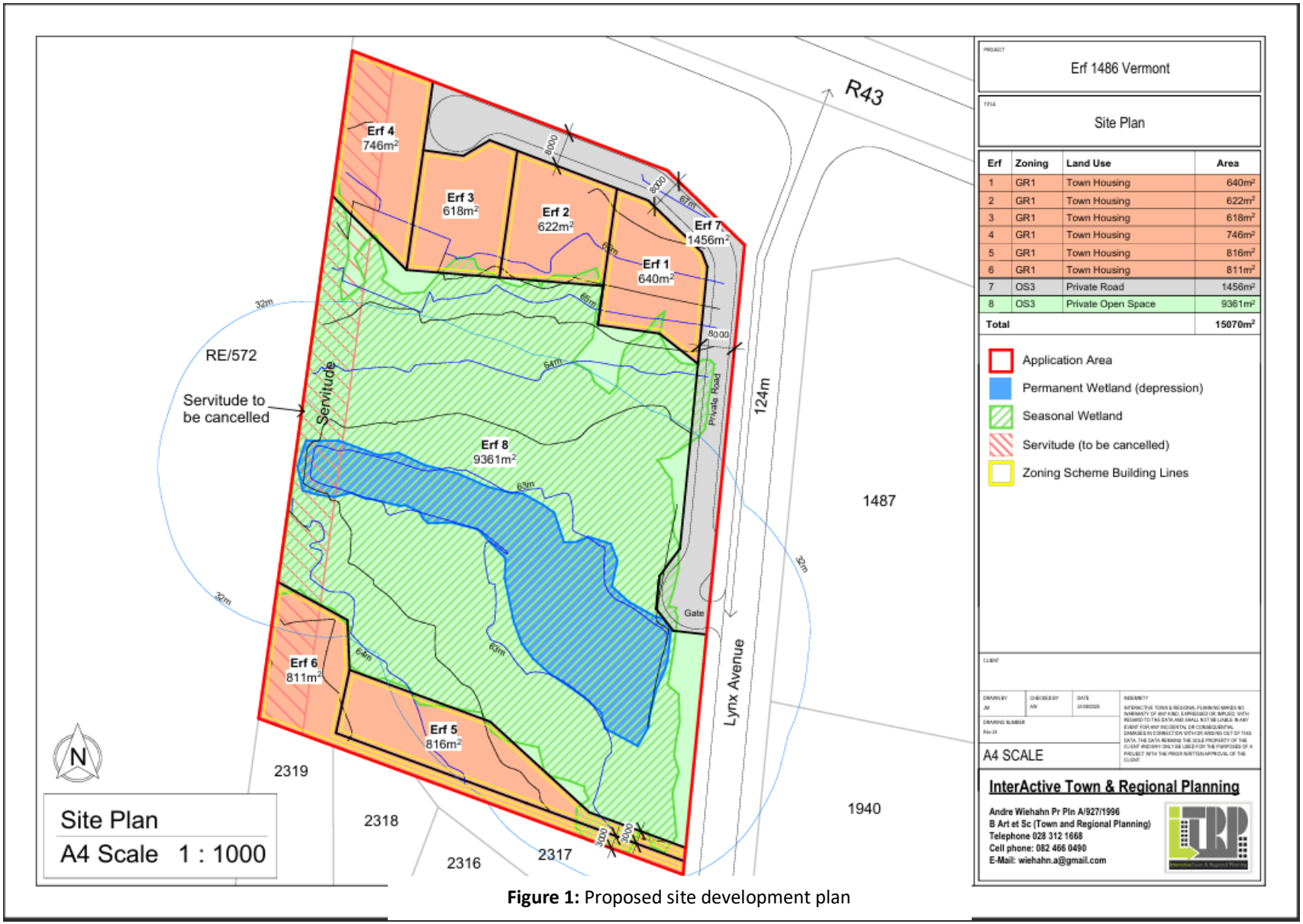
- The proposed development will be connected to the municipal sewer system. Wastewater from all residential erven will be conveyed through:
- An existing sewer pipeline system off site of which a specific section of the outfall sewer in Malmok Crescent and Kolgans street, will be upgraded from 110 mm to 160 mm to accommodate the increased effluent load.

- The sewer line extension on site has been shifted to fall outside the wetland zone in the final preferred layout (Alternative 4).

Stormwater Management

A site-specific Stormwater Management Plan (SMP) has been designed by DECA Consulting Engineers (February 2026).

The site falls within a large catchment draining mountainous areas to the north. It is flat, drains eastward into the wetland, and the soils are sandy and well-draining. The development falls within the City of Cape Town's SUDS policy threshold (4 000–50 000 m²), requiring post-development runoff to be reduced to pre-development levels for the 50-year storm, with target reductions of 80% suspended solids and 45% total phosphorus.
Modelling shows that without mitigation, post-development runoff and wetland water levels marginally exceed pre-development conditions. With the proposed Low Impact Development (LID) measures in place, runoff and water levels are reduced to pre-development levels across all storm return periods.



Erf	Zoning	Land Use	Area
1	GR1	Town Housing	640m²
2	GR1	Town Housing	622m²
3	GR1	Town Housing	618m²
4	GR1	Town Housing	746m²
5	GR1	Town Housing	816m²
6	GR1	Town Housing	811m²
7	OS3	Private Road	1456m²
8	OS3	Private Open Space	9361m²
Total			15070m²

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 road 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 site on a weekly basis or as required and must take immediate measures to address unforeseen disturbances to the wetland 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 (DEA&DP) 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, specifically the open space.

The HOA will be responsible for ensuring that clearly defined roles, responsibilities, and procedures are in place for the ongoing maintenance and protection of the wetland within the urban residential context. This will include the implementation of the wetland management measures, coordination of routine maintenance activities, and compliance with the conditions of the environmental authorisation and specialist mitigation and management measures.

A portion of the HOA levy will be ringfenced for this purposes.

4.7.1. Operational Management Responsibilities

The HOA's responsibilities will include, but not be limited to, the following post-construction management actions:

- Alien Invasive Vegetation Control: Ongoing monitoring and removal of invasive alien plant species.
- Vegetation Management: Maintenance and replacement of indigenous wetland vegetation where required to support wetland functionality.
- Erosion and Stormwater Control: Maintenance of banks, channels, and stormwater infrastructure to prevent erosion, sedimentation, and degradation of the wetland.
- Access Control: Restriction of access to sensitive wetland areas, with only controlled, low-impact access permitted where appropriate.
- Implementation of the specialist management and mitigation measures.

4.7.2. Monitoring and Adaptive Management

The HOA will ensure that routine monitoring of the wetland is undertaken to assess ecological condition and functionality. Where required, adaptive management measures will be implemented, and oversight by a suitably qualified Environmental Control Officer (ECO) or wetland specialist may be required during the initial post-construction period.

4.7.3. Financial Management

The HOA will establish a dedicated levy to provide for the ongoing operational management and maintenance of the open space. This fund will cover costs associated with vegetation management, monitoring, minor rehabilitation works, and any specialist input required.

5. CONDITIONS OF AUTHORISATION

The conditions of Environmental Authorisation (EA) must 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 stormwater 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 (breeding 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. The fencing must have gaps at the bottom to allow fauna movement.
- → 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'. The fencing must have gaps at the bottom to allow fauna movement.

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 stormwater 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	*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 (breeding 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. The fencing must have gaps at the bottom to allow fauna movement. - 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	- 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.	ECO, Contractor Applicant

	Post-construction	- Cover fine material stockpiles. - 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*	- Ensure labour force is sourced locally as far as possible. - A gender balance to be considered during employment.	

	Job creation during the development /construction phase of the Erven *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

Refer to Site specific DECA Consulting Stormwater Management Plan (February 2026).

Construction Phase

- → Install permeable paving (Aquaflow blocks on geotextile/geogrid with 250mm lower sub-base and fin drain to 110mm uPVC pipe) on the road section south of the wetland before any impervious surfaces are completed.
- → Install the enhanced swale (400mm storage depth, 750mm permeable soil base, 110mm perforated uPVC underdrain) along the northern boundary before the site becomes operational.
- → Install 2 × 900mm diameter stormwater pipes through the development to safely convey runoff from the existing 2 × 600mm culvert discharging from the R43, preventing flooding of the new erven.
- → Ensure all finished floor levels are a minimum of 1.0m above the wetland water level.
- → Install gabion erosion and litter control structures at all three outlet points into the wetland prior to any stormwater being directed to those outlets.

Operational Phase – Permeable Paving (ongoing maintenance)

- → Monthly: inspect porous pavers and outlet structures for sediment; confirm the system dewaters between storms.
- → 3–4 times per year: vacuum sweep paver surface to prevent sediment clogging.
- → Annually: inspect surface for debris or spalling.
- → As needed: clear debris from contributing areas.
- → Upon failure: full rehabilitation of top course and base course.

Operational Phase – Enhanced Swale (ongoing maintenance)

- → After every storm: check inflow points, side slopes, and channel base for scour and erosion; repair immediately; check stormwater is filtering through soil.
- → Monthly: remove debris from inflow points and outlet; mow grassed channel to below 150mm (remove clippings); weed and water planted areas; check plant health and density.
- → Every two years: check for boggy patches or ponding; aerate soil; re-seed or replant bare patches; verify infiltration by monitoring after storm events or running a test flow across the swale.

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 4. 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	As required	Construction team(s) informed of all requirements in terms of EMPr and EA	ECO Project Manager			

	METHOD: Briefing to be undertaken by project manager and / ECO						
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 - 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	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			
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	Duration of Construction	A well placed and functional contractors camp to minimise impacts on other areas on site	Project Manager Contractor			

	or used (i.e roads or house footprints) or already transformed areas - 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 stormwater 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	**Removal of fill material** - 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.	Construction and 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: A suitably qualified restoration ecologist with a proven track record in wetland restoration (including but not limited to the revegetation component) should be appointed to lead implementation.			

	- 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 as per **Section 8.5** of the Wetland Offset, Rehabilitation Management Plan. **Revegetation with indigenous vegetation** - 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. **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. 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.

14. 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: _____