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ENVIRONMENTAL CONSULTING

Draft Environmental Management Plan

PROPOSED DEVELOPMENT OF 19 RESIDENTIAL UNITS ON ERF 511, OTTERY, CAPE TOWN, WESTERN CAPE

MARCH 2022

SEC REFERENCE NUMBER: 021015
DEA&DP REFERENCE NUMBER: TBC

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Definitions

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas, ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described;

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility, and composition of the soil;

Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer (independent party)
EO	Environmental Officer (the engineer's environmental representative)
ESO	Environmental Site Officer (the construction contractor's environmental representative)
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
DEA&DP	Department of Environmental Affairs & Development Planning
DWS	Department of Water & Sanitation
GN	Government Notice
HWC	Heritage Western Cape
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act, Act 107 of 1998, as amended
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, Act 25 of 1999
NWA	National Water Act, Act 36 of 1998

1. DETAIL AND EXPERIENCE OF THE EAP WHO PREPARED THE EMPR

This report was prepared by Anthony Mader and reviewed by Chantel Müller of Sillito Environmental Consulting (Pty) Ltd.

Chantel has a BA Social Dynamics and obtained her MPhil Environmental Management at the University of Stellenbosch in October 2008. Chantel is a registered EAP with EAPSA as well as a member of the International Association for Impact Assessment (IAIA). Chantel is also an Accredited Professional with the Green Building Council of South Africa. Please see Appendix M1 for CV.

Anthony Mader holds a BSc (Honours) Ecology, Environment and Conservation from the University of the Witwatersrand and is currently completing his Doctor of Philosophy (PhD). Please see Appendix M2 for CV.

SEC has extensive experience in environmental impact assessment (EIA) procedures and has completed numerous such applications in most provinces of South Africa since 1998.

2. INTRODUCTION

Arc Timbers CC, hereafter referred to as the client, proposes the development of 19 residential units on Erf 511, Wetton, Cape Town. The property is situated between the Old Strandfontein (west) and New Strandfontein Road (east) and is accessed via Bloemhof Avenue.

This Environmental Management Programme (EMPr) has been compiled as part of an EIA application for the Environmental Authorisation for the proposed development, in terms of the requirements of the National Environmental Management Act, 1998 (Act 107 of 1998) and the Environmental Impact Assessment Regulations, 2014, as amended.

This EMPr is intended to ensure compliance with the conditions of the Environmental Authorisation (once issued), the principles of sound environmental management and the general “Duty of Care” specified in the NEMA, so as to avoid or minimize potential negative impacts on the natural environment during the pre-construction, construction and operational phases of the proposed upgrade.

This document provides measures that should be implemented to ensure that environmental and social impacts associated with the development are avoided, or where such impacts cannot be avoided entirely, are minimized and mitigated appropriately.

3. PROJECT LOCATION

The site is located on Erf 511, Wetton, Cape Town. The location of the site is shown in **Figure 1** below.

SG Digit code(s) of the proposed site(s) for all alternatives:	C01600610000051100000
Coordinates of the proposed site(s) for all alternatives:	
Latitude (S)	34° 0'16.91"S
Longitude (E)	18°31'5.75"E

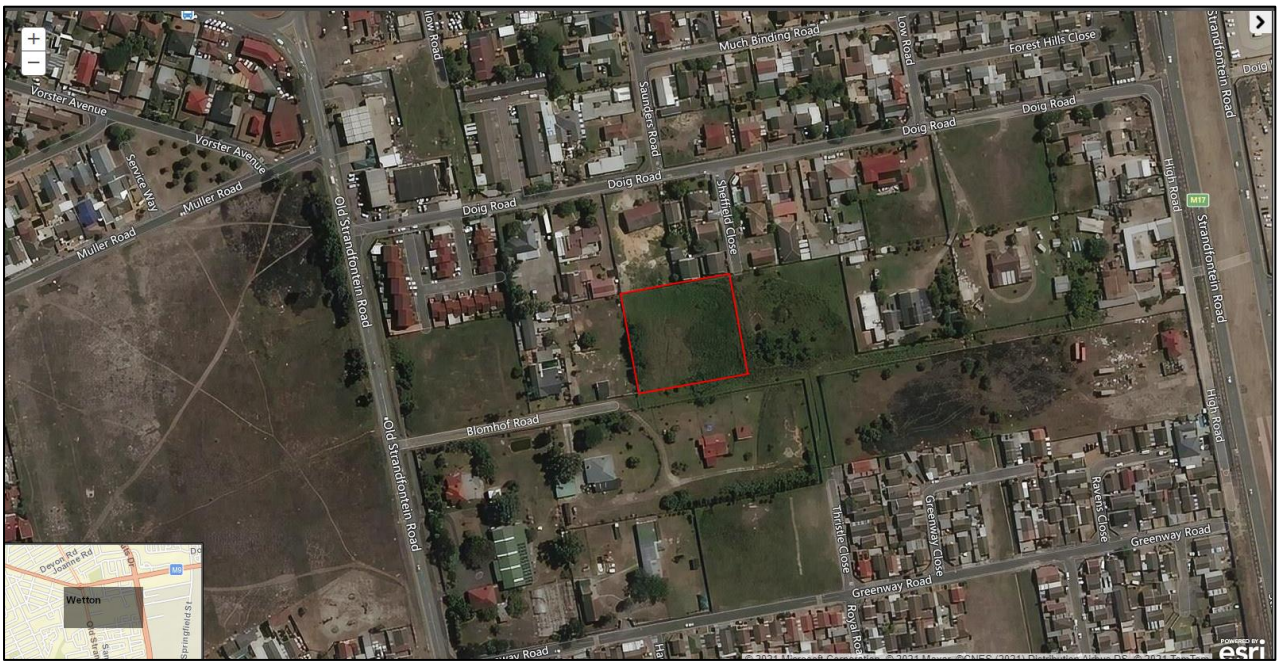

Figure 1: Location of Erf 511, Wetton, Cape Town (Source: Cape Farm Mapper, 2021). The site is indicated by the red outline.

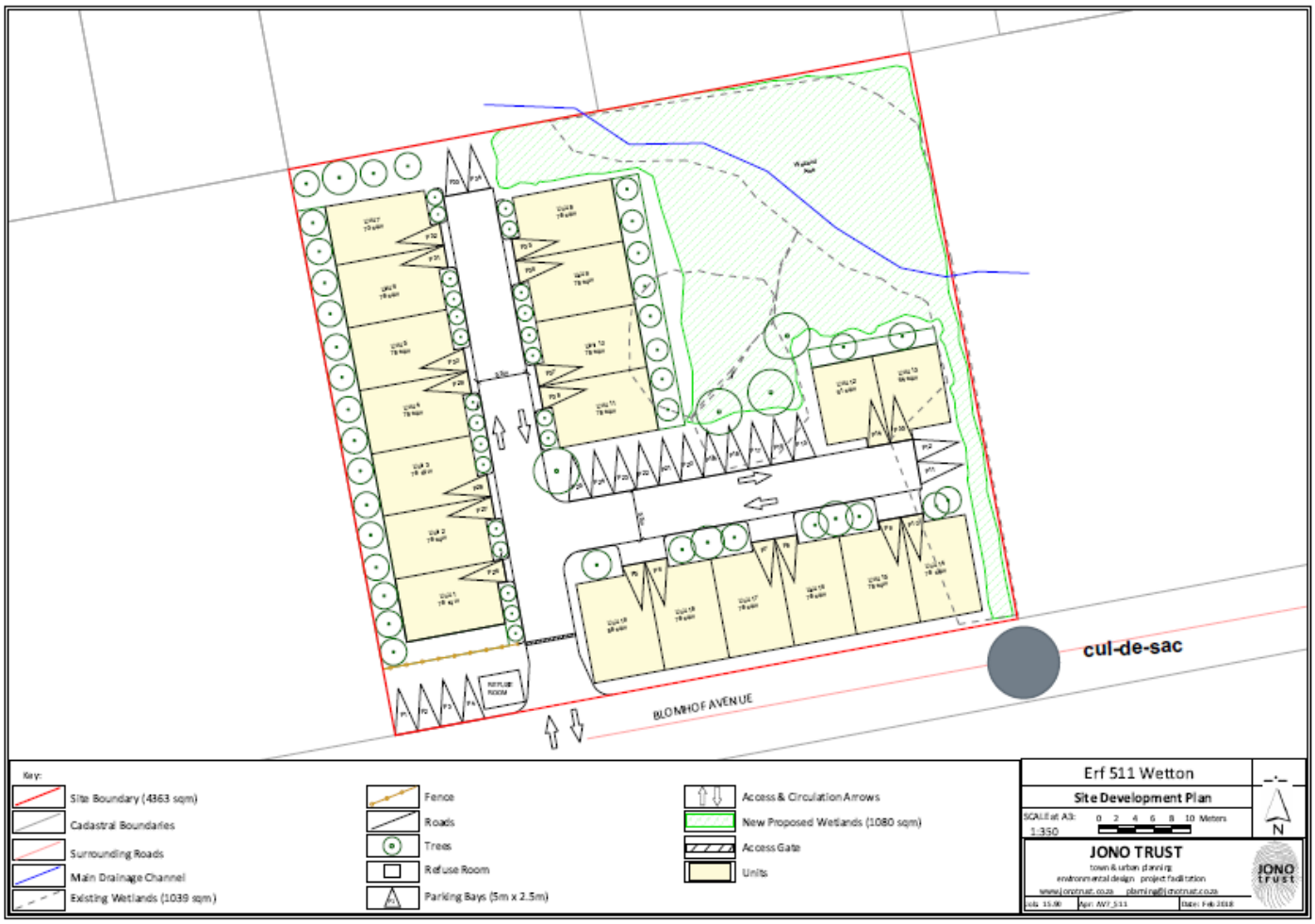

***Figure 2**: Preferred Alternative Site Development Layout. Please refer to Appendix B1 of the Post-Application DBAR.*

4. PROJECT DESCRIPTION

The applicant proposes to develop a residential development on Erf 511, Wetton, Cape Town. The proposed site is approximately 4362m^2 in extent.

a) In summary, the following is proposed:

- 19 residential units of approximately 80m^2 each.
- An open space/ stormwater management area of 382m^2
- Refuse room of 18m^2

b) Water Reticulation

A 100mm ø watermain is located on the western verge on Old Strandfontein Road with a 50mm ø leading off this main into Blomhof Avenue, it is proposed that the 50mm ø line be replaced with at least a 100mm ø to service the proposed development of ERF 511.

c) Sewer Reticulation

There are two (2) sewer connection points, in Old Strandfontein Road and Thistle Road, however the cover levels of these existing manholes, are higher than the average height of Erf 511. To provide adequate sewer drainage the ERF needs to be filled to a maximum ±0.5m along the northern boundary to ±1.0m along the southern boundary. Retaining structures are required along the northern and western boundaries.

d) Access

Access to the proposed residential development will be off Bloemhof Avenue approximately 175m from the Old Strandfontein Road / Bloemhof Avenue intersection. The proposed access will require a two-lane cross section i.e., one lane in and one lane out, with a combined carriageway crossing approximately 5.5m wide. The access intersection on the development access side will be stop controlled.

5. ASPECTS COVERED BY THIS EMPR

The development proposal entails the construction 19 residential units with associated services infrastructure. The potentially significant impacts identified during the EIA process associated with the development are as follows:

<u>Construction phase:</u>

- **Botanical Impact:** Invasive plant species will be removed to clear the site for development.
- **Freshwater Impact:** The wetland on site will be infilled, a new stormwater pond/ artificial wetland is proposed in the north-eastern corner of the site.
- **Soil & Groundwater Contamination & Pollution:** Associated with poor waste management activities, fuel spills and cement batching.
- **Dust & Noise Impacts:** Associated with construction machinery and traffic and dust during construction activities.
- **Traffic, Safety and Access Impacts:** Associated with delivery of construction materials and vehicles entering and leaving the site.
- **Visual Impacts:** Associated with poor housekeeping during construction activities.

- **Socio-economic Impacts:** Creation of temporary jobs during the construction phase.

- **Terrestrial Biodiversity Impact**: Sections of the wetland will require infilling, the wetland area inhabited by various animal species (predominantly reptilian and amphibian), as such, the proposed development will result in a reduction in habitat.

- **Geohydrological Impacts**: Associated with site preparation to allow for the construction of the houses within a wetland area.

Operational phase:

- **Visual Impact:** Associated with a built-up development.

- **Socio-economic Impact: Health & Wellbeing (positive benefit):** Provision of housing, increased services and economic growth.

- **Freshwater Impact:** Modification of aquatic habitat and potential for flow and water quality modification (associated with management of stormwater). The NO-GO is associated with the continued deterioration of the habitat.

- **Health and Safety Impact:** Associated with the drowning risk of the detention pond due to fence theft.

- **Traffic Impact:** Associated with increased vehicles using the road, road infrastructure and congestion.

In order to minimise any negative impacts associated with the upgrade, it is imperative that the lifecycle of the facility, as well as all aspects of the facility's upgrade (infrastructure and buildings) and operation are subject to the conditions set out in this EMPr. The conditions directly address the identified potential impacts, in order to ensure that the health, safety and environmental risks associated with the upgrade can be avoided or if unavoidable, minimised.

6. DESCRIPTION OF ENVIRONMENTAL SETTING AND SENSITIVITY

Erf 511, Wetton, Cape Town is undeveloped and contains a wetland area with several wetland plant species on site. The site is located in a Critically Endangered Ecosystem as a result of the vegetation type of the area being the Cape Flats Sand Fynbos. The site has however been transformed and currently consist of several grass species (several of which is invasive). The site therefore contains no intact Cape Flats Sand Fynbos plant species.

Botanical Environment

The natural vegetation which is thought to have once occurred in the study area is mapped as Cape Flats Sand Fynbos. This vegetation type is mapped as critically endangered. None of this vegetation type is still intact within the study area. Only a mix of grasses (invasive alien kikuyu grass in the drier areas and indigenous kweek grass in the wetter areas) occur with rushes and sedges (*Typha capensis* bulrushes in the permanently inundated areas and *Pycreus polystachyos* sedges in the seasonally inundated areas) in the wetland areas.

Due to its transformed habitat along with existing negative influence and lack of positive appropriate vegetation drivers the study area is deemed to be of a 'low sensitivity' for terrestrial plant species. The proposed development will therefore not have any impact on terrestrial plant SCC.

Freshwater Environment

There is an isolated sand fynbos depression wetland on the erf. The wetland is approximately 1040m^2 in extent. This wetland is considered to be largely modified and of low ecological sensitivity and importance.

In order to maintain the ecosystem services provided by the wetland area as well as offset the loss of wetland habitat in the proposed development, an open area for storm water attenuation that will incorporate wetland features is proposed. Although the loss of the wetland will not be completely offset, the loss in habitat is not deemed a significant impact due to the existing wetland's modified state and low ecological importance. The supply of ecosystem services of the wetland will however not be reduced by the reduction in the wetland size.

Animal Species

Although the project area is considered to be heavily transformed and very little, if any, indigenous vegetation remains, various amphibian species are evidently utilising the remaining habitat in the project area and certain species appear to be present in high densities.

The following amphibian and reptile species were recorded in the project area during the June 2021 survey: Cape River Frog (*Amietia fuscigula),* Clicking Stream Frog (*Strongylopus gryii*) and the Cape Dwarf Chameleon (*Btsfypodion pumilum*). The Clicking Stream Frogs were found in abundance across the project area and could be heard calling throughout the day. Four (4) adult Cape Dwarf Chameleons were recorded in different locations across the project area. No tadpoles were recorded in any of the water bodies present in the project area.

There was no evidence of amphibian SCC occurring in the project area (Erf 511), and due to the poor environmental condition of the site and extensive impacts, it is not anticipated that any such species occur. However, due to the cryptic nature of amphibians, the single season survey, the seasonal timing of the survey and historic records of amphibian SCC in the wider project area, it is plausible that such species, as listed below, may nonetheless be present and/or may utilise the site for brief periods during the year.

- Micro Frog (*Microbatrachella capensis)*
- Cape Platanna (*Xenopus gilli*)
- Western Leopard Toad (*Sclerophrys pantherine)*

Geotechnical conditions

The main conclusions and recommendations of the Geotechnical Assessment (Appendix G4) were as follows:

- The fill comprises fine sandy clayey silt and extends to a depth of approximately 0,80 m below ground level (bgl). A clayey sandy fill layer underlies the surface fill, extending to a depth of approximately 1,30 m. This layer comprises fine to medium grained sand and clayey sand with isolated amounts of builder's waste.
- Medium grained sands and clayey sands, likely that of transported origin, underlie the fill layers and extend to a depth in excess of 2,30 m bgl.
- Laboratory test results indicate that the fine-grained fill soils at surface are moderately plastic and will not be suitable for use in construction.
- With increasing depth medium grained transported sands are encountered. These sands are expected to exhibit moderate to good compaction characteristics and will be suitable for use in construction, if dry.
- Transported sands that are above optimum moisture content may need to be stabilised with cement in order to improve workability and final CBR strength. Soils are not active or problematic with regards to heave.
- Fill material presently at surface is variable with regards to consistency and composition. These soils will not be suitable for use below load-bearing foundations and floors. Any fill material containing rubble or waste materials, if encountered, is unsuitable for use in construction or for founding purposes.
- Transported sands are generally medium dense and slightly variable with regards to consistency. These soils can be described as moderately compressible and will be suitable for load-bearing structures provided bearing pressures are suitably limited. Strip foundations should still be strengthened with steel reinforcement in order to span potential soft spots that may be present.

- Founding recommendations must be reassessed following a secondary site inspection. A secondary site inspection will also allow for other foundation recommendations to be made once additional information regarding site conditions is known. The following fouling recommendations have been given:

Strip foundations in medium dense sands:

- Settlement is based on foundations founded through any uncontrolled fill and within the medium dense sands near surface. Trenches can be nominally compacted with a trench compactor, if dry, and cement (stabilisation) could be added to improve compaction.

Strip foundations in recompacted soil mattress:

- Excavate across the entire building footprint to 1,00- 1,50 m below final ground level, to get through any uncontrolled fill and stripping fill to spoil. Compact the base of the excavation, using cement stabilisation in wet conditions and to increase CBR were required. Import granular material of G7 quality and compact in layers up to founding level.

Reinforced concrete raft:

- From ground level, remove unsuitable fill, compact the underlying soils. Imported granular material and compact to final founding layer.

- In addition to foundation options above, one should consider the marshy conditions. One will likely need to formalise and create extensive site drainage.
- Another alternative would be to raise elevation levels across the site using engineered fill terraces. In this case one would either need to:

- Create the terrace (at least 1,00 m high) above the existing ground level using suitable quality and compacted material and then found using rafts, or;
- Remove and replace the fill with suitable material and then create terraces. One can then consider strip footings.

- Allowable bearing pressures and spread foundations should be limited to those given in Table 4.1, due to limited information available on the deeper soil profile. Larger foundations could potentially be considered but have a greater depth of influence and are not recommended without additional testing into the nature and compressibility of the deeper soil profile.
- Foundations should be stiffened to accommodate potential soft spots and resulting differential movements.
- Compaction can be done using a heavy vibrator roller and one should consider the effect of a roller on nearby properties. Any compaction for load-bearing foundations should be compacted to at least 95 % MOD AASHTO.
- Clayey and silty fill material encountered at surface will not be suitable for use in construction at all. It is possible that this material is only encountered in a small area on-site and will need to be confirmed with additional field testing. This material will need to be stripped to spoil to make use of transported soils underlying it and may require the importing of suitable quality granular material.

- The fine to medium grained transported sand and clayey sand is generally medium dense in-situ and is expected to achieve fair to good CBR when recompacted. Soils at various depths might be moist to wet and cement could be added to increase compaction.
- In areas where the fine clayey soils are not encountered at surface, it is expected that in-situ and undisturbed sands will be suitable for use below floors and as a fair to moderate quality subgrade for road and paving areas for light traffic. Cement can be added to increase re-compaction strength, if required.
- For roads and parking areas, material for sub-base and base course will need to be imported. Allowance will also need to be made to remove unsuitable fine grained soils as well as fill and to import a suitable quality subgrade material.
- Extensive road drainage will be required unless elevation levels are raised.

- Water inflow into excavations is expected to be moderate to strong and should be manageable with sump pumps to some extent. The need for dewatering wells or other more sophisticated dewatering techniques is best assessed and determined during excavation.
- The supplied stormwater management form indicates the use of permeable pavers. Permeable pavers will likely not be practical when considering the clayey soils encountered at surface, and impermeable pavers with good drainage is suggested. However, as indicated before, it is likely that this clayey layer is not encountered across the entire site and, thus, permeable pavers may be suitable in other areas. Additional test pits are required to confirm this. Extensive site surface and subsurface drainage will likely be required.

- No particular excavation difficulties are anticipated within the fill and transported material. However, a digger-loader (TLB) has limited moveability due to the present waterlogged conditions on-site. Therefore, a tracked excavator is suggested. Excavations deeper than 1,50 m (but not in excess of 2,00 m deep) will need to be battered to at least 40° to the horizontal, for safety purposes.
- Excavation to within at least 2,30 m bgl classifies as “soft excavation” in terms of the SANS 1200 D (COLTO 1998) Earthworks Specification. In practice, these materials can probably be excavated and worked using conventional earthmoving equipment. Excavation by hand is also relatively easy within 1,00 m bgl.
- Slumping may occur in wet areas or where the shallow water table is present. Excavations here will need to be battered to at least 30° to the horizontal. In addition, sandbagging may also be used to limit excessive slumping. This is best assessed on-site during construction.
- Sidewall collapse was experienced, essentially due to wet conditions. Trenches are expected to be marginally stable up to 1,00 - 1,50 m deep during dry conditions. It is likely that sidewall collapse will occur in excavations deeper than 1,00 - 1,50 m. Normal safety precautions should be taken in this regard, especially relating to personnel working in trench excavations deeper than 1,50 m or below the groundwater level. As mentioned above, excavations deeper than 1,50 m (but not in excess of 2,00 m deep) will need to be battered to at least 40° to the horizontal, for safety purposes.

7. LEGAL FRAMEWORK

The following Activities in Listing Notice 1 and Listing Notice 3 of the 2014 EIA Regulations, as amended, are triggered by the proposed development and it is for this reason that it is required to obtain an Environmental Authorisation and to undertake a Basic Assessment EIA Process.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1**	Describe the portion of the proposed development to which the applicable listed activity relates.
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The wetland on site will require infilling.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3**	Describe the portion of the proposed development to which the applicable listed activity relates.
Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Within the Western Cape:	The vegetation type of the area is classified as Cape Flats Sand Fynbos, which is listed as critically endangered ecosystem. However, as per Appendix G2.2., the Botanical Specialist concluded that Activity 12 will **not** be triggered due to the site not containing ‘indigenous vegetation’ and the site not being

	Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.	characteristic of the Cape Flats Sand Fynbos vegetation type. Please refer to Appendix G2.2 for more information.

As per the definitions, a "watercourse" means:

a) A river or spring;
b) A natural channel in which water flows regularly or intermittently;
c) A wetland, pan, lake or dam into which or from which water flows.

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

This EMPr has been compiled in fulfilment of the requirements of NEMA. The contents of this EMPr comply with the requirements for EMPr's as contained in Appendix 4 to the 2014 EIA Regulations.

The EMPr should also adhere to the local authority by-law requirements as well as any other obligatory environmental and other legal requirements.

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the EMPr in the following manner:

- Amendment of the impact management outcomes or objectives: in line with the process contemplated in Regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in Regulation 36 of the EIA Regulations.

It is understood that the applicant / developer will be fully responsible for this EMPr and its requirements including any environmental rehabilitation that may be needed. This is required in terms of Section 28 (Duty of Care and Remediation of Damage) of the NEMA, as amended.

The applicant should adhere to any statutory requirements which may be relevant to the construction of the residential development, contained in:

- The National Environmental Management Act, Act 107 of 1998, as amended (NEMA);
    - Including Section 30 of the NEMA (Act No. 107 of 1998), pertaining to the control of incidents. In the event of a significant spill or leak of hazardous substances (e.g. petrol, diesel, etc.) used during the proposed activities, such an incident(s) must be reported to the relevant authorities, including this Directorate, in accordance with section 30 of the NEMA.
- The National Environmental Management Air Quality Act, Act No. 39 of 2004;
- National Water Act, Act 36 of 1998, as amended;
- Western Cape Noise Regulations (2013);
- National Health Act, Act No. 61 of 2003;
- National Environmental Management Waste Act, Act 59 of 2008;
- All relevant by laws and building regulations of the Theewaterskloof Municipality;
- Relevant SANS codes;
- The Operational Health and Safety Act, Act 85 of 1993; and
- National Heritage Resources Act, 1999 (Act No. 25 of 1999).

8. ENVIRONMENTAL OBJECTIVES, OUTCOMES AND IMPACT MANAGEMENT ACTIONS

8.1. PLANNING & DESIGN PHASE

No direct environmental impacts are associated with the planning and design phase. However, poor planning or inappropriate design decisions in this phase may result in environmental impacts arising during subsequent phases of the project.

Planning and design activities must therefore take into account the environmental constraints and opportunities identified during the EIA process, in order to avoid or minimise the potential future impacts of the development. Proper planning is also essential to ensure that adequate provision is made to implement the environmental requirements of this EMPr, and to ensure that the development remains compliant with the received Environmental Authorisation.

The environmental management objectives (goals) listed below should take place during the detailed design phase, prior to the construction phase:

1. Appoint an environmental control officer and undertake environmental awareness training.
2. Compile a detailed storm water management plan.
3. Establishment of site camp and associated site facilities.
4. Compile a Landscaping method statement for ECO approval.
5. Demarcate the NO-GO Areas.
6. Complete the detailed design including detailed services design.
7. Pre-construction ECO visit.

These environmental management objectives, as well as the management actions (mitigation measure) that should be implemented in order to achieve the desired objective and avoid/minimize potential impacts are discussed in more detail below. The mitigation measures listed below are required to be implemented by the developer and are required to be audited by an ECO.

8.1.1. Objective 1: Appoint an Environmental Control Officer (ECO) & Undertake Awareness Training

Impact Management Outcome:	• The conditions of Environmental Authorisation and the requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site. • All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.		
IMPACT MANAGEMENT ACTIONS:			
Mitigation Measure		**Responsible**	**Time Period**
1. A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site. 2. The ECO should inspect **the site fortnightly for the duration of the construction phase, additional visits may be required during the site establishment phase.** 3. The appointed ECO must be advised on the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.		Developer	During Design Phase
Performance Indicator	A suitably qualified ECO is appointed prior to the commencement of any construction activities taking place on site.		

8.1.2. Objective 2: Compile a Detailed Stormwater Management Plan

Impact Management Outcome:	• The measures required to adequately control and manage storm water are identified, and adequate planning and provision is made to implement these measures during subsequent phases of the project. • Mitigate quality prior to direct discharge.
IMPACT MANAGEMENT ACTIONS:	

Mitigation Measure	**Responsible**	**Time Period**
1. A storm water management plan must be developed and must adhere to the principles of storm water management to ensure stormwater areas surrounding the site does not cause flooding on the site.	Developer	During Design Phase
Performance Indicator:	A storm water management plan is developed.	

8.1.3. Objective 3: Establishment of Site Camp and Associated Site Facilities

Impact Management Outcome:	• Before the start of the construction phase a site camp must be established with all the required ablutions, waste management infrastructure and firefighting equipment where the vehicles and equipment can be stored. • Impacts on the environment are minimized during site establishment and the development footprint is kept to demarcated development area.
IMPACT MANAGEMENT ACTIONS:	

Mitigation Measure	**Responsible**	**Time Period**
The following general management measures pertaining to the set-up, operation and closure of a site camp should be applied where appropriate, reasonable and practicable: 1. **Fencing & Security:** The site camp area should be secured to prevent unauthorised individuals from entering the site camp and possibly getting injured or posing a safety and/or security risk. Adequate signage must be in place and the site camp and associated areas should be fenced off along the demarcated boundaries of these areas, preferably with 2m high fence and shade netting or Bonnox fencing or similar. 2. **Fire Fighting Equipment:** No less than 2 fire extinguishers should be present in the site camp. The extinguishers should be in a working condition and recently serviced. A fire extinguisher should always be present wherever any "hot works" (e.g., welding, grinding etc.) are taking place. 3. It is recommended that all construction workers receive basic training in fire prevention and basic firefighting techniques and are informed of the emergency procedure to follow in the event of accidental fires. 4. No open fires may be made on the construction site during any phase of the project. 5. No smoking should be allowed on the construction site. In the case of accidental fires, the contractor shall alert the Local Authority's Fire Department as soon as a fire starts and not wait until the fire can no longer be controlled. 6. **Waste Storage Area:** Sufficient bins for the temporary storage of	Construction Contractor and Developer	Pre-construction Phase (prior to arrival of construction equipment, machinery, or workers on site)

construction related waste should be provided inside the site camp and/or at the working area. 7. **Hazardous Substances Storage Area:** Fuels, chemicals, lubricants and other hazardous substances should be stored in a demarcated, secured, bunded and clearly sign-posted area within the site camp. 8. **Potable Water:** An adequate supply of potable water must be provided to construction workers at the site camp. 9. **Ablution Facilities:** Chemical toilet facilities or other approved toilet facilities (at least 1 toilet for every 15 workers) must be provided and located on the site in such a way that the toilets will not cause any form of pollution of the site. Toilets should be placed within the site camp. Toilets should be placed well outside of any surface drainage/ storm-water canals. The toilets must be placed on a level surface and secured to prevent them from blowing over. The toilets must be serviced regularly and kept in an orderly state. The contractor must ensure that no spillage occurs when the toilets are cleaned, serviced or moved. Performing ablutions outside of the provided toilet facilities is strictly prohibited. The ECO would need to regularly inspect the state of the chemical toilets. **10. Eating Area & Rest Area:** A dedicated area within which construction workers can rest and eat during breaks must be provided within the site camp. Seating and shade should be provided. **11. Vehicle & Equipment Maintenance Yard:** Where possible, construction vehicles and equipment that require repair should be removed from site and taken to a workshop for servicing. If emergency repairs and/or basic maintenance of construction vehicles or equipment are necessary on site, such repair work should be undertaken within the designated maintenance yard area. Repairs should be conducted on an impermeable surface, and/or a tarpaulin and/or drip trays must be laid down prior to emergency repairs taking place, to prevent any fuel/ oil/ lubricant spillages from contaminating the environment. 12. **Housekeeping:** the site camp and related site camp facilities must be kept neat and orderly at all times, to prevent potential safety risks and to reduce the visual impact of the site during construction.		
Performance Indicator:	• Working areas and areas for site camp facilities have been identified and appropriately demarcated to the satisfaction of the ECO, before construction activities commence on site. • The site camp and facilities are established to the satisfaction of the ECO, before construction activities commence on site.	

8.1.4. Objective 5: Demarcate the NO-GO Areas

Impact Management Outcome:	• To prevent activities taking place during the construction phase from impacting on the freshwater environment.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Wetland areas and furrows on and adjacent to the site must be	Construction	During Design

demarcated in conjunction with the ECO prior to any work starting on site. 2. All areas containing freshwater ecosystems, except for the furrows within the proposed development footprint, must be treated as a No-Go area. 3. Should additional working space be required at a later date, this must be agreed between the Principal Agent, Contractor, and ECO. 4. A Method Statement for the demarcation of NO-GO areas must be submitted and approved by the ECO prior to start of construction. 5. Any construction activities taking place prior to the demarcation of NO-GO areas will constitute a serious violation of this EMPr and are liable to a fine as detailed within this EMPr.	Contractor	Phase
Performance Indicator:	No-Go areas are demarcated to the satisfaction of the ECO, before construction activities commence on site.	

8.1.5. Objective 6: Complete a Detailed Design Including Detailed Services Plan

Impact Management Outcome:	• The development is compliant with the Environmental Authorisation, the EMPr, Conceptual Site Layout Plan and Conceptual Services Plans Submitted.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Detailed Design for the proposed top structures, associated services and proposed infilling must be designed based on the conceptual designs already approved by the Department. 2. If any changes to the approved Conceptual Plans is made this should be checked with the appointed ECO or an EAP to ensure no EA Amendment or EMPr Amendment Application is required	Developer	During Design & Construction Phase
Performance Indicator:	Detailed Designs are drawn up and are compliant with the Environmental Authorisation & EMPr designs already approved.	

8.1.6. Objective 7: Pre-construction ECO Visit

Impact Management Outcome:	• Good environmental management is to be promoted and enforced by the ECO during the pre-construction and construction phases. Site facilities are appropriately located on site. Construction workers receive environmental awareness training before commencing work on site.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. The ECO will provide for site contractor management training sessions (if required), who will in turn ensure that all staff working on site are familiar with the workings and requirements of this EMPr.	Construction Contractor	During Design Phase
Performance Indicator:	The site contractor and all site management are trained and aware of the all the conditions listed in this EMPr.	

8.2. CONSTRUCTION PHASE

During the construction phase dust, noise and traffic impacts are likely to occur. However, these impacts will transpire for the duration of the construction phase only and will be temporary for the duration of construction. Dust, botanical and traffic impacts may be felt locally, within the immediate vicinity of the site. Other impacts related to the construction phase is the potential to contaminate the soil and groundwater due to potential fuel spills as well as visual impacts associated with construction activities taking place on the site and poor waste management.

The environmental management objectives (goals) for this phase is to:

1. Avoid contamination and pollution of the soil and groundwater.
2. Traffic Safety and Site Access
3. Noise management.
4. Dust management.
5. Reduce the visual impact of the construction phase activities.
6. Socio-economic Impact
7. Freshwater Impact
8. Botanical Impact
9. Terrestrial Biodiversity Impact
10. Geohydrological Impacts

8.2.1. Objective 1: Avoid Contamination and Pollution of the Soil and Groundwater

Construction activities will generate waste. In addition, fuel, oil, lubricants and other pollutants may leak from vehicles/ machinery and contaminate the soil. Pollution and soil contamination could also occur from chemical toilets, cement mixing directly on the soil and storm water runoff may flow over the site camp area and carry contaminants off-site.

Impact Management Outcome:	To avoid the contamination of soil and groundwater by inappropriate waste management practises, fuel and oil spills, chemical toilet spills and inappropriate cement mixing.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. During the construction phase of the development, an experienced contractor will be appointed, and it will be ensured that the correct protocols are followed that relate to the handling of materials, thereby minimising the likelihood of such an incident occurring. 2. Adequate training of construction personnel will ensure that incidents resulting in product spills are minimised and that the correct actions are taken in the event of an incident. In addition, the following general management measures will be implemented to avoid contamination of soil and groundwater: <u>Waste Management:</u> 1. Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins. 2. Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust. 3. Waste bins/skips must be regularly emptied and must not be allowed to overflow. 4. Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. 5. All waste generated on site (general, hazardous and organic/green	Construction Contractor & Developer	Construction Phase

waste must be separated and disposed of appropriately at a licensed Waste Disposal Facility (WDF). 6. All waste generated during the construction phase should be separated into the different waste streams for recycling purposes, prior to removal from the construction site by a reputable contractor to a recycling facility or for disposal at an appropriately licenced waste disposal facility. <u>Pollution Management – hydrocarbons (oil, fuel etc.)</u> 1. Vehicles and machinery must be in good working order and must be regularly inspected for leaks. 2. If a vehicle or machinery is leaking pollutants it must, as soon as possible, be taken to an appropriate location for repair. 3. Repairs to vehicles/ machinery may take place on site, within a designated maintenance area at the site camp. Drip trays, tarpaulin or other impermeable layer must be laid down prior to undertaking repairs. 4. Refuelling of vehicles/ machinery may only take place at the site camp or vehicle maintenance yard. Where refuelling must occur, drip trays should be utilised to catch potential spills/ drips. 5. Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks. 6. Drip trays must be placed under generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricant, or where there is risk of leakage/spillage. 7. Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste. <u>Pollution Management – Ablution facilities</u> 1. Chemical toilets should be kept at the site camp, on a level surface and secured from blowing over. 2. Toilets must be located well outside of any storm water drainage lines and may not be linked to the storm water drainage system in any way. 3. Chemical toilets must be regularly emptied, and the waste disposed of at an appropriate wastewater disposal/ treatment site. Care must be taken to prevent spillages when moving or servicing chemical toilets. <u>Cement Batching:</u> 1. Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, plastic/ bidim lined detention ponds (or similar) should be constructed to catch the run-off from batching areas. Once the water content of the cement water/ slurry has evaporated the dried cement should be scraped out of the detention pond and disposed of at an appropriate disposal facility authorised to deal with such waste 2. Cement batching should take place on already transformed areas within the footprint of the facility. 3. Unused cement bags must be stored in such a way that they will be protected from rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin. 4. Washing of excess cement/concrete into the ground is not		

allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location. <u>Impact on Aquifer:</u> Solid waste generation, hydrocarbon and cement batching-related activities may release contaminants into the receiving environment. These contaminants may leach into groundwater impacting groundwater and thus, the aquifer. Therefore, the following mitigation measures are proposed: 1. Mitigation measures proposed above [i.e., for Waste Management, Pollution management (hydrocarbons and ablution facilities), and cement batching] must be implemented to reduce the contamination of water on site which may leach into groundwater. 2. As per the Geotechnical Report (**Appendix G4**), water inflow into excavated areas is expected to be moderate-to-strong and should be manageable with sump pumps to some extent. The need for dewatering wells or other more sophisticated dewatering techniques will need to be addressed and determined during excavation activities (i.e., based on site-specific conditions). 3. Should contaminated water enter excavated areas, dewatered contaminated water must be treated prior to its disposal or disposed of at a registered hazardous disposal facility. 4. Appoint an ECO to undertake regular site inspections for the duration of the construction phase, and to produce regular ECO monitoring audit reports, auditing on the compliance of the developer with the conditions of the EA and the approved EMP. The ECO must ensure that dewatering activities are being routinely undertaken.		
Performance Indicator:	• The ECO will monitor the site to check that the measures have been implemented. • The environment is not polluted or contaminated as a result of construction activities on site. • Spillage incidents are effectively contained and do not lead to pollution of the soil or water resources. • Waste is reduced, reused and recycled where possible.	

8.2.2. Objective 2: Traffic Safety and Site Access

It is proposed to deliver materials and equipment to the site during the construction phase of the development. Vehicles may impact on road safety conditions due to an increase in construction phase vehicles entering and exiting the site and they may impact on the condition of the existing road network. Safety of pedestrians is also at risk with increased vehicle activity.

Impact Management Outcome:	• During the construction phase of the development while materials are being delivered to the site, damages to road infrastructure does not occur and the safety to pedestrians is not at unacceptable risk. • Other road users are not significantly impacted by the movement of construction vehicles, equipment, machinery of workers to/ from the site.		
IMPACT MANAGEMENT ACTIONS:			
Mitigation Measure		**Responsible**	**Time Period**
1. The contractor must provide a traffic marshal for situations where heavy construction traffic may impede normal traffic flows on any roads adjacent to the site. 2. Construction vehicles must adhere to the load carrying capacity of road		Construction Contractor & Developer	Construction Phase

surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. 3. All vehicles travelling on site will adhere to the specified speed limits. 4. If damages to the road infrastructure occur, the developer should maintain the road directly after the damage has occurred.		
Performance Indicator:	• The ECO will monitor these mitigation measures to ensure they are implemented. • No safety incidents occur to pedestrians or truck drivers.	

8.2.3. Objective 3: Noise Management

Noise impacts may result due to construction activities and machinery on the site. Excavations and associated earth-moving activities may generate noise and vibration which may pose a nuisance to surrounding residents and other land users. Movement of heavy vehicles to and from the site may generate noise, which may affect surrounding residents.

Impact Management Outcome:	The surrounding environment, land users, residents and by-passers do not experience significant nuisance impacts related to noise and vibration.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. A complaints register will be opened in which noise complaints will be recorded. 2. Excavations and earth-moving activities should be restricted to normal construction working hours (7:30am – 17:30pm). 3. Vehicles and equipment should be kept in good working condition. If deemed necessary, machinery and equipment should be fitted with mufflers/ exhaust silencers. No unnecessary disturbances should be allowed to emanate from the construction site. 4. The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to produce regular ECO monitoring audit reports, auditing on the compliance of the developer with the conditions of the EA and the approved EMPr.	Construction Contractor & Developer	Construction Phase
Performance Indicator:	• The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to Developer with the conditions of the EA and the approved EMPr. • Noise complaints from the community are monitored by the ECO.	

8.2.4. Objective 4: Dust Management

Dust levels may increase as a result of construction phase traffic and activities, including earth moving activities such as infilling.

Impact Management Outcome:	The surrounding environment, land users, residents and passers-by do not experience significant nuisance impacts related to dust.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. If dust issues occur, dust can be suppressed on access roads and the construction site during dry periods by the regular application of non- potable water or a biodegradable soil stabilisation agent. 2. All soil stockpiles must be covered with tarpaulin / netting to	Construction Contractor & Developer	Construction Phase

prevent wind-blown dust from blowing into the adjacent water resources. 3. The soil stockpiles proposed for the infilling must be levelled and compacted on the site as soon as possible and not be stockpiled for long. 4. All vehicles transporting sand need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks. 5. Dust levels specified in the *National Dust Control Regulations* (GN827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m^2/day, measured using reference method ASTM D1739. 6. A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received. 7. The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to produce regular ECO monitoring audit reports, auditing on the compliance of Developer with the conditions of the EA and the approved EMPr.		
Performance Indicator:	• The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to produce regular ECO monitoring audit reports, auditing on the compliance of the property developer with the conditions of the EA and the approved EMPr. • Excessive dust does not arise from the site. • Dust complaints from the community are monitored by the ECO.	

8.2.5. Objective 5: Reduce the Visual Impact of the Construction Phase Activities

The construction phase is associated with temporary disturbance as a result of construction (trench excavations, vehicles, machinery, fencing and signage) that may have a negative visual impact to the area and sensitive receptors for a temporary duration.

Impact Management Outcome:	• Temporary construction activities may cause a visual impact to sensitive receptors due to earth moving activities, construction traffic, material storage, construction camp etc.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Consult with the ECO when determining the appropriate site for the site camp. 2. The site camp must be kept neat and tidy and free of litter at all times. 3. Waste must be managed according to the EMPr and the mitigation measures listed above in terms of waste management. Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy. 4. The site camp, storage facilities, stockpiles, waste bins, and any other temporary structures on site should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. 5. The site camp may require visual screening via shade cloth or other suitable material. 6. Construction vehicles must enter and leave the site during working hours.	Construction Contractor	Construction Phase

7. The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to produce short ECO monitoring audit reports, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMPr.		
Performance Indicator:	• The ECO will monitor the performance of the impact management actions. • Good "housekeeping" is evident on site. • The site does not pose a visual impact to the surrounding community.	

8.2.6. Objective 6: Socio-economic Impact

Temporary employment opportunities will be provided during the construction phase to those residing in the geographical area.

Impact Management Outcome:	• Local contractors as well as local suppliers are used during the construction phase.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Local Contractors as well as local suppliers will be used during the construction phase. The tender documents will require contactors to use local employees and provide some skills development during the construction process.	Developer	Construction Phase
Performance Indicator:	• Employment opportunities are created of which preference is given to the local community. • Construction materials are sourced from local suppliers.	

8.2.7. Objective 7: Freshwater Impact

The construction activities may cause disturbance of the aquatic habitat and alter the flow and water quality of the natural wetland on site.

Impact Management Outcome:	• The wetland on site will be infilled, a new stormwater pond/ artificial wetland is proposed in the north-eastern corner of the site.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. A new stormwater attenuation facility of >1000m2 should be constructed to offset the loss of the existing wetland (1040m2). 2. The existing canal should be moved to pass through the north-eastern corner of the property to link the stormwater pond and wetlands. 3. Kikuyu grass should be kept out of the wetland area and open space. 4. The new wetland areas should contain both permanently inundated areas such as the channel and the pond, as well as a wider seasonal wetland which should be vegetated with appropriate wetland species. 5. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of the Kikuyu grass. 6. The Environmental Management Plan should specify conditions to	Construction Contractor	Construction Phase

reduce sedimentation and contamination of the aquatic features on site. 7. The construction should take place in the drier summer seasons. 8. The wetland should be designed to mitigate the water quality impacts arising from the site. 9. The stormwater arising from the proposed developed area should be mitigated through onsite stormwater management. 10. The increased intensity of the runoff from the site would result in the hardening of surfaces on site. This should be mitigated by encouraging infiltration where possible within the developed site. 11. The recreation and rehabilitation of the wetland area should be undertaken by a suitably qualified horticulturalist/ rehabilitation specialist with input from an aquatic ecologist. 12. A pond should be created within the wetland habitat that is large enough to ensure adequate retention time on the site to allow for the settling of sediment and removal of nutrients and toxicants. 13. The following landscaping is proposed within the site: • Removal of any alien vegetation, building rubble and refuse by hand and with hand-held tools. • Shaping of the shallow wetland area with flat banks with a light machine to tie into the stormwater in and outflows as per levels provided by the engineer. • Shaping of the shallow wetland area with flat banks with a light machine to tie into the stormwater in and outflows as per levels provided by the engineer. • Planting of ex-open and 6 pack size plants at a density of 5/m2 in three different zones (dry wetland banks, marginal areas - prone to seasonal flooding and the base of the wetland - inundated during winter months). • Maintenance of the area to remove weeds and alien vegetation by hand for a period of 12 months after which maintenance is handed over to the homeowners.		
Performance Indicator:	The ECO will measure the performance of these mitigation measures during the compliance audits to take place during the construction phase.	

8.2.8. Objective 8: Botanical Impact

Invasive plant species will be removed to clear the site for development.

Impact Management Outcome:	• To have a development which comprises of mature indigenous trees and grasses to stabilise the soil.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Indigenous plant species should be incorporated into the landscaping and open space areas. 2. Alien invasive plant species should be removed from site.	Construction Contractor	Construction Phase
Performance Indicator:	Indigenous vegetation is planted in the public open space.	

8.2.9. Objective 9: Terrestrial Biodiversity Impact

Sections of the wetland will require infilling, the wetland area inhabited by various animal species (predominantly reptilian and amphibian), as such, the proposed development will result in a reduction in habitat.

Impact Management Outcome:	• Rehabilitation and construction of a stormwater pond and artificial wetland habitat of >1000m2. • The proposed layout will result in reduced habitat and wetland lost.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. The mitigation measures provided for the terrestrial biodiversity impacts should be read in conjunction with the mitigation measures listed under the freshwater impacts table. 2. An Environmental Control Officer (ECO) should be present during initial site clearing activities, in the unlikely event that any amphibian SCC are encountered. Any other amphibians that are encountered can be relocated to the wetland in the north-eastern corner of the project area or the wetland on Erf 509. 3. The portion of the wetland in project area, which is to remain undeveloped, should be cordoned off during construction to prevent further anthropogenic impacts to the system. 4. If a new wall is to be constructed on the eastern boundary of the project area, it should be constructed in such a way as to be as 'frog-friendly' as possible. Ideally the fence / wall should be made of palisade fencing. If this is not possible, then rectangular holes of approximately 10 cm (high) by 15 cm (length) should be made at ground level in the wall / fence, in order to facilitate the movement of amphibians to the adjacent wetland. 5. Alien invasive plant species should be removed from the project area and the wetland during the wetland rehabilitation process, in accordance with advice from a horticulturist. 6. Indigenous plant species (and preferably locally indigenous plant species) should be used for all landscaping. 7. The use of poisons, such as pesticides, should be avoided as far as possible. 8. A nocturnal search and rescue mission should be conducted in order to capture and relocate any Cape Dwarf Chameleons in the project area. This should be done before construction begins. It is recommended that these animals be relocated to suitable habitat in the adjacent wetland on Erf 509. 9. Ensure that no structures are built, during and after construction that could act as potential pit-fall traps for amphibian species. Any trenches that are necessary during construction should be checked every morning for the presence of amphibians. 10. Ensure that no pollutants enter the stormwater system or the wetland areas.	Construction Contractor	Construction Phase
Performance Indicator:	The ECO will measure the performance of these mitigation measures during the compliance audits to take place during the construction phase.	

8.2.10. Objective 10: Geohydrological Impacts

Associated with site preparation to allow for the construction of the houses within a wetland area.

Impact Management Outcome:	• Health impacts if human exposure to groundwater occurs	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
Due to the waterlogged soils on site during the Geotechnical investigation, only one sample pit could be dug. As such, as second site inspection would be required during the summer months to validate the findings from the one sample site. The mitigation measures listed below will therefore only be finalised once the section inspection has been carried out. The possible provisional mitigation measures include: 1. Proposed founding solutions: • Settlement is based on foundations founded through any uncontrolled fill and within the medium dense sands near surface. Trenches can be nominally compacted with a trench compactor, if dry, and cement (stabilisation) could be added to improve compaction. • Excavate across the entire building footprint to 1,00-1,50 m below final ground level, to get through any uncontrolled fill and stripping fill to spoil. Compact the base of the excavation, using cement stabilisation in wet conditions and to increase CBR were required. Import granular material of G7quality and compact in layers up to founding level. • From ground level, remove unsuitable fill, compact the underlying soils. Imported granular material and compact to final founding layer. 2. Extensive site drainage would be required due to the marshy conditions on site. Alternatively, the ground levels should be raised by creating a terrace at least 1m above the existing ground level. 3. Foundations should be stiffened to accommodate potential soft spots and resulting differential movements. 4. Compaction can be done using a heavy vibrator roller and one should consider the effect of a roller on nearby properties. Any compaction for load-bearing foundations should be compacted to at least 95 % MOD AASHTO 5. Allowance will also need to be made to remove unsuitable fine-grained soils as well as fill and to import a suitable quality subgrade material. 6. Extensive road drainage will be required unless elevation levels are raised. 7. Damp-proofing measures for structures are thus suggested. 8. The supplied stormwater management form indicates the use of permeable pavers. Permeable pavers will likely not be practical when considering the clayey soils encountered at surface, and impermeable pavers with good drainage is suggested. However, as indicated before, it is likely that this clayey layer is not encountered across the entire site and, thus, permeable pavers may be suitable in other areas. This will be addressed during the	Construction Contractor	Construction Phase

building plan approval stages. 9. As per the Geotechnical Report, water flowing into excavations is expected. It is expected that sump pumps will be sufficient to adequately dewater excavated areas, however, other dewatering methods may be required but will be determined during excavation activities.		
Performance Indicator:	The ECO will measure the performance of these mitigation measures during the compliance audits to take place during the construction phase.	

8.3. POST CONSTRUCTION REHABILITATION PHASE

After all construction activities have ceased, the site must be cleared of all construction related equipment, materials, facilities and waste.

The environmental management objective (goal) for this phase is to:

1. Rehabilitate & stabilise disturbed areas and ensure environmentally sensitive closure of the construction site.

8.3.1. Objective 1: Rehabilitate & Stabilise Disturbed Areas, Ensure Environmentally Sensitive Closure

Impact Management Outcomes:	• Once construction is complete, the site is appropriately rehabilitated according to the EMPr requirements.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measures	**Responsible**	**Time Period**
1. On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material. 2. Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved in writing by the ECO. 3. Any contaminated soil must be collected and disposed of as hazardous waste. 4. All construction waste, litter and rubble are to be removed from the site and re-used elsewhere or recycled/disposed of at an appropriate facility. Burying or burning of waste or rubble on site is prohibited. 5. Final rehabilitation of the site must be done to the satisfaction of the ECO and signed off by the ECO.	Construction Contractor	Post-construction Rehabilitation *(Some rehabilitation measures can be applied during the construction phase, as construction activities are completed in each area)*
Performance Indicator:	• All construction-related materials, equipment, facilities and waste have been removed from the site. • The final ECO inspection will comprise of a Closure Audit Report, measuring the performance of the mitigation measures listed above.	

8.4. OPERATIONAL PHASE

The only negative impacts associated with the operational phase of the development (once the houses are built and inhabited) is potential increased traffic in the area at key intersections and the visual impact of the built-up environment. A benefit of the development that should be enhanced is job provision.

The environmental management objectives (goal) for this phase is to:

1. Visual Impacts
2. Socio-economic – Health & Well-being
3. Freshwater Impacts
4. Health and Safety Impact
5. Traffic and Safety Impact

8.4.1. Objective 1: Visual Impacts

Associated with a built-up environment.

Impact Management Outcome:	To have a visually pleasing and well landscaped development	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	Developer	**Time Period**
1. A landscaping plan should be developed using indigenous vegetation and input from both a horticulturist and aquatic specialist. 2. Indigenous vegetation should be planted in the open spaces and used to rehabilitate the wetland area.	Developer	Design, Construction and Operation Phase
Performance Indicator:	• The development is visually pleasing and well landscaped.	

8.4.2. Objective 2: Socio-economic – Health & Well-being

Impact Management Outcome:	• Provision of housing, municipal services and work opportunities associated with residential properties.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. Preference should be given to historically disadvantaged individuals from the local, surrounding community, when appointing permanent employees for the operational phase.	Developer	Operation Phase
Performance Indicator:	• New employment opportunities are provided of which preference is given to the local community.	

8.4.3. Objective 3: Freshwater Impacts

Water quality impact associated with sewage spills from the internal sewage system. Loss of aquatic habitat may result from spills

Impact Management Outcome:	• Modification of aquatic habitat and potential flow and water quality modification (associated with management of stormwater).
IMPACT MANAGEMENT ACTIONS:	

Mitigation Measure	Responsible	Time Period
1. A stormwater maintenance plan must be created. The plan must include a maintenance team responsible for the supervision of the facility. 2. The maintenance should include weeding, litter control, sweeping, grit removal and cleaning of stormwater drains. 3. The netting placed over stormwater drains to mitigate against animal species falling into the drains should be inspected to ensure the netting is not broken. The inspection can form part of the stormwater maintenance plan. 4. Signage must be installed to convey to the user client/residents that the detention ponds perform a vital stormwater management function, and as such should not be tampered with. 5. Inspection of the site should occur frequently in the period after construction, especially after rain events. 6. Particular attention should be given to any open channels or downpipes discharging into the ponds as debris will quickly clog up at the gratings at the inlets and outlets of the detention pond. 7. Construction of an enhanced swale, to ensure pre-development runoff water quality. 8. Wastewater minimization at source is recommended take place to reduce the volumes discharged to the system. 9. Onsite spill prevention measures should be in place that prevent contamination of both surface and groundwater; and 10. Regular monitoring and maintenance of the sewer line and its associated infrastructure should be conducted to enable rapid remediation of any sewage leakages.	Developer & Municipality	Operational Phase
Performance Indicator:	• No reported incidents of sewer line leaks/spills.	

8.4.4. Objective 4: Health and Safety Impact

Associated with the drowning risk of the detention pond.

Impact Management Outcome:	• The health of the community is not impacted by the detention pond.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
1. The detention pons should be fenced off with appropriate signage. 2. A maintenance team must do regular site inspections, to ensure the fence and the detention pond is maintained and inaccessible to the public.	Developer & Municipality	Operational Phase
Performance Indicator:	• Health & safety impacts to humans are avoided. • Incidents are avoided on site.	

8.4.5. Objective 5: Traffic and Safety Impact

Associated with the increase in vehicles, road infrastructure use, traffic congestion and safety impacts to pedestrians.

Impact Management Outcome:	• To ensure that any damages to the road network are maintained. • To avoid traffic accidents or delays as a result of heavy traffic.
IMPACT MANAGEMENT ACTIONS:	

Mitigation Measure	Responsible	Time Period
1. The developer will have to formalise the Bloemhof Avenue by constructing a class 5 road from Old Strandfontein Road to the eastern boundary of Erf 511 (approximately 220m) long with a cul-de-sac turning circle. 2. The proposed class 5 access road design should be based on the City of Cape Town's Transport Directorate *Standard and Guidelines for Roads & Stormwater, October 2020.* 3. Care should be taken when designing the cul-de-sac to ensure that the circle radius is at least 12.3m and has an unobstructed width of 1m on the road verge to accommodate the overhang of refuse vehicles. 4. A minimum of 6m per vehicle length should be provided for stacking at the site access point between the gate and Bloemhof Avenue. 5. The access width and minimum heigh clearance of 4.2m must allow for unimpeded access for emergency and service vehicles.	Developer & Municipality	Operational Phase
Performance Indicator:	• Health & safety impacts to humans are avoided. • Incidents are avoided on site.	

9. IMPLEMENTATION OF THE EMPR

9.1. Roles and Responsibilities, including Monitoring and Auditing

9.1.1 Environmental Control Officer ("ECO")

Role: The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts.

Responsibilities:

- The responsibilities of the ECO and the contractor will include monitoring of compliance with the EMPr by the applicant and any sub-contractors during the construction phase. The frequency of the site inspections will be fortnightly until the completion of the construction phase. Additional site inspections may be required during site establishment. Pictorial reports will be submitted fortnightly, and a full audit report will be submitted when the construction phase has been completed;
- Educate the construction team about the management measures contained in the EMPr and environmental licenses;
- Reviewing and approving method statements in consultation with the Contractor and the ESA;
- Advising the contractor on environmental issues and assisting in developing environmentally responsible solutions to problems;
- Reporting to the applicant on a regular basis and advising of any environmental impacts.
- Checking the record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken;
- Checking the public complaints register in which all complaints are recorded, as well as action taken;
- Attending site meetings (when necessary) and giving a report back on the environmental issues at these meetings and other meetings that may be called regarding environmental matters;
- Inspecting and auditing the site and surrounding areas regularly;
- Requesting the removal of person(s) and/or equipment not complying with the specifications;
- Keeping both a written and photographic record of progress on site from an environmental perspective. These records should be dated and accurately catalogued in the onsite logbook, and separate audit reports;
- Undertaking continual internal review of the EMPr and submitting a closure report at the end of the project;
- ECO is responsible to issue fines to contractors for repeated transgressions;

9.1.2 The Developer

Role: The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA).

Responsibilities:

- Ensure that all stipulations within the EMPr are communicated and adhered to by the Contractor(s);
- Issuing of site instructions to the Contractor for corrective actions required;

9.1.3 The Contractor

Role: The contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr. The contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMPr. The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMPr will be implemented.

Responsibilities:

- Project delivery and quality control for the development services as per appointment;
- Ensure that safe, environmentally acceptable working methods and practices are implemented, and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely;
- Repair any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.

9.1.4 Environmental Site Officer

Role: The ESO is employed by the contractor as his/her environmental representative to monitor, review and verify compliance with the EMPr by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team.

Responsibilities:

- Be on site throughout the duration of the project and be dedicated to the project;
- Ensure all their staff are aware of the environmental requirements, conditions, and constraints with respect to all of their activities on site;
- Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements;

9.2. Documentation and Record Keeping

An environmental register must be kept at the site, which must include the following:

- Copy of the EA in terms of NEMA, granting approval for the development;
- Copy of the EMPr (this document) as well as any amendments thereof;
- All method statements;
- Incident and accident register;
- Complaints register.
- Signed environmental training register; and
- Waste disposal certificates.

9.2.1 Accident and Incident Register

An accident and incident register must be kept and should include the following information:

- Time, date and place of the accident and/or incident;
- Who and what was involved; and

- A detailed description of the accident or incident.

9.2.2 Complaints register

A complaints register must be kept for the recording of all complaints lodged. It is important that the complainant feels that his/ her concerns have been listened to and that appropriate action (within reason) has been taken to address these.

The complaints register must include:

- Detail of the complaint in clear, well-structured language;
- Time and date of complaint and details of complainant for follow-up purposes;
- Name of the person who received the complaint; and
- Description of action that was taken to address the complaint, including date and time of action.

9.2.3 Method statements

Method Statements (a template for these purposes is appended to this EMPr) will be required for activities that may result in significant impacts according to the ECO.

These must address the following aspects:

- What – a brief description of the work to be undertaken;
- How – a detailed description of the process of work, methods and materials;
- Where – a description of the location of the work (if applicable); and
- When – the sequencing of actions with commencement and completion date estimates.

All Method Statements (MS) must be in place at least **5 working days prior to the relevant construction activities** taking place and must be approved by the ECO prior to being implemented.

9.3. Environmental Awareness and Training

The Contractor should make allowance for all construction site staff, including all subcontractors that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing any work on site. During this training, the ECO will explain the EMPr and the conditions contained therein. Attention will be given to the construction process and how the EMP fits into this process. Other items relating to sound environmental management which should be discussed and explained during the environmental awareness training sessions include:

- General do’s and don’ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;
- Use of the toilets provided;
- Use and control of building materials and equipment etc.;
- Control, maintenance and refuelling of vehicles and tanks;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.); and
- General “best practice” principles, as regards the protection of environmental resources.

Environmental awareness training and education should be ongoing throughout the construction phase and should be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMPr), or as new workers come to site. Translators should be utilized where needed.

9.4. Matters Pertaining to Non-Conformance onsite

"Non-conformances" would occur when there are deviations from any of the requirements of this EMPr. This may also include non-compliance with the relevant environmental regulations.

Non-conformances and corrective action must be recorded in the environmental register and included in the audit reports compiled by the ECO.

The developer its contractors, sub-contractors and employees are legally bound by *Section 24(h) National Environmental Management Second Amendment Act, Act No. 107 of 1998,* which states that it is "an offence for any person to contravene conditions applicable to any environmental authorization granted for a listed activity. A person convicted of an offence is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding ten years, or to both such fine and such imprisonment"

This EMPr, when approved, constitutes a Condition applicable to an EA and any transgression would thus trigger Section 24(h) of the above-mentioned Act.

The table below specifies the transgressions for which the Construction Contractor may incur financial penalties (to be issued by the ECO and specified in the ECO Monthly Report), and the amount of the fines that may be levied. The ECO will however provide a warning and a notification of intent to submit a fine to allow the contractors to rectify a transgression before being fined.

For repeat offences of the same/ similar transgression by the same party, the value of the fine shall be doubled for each subsequent repeat offence to a maximum value of **R50 000.00** per offence.

Note: "Provisions", as stated in the table below, relates to the requirements specified in this EMPr and any requirements or conditions specified in the Environmental Authorization, as well as any other requirements governing the environmental management aspects of the development, which the Contractor is responsible for implementing.

#	Finable Transgression	Min Fine	Max Fine
1	Failure to comply with the provisions relating to the demarcation of the working area, site camp and associated facilities, and the maintenance of the demarcated boundaries.	R1 000	R5 000
2	Failure to comply with the provisions relating to the demarcation of all "no-go" areas, and the maintenance of the demarcated boundaries.	R2 000	R5 000
3	Failure to adhere to designated access routes;	R1 000	R5 000
4	Movement of vehicles and/or construction workers in no-go areas;	R1 000	R10 000
5	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, within designated "no-go" areas.	R1 000	R10 000
6	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, outside of the areas demarcated for such parking/storage.	R500	R5 000
7	Failure to comply with the provisions relating to the management of topsoil and subsoil	R1 000	R5 000
8	Failure to comply with the provisions relating to waste management on site.	R500	R5 000
9	Failure to comply with the provisions relating to the storage, use and management of hazardous substances and fuels on site and/or the spillage of hydrocarbons or hazardous substances on site leading to environmental damage	R1 000	R10 000
10	Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching	R1 000	R5 000
11	Failure to comply with the provisions relating to storm water control and erosion management	R500	R5 000
12	Failure to provide adequate fire-fighting equipment (in working order) on site at all times and/or failure to comply with the provisions relating to fire prevention and/or the occurrence of unattended or out of control fires.	R500	R5 000
13	Refueling of vehicles, machinery or equipment outside of the designated refueling area.	R500	R2 000
14	Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies	R500	R2 000
15	Failure to undertake refueling or repairs over a drip tray or other impermeable bunded surface to collect spilled hydrocarbons (fuels, lubricants, oils etc.) and other hazardous substances; failure to provide drip trays under fuel burning equipment (including pumps and generators) where there is a risk of hydrocarbon leakage.	R500	R2 000

16	Prolonged obstruction (>20 minutes) of the movement of other road users with failure to provide an established route by which the road user can safely bypass the area of obstruction and/or endangering the safety of other road users.	R1 000	R10 000
17	Failure to adhere to the provisions relating to traffic management and road safety.	R1 000	R10 000
18	Failure to produce a required method statement/s to the engineer's and ECO's satisfaction prior to undertaking the activity concerned and/or failure to adhere to an approved method statement	R1 000	R5 000
19	Excessive dust or noise emanating from the site	R1 000	R5 000
20	Failure to adhere to the provisions relating to environmental awareness training of construction workers, including sub-contractors and service providers rendering a service to the construction site	R1 000	R5 000

This report was compiled by Anthony Mader and Reviewed by Chantel Müller.

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