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FINAL

PRE-CONSTRUCTION, CONSTRUCTION AND POST-CONSTRUCTION PHASE

ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

**THE PROPOSED DEVELOPMENT OF A RETIREMENT VILLAGE ON
PORTION 103, 104 AND A SECTION OF ROTTERDAM STREET,
WITTEDRIFT, BITOU LOCAL MUNICIPALITY, WESTERN CAPE.**

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ENVIRONMENTAL CONSULTANT:	Sharples Environmental Services cc Primary Author: Lloyd Barnes <u>Revision EAP: Madeleine Knoetze (EAPASA Reg: 2021/3230)</u>
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Appendix 4 of the EIA Regulations 2014 (as amended 2017).

This Environmental Management Programme has been drafted in accordance with Appendix 4 of the Environmental Impact Assessment Regulations 2014 (as amended 2017). The table below shows how the requirements of Appendix 4 have been included within this Environmental Management Programme.

(1) An EMPr must comply with section 24N of the Act and include— (a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Appendix A- EAP CV
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4 – Description of the Activity
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 4 - Description of the Activity
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 9 - Environmental Impact Management: Planning and Design Phase Section 10 - Environmental Impact Management: Pre-construction Phase Section 11 - Environmental Impact Management: Construction Phase Section 12 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase Appendix E: Rehabilitation Plan
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 9 - Environmental Impact Management: Planning and Design Phase Section 10 - Environmental Impact Management: Pre-construction Phase Section 11 - Environmental Impact Management: Construction Phase Section 12 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 15 - Roles and Responsibilities Section 17 - Monitoring, Record Keeping and Reporting
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 15 - Roles and Responsibilities Section 17 - Monitoring, Record Keeping and Reporting
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 9 - Environmental Impact Management: Planning and Design Phase Section 10 - Environmental Impact Management: Pre-construction Phase Section 11 - Environmental Impact Management: Construction Phase Section 12 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase Section 15 - Roles and Responsibilities
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 9 - Environmental Impact Management: Planning and Design Phase

	Section 10 - Environmental Impact Management: Pre-construction Phase Section 11 - Environmental Impact Management: Construction Phase Section 12 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase
(k)the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 15 - Roles and Responsibilities Section 17 - Monitoring, Record Keeping and Reporting
(l)a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 9 - Environmental Impact Management: Planning and Design Phase Section 10 - Environmental Impact Management: Pre-construction Phase Section 11 - Environmental Impact Management: Construction Phase Section 12 - Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase Section 15 - Roles and Responsibilities Section 17 - Monitoring, Record Keeping and Reporting
(m)an environmental awareness plan describing the manner in which— (i)the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii)risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 15 - Roles and Responsibilities
(n)any specific information that may be required by the competent authority.	

DOCUMENT DETAILS

Project Ref. No:	8/BAR/PLT/H/6/20; Revision: CT15/WTD/EMPR/08/2025
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Sharples Environmental Services cc Since 1998, SES has been actively engaged in the fields of environmental planning, assessment and management. We advise private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale residential estates and resorts to golf courses, municipal service infrastructure installations and the planning of major arterials. Our consultants have over 20+ years of combined experience and we operate in the Southern, Eastern and Western Cape regions.

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LLOYD BARNES (Environmental Assessment Practitioner)- Lloyd has recently obtained his National Diploma and Bachelor of Technology in Environmental Management from the Cape Peninsula University of Technology. He has gained experience in on-site compliance monitoring, sustainable development, conservation and report writing. In his time as a consultant, he has compiled multiple management plans.

MADELEINE KNOETZE (Environmental Assessment Practitioner) - Madeleine holds a Bachelor of Science in Environmental Sciences from the Nelson Mandela Metropolitan University obtained in 2014. She has 10+ years' experience in the environmental field, she has proven competency in the compilation of environmental assessments, water use licence applications, legal compliance, on-site monitoring, rehabilitation reporting, aquatic impact assessments and Geographic Information Systems (GIS).

JOHN SHARPLES (Director) - John started Sharples Environmental Services in 1998 and has overseen the company's growth and development since then. John also started the Cape Town office in 2010. John holds a Masters in Environmental Management from the University of the Free State as well as a Bachelor's degree in Conservation. He has consulted for 19 years running a team of highly trained and qualified consultants and prior to this gained 12 years of experience working for environmental organizations. John is registered with EAPASA as a certified Environmental Practitioner (No 1485).

1. Introduction

Sharples Environmental Services cc (SES) was appointed by The Home Market NPC (the proponent) to compile the Environmental Management Programme for the proposed development of a retirement village and associated infrastructure on Portion 103, 104 and a section of Rotterdam Street, Wittedrift, Plettenberg Bay, Western Cape.

The proposed development of Erf 103 and 104 with a portion of the Rotterdam Street and road reserve, requires the two erven and reserve portion to be consolidated into one Erf (this also includes the road reserve to be discarded). The consolidated area will then form the development site. The development of the retirement village will entail the following:

- 53 Residential Units between 104 m² and 124 m² (Sectional title units)
- A Community Centre with the following components:
 - Library
 - Kitchen
 - Utility/storeroom
 - Hair salon
 - Gym
 - Nurses Station
 - Office
 - Wheelchair friendly toilet facilities
 - Events Hall
 - Patio and braai
- An assisted living facility with the following components:
 - Six en-suite bedrooms for those requiring assistance
 - Assisted living quarters
 - Office
 - Kitchen
 - Laundry
 - Dining and lounge facility
 - Yard
- Open spaces:
 - The preservation of the seven mature oak trees that are found on the southern border
 - The northern section of the consolidated erf adjacent to the Bosfontein River, this will act as a buffer area.

The Environmental Authorisation (EA) for the proposed development was granted on 07 October 2021. As part of the conditions of the EA, specific requirements for inclusion into the Environmental Management Programme (EMPr) were provided. The final EMPr submitted during the Application for EA process has been updated in accordance with Section E9 of the EA. The table below includes the revisions to the EMPr in accordance with these requirements as well as where these changes have been included. Please note that all changes and additions made in line with the EA have been highlighted in red.

Condition	Description as per EA	Section/Comment
E. 9.1	The EMPr must be amended to incorporate the following -	
E. 9.1.1.	Incorporate all the conditions given in this Environmental Authorisation.	This has been done throughout this document. All changes have been marked up in red for ease of reference.
E. 9.1.2.	Include the final design for the stormwater infrastructure that will be constructed within the delineated buffer area.	Section 4 of the EMPr has been updated to include the requested information.

Environmental Management Programme

Condition	Description as per EA	Section/Comment
E. 9.1.3.	The rehabilitation measures proposed by the Freshwater Specialist must be incorporated;	
E. 9.1.4.	A detailed storm water management plan must be developed and included in the EMPr;	Report has been attached as Appendix F of the EMPr.
E. 9.2.	The amended EMPr must be submitted to the Competent Authority prior to the construction activities commencing on site.	This EMPr aims to comply with this Condition of the EA.
Other Conditions which were included in line with Condition 9.1.1.		
E. 3.	This Environmental Authorisation may only be implemented in accordance with an approved Environmental Management Programme ("EMPr").	This EMPr has been submitted to the Competent Authority (CA) for approval. Once a decision has been received, this must be kept on site during the construction and post construction phases.
E.4.	The Holder shall be responsible for ensuring compliance with the conditions by any person acting on his/her behalf, including an agent, sub-contractor, employee or any person rendering a service to the Holder.	Added to Section 9.2.
E.10.	The EMPr must be included in all contract documentation for all phases of implementation.	Added to Section 9.2.
E.15 and E.16.	The Holder must, for the period during which the environmental authorisation; and EMPr remain valid ensure the compliance with the conditions of the environmental authorisation and the EMPr, is audited. Section E16 refers to the environmental auditing frequency.	Where applicable, Section 17.1 has been updated to include the Environmental Auditing requirements of the EA.
Specific Incorporated into the EMPr		
E.19	All development, except for stormwater outlet structures and slope stabilisation structures, must be situated outside of the 10-metre aquatic buffer zone (i.e. south of the development setback line). The area on the watercourse side of the development setback line, must be managed as a No-Go area for development.	Incorporated into Sections 9.2, 10.2 and 11.3.
E.20.	No indigenous vegetation may be cleared in the no-go area without written environmental authorisation is obtained from the competent authority.	Incorporated into Section 10.1 and Section 11.3
E.21	The raised boardwalk, structures and pathways proposed on Erf 103, as depicted on Site Development Plan compiled by Erik Voigt Architects (Job number 5075-01, Drawing number 01 (CD) Rev. No. R09, dated May 2019), may not be developed, unless written environmental authorisation is obtained from the competent authority.	Incorporated into Section 9.2.
E.22.	The No-Go areas must be physically and clearly demarcated prior to any earthworks commencing. this area may not be used to store any materials. All construction related activities such as materials storage and site camp establishment must occur within an identified area approved by the ECO.	Incorporated into Section 10.1, and 11.3.
E.23.	The Holder must, for the period during which the environmental authorisation and EMPr remain valid, adopt and implement a Rehabilitation Plan and Alien Invasive Management Plan for the management of the site, the aquatic buffer area and the remainder of Erf 103, Wittedrift.	The Rehabilitation Plan has been included as Appendix E of the EMPr and the Alien Invasive Management Plan has been included as Appendix B of the EMPr.

Condition	Description as per EA	Section/Comment
E.24.	A final design plan of the proposed stormwater infrastructure and stabilising structure in the aquatic buffer area must be included in the EMPr and submitted to the Competent Authority prior to the commencement of the activities on site.	This has been included into Section 4 and a Detailed Stormwater Management Plan has been included as Appendix F of the updated EMPr.

2. About this EMPr

This document is intended to serve as a guideline to be used by *The Home Market NPC* (as the Implementing Agent) and any person/s acting on behalf of *The Home Market NPC*, during the pre-construction, construction, post-construction rehabilitation and operational (maintenance) phases of the proposed development. This document provides measures that must be implemented to ensure that any environmental degradation that may be associated with the development is avoided, or where such impacts cannot be avoided entirely, are minimised and mitigated appropriately.

This EMPr has been prepared in accordance with the requirements of an EMPr as specified in the Environmental Impact Assessment Regulations, 2014 (as amended), and with reference to the "Guidelines for Environmental Management Programmes" published by the Department of Environmental Affairs and Development Planning (2005).

It is important to note that not only is the EMPr designed to manage the physical establishment of the development *per se*, but also as a tool which can be used to manage the environmental *impacts* of the development.

The rehabilitation, mitigation, management and monitoring measures prescribed in this EMPr must be seen as binding to *The Home Market NPC*, and any person acting on its behalf, including but not limited to agents, employees, associates, guests or any person rendering a service to the development site.

2.1 Important caveat to the report

In the past, some developments have had a devastating impact on the environment even though they have had Environmental Management Programmes in place, while other developments have had a low impact even though no management plans have been compiled.

The Implementing Agent and the attitude of the construction team play an integral role in determining the impact that the development will have on the environment. The ECO needs to ensure that all the role-players are aware of the constraints that the EMPr, and associated Environmental Authorization, places on the development and construction team and are prepared to be actively involved in enforcing these constraints. In order to, ensure that the development is sustainable and compliant, will depend on the cooperation, mutual respect and understanding of all parties involved.

3. How to use this document

It is essential that this EMPr be carefully studied, understood, implemented and adhered to as far as reasonably possible, throughout all phases of the proposed development. *The Home Market NPC* must retain a copy of this EMPr, and an additional copy must be kept on site at all times during the pre-construction, construction and post-construction rehabilitation phases of the development.

This EMPr must be included in all contracts compiled for contractors and subcontractors employed by *The Home Market NPC*, as this EMPr identifies and specifies the procedures to be followed by engineers and other contractors to ensure that the adverse impacts of construction and maintenance activities are

either avoided or reduced. Appointed contractors must make adequate financial provision to implement the environmental management measures specified in this document.

This EMPr must be seen as a working document, which may be amended as and when needed, in order to accommodate changing circumstances on site or in the surrounding environment, or in order to accommodate requests/ conditions issued by the competent authority, the Department of Environmental Affairs & Development Planning (DEADP). Amendments to this EMPr must first be approved by the competent authority, in writing, before being implemented.

4. Description of the Activity

The Home Market NPC proposes to develop housing units and associated infrastructure for retirement village purposes. The proposed site chosen for this development lies within the semi-rural village of Wittedrift, Western Cape. The town falls within the Bitou Local Municipality and is approximately 6km north-west from the popular town of Plettenberg bay (Figure 1).

Erven 103, 104 and a section of Rotterdam Street is proposed to be consolidated into one portion and is located near the centre of the semi-rural village, off of Main street (Figure 2). Wittedrift is connected to the N2 via the R340.



Figure 1: Locality of the proposed site

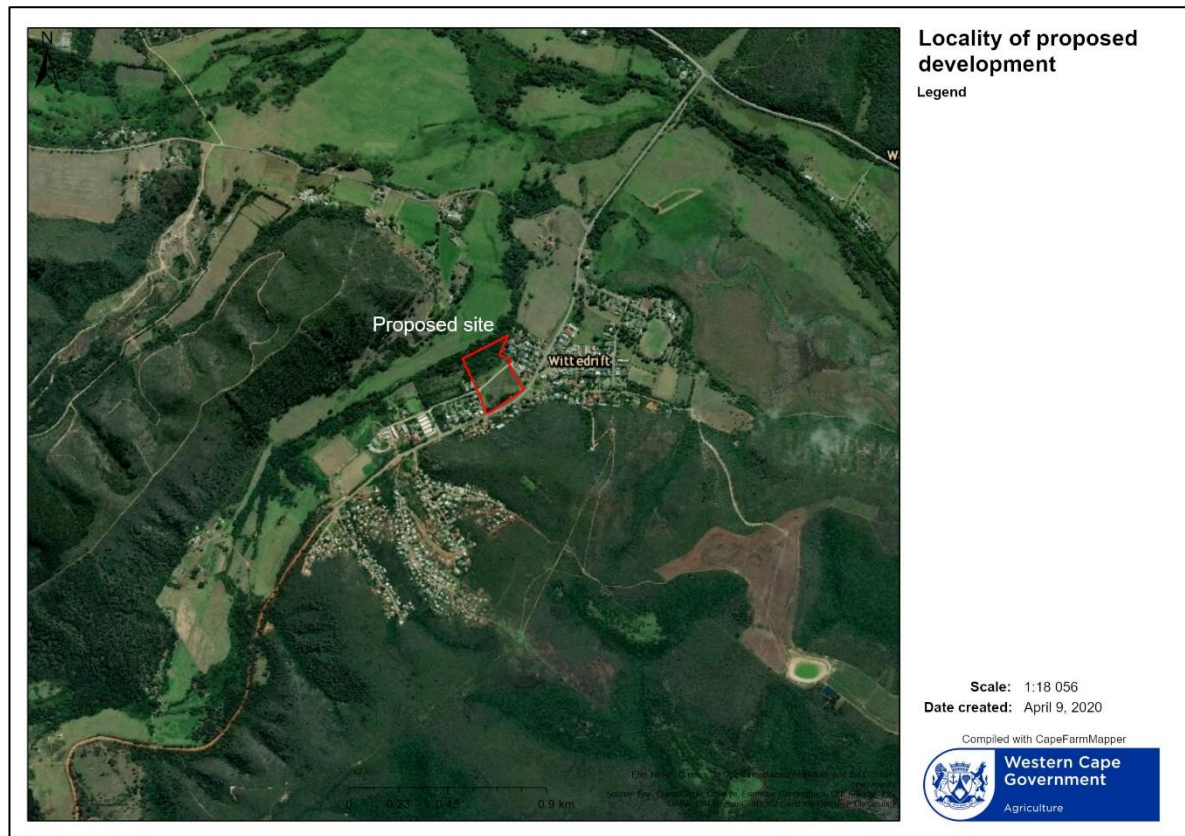


Figure 2: Site locality within Wittedrift

The extent of the subject portions and coordinates for extent of the footprint is depicted in figure 3 below, and are as follows:

Table 1: Cadastral Details and Extent of Area

Portion	Size	
Erf 103 Wittedrift	1,7422ha	
Erf 104 Wittedrift	1,3058ha	
SUB TOTAL	3,0480ha	
Portion of Rotterdam Street Reserve	0,2921ha	
TOTAL	3,3401ha	
Point	Latitude	Longitude
A	34° 0' 29.30"	23° 19' 55.53"
B	34° 0' 26.51"	23° 20' 2.15"
C	34° 0' 33.03"	23° 20' 4.43"
D	34° 0' 35.90"	23° 19' 59.12"
Southwestern boundary/buffer intercept	34° 0' 31.79"	23° 19' 56.94"
Northeastern boundary/buffer intercept	23° 20' 1.58"	34° 0' 29.28"

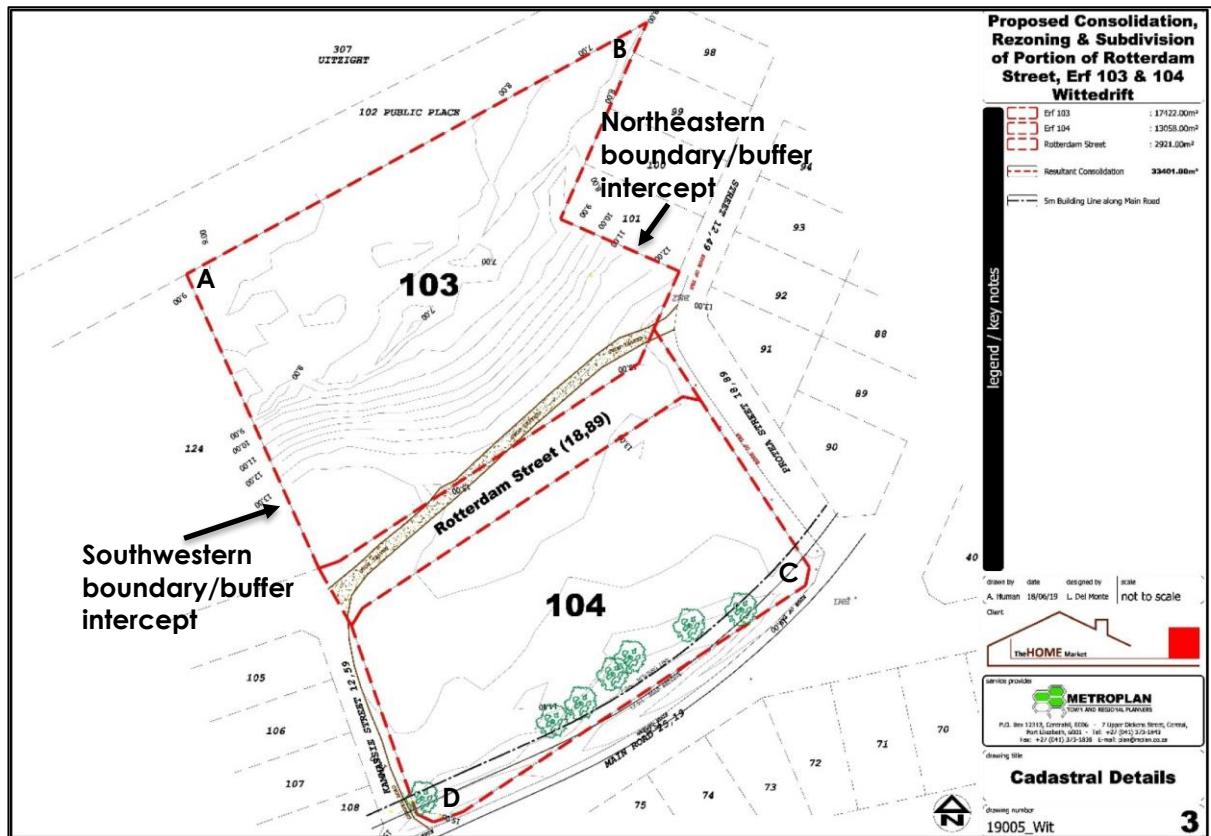


Figure 3: Proposed consolidation of Erf 103, Erf 104 and a Portion of Rotterdam Street

The proposed development will include 53 residential units of between 104m² and 124m² (depending on whether they have single or double garages) in extent. These units are to be sold under Sectional Title to those retirees of over 55 years of age who wish to reside there and those under 55 years who purchase for a household member, or private individual who is 55 years and over and who would also reside there.

The proposed layout and associated infrastructure are depicted below.

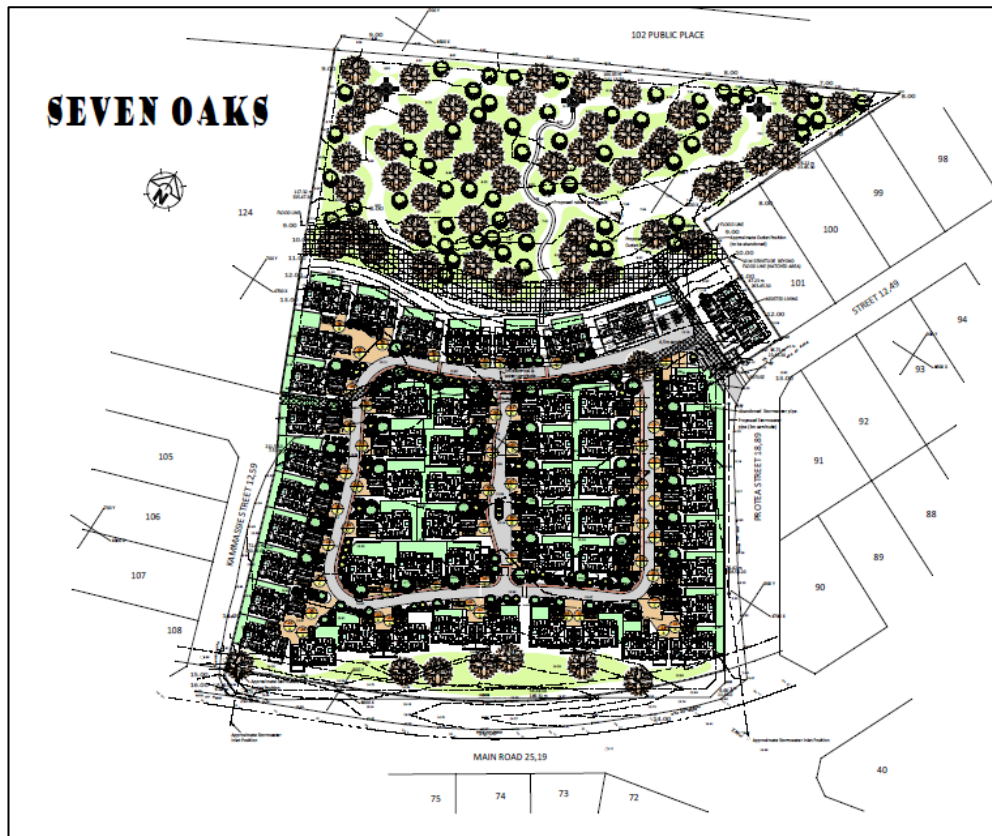


Figure 4: Endorsed layout.

The associated infrastructure proposed includes the following:

Community Centre

A community centre is planned to be positioned, at the North East corner of the site, close to the entrance of the retirement village with public parking and northern views. The community centre will have the following components:

- Library
- Kitchen
- Utility/storeroom
- Hair salon
- Gym
- Nurses Station
- Office
- Wheelchair friendly toilet facilities
- Events Hall
- Patio and braai

The community centre building will be approximately 183m².

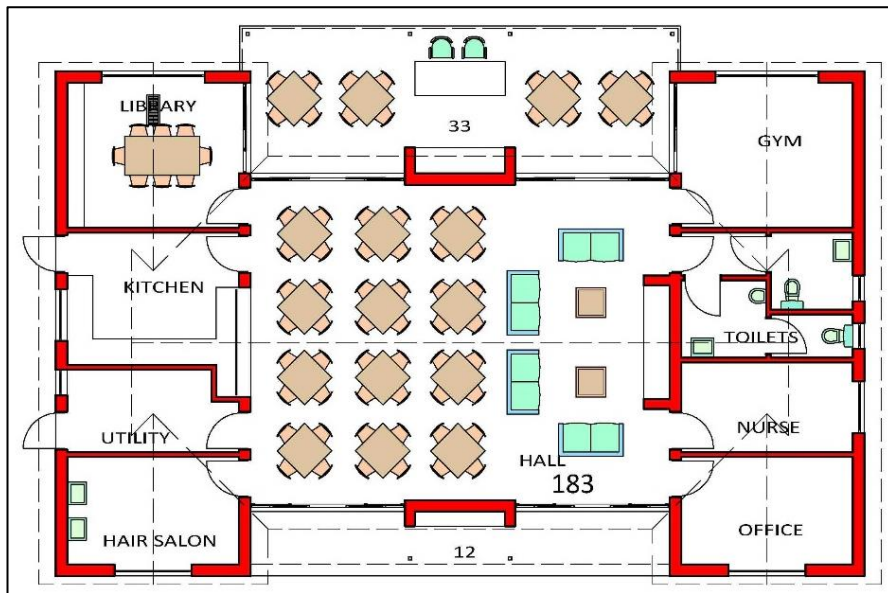


Figure 5: Community centre design

Assisted Living Facility

The assisted living facility will also be close to the entrance and will share visitor's parking with the community centre. An assisted living facility will have the following components:

- Six ensuite bedrooms for those requiring assistance
- Assisted living quarters
- Office
- Kitchen
- Laundry
- Dining and lounge facility
- Yard

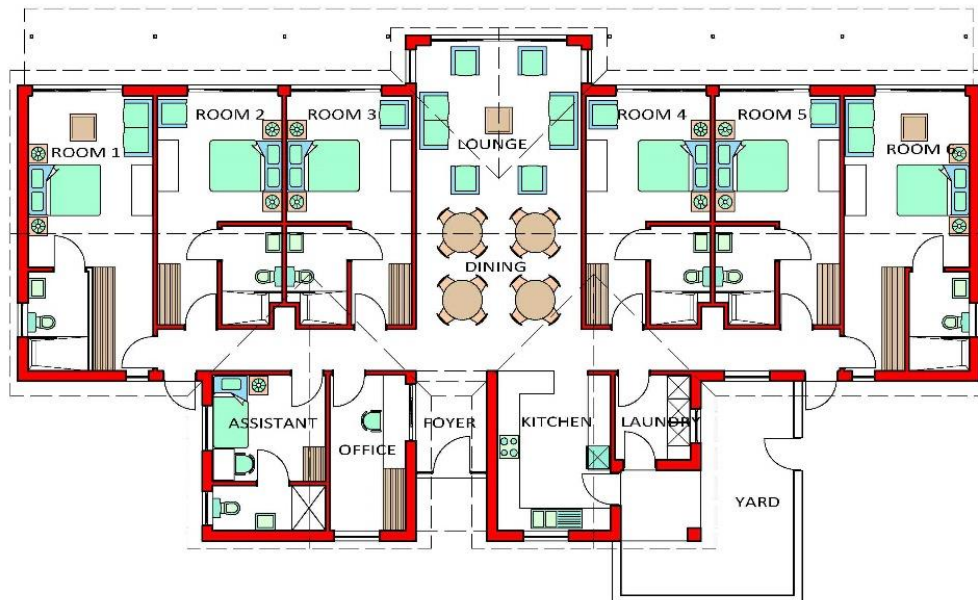


Figure 6: Assisted living facility design

Open Space

Mature Oak trees that occur on the site will be retained in an open space accessible to all the residents. Most of the Northern Section of the site, close to the Bosfontein River will also be kept as a public open space accessible to the inhabitants. A 10m aquatic buffer has been identified and recommended by the aquatic specialist, this is to be adopted as a part of the construction and operational phase.

Engineering Services:

With regard to bulk infrastructure, the Engineering report does specify that the developer may be liable for the payment of a Development Contribution (as calculated by Bitou Municipality) for bulk infrastructure upgrades as per Council Policy.

Water

Bulk Infrastructure:

The existing water reticulation system has sufficient capacity to accommodate the domestic flow of the proposed development in order to comply with the pressure criteria as set out in the master plan. However, upgrading of the existing reticulation network and bulk supply system is required in order to comply with the fire flow criteria and bulk supply criteria as set out in the master plan.

This bulk system to the Wittedrift, Aventura and Matjiesfontein reservoirs does not have sufficient capacity and will have to be reinforced to accommodate the proposed development in the existing water system.

The following network upgrades are proposed in order to comply with the fire flow criteria as set out in the master plan:

Network upgrade

- 430 m x 160 mm Ø replace existing 75 mm Ø pipe.
- 390 m x 110 mm Ø replace existing 75 mm Ø pipe.

Bulk Water Supply Upgrades

- 25 m x 160 mm Ø inter-connection between existing 150mm & 300mm Ø pipes (will be verified by the Bitou Municipality).

The existing 75mm Ø bulk pipeline between Kammassie Street and Protea Street crosses through the proposed development and will need to be relocated to within the proposed road reserve and form part of the internal reticulation. The cost of isolating valves and re-routing of the pipeline will be to the Developer's account. GLS Consulting have recommended that a new 75mm Ø pipe be installed in Kammassie Street to improve the existing network west of the proposed development.

Internal Infrastructure:

A metered water supply will be provided for each site. The existing 75 mm Ø pipe is currently supplied under gravity via the Wittedrift reservoir at a Top Water Level (TWL) of 70.0 m.a.s.l. While the existing water reticulation system has sufficient capacity to accommodate the domestic flow of the proposed development, upgrading of the existing reticulation network is required to comply with the fire flow criteria.

The existing reservoir volume available at the Wittedrift reservoir is 90 hours of the total AADD and is therefore sufficient to accommodate the proposed development. A preliminary water reticulation layout is included as Dwg 1692-R-100 in Appendix L.2 of the Basic Assessment Report,

The proposed water reticulation network includes the following details:

- 50mm HDPe, ISO 4427, PE63, PN 10 /75mm Ø PVC-U SABS 966 class 9
- Approximate Length: +/- 625m

Wastewater

Bulk Infrastructure:

It has been determined that there is sufficient capacity in the existing sewer reticulation system to accommodate the proposed development. The existing Wittedrift pump station and rising main have sufficient capacity to accommodate the proposed development, however this should be verified by the Bitou Municipality.

The flow from Wittedrift pump station and multiple other pump stations are received at Aventura Pump Station. GLS Consulting have received information that the Aventura Pump Station has recently been upgraded to a pumping capacity of 78 L/s, but no upgrading has been performed to the existing Aventura PS rising main.

While the pumping capacity of 78 l/s at the Aventura PS will be sufficient to accommodate the proposed development at Wittedrift in the existing sewer system, the Engineers have recommended that the existing 200 mm Ø Aventura PS rising main is upgraded to a 355 mm Ø rising main (master plan item BPS34.2) to accommodate the ultimate planned Aventura PS capacity.

However, the capacity of the Aventura PS of 78 l/s and the diameter of the accompanying rising mains of 200 mm should be verified by the Bitou Municipality.

The following master plan item will be required to reinforce the existing system in order to accommodate the proposed development.

Network upgrade (Minimum requirement)

- 5 400 m x 355 mm Ø Upgrade existing Aventura pump station rising main.

Internal Infrastructure:

An existing 110mm Ø uPVC sewer extends down Protea Street which has been determined to be the most suitable sewer connection for the retirement village. While an existing 110mm Ø uPVC sewer extending from erf 104 into the sewer in Protea Street, which carries no flow and will be abandoned.

Various options were considered to provide sewerage infrastructure to the proposed development. Based on ground-based survey information, it was found that it is was not possible to provide a full gravity sewer system to serve the entire development based on existing ground levels.

This left two options, namely a pumped system (which would have to be maintained by the residents) or shaping of the site to suit drainage of the properties. This second alternative was considered the most suitable option, primarily requiring shaping of a portion of erf 103 back towards the proposed roadway. The preliminary sewer design included in Volume 2 is based on a gravity sewer system to serve the development.

A layout indicating the proposed sewer network for the entire development is included as Dwg 1692-R-200, of Appendix L.2 of the Basic Assessment Report. However, this will only be finalised during the detail design stage of the project. Typical sewer and erf connection details are included as Dwg 1692-R-201 of Appendix L.2 of the Basic Assessment Report.

The proposed sewer network will entail the following details:

- 110mm Ø PVC u, Type 1, SANS 1601, 400 kPa pipes.
- Approximate Length: +/- 525m.

Stormwater

A Stormwater Management Plan, prepared by Nadeson Consulting Engineers (Pty) Ltd and supplied by Bitou Municipality, has been used as the basis for the required stormwater infrastructure to accommodate flows within the catchment leading to the proposed development. Upon approval of the Environmental Authorisation, Elwandle Consulting Engineers were appointed by the Holder to design the detailed Stormwater Management Plan for the proposed development (Please refer to Appendix F of the EMPr for this detailed Plan).

The current drainage is observed along Rotterdam Street where it crosses Rotterdam Street with a 600mm [450mm Ø] diameter pipe which outlets into an open field and eventually down to Bosfontein River. It has been determined that the proposed pipe sizes have adequate capacity to accommodate the 2-year storm runoff with over 30% spare capacity (allowed for flash floods), and the drainage channels have adequate capacity to accommodate the 50-year storm runoff. Preliminary designs based on using the proposed roadway cross sections, indicate that accommodating the internal stormwater will be possible.

Due to small area encompassing the proposed retirement village (2.1 hectares), there would be no need for on-site attenuation of stormwater. A 600mm diameter, 100D concrete stormwater pipe will convey stormwater generated on the site from the lowest point (near the community centre) to the main pipeline leading to the discharge point. An overland escape route will also be created to allow major storm flow to discharge into the valley below. The outlet will be suitably protected with gabions, reno mattresses or other suitable materials to prevent scour.

The following image provides the stormwater management plan to be adopted for the proposed development as designed by Elwandle Consulting Engineers, following both the receipt of the EA and further feedback received from Bitou Local Municipality regarding the Site Development Plan (Figure 7). Please refer to Appendix F of this EMPr for a high-resolution version of this plan.

The development will see to the construction of one new storm water pipeline of Ø450 mm leading from the development to an outlet headwall within the sensitive area which will be equipped with a 2 m reno mattress in front of the outlet as scour protection. All other inlet structures are either abandoned structures or have been proposed by other parties.

Furthermore, as can be seen in the stormwater management plan, the internal stormwater reticulation will be 375 mm throughout the development and Stormwater Manholes (SWMH as indicated on the plan) have been placed in strategic locations throughout the development. All stormwater will be collected through two catchments, with SWMH2, SWMH2.1 and SWMH2.2 draining toward the pipeline labelled "Stormwater Pipe by Others" and all other SWMHs drain towards the Ø450 mm pipeline to be constructed by the EA Holder. Please refer to Figure 9 for the stormwater catchment areas associated with the development's stormwater layout plan.



Figure 7. Detailed Stormwater Management Plan for the development.

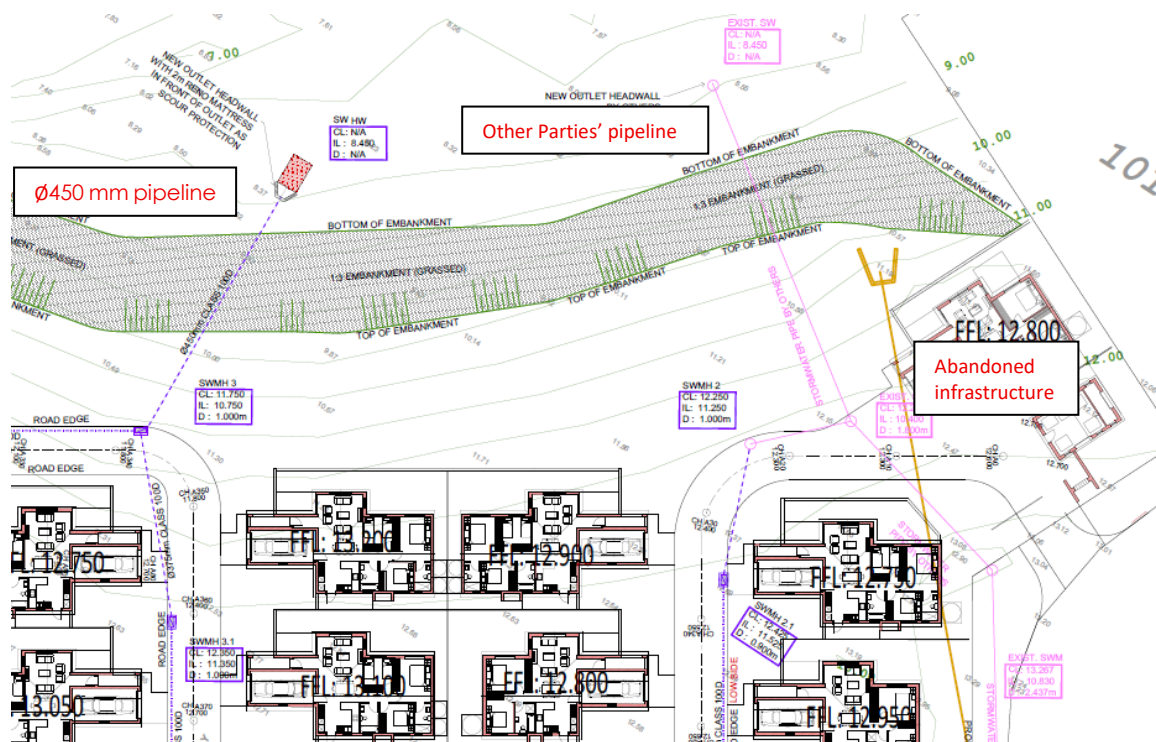


Figure 8. Stormwater Pipelines within proximity to the sensitive areas.



Figure 9. Stormwater Catchment areas.

Floodline Analysis

A floodline analysis was carried out by Fraser Consulting Civil Engineers, which conclude that the 100-year recurrence interval storm it's at approximate level 8m MSL, which is at least 1,5m below the existing level of the lowest properties on erf 103 and 4,5m below the proposed levels of the lowest properties (after shaping). Their hydrological calculations show the 100-year RI peak flow rate to be 30m³/s.

Access

Entrance to and exit from the retirement village will be onto Protea Street, which carries minimal traffic, as it ends in a cul-de-sac serving 10 erven. During the worst peak hour, the development will generate approximately 16 trips compared to the 10 trips generated by the existing residential units along Protea Street. Bitou Municipality requested that Engineering Advice and Services apply to the District Roads Engineer (Oudtshoorn) for approval of the access onto Main Street, which is a District Road. All efforts to contact the DRE have been without success.

Roads

Table 2: A broad indication of the hierarchical functionality of the road network which is found in the proposed development.

Road Class	Maximum Dwelling Units Served	Preferred Maximum Length	Proposed Road Reserve Widths	Proposed Roadway Widths	Proposed Bell Mouth Radii at Intersections
Minor Collectors - Class 4	-	-	-	8.0 m	-

Local Distributors - Class 4	400 - 1500	n/a	16m	7.4 m	12m
Residential Access Collectors - Class 5a	200	500 m	12m	6.2 m	10m
Residential Access Loops - Class 5b	120	300 - 500 m	12m	6.0 m	8m
Access Cul-de-Sacs - Class 5c and 5d	< 60	150 m	8m	3.0 m	6m

The proposed road layout is indicated on the road layout plan (see Appendix L.2 of the Basic Assessment Report, Dwg 1692-R-300). Typical long sections for internal roads is included (see Appendix L.2 of the Basic Assessment Report, Dwg 1692-R-301 through 1692-R-304) and incorporate the road reserve and road widths proposed in the following section of this report.

The Engineers have noted that road widths and reserves for this development, do not comply with the guidelines but the Client has indicated that these should not be changed. In addition, they have noted that the Bell Mouth radii for this development do not comply with the guidelines due to the reduced road widths.

All road markings and signage are to be in accordance with the requirements of the South African Development Community Road Traffic Signs Manual (SADCRTSM). An allowance has been made for 1m wide sidewalks along roads within the proposed development, while it should be noted that no public embayments are provided within the development.

Electrical services

An electrical LB Distribution Line and Electrical MV cable run in the Rotterdam Road reserve. With the planned closing of a portion of the road for the development, a servitude needs to be created within the erf with some re-routing. According to Telkom records, it has been confirmed that there are no existing servitudes, therefore a new underground route will be established by Openserve to make provision for the relocation of the overhead aerial route, that currently runs along the portion of Rotterdam Road that will be closed, to outside of the housing project's boundary.

Table 3: Summary Table: Site and Farm Details

Province	Western Cape	
District Municipality	Eden District Municipality	
Local Municipality	Bitou Local Municipality	
Ward number(s)	Ward No 7	
Nearest town(s)	Wittedrift (within)	
SG Code	Erf 103	C03900110000010300000
	Erf 104	C03900110000010400000
	Rotterdam street (ID: RE/245)	C03900110000024500000

Co-ordinates of the farm boundaries as shown in the adjacent table and figure:

	Latitude	Longitude
A	34° 0' 29.3"	23° 19' 55.49"
B	34° 0' 26.48"	23° 20' 2.17"
C	34° 0' 28.83"	23° 20' 0.95"
D	34° 0' 29.47"	23° 20' 2.58"
E	34° 0' 33.04"	23° 20' 4.45"
F	34° 0' 35.94"	23° 19' 59.06"

Table 4: Site boundary coordinates



Figure 10: Site boundary coordinates.

5. Description of Environmental Setting

5.1 Vegetation

5.1.1 Vegetation description

According to CapeFarmMapper (Accessed April 2020) the vegetation map of SA (Figure 7) indicates that the vegetation unit primarily affected by the proposed development is Garden Route Granite Fynbos which has an Endangered (EN) threat Status.



Figure 11: Vegetation Map of SA.

As part of the application for environmental authorisation, an Aquatic Habitat Impact Assessment was completed by Sharples Environmental Services CC in 2019. The Aquatic Habitat Impact Assessment stated that the study site has been subject to various anthropogenic impacts. The current terrestrial vegetation on site includes few indigenous species. This is likely due to agriculture transforming the land through clearing and ploughing. The proposed development area has flat topography and is mainly covered in grass species (Figure 9A) such as kikuyu (*Pennisetum Clandestinum*) and *Eragrostis curvula*. A large group of poplar trees (*Populus alba*) are found on the western boundary of the study site (Figure 9B). Some individuals grow in-between the mature trees next to Main Road and just upslope of the aquatic habitat. Seven oak trees (*Quercus* sp.) line the southern boundary of the property, next to a grassed stormwater v-drain. A few young Milkwood trees grow close to the stormwater outlet at the south-western corner of the study site. The area proposed for development is on top of a fluvial terrace on site and covered in terrestrial vegetation with negligible natural habitat remaining.

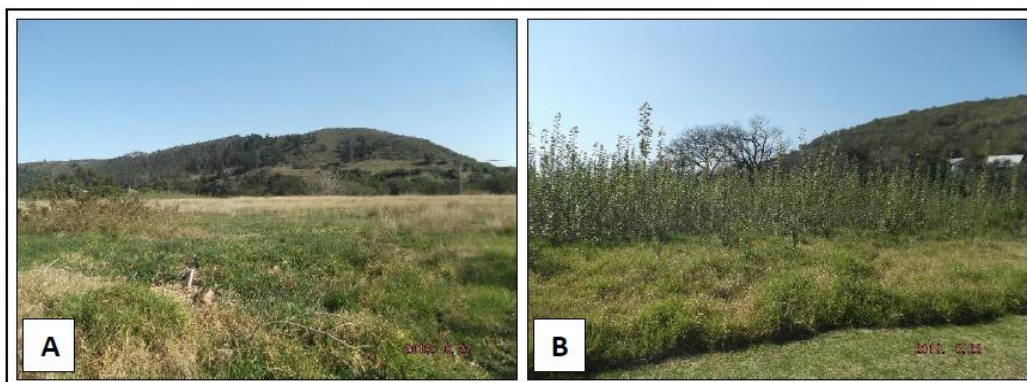


Figure 12: Vegetation found on site

Existing regular human use of the area can be seen by the footpaths through the site. A well-used path cuts diagonally through erf 104 and is scattered with solid domestic waste and garden refuse. There is also a trail leading from the gravel road to the active channel of the river in the northeast of the study site. This trail has denser vegetation cover and large volumes of domestic waste as well as human waste is scattered in the area. The study site overall seems to be used as a dump site for garden waste, building rubble and black bags with domestic waste. Garden wastes include leaves, soil and grass cuttings and building rubble vary from pieces of brick to broken concrete and plastic.

According to CapeFarmMapper (Accessed in April 2020) in a more fine-scale study Vlok et al (2008) mapped Sedgefield Coastal Grassland as the dominant vegetation type. Groot Brak River Floodplain vegetation is present along the Bosfontein River Wetland north of the development. A small portion of Knysna Enon Fynbos is mapped in the southern region of the site. This vegetation type is dominant within the area (Figure 10).

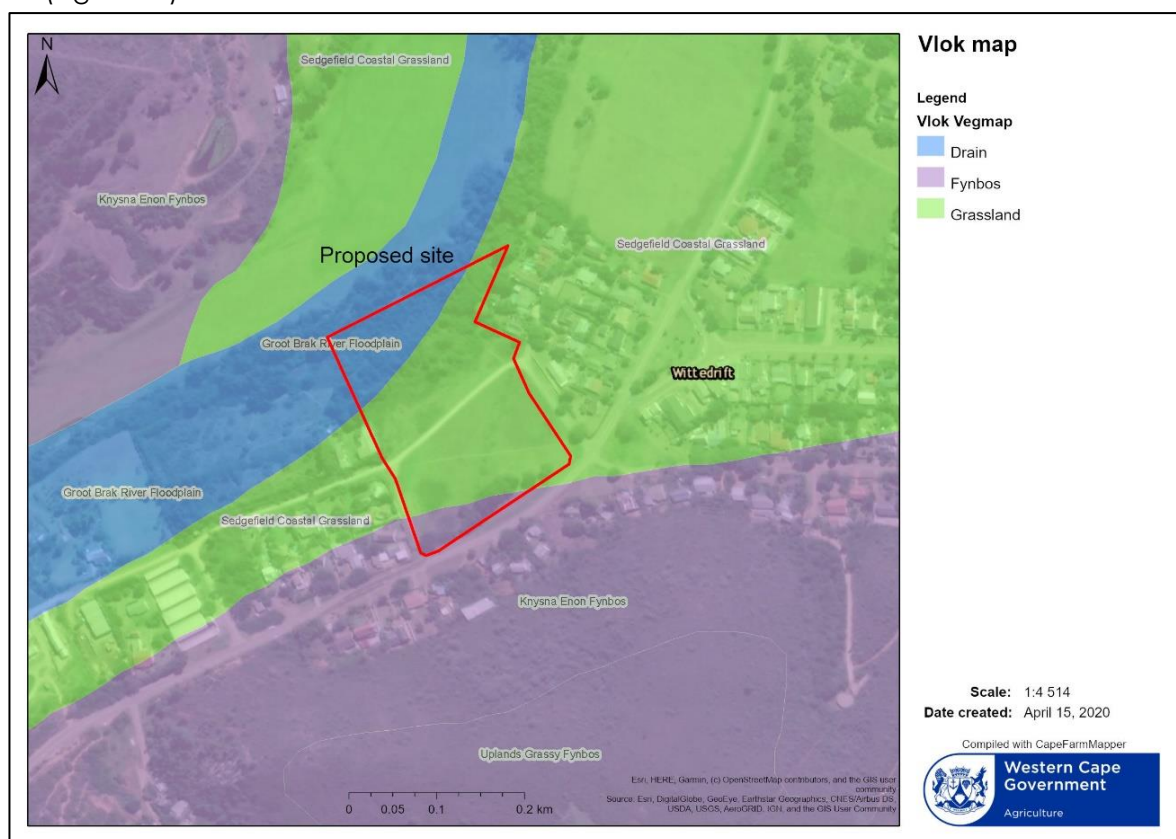


Figure 13: Vlok map.

5.1.2 Critical Biodiversity Areas

According to the CapeFarmMapper (Accessed April 2020), there are areas mapped as Ecological Support Areas (ESA) and Critical Biodiversity Areas (CBA) by the Western Cape Biodiversity Spatial Plan (2017) within the proposed site, as seen in Figure 11 below. The presence of the Bosfontein River and associated riverine habitat north west of the proposed property has resulted in the classification of the area as a Category 1 Terrestrial CBA. The remainder of the site is classified as a Category 1 Terrestrial ESA. However, the area mapped as the ESA has been completely degraded as a result of invasive alien vegetation as well as footpaths and occurrence of grass types such as Kikuyu.

An Environmental Compliance Statement completed by Mark Berry Environmental Consultants (2021) explains that the site proposed for the development (outside the river corridor and main wetland area) is highly degraded/transformed and considered to be of low value (and significance) as a viable habitat for indigenous plant species. No fynbos was recorded on site. It is also unlikely that any species of conservation concern (SCC) will be found on site. Its position inside an urban context largely surrounded by houses, further supports the statement. With regards to the sensitive species listed in the Screening Report, the following: *Selago burchellii*, *Erica glandulosa ssp fourcadei*, *E. glumiflora* (sand dunes) and *Lampranthus pauciflorus* are more coastal species. In other words, they are more abundant in habitats directly adjacent to the shoreline. *Ruschia duthiae* is an endemic vygie found mainly between Wilderness and Knysna. *Pterygodium cleistogamum*, *Acmadenia alternifolia* (recorded on the hilltops west of Wittedrift), *Muraltia knysnaensis* and *Leucospermum glabrum* are fynbos species found on more elevated, hilly areas. The presence of any of these species in the immediate area of the site is unlikely. The Environmental Compliance Statement (2021) states that cognisance must however be taken of the recorded milkwoods and wetland area (on northern side) and planned accordingly. Either the milkwoods must be accommodated inside the development or a permit is needed for its removal.

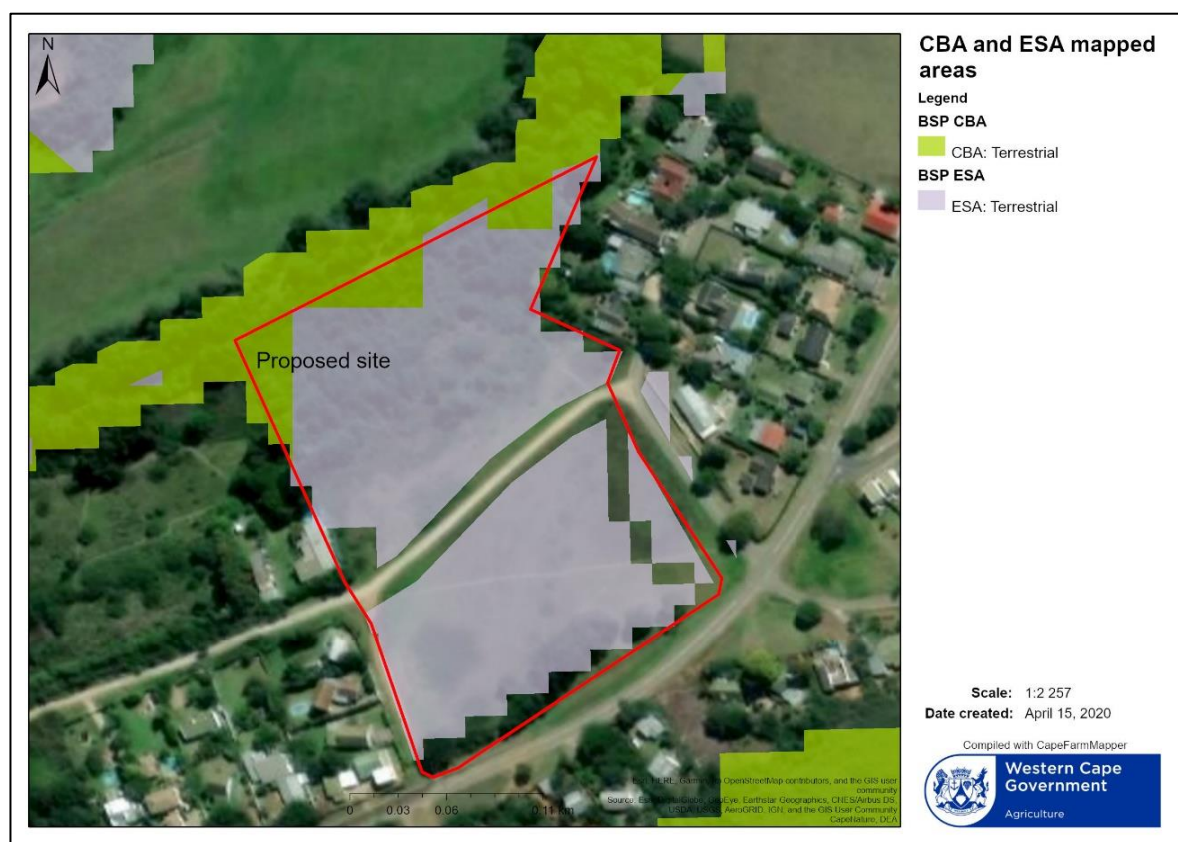


Figure 14: CBA and ESA areas identified by the Western Cape Spatial Plan.

5.2 Freshwater features

5.2.1 The Aquatic Environment

According to the Aquatic Habitat Impact Assessment completed by Sharples Environmental Services CC in 2019, the study site is within quaternary catchment K60F (Figure 12) and falls under the jurisdiction of the Breede Gouritz Catchment Management Agency as the water use authority. The Bitou River is the largest system within this catchment and joins the Keurbooms River in the south to form the Keurbooms Estuary. The study site is located within the Bosfontein River valley that flows in a north easterly direction towards the Bitou River. This reach of the Bitou contains vast floodplain wetland habitat of national biodiversity importance. The broad floodplain wetland of the Bitou River is more than 600ha in size and is a valuable ecological resource. The Bitou wetland is essentially part of the greater Keurbooms Estuary and therefore impacts on the Bitou will in turn impact the Keurbooms system.

The Bosfontein River that flows past the study site merges with the Bitou River wetland. The Bitou River in turn contributes to the freshwater supply of the Keurbooms Estuary.

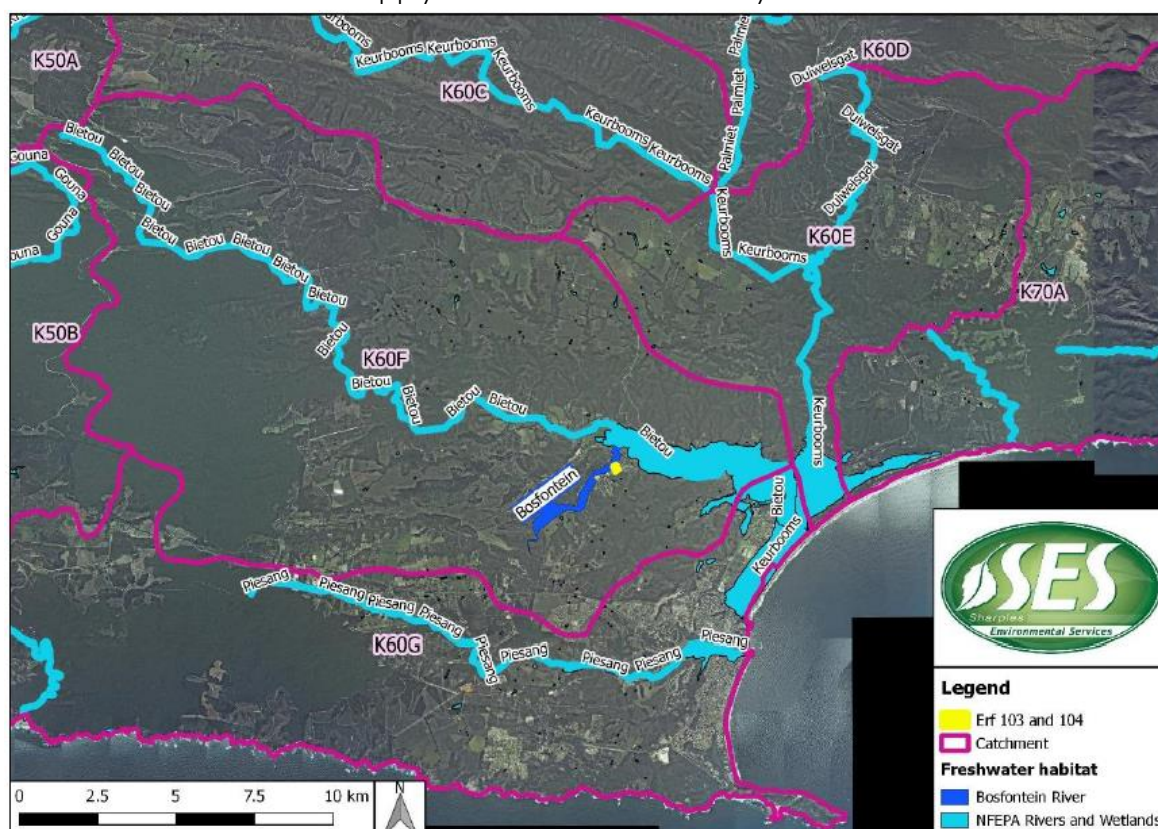


Figure 15: Map showing the study site in relation to quaternary catchments of the area.

Figure 13 below indicates that the area proposed for development is on top of a fluvial terrace. The area is covered in terrestrial vegetation with negligible natural habitat remaining and has been subject to various impacts such as from agriculture, forestry and urban development. The top of the fluvial terrace is covered in Kikuyu grass (*Pennisetum Clandestinum*) and *Eragrostis curvula*. The study site has well-used footpaths through it and is scattered with domestic waste, building rubble and garden waste. However, most of the disturbance are in the terrestrial area and the aquatic habitat on site is less impacted and viable.

The Aquatic Habitat Impact Assessment (2019) determined that the aquatic habitat that will be impacted by the development is the Bosfontein River wetland north of the development (Figure 13). This wetland is

fed by the perennial river channel that runs through it, the Bosfontein River. Under natural conditions the channel was likely shallow and situated within more extensive wetland habitat. However, due to its current incised nature, the active channel and remnant wetland vegetation is predominantly disconnected.



Figure 16: Landscape features dictating aquatic habitat extent on site.

The wetland habitat has an overall 'D' Present Ecological State (PES) score, indicating a Poor system. However, this is an indication of the health of the whole reach of natural wetland. The fragment of wetland habitat remaining is in better health with dense vegetation cover and no signs of erosion. The wetland's functional importance is highlighted in its ability to attenuate floods, trap sediment and control erosion. These services will benefit the downstream Bitou River wetland by acting as buffer between this system and developments upstream.

5.2.2 Habitat Integrity, Ecological Importance & Sensitivity

The Ecological importance of the wetland can be classified into goods/products (directly harvested from wetlands), functions/ services (performed by wetlands), and ecosystem scale attributes. The WET-EcoServices assessment highlights these benefits and the extent of each benefit for the wetlands. The assessment indicates that the wetland habitat has a Low to Moderate functional importance. The functionality of the wetland has been compromised by degradation as a result of forestry, urbanization and agricultural activities in the catchment.

The wetland fulfils its function in contributing ecosystem services. The most important services include flood attenuation, sediment trapping and erosion control. These services will benefit the downstream Bitou River wetland by acting as buffer between this system and developments upstream. Increased stormwater inputs and altered runoff from the hardened surfaces of the proposed development will be mitigated by the wetland to prevent erosion and flooding downstream. The wetland's ability to trap pollutants are also

beneficial considering the higher pollution load associated with the development's construction and operational phase.

The wetland has a Moderate overall Ecological Importance and Sensitivity (EIS) score. The biodiversity importance is moderate due to its sensitivity to changes in floods and water quality; the protection status of the surrounding vegetation type and its ability to act as a migration route. The hydrological importance of the system is limited due to the size of the remnant wetland habitat.

5.2.3 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Area project (NFEPA) aims to provide strategic spatial priority areas for conserving South Africa's aquatic ecosystems and supporting sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas (FEPAs) and the main output of the NFEPA project was the creation of FEPA maps. FEPAs were identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (Driver et al. 2011). The Freshwater Habitat Assessment Report (2019) states that the NFEPA data failed to identify and/or appropriately classify the aquatic habitat. Therefore, no FEPA habitat were identified within or adjacent to the study site by the NFEPA project

6. Legal Framework

6.1 The NEMA, Act No 107 of 1998, as Amended, and the EIA Regulations (2014)

The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa by providing a framework for co-operative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment. NEMA requires that an environmental authorisation be issued by a competent authority (CA) before the commencement of an activity listed in Environmental Impact Assessment Regulations Listing Notices G.N. 324, 325, 326 & 327 published on the 7th April 2017.

Due to the fact that this development proposal is an activity listed in the EIA Regulations, a Basic Assessment Report is required, and the respective reports must be submitted to the Department of Environmental Affairs and Development Planning (DEADP) before they issue *The Home Market NPC* with an Environmental Authorisation (either approval or rejection of the development proposal).

The following table indicates the amendments necessary for the new development proposal to be compliant with the latest NEMA Regulations:

Table 2: Listed Activities in terms of the NEMA Environmental Impact Assessment Regulations (2017), as amended, that are proposed to be triggered

Activity #	Listing notice 1. Description of Activity as per GN No. R 327
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or

	(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
Activity #	Listing notice 3. Description of Activity as per GN No. R 324
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. i. Western Cape i. Areas zoned for use as public open space or equivalent zoning; Areas outside urban areas; (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or ii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.
Activity #	Listing notice 2. (GN No. R325): Scoping & Environmental Impact Reporting
N/A	N/A

Therefore, in summary, the following activities will be applied for:

- Listing Notice 1: Activity No: 12 and 27
- Listing Notice 2: None
- Listing Notice 3: Activity No: 4

6.2 Other applicable legislation

The Home Market NPC is responsible for ensuring that all contractors, labourers and any other appointed person/entity acting on their behalf, remain compliant with the conditions of the received authorisations, as well as the provisions of all other applicable legislation, including *inter alia*:

- National Environmental Management Act (NEMA) (Act No 107 of 1998, as amended);
- National Environmental Management Biodiversity Act (Act 10 of 2004);
- National Environmental Management: Waste Act (Act 59 of 2008);
- National Water Act (Act 36 of 1998)
- National Forest Act (Act No 84 of 1998);
- National Heritage Resources Act (Act No 25 of 1999);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Veld and Forest Fire Act (Act No. 101 of 1998).

The National Water Act (Act 36 of 1998) provides the framework for the sustainable management of South Africa's water resources. It aims to protect, use, develop, conserve, manage and control water resources as a whole, promoting integrated water resource management that involves participation of all stakeholders. The Act declares the national government to be the public trustee of the nation's water. The Act is administered by the national Department of Water Affairs (DWA) via regional offices.

The proposed development activities will trigger a water use licence in terms of Section 21 (c) and (i) of the National Water Act (Act 36 of 1998). The Water Use License and applicable conditions thereof, were obtained on the 22nd of April 2021.

The above listed legislation has general applicability to most development applications, and it is *The Home Market NPC's* responsibility to ensure that all contractors and employees are aware of their obligations in terms of these Acts. This EMP_r does not detract from any other legal requirements.

The proposed development activity will take place through various phases. Each phase has specific impacts or issues unique to that phase of the development activity. These phases of the development are listed below, and the impacts associated with each phase as identified through the environmental impact assessment process are identified and given a brief description. Brief management statements are provided, as well as a description of the desirable impact management outcomes.

7. Scope of this EMP_r

This EMP_r describes the measures that must be implemented in order to avoid, minimise, manage and monitor the potential environmental impacts of the development, during all phases of the project life cycle, namely:

- Planning and Design Phase
- Pre-construction Phase
- Construction Phase
- Post-Construction Rehabilitation
- Operational Phase

General environmental management measures that must be applied throughout the project lifecycle (as and where applicable) are described in Chapter 8 below. Additional management measures that must be implemented to address specific impacts that may arise during each phase are provided in **Chapters 9-12** of this EMP_r.

8. General Environmental Management

The following general management measures are intended to protect environmental resources from pollution and degradation during all phases of the project life cycle. These measures should be implemented as and where applicable, reasonable and practicable during the pre-construction, construction and post-construction rehabilitation and operational (maintenance) phases of the proposed development.

Code of Conduct

The purpose of the Code of Conduct (CoC) is to minimise the impact of the activities associated with the construction phase on the environment. The rules and regulations prescribed in this CoC are intended to ensure that the impacts on the environment are not prejudiced by the construction activities. Failure to adhere to or any breach of this CoC will result in a fine being levied against the offending or defaulting party / individual.

Labourers during the construction phase should conserve the natural environment, endorsing the principles of sustainable use and minimum impact. They should also be sensitive to the impact of their operation on the environment within which they work and minimise any adverse impacts.

This EMPr forms an integral part of the activities during the construction phase and as such, is legally enforceable. In addition to the restrictions and controls provided for in this EMPr, the environmental controls comprise the following:

Engineers

- Unless otherwise stated by the holder, only a registered engineer must be appointed for the construction phase of the development.
- The engineer shall provide work or services of a quality and scope, and to a level, which are commensurate with accepted standards and practices.
- The engineer shall be impartial in decision-making, provision of advice and judgement.

Contractors and sub-contractors

- Unless otherwise determined, only appropriately registered contractors shall be appointed.
- It shall be the responsibility of the holder / engineer to ensure that the contractors abide by and comply with the rules and regulations of the Code of Conduct.
- Contractors shall at all times be responsible for their sub-contractors and employees whilst they are on the development property.

Rules and Regulations

It is of vital importance that engineers, and contractors understand and acknowledge that they are working on an environmentally sensitive development and agree to conform to all environmental controls specified in this EMPr, and any additional environmental permits/licenses, as well as any additional input by the ECO. In addition to the EMPr, the environmental controls comprise of the following:

- **Building Plan Controls**
 - A copy of the approved and signed building plans must be available on site during the construction phase of the development.
 - Variations of the building plans must be approved by the engineer / holder prior to being implemented.

- Prior to commencing building, the contractor must remove all topsoil and store it in a berm of not more the 2m high, away from construction activities.
- **Site tidiness**
 - The contractor must keep the appearance of the site neat and tidy at all times. Building rubble must be removed from site at regular intervals, and litter must be removed from the site on a daily basis. Refuse drums must be available on site which waste can be placed in. The drums must be emptied on a regular basis and the waste taken to a licenced local waste disposal facility.
- **Safety**
 - The contractor shall comply with the Health and Safety Act (Act No. 85 of 1993), as amended, together with such regulations promulgated thereunder.

8.1 Site access and traffic management

The site will be accessed from Protea Street.

All construction vehicles need to adhere to traffic laws and regulations, drivers must be sensitised to the fact that they are working in an area with a potentially high volume of foot and vehicle traffic. The speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. As far as possible, care should be taken to ensure that the local traffic flow pattern is not significantly disrupted, and vehicle operators therefore need to be educated in terms of "best-practice" operation in order to minimise unnecessary traffic congestion or dangers. These practices include, but are not limited to, not unnecessarily obstructing the access point or traffic lanes used to access the site; considering the load carrying capacity of road surfaces and adhering to all other prescriptive regulations regarding the use of public roads by construction vehicles.

Adequate signage that is both informative and cautionary to passing traffic should be erected to warn other road users (motorists and pedestrians) about the presence of construction vehicles, particularly at the point where construction vehicles enter/ exit the site from the N2 warning them of the construction. Signage would need to be clearly visible and include, amongst others, the following:

- Identifying working area as a construction site;
- Cautioning against relevant construction activities;
- Prohibiting access to construction site;
- Clearly specifying possible detour routes and / or delay periods;
- Possible indications of time frames attached to the construction activities, and;
- Listings of which contractors are working on the site.

Other mitigation measures include:

- No construction to take place over or during the December holiday period without prior permission from the relevant authorities.
- Construction vehicles must adhere to the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles.
- ECO to do awareness training with the contractor and labourers and to highlight the traffic related risks before construction commences (see Appendix D for Environmental Awareness Plan).
- Where possible, construction traffic that may obstruct traffic flow on the surrounding roads should be scheduled for outside of peak traffic times.
- Ensure appropriate behaviour of operators of construction vehicles.

- If needed, appropriate traffic management measures and/ or points men (traffic marshals) should be utilized to assist vehicles entering/ exiting the site, particularly where vehicles must cross the path of oncoming traffic.

8.2 Site demarcation

The working areas should be clearly demarcated on site during the pre-construction or construction phases of the development, as appropriate.

8.2.1 Construction working area

Prior to the commencement of any land-clearing or construction activities, the outer boundary of the development area must be surveyed and pegged, particularly near the aquatic no-go area. This demarcation boundary is to ensure that land clearing and construction activities are restricted to only that area strictly required for the proposed development, and to prevent unnecessary disturbance of soil surfaces and vegetation outside of the development footprint.

The outer boundary of the working area should be enclosed with, at least, shade netting, droppers & wire, or similar – as is feasible and practical. Access point should be temporarily gated. The fencing should be retained and maintained for the duration of the construction period, it should not be removed until construction and reinstatement/rehabilitation concludes, unless changes are required, which will only apply with the approval of the appointed ECO and Site Engineer. Areas to be cleared must be demarcated before any clearing and grubbing commences.

8.2.2 No-go areas

Prior to the commencement of any land-clearing or construction activities, all sensitive areas (as identified by the ECO), must be demarcated and must not be disturbed during the construction phase. It is recommended that the No-Go areas be demarcated with a suitable material that can be easily identified and noticed. Danger tape flagging (pieces of danger tape tied to twine or rope) may be utilised, however the use of only danger tape is not recommended for long-term demarcation as this will easily become untidy and blown away by the wind resulting in pollution.

No-go areas could include areas with slopes of 1:4 and steeper, greenbelt / corridor areas, public open spaces, drainage lines, demarcated/barricaded trees, streams and/or other wetlands outside of the approved development area. No-go areas outside the approved development area must be off-limits to all construction workers, vehicles and machinery during all phases of the development. No vegetation may be cleared from within the no-go areas (unless in accordance with an approved alien invasive management plan and under the supervision of the ECO), and no dumping of any material (waste, topsoil, subsoil etc.) may occur in these areas. Construction workers must be informed of the no-go areas, and if necessary appropriate signage can be used to enforce the demarcation. Any interaction with no-go areas should be consulted between the contractor and ECO prior to any actions.

As described in the Freshwater Habitat Impact Assessment compiled by Sharples Environmental Services cc (2019), aquatic buffer zones are designed to act as barriers between human activities and sensitive water resources in order to protect them from adverse negative impacts. Buffer zones associated with water resources have been shown to perform a wide range of functions and have therefore been adopted as a standard measure to protect water resources and associated biodiversity. An aquatic impact buffer zone is defined as a zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels (Macfarlane and Bredin 2016).

A buffer area surrounding the freshwater habitat needs to be established, demarcated and strictly adhered to (see Appendix C for the buffer coordinates). The specific size of the buffer zone was informed by a tool developed by Macfarlane and Bredin (2016) called Buffer zone guidelines for rivers, wetlands and estuaries. A buffer of 10 meters from the boundary of the delineated freshwater habitat was determined using the tool and is indicated in Figure 14 below. Key personnel need to be established by *The Home Market NPC* to clear alien vegetation in buffer zone, in accordance with the alien vegetation management plan (Appendix B), identifying alien and indigenous species. The inclusion of the stormwater control and slope stability measures/infrastructure may encroach upon this area, therefore the positioning of these structure should be done under the supervision of the ECO and in compliance with the authorized layout plan. However, where possible encroachment should be avoided.

An aquatic buffer is not straight line, therefore must be delineated on site, and demarcated accordingly. No construction activities are permitted within the buffer area. No materials may enter or be stored within the buffer area.



Figure 17: A map showing the recommended 10m buffer from aquatic habitat overlaid on the amended proposed layout.

8.2.3 Demarcation of the site camp

The area chosen for the site camp and associated facilities must be the minimum area reasonably required to accommodate the site camp facilities, and which will involve the least disturbance to the environment. It is recommended that easily accessible, transformed areas must be used for the site camp, at least 50m away from any no-go areas. Site selection must be done in consultation with the ECO.

8.3 Site camp and associated facilities

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:

8.3.1 Fencing & Security

The site camp area must be secured to prevent any un-authorised individuals from entering the site camp and possibly getting injured or posing a safety and/or security risk. Adequate signage must be displayed, designating the site office / camp as a restricted area to non-personnel. If required, the site camp and associated areas may be fenced off along the demarcated boundaries of these areas, preferably with 2m high fence and shade netting or similar.

8.3.2 Fire Fighting Equipment

No less than 2 fire extinguishers must be present in the site camp. The extinguishers must be in a working condition and within their service period. A fire extinguisher must always be present wherever any "hot works" (e.g. welding, grinding etc.) are taking place. It is recommended that all construction workers receive basic training in fire prevention and basic fire-fighting techniques and are informed of the emergency procedure to follow in the event of accidental fires. No open fires may be made on the construction site during any phase of the project. Construction workers may make small, contained fires (e.g. for warming or cooking purposes), within the site camp provided the small fire is encircled by a corrugated iron structure, drum or similar, to prevent wind-blown cinders from causing fires elsewhere. Such fires may not be left unattended and must be thoroughly extinguished after use. No smoking must be allowed on the construction site. In the case of accidental fires the contractor must (if required) alert the Local Authority's Fire Department as soon as a fire starts prior to the fire becoming uncontrollable.

8.3.3 Waste Storage Area

Sufficient bins for the temporary storage of construction related waste must be provided inside the site camp and/or at the working area and should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. Label each waste receptacle for waste separation, and ensure waste is contained either by use of lids or by ensuring waste receptacles are emptied prior to filling up, making them susceptible to wind dispersion. Sufficient signage and awareness should be created to ensure that these bins are properly used.

8.3.4 Hazardous Substances Storage Area

Fuels, chemicals, lubricants and other hazardous substances must be stored in a demarcated, secured and clearly sign-posted area within the site camp away from the watercourses on site. Sufficient signage and awareness should be created to ensure that these bins are properly used. Ensure that when substances are transferred, this is done on an impermeable and/or bunded surface, to contain any spillage. Spillage, should it occur, should be disposed of appropriately.

8.3.5 Potable Water

An adequate supply of potable water must be provided to construction workers at the site camp. It is the Contractors duty to ensure that the labour has adequate access to potable water throughout construction phase, and to monitor weather conditions, to ensure that labour has enough drinking water on hotter days, or construction activity must cease, until conditions are safe to continue.

8.3.6 Ablution Facilities

Chemical toilets should be maintained on the site camp for the duration of the construction phase and rehabilitation, on a level surface and secured from blowing over and located in such a way that the toilets will not cause any form of pollution. As per the SANS10400 requirement, one ablution facility for every 8 male workers and 2 ablution facilities for every 8 female workers will be provided.

The ablution facilities must not be linked to the river system in any way. 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. The toilet facilities should be emptied on a weekly basis, by an appropriately

registered service provider. Proof of this weekly servicing must be obtained and filed in the Environmental File on site. Performing ablutions outside of the provided toilet facilities is strictly prohibited and the ECO would need to regularly inspect the state of the chemical toilets to ensure compliance.

- Ablution facilities provided for construction workers must be placed away from the terrace edge.
- Ablutions should be further than 50m from the identified aquatic buffer area.

8.3.7 Eating Area & Rest Area

A dedicated area within which construction workers can rest and eat during breaks should be provided within the site camp. Seating and shade should be provided.

8.3.8 Vehicle & Equipment Maintenance Yard

Where possible, construction vehicles and equipment that require repair must 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 must be undertaken within the designated maintenance yard area away from any watercourses. Repairs must be conducted on an impermeable surface, and/or a tarpaulin and/or drip trays must be laid down prior to emergency repairs taking place, in order to prevent any fuel, oil, lubricant or other spillages from contaminating the surrounding environment.

8.3.9 House-keeping

The site camp and related site camp facilities must be kept neat and orderly at all times, in order to prevent potential safety risks and to reduce the visual impact of the site during construction.

8.4 Protection of fauna

Construction workers are to be sensitised to the fact that they may encounter fauna during the construction period. This should be included in the environmental awareness training completed with all site personnel before any construction commences (see Appendix D for Environmental Awareness Plan). No faunal species are to be trapped, or killed, if any fauna is encountered by construction workers, the ECO is to be notified. If the ECO is not on site, the site manager is to be informed. Rescued fauna should be released into a nearby area of similar habitat away from any construction. Contact details for animal rescue services and/or snake wrangler, from the local area, should be available on site, in case of an emergency.

8.5 Indigenous vegetation clearing and protection.

Where indigenous vegetation must be cleared for the development, the following measures must be implemented:

- **If it is found that Milkwood tree/s cannot be accommodated and require clearance, a permit is required from Department of Environment, Forestry and Fisheries (DEFF), prior to any actions taken on site.**
- European Oak trees to be preserved, should be effectively demarcated and barricaded to protect the trees from construction activities.
- Blanket clearing of vegetation must be limited to the approved development footprint, and the area to be cleared must be demarcated before any clearing commences
- Where feasible vegetation must simply be trimmed to facilitate access/ construction, rather than being completely cleared or removed, unless vegetation has been identified as an SCC (Species of Conservation Concern), in which case no removal, trimming or any further alteration may take place unless the relevant authority is notified, and procedures are undertaken to permit alternations.
- Vegetation clearing/trimming must be cleared by hand (i.e. brush cut) and stockpiled for use as mulch/ brush-packing during rehabilitation of the site. Any alien vegetation that is cleared must

be disposed of off-site, immediately, in consultation with the ECO and the Alien Vegetation Management Plan. If disposal cannot occur immediately, the cleared alien vegetation should be stored in an appropriate waste disposal vessel, that prohibits dispersal of the vegetation, from wind, etc, and disposed of as soon as possible.

- Only the areas required to accommodate the construction and access to the construction site must be cleared/trimmed of vegetation, as long the vegetation has not been identified as an SCC.
- After any clearing is completed, if the area is not to accommodate hardened surfaces, an appropriate cover crop should be planted where any weeds or exotic species are removed from disturbed areas timeously.
- Vegetation outside of the construction footprint and within any no-go areas must not be cleared, unless permitted in accordance with the alien invasive management plan, and under the supervision of the ECO.
- Land clearing and earthmoving activities should not be undertaken during strong winds, where possible.
- Ensure the open space is kept clear of alien plant species through the adoption of an Alien Invasive Management plan.
- Trees located in areas where sidewalks, open areas or gardens are proposed, these trees are to be barricaded and not cleared.
- No fires are permitted on site.

The proposed development requires the clearance of vegetation; however the following measures should be implemented to protect the indigenous vegetation where possible.

- Great care will be taken if cement is to be mixed on site, especially in the proximity of vegetation. Cement is to be mixed on thick plastic sheets or in large buckets and not allowed to spill onto bare ground. Any spillage will be cleaned up immediately. Cement water is also to be contained in the above manner and allowed to dry out and then removed from site. Cement water, which is highly alkaline, poses a definite threat to the soil and seed banks.
- Blanket clearing of vegetation must be limited to the approved development footprint, and the area to be cleared must be demarcated before any clearing and grubbing commences.
- A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the construction phase, but also to monitor any post-construction environmental issues and impacts such as increased surface runoff. The monitoring should be regular and additional visits must be taken when there is potential risk to the aquatic habitat.
- No clearing outside of development and infrastructure footprint area to take place.
- Rescued plants should be replanted into a nearby disturbed area of similar habitat or for open space rehabilitation.
- An Independent Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here and will be on site regularly.
- Provide provisions in the detailed design of the layout to accommodate protected trees.
- Barricade protected trees during construction.
- Key personnel need to be established by *The Home Market NPC* to clear alien vegetation in buffer zone, with an alien vegetation management plan, identifying alien and indigenous species, during operational phase.
- A Rehabilitation Plan was developed in order to maintain the aquatic system and wetland area in its current state. See Appendix E for the Rehabilitation Plan.

8.6 Topsoil and subsoil management

It is recommended that topsoil be removed from any area where physical disturbance of the surface will occur, including within the footprint of the development site (working area) and possibly within the site

camp, ablution area, vehicle maintenance yard, refuelling area and temporary waste storage area. Topsoil removal and stockpiling must be undertaken only after consultation with the ECO.

- Excavated topsoil and subsoil must be stockpiled for the duration of the active construction period and utilised for the final landscaping and rehabilitation of disturbed areas on site.
- Stockpiles must not be located within the buffer area, or close to any sloped surfaces.
- The topsoil berm may be a few meters wide but must ideally not be more than 2m high to allow light and air penetration.
- Excavated subsoil must be stockpiled separately from topsoil.
- The topsoil & subsoil storage area must be located on a level area outside of any surface drainage channels outside the riparian zone, and at a location where it can be protected from disturbance and river flow/floods during construction and where it will not interfere with construction activities.
- Topsoil and subsoil stockpiles must be adequately protected from being blown away or eroded by storm water. If necessary, shade cloth or other suitable measures must be used to stabilise and protect the stockpile from wind/water erosion. Topsoil stockpiles must not be covered with tarpaulin, as this may smother and decrease the virility of topsoil.
- Stockpiles must not be located within 50 metres of the edge of the wetland habitat.
- Handling of topsoil must be minimised as much as possible, and the location of the topsoil berm must be chosen carefully to avoid needing to relocate the topsoil berm at a later date.
- Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.
- If soil stockpiles will be stored for an extended period of time, the stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding, (or application of herbicides if agreed with the ECO).
- Soil material that will not be re-utilised on site may be removed from site and taken to an appropriate site for re-use or disposal.
- Topsoil removed from fynbos areas to be reused in rehabilitation areas, e.g. open space areas. Where possible, topsoil from fynbos areas, containing indigenous plant seeds, should be transferred immediately to rehabilitation areas rather than being stockpiled, as stockpiling kills important fungi, microbes, seeds and soil fauna. Topsoil stockpiles of this kind must not exceed 0.5 m in height and must not be compacted.
- Note that the topsoil must be the final layer applied to a rehabilitated/ re-landscaped site, after subsoil/ spoil material has been placed and shaped on the site.
- Stockpiles must not be located within 50 metres of the edge of the wetland habitat.
- Avoid stockpiling too close to the edge of the terrace.

8.7 Integrated waste management approach

It is recommended that an integrated waste management system is adopted on site. The system must be based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Separate waste bins/skips that are weather and animal proof must be provided for recyclable waste, general waste and hazardous waste. Recovered builder's rubble & green waste may be stockpiled on the ground within the site camp, or in separate skips until removal. These bins/skips must be emptied, and the waste taken to a registered recycling facility. The receipts from the facility must be kept on file and must be available on request.

The non-recyclable and non-reusable waste (e.g. builder's rubble, etc.) generated on site must be disposed of at a landfill site licensed in terms of the applicable legislation. The receipts from the facility must be kept on file and must be available on request.

Chemical toilets present a risk to the surrounding environment and must be managed accordingly. Chemical toilets must be kept within the site camp (not be linked to the storm water drainage system), on a level surface and secured from blowing over. 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. Ablutions should be further than 50m from aquatic buffer area.

Hazardous substances such as diesel, oil and detergents will be present on site throughout the construction phase of the proposed development. Hazardous substances pose a greater risk to the surrounding environment than general substances and therefore need to be managed accordingly. A designated storage area within the site camp that is clearly demarcated must be set aside for the storage of hazardous substances and is to be treated as a no-go zone to unauthorised personnel. Appropriate signage, Material Safety Data Sheets (MSDSs), recently serviced fire extinguishers and spill kits should accompany the hazardous substances. Appropriate storage of hazardous substances is important while drip trays should always be utilised when decanting of hazardous substances and when refilling chemical/ fuel storage tanks. If any spills do occur, the solid must be excavated and disposed of as hazardous waste.

Cement and concrete batching will be permitted on site, but may only take place on designated impermeable, bunded surfaces, as agreed with the ECO. Used cement bags should be disposed of as hazardous waste on site.

8.8 Erosion control and stormwater management

Appropriate measures must be implemented to control the flow of stormwater across the construction site, in order to prevent possible flooding, soil loss and dispersion of pollutants. To prevent excessive erosion activities, exposed earth surfaces must be protected from wind and water erosion.

The scale and nature of the erosion and stormwater control measures implemented on site must be appropriate to the conditions on site, and sufficient to achieve the desired outcomes (soil preservation, prevention of flooding, stormwater control) to the satisfaction of the ECO and consulting engineer.

The prevention of soil erosion can be initiated by designating specific areas for stockpiling of raw materials with consultation of the ECO. No stockpiling is to occur on or near slopes or water resources (must not be located within the buffer area) and all stockpiling areas must be approved by the ECO before stockpiling occurs.

Stockpiles need to be effectively managed and maintained as they have the potential to contribute to runoff and erosion. To prevent this, the following management measures must be implemented.

- Stockpiles of topsoil & spoil material must be protected from wind & water erosion.
- Stockpiles of earth material may not be located within any storm-water drainage pathways and must be outside of the reach of potential flood waters.
- Any erosion runnels/ gulleys/ channels that form on site must be infilled with appropriate material, compacted, rehabilitated as needed and appropriate erosion control measures put in place to prevent recurrent erosion at that site. Rehabilitation of erosion channels should be ongoing during the construction phase and not left until the end of the construction period
- Stockpiles must not be located within 50 metres of the edge of the wetland habitat.

It may be necessary to implement small-scale erosion protection measures at the construction site, to prevent soil erosion. Such measures may include the use of shade netting, geo-fabric, brush-packing or similar barriers in areas susceptible to erosion and along exposed slopes. The storm water management plan should adhere to the principles of sound storm water management. The storm water management

system must be implemented on site and must be properly maintained to ensure that contaminated run-off from the construction site is prevented from flowing into the watercourse.

Cleared areas and any other area susceptible to erosion should be provided with a suitable cover and stabilised as soon as possible via the implementation of appropriate erosion control measures. This may include use of cut-off drains, temporary/permanent drainage channels, brush-packing, mulching, planting or sodding, use of environmentally benign soil binders, use of geo-textile or other coverings. The appropriate measures should be selected by the contractor in consultation with the Engineer & ECO. No clearance or brush-cutting is to be permitted within the aquatic buffer.

Only areas disturbed by construction activities, or indirect impacts of construction activities, may be rehabilitated as per the Rehabilitation Plan in Appendix E.

A Stormwater Management Plan, prepared by Nadeson Consulting Engineers (Pty) Ltd and supplied by Bitou Municipality, has been used as the basis for the required stormwater infrastructure to accommodate flows within the catchment leading to the proposed development during the EA Application process. Subsequent to the receipt of the EA, a site-specific stormwater management plan was compiled by Elwandle Consulting Engineers. This Stormwater Management Plan has been included as Appendix F of this EMPr.

8.9 Construction near a watercourse

A demarcated buffer of 10m should be implemented as seen in figure 14 to protect the aquatic system and maintain the present ecological processes (see Appendix C for the buffer coordinates). This buffer area should be regarded as a no-go area. Ablutions should be at least 50m from the aquatic buffer area and stockpiles cannot be located within 50m of the edge of the wetland habitat. Erosion control measures may be required around stockpiles, while the use of grease traps/oil separators to prevent pollutants from entering the environment are recommended as no pollution of surface water or ground water resources may occur due to any activity on the site. A monitoring programme shall be in place to ensure compliance with this EMPr throughout the construction phase. Stockpiles must not be located within 50 metres of the edge of the wetland habitat. The 10m no-go buffer area should be observed and no construction activity is to be permitted in this area.

As per the Rehabilitation Plan in Appendix E, once construction has been completed, the objective would be to promote the re-establishment of the ecological functioning of any area disturbed by construction activities and maintain a healthy system throughout operation. The buffer area regarded as a no-go area during construction will be zoned as open space during the operational phase of the development. During the post-construction and operational phase of the development, erosion features that have developed are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed. The area must be maintained through alien invasive plant species removal in accordance with the Alien Invasive Vegetation Management Plan (Appendix B) and the establishment of indigenous vegetation cover to filter run-off before it enters the freshwater habitat. Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species.

All equipment and material storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourse. The appointed ECO must be consulted in this regard.

8.10 Excavations and Earthworks

Any major earthworks with bulldozers and heavy machinery must be under constant supervision and operators are to be aware of all the environmental obligations, as there is always the potential to inflict

damage to the sensitive areas. Any unnecessary or excessive heavy machinery movement must be kept to a minimum i.e. only what is absolutely necessary. Areas to be excavated must be clearly demarcated. Areas, which have already been excavated and entail fairly significant earthworks, must be similarly demarcated to avoid the spreading of construction activities into more sensitive areas.

All excavated material must be stored on a flat surface away from any drainage line or area susceptible to erosion. The location must be decided upon in consultation with the ECO. Stored material must be protected from wind and water erosion and this may entail covering the material with suitable shade cloth material or similar (if and when necessary). The shade cloth may need to be weighed down in such a manner that any stream flow is directed away from the stockpile, reducing the risk of erosion.

In the event that any heritage resources (human remains, grave stones, stone tools, artefacts, old coins and pottery, fossil shell middens, rock art and engravings, remains of old built structures etc.) are encountered during construction, the finding should be protected from further disturbance (ideally left in situ) and the ECO and relevant Heritage Authority should be notified. The Heritage Authority or delegated heritage specialist, will advise on way forward.

8.11 Visual Impact.

The proposed development has the potential to cause a visual impact during the construction and operational periods. To minimise the potential visual impact, all working areas, storage facilities, stockpiles, waste bins, elevated tanks and the site camp should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible. Waste must be managed according to this EMPr. Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy. The site camp may require visual screening via shade cloth or other suitable material. The use of reflective materials and excessive lighting should be avoided, and construction vehicles must enter and leave the site during working hours.

8.12 Noise management.

Additional noise is expected during the construction period due to construction activities. It is important that noise complaints register should be opened and that all excavations and earth-moving activities must be restricted to normal construction working hours (7:30 – 17:30) as far as possible. Work on site must be well-planned and should proceed efficiently so as to limit the duration of the disturbance. This is to be done by ensuring that all equipment is in good working condition and fitted with mufflers/exhaust silencers in necessary. Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate, and all affected parties must be informed of the excessive noise factors.

8.13 Dust management.

Although the generation of dust is synonymous with construction sites, care needs to be taken to prevent excessive dust from impacting the surrounding environment and community. Majority of the dust causing activities will take place during the construction period. Exposed surfaces, such as stockpiles and cleared areas should be provided with a suitable cover as soon as possible or wetted down. Construction vehicles should maintain low speeds of 20-40km/h and must ensure that tarpaulins are used to cover any loads transported. Dust levels specified in the National Dust Control Regulations (GN 827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m²/day, measured using reference method ASTM D1739.

A Complaints Register must be available at the site office for inspection by the ECO, in case of complaints, such as those related to dust. This should form a part of your Environmental File.

8.14 Heritage Resources

Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities, all works must be stopped immediately within this area, and Heritage Western Cape must be notified without delay.

Heritage Western Cape:

T: 021 483 5059

E: hwc.hwc@westerncape.gov.za

8.15 Site closure and rehabilitation

As per the Rehabilitation Plan in Appendix E, upon completion of the construction phase, and after each maintenance event, all disturbed areas, including the working area (disturbance corridor), temporary access road, and all areas utilised for the site camp and associated site camp facilities will require rehabilitation as follows:

- 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.
- All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped to improve filtration and reduce run-off.
- All demarcation fencing, including all droppers, wires, netting and barrier tape must be removed from site and taken to an appropriate site for re-use or disposal.
- Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. Any soil contaminated with hydrocarbons (oil, fuel, etc) or other hazardous substance must be collected and disposed of as hazardous waste to a licenced disposal facility.
- All construction waste is to be removed from the site and disposed of at an appropriate facility. Burying or burning of waste or rubble on site is strictly prohibited.
- Topsoil that was removed and stockpiled before construction, must be replaced by spreading it evenly over the areas from which it was removed. This topsoil (and the seedbank it contains) will facilitate the re-vegetation of the site.
- Disturbed areas, especially areas where excavations have taken place, must be shaped as appropriate (original topography must be restored where possible), and covered with a layer of stockpiled topsoil as soon as possible.
- Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and disposed of at an appropriate disposal site.
- The disturbed, newly rehabilitated surfaces (particularly steeper slopes and areas recently covered with topsoil) must be protected from wind & water erosion using mulch, brush packing or other appropriate erosion protection measures. Brush-packing/ mulching is done by covering the exposed surface with organic plant material such as branches, plant cuttings and leafy material. Ideally the vegetation removed from site at the start of the construction must be utilised. Brush-packing/ mulching plays a valuable role in erosion control, while also promoting re-vegetation of the site by retaining moisture in the soil, introducing seeds and/or trapping wind-blown seeds and providing organic material (compost) to promote new plant growth.
- Rehabilitate the buffer area with indigenous vegetation.
- Final landscaping and rehabilitation of the site must be done to the satisfaction of the ECO and must adhere to all conditions/ requirements of the Environmental Authorisation.

8.16 Mitigation measures provided by the Freshwater/Aquatic Biodiversity Specialist

As per the recommendations of the Aquatic Biodiversity Specialist, and in compliance with requirements of the EA, the following mitigation measures are required to be taken into consideration during the various phases of the project:

- Design phase and Buffer area:

Regarding any proposed housing development on the property, a buffer area from the boundary of the wetland habitat must be adopted and demarcated. The specific size of the buffer zone was informed by a tool developed by Macfarlane and Bredin (2016) called Buffer zone guidelines for rivers, wetlands and estuaries. The result was a recommended aquatic buffer area (to be considered a No-Go zone) of 10 m from the boundary of the delineated aquatic habitat. This width is sufficient to maintain the aquatic habitat in the current state.

The open space proposed below the terrace in the development should serve as adequate to protect aquatic habitat. It is important that the buffer area, be considered as a No-Go zone in order to ensure adequate protection of aquatic resources. No infrastructure should be developed within this area, including stormwater outlets. Please note that stormwater infrastructure within this area has been approved as part of the EA.

- Construction Phase:

- No construction, including workers and vehicles, must be allowed within the buffer area.
- The mitigation of impacts must focus on managing the runoff generated by the development and introducing it responsibly into the receiving environment. The stormwater flows must enter the wetland areas in a diffuse flow pattern without pollutants. The figures below show examples of measures that can be put in place on the terrace to restrict erosion and sedimentation caused by construction activities.

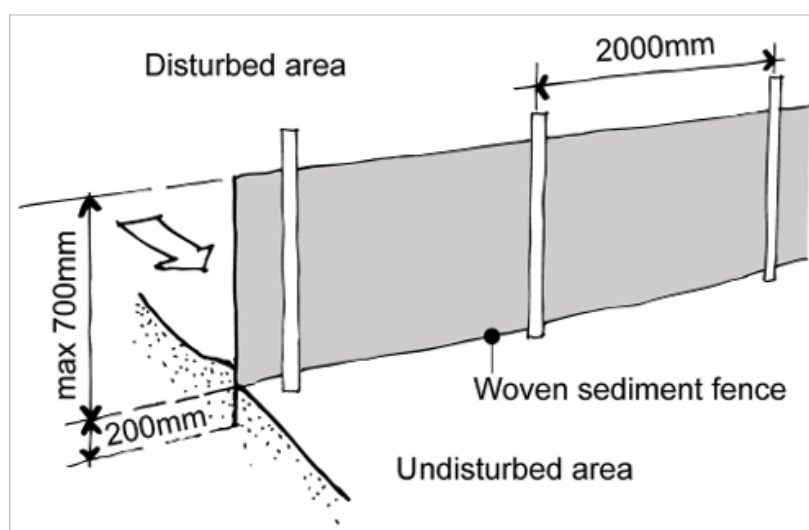


Figure 18. An example of a silt fence, which is a structure that could be put in place to restrict disturbance to the upslope area and it could potentially be used to delineate the buffer area.

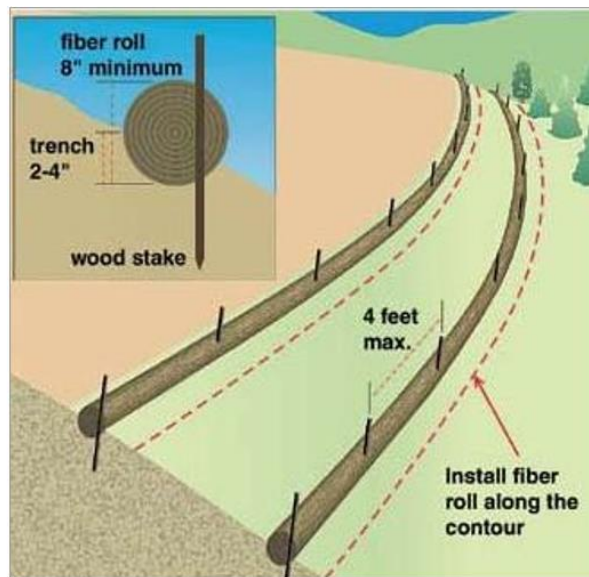


Figure 19. An example of a construction and/or rehabilitation methods to prevent erosion on the hillslope due to any soil disturbance and vegetation clearance.

- Soft infrastructure must be considered where practical. For example, permeable surfaces can be done via permeable concrete block pavers (such as Amorflex), brick pavers, stone chip, and gravel and may contribute to slowing surface flows (especially if maintained). Stormwater managed by the development could be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development. This will provide for some filtration and removal of urban pollutants (e.g. oils and hydrocarbons), provide some attenuation by increasing the time runoff takes to reach low points, and reduce the energy of storm water flows within the stormwater system through increased roughness when compared with pipes and concrete V-drains.



Figure 20. Examples of soft infrastructure incorporated into the stormwater management design.

- Frequent stormwater outlets must be designed to prevent erosion at discharge points. All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level. Structures such as

these must be located within the layout footprint and not encroach into the buffer areas. Otherwise the assessment must be amended after the stormwater management plan, location of structures, and designs become available, to incorporate the impact of this encroachment.

- Stockpiles must not be located within 50 metres of the wetland. The furthest threshold must be adhered to. They should not be placed in vegetated areas that will not be cleared. Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles. Alternatively, the exposed slopes must drain into small temporary stormwater and silt traps/ponds.
- Regular inspections during the operational phase should also be undertaken to ensure that functions are not undermined by inappropriate activities.

- **Post-construction / Rehabilitation Phase:**

Although it is recommended that no construction should be allowed to occur within or impact upon watercourses under the current proposal, there is always potential for accidental disturbance therefore guidelines for rehabilitation of aquatic habitats are provided. The aim of the rehabilitation is to ensure the necessary procedures are appropriately implemented in the natural environment that may be negatively affected by the development. The plan will promote the re-establishment of the ecological functioning of any area disturbed by construction activities. Also consult WET-RehabEvaluate, WET-RehabMethods (Cowden and Kotze, 2009), and the river rehabilitation manual developed by Day et al. 2016, for further information. Important guidelines for rehabilitation are:

- A rehabilitation plan must be compiled with the assistance of a botanist to ensure that the buffer area is revegetated with indigenous plant species in the correct manner. The area must be maintained through alien invasive plant species removal (which is the landowner's responsibility regardless of mitigation associated with this project) and the establishment of indigenous vegetation cover to filter run-off before it enters the freshwater habitat. Please see Appendix B of this EMPr for the Alien Invasive Management Plan and Appendix E of this EMPr for the Rehabilitation Plan submitted with the Water Use Licence Application for the project.
- The solid domestic waste must be removed and disposed of offsite. All post-construction building material and waste must be cleared in accordance with the EMPr.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. Care must especially be taken near the wetland not to damage the vegetation.
- Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
- Alien/ invasive species shall not be stockpiled. It should be removed from site and dumped at an approved site.
- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use, for the necessity, type proposed to be used, effectiveness and impacts of the product on aquatic biota.
- A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the construction phase, but also to monitor any post-construction environmental issues and impacts such as increased surface runoff. The monitoring should be regular and additional visits must be taken when there is potential risk to the aquatic habitat.

- **Operational Phase:**

- When developing a stormwater management plan for the site, it will be critical that due consideration is given to the collection and treatment of stormwater prior to discharge into the natural environment. It is therefore recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS).
- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion.
- Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area and not in the buffer.
- The use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater is recommended.
- Appropriate waste water infrastructure must be designed to prevent any such water from entering the surrounding environment.
- Maintenance of the buffer area must be implemented for it to remain effective. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented.
- Constructing water tanks to catch rainwater runoff from roofs for watering gardens will reduce stormwater runoff and possible erosion associated therewith. Tanks can also be installed at the communal buildings.
- The local authority should prevent illegal dumping in this area by providing suitable waste disposal facilities where waste can be recycled and disposed of in a controlled manner.
- Engage with the community and Home Owners Association to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. The landowners and community could be involved in the monitoring of the aquatic habitat.
- Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species as well as plant name signage for indigenous species. Promoting a sense of ownership from the residents of their open space area will benefit them as well as the environment.

9. Environmental Impact Management: Planning and 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 Environmental Impact Assessment 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 is compliant with additional conditions which may be included in the Environmental Authorisation.

The environmental management objectives (goals) during this phase are to:

- Appoint an Independent Environmental Control Officer.
- Complete the detailed design of the structures and detailed site layout plan.
- Update the EMPr (if necessary).

These environmental management objectives, as well as the management actions that must be implemented in order to achieve the desired objective and avoid/minimise potential impacts are discussed in more detail below.

9.1 OBJECTIVE 1: APPOINTMENT OF AN INDEPENDENT ENVIRONMENTAL CONTROL OFFICER

Impact Management Objective: To appoint a suitably qualified and experienced Environmental Control Officer.			
Potential impact to avoid	Failure to appoint an ECO will result in non-compliance with the requirements of the EMPr.		
Impact Management Outcome	The requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site. Provisions made for all environmental measures and rehabilitation of any disturbance to the wetland.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- The Holder shall be responsible for ensuring compliance with the conditions by any person acting on his/her behalf, including an agent, sub-contractor, employee or any person rendering a service to the Holder. - A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site. - The appointed ECO must adhere to the requirements stated in Chapter 15 and any other requirements specified in the Environmental Authorisation.		The Home Market NPC	During design phase

• The appointed ECO must be advised of the construction start date, at least two weeks in advance, prior to the commencement of any construction activities on site, so that the ECO can perform a pre-commencement inspection, ensure any pre-construction conditions of the environmental authorization are completed, and plan for environmental awareness training of construction workers (see Appendix D for Environmental Awareness Plan). • The Rehabilitation Plan included in Appendix E is to be understood and provisions made for rehabilitation. • The Alien Invasive Management Plan, as per Appendix B, should be understood and provisions made for this to be efficiently implemented, including related costs, materials and time.		
Performance Indicator	A qualified ECO is appointed prior to the commencement of any construction activities (including pre-construction set-up activities) on site.	

9.2 OBJECTIVE 2: DETAILED DESIGN AND SITE LAYOUT PLAN

Impact Management Objective: To compile a detailed design and site layout plan that adheres to the recommendations of the BAR Report and any additional conditions which may be included in the Environmental Authorisation.

Potential impact to avoid	Substantial deviation from the conceptual layout plan may result in: • Non-compliance with the Environmental Authorisation during construction. • Triggering of additional listed activities not authorised in the Environmental Authorisation. • An increase in the severity of the impacts identified and assessed in the BAR or may result in new impacts not previously assessed and not provided for in the EMPr, resulting in environmental degradation. • Visual disturbance. • Damage to the aquatic ecosystem.		
Impact Management Outcome	Development is compliant with recommendations of the BAR and the EMPr.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
<u>General</u> • The final detailed design & layout must adhere to the conceptual layout assessed in the BAR process. • The final detailed design & layout must adhere to any conditions of the Environmental Authorisation (EA).		The Home Market NPC / Consulting Engineer	During design phase

• If the final detailed design differs significantly from that assessed during the BAR, the revised layout must be assessed by an Environmental Consultant and the approved EA must be amended by the Competent Authority before proceeding. • Interested & Affected Parties may need to be provided with an opportunity to comment on any proposed amendment to the EA depending on the significance of the changes. • It is recommended that the stormwater management plan take into account any ecological input and be developed based on Sustainable Drainage Systems (SUDS). • Attention must be given to the 10m buffer (see Appendix C for the buffer coordinates), construction work and the site camp must be planned in accordance with measures relative to the buffer area (stockpiles, ablutions, etc.) • Provide provisions in the detailed design of the layout to accommodate protected trees. • A Stormwater Management Plan, prepared by Nadeson Consulting Engineers (Pty) Ltd and supplied by Bitou Municipality, has been used as the basis for the required stormwater infrastructure to accommodate flows within the catchment leading to the proposed development. Following the receipt of the Environmental Authorisation for the project, a detailed Stormwater Management Plan has been compiled. This report has been attached as Appendix F of this report. • The raised boardwalk, structures and pathways proposed on Erf 103, as depicted on Site Development Plan compiled by Erik Voigt Architects (Job number 5075-01, Drawing number 01 (CD) Rev. No. R09, dated May 2019), may not be developed, unless written environmental authorisation is obtained from the competent authority. • All development, except for stormwater outlet structures and slope stabilisation structures, must be situated outside of the 10-metre aquatic buffer zone (i.e. south of the development setback line). The area on the watercourse side of the development setback line, must be managed as a No-Go area for development. • Please refer to Section 8.16 for further Design phase mitigations.		
Performance Indicator	Detailed designs and site layout plans that adhere to the conditions of the EA and EMPr are finalised prior to the commencement of construction.	

10. Environmental Impact Management: Pre-construction Phase

Proper set-up during the pre-construction phase can set the foundation for good environmental management during the active construction phase to follow and can avoid potential impacts from arising at a later date.

The Impact Management Objectives for this phase of the project relate to:

- Identification and Demarcation of no-go areas and working areas.
- Establishment of site camp and associated site facilities.
- Pre-construction ECO visit.

10.1 OBJECTIVE 1: IDENTIFY & DEMARCATÉ NO-GO AND WORKING AREAS

Impact Management Objective: *Identify and demarcate no-go areas, working areas and site facilities.*

Potential impact to avoid	• No-Go areas include aquatic habitats and public open space to remain natural. • Insensitive location of working areas and site facilities may result in environmental impacts during the construction phase. • Failure to accurately demarcate working areas may result in an increased disturbance footprint. • Failure to demarcate no-go areas may result in disturbances to these areas during construction.
Impact Management Outcome	Future construction activities will be restricted to within the designated areas & environmentally sensitive areas (no-go areas) will be protected from disturbance.

IMPACT MANAGEMENT ACTIONS

Mitigation measure	Responsible party	Time period
• The environmentally sensitive areas must be identified and be designated as no-go areas. • Demarcation of working area and no-go areas must be done in accordance with Section 8.2 of this EMP. • Site camp facilities must be situated as far away from the No-Go areas as possible. • 7 European Oak trees and Milkwood trees are to be identified and effectively barricaded. Barricade to remain throughout the construction phase. • If it is found that Milkwood tree/s cannot be accommodated and require clearance, a permit is required from Department of Environment, Forestry and Fisheries (DEFF). • Ensure the relevant ECO is present for demarcation. • No indigenous vegetation may be cleared in the no-go area without written environmental authorisation is obtained from the competent authority.	Contractor	Pre-construction phase (prior to arrival of construction equipment, machinery, or workers on site)

The No-Go areas must be physically and clearly demarcated prior to any earthworks commencing. This area may not be used to store any materials. All construction related activities such as materials storage and site camp establishment must occur within an identified area approved by the ECO.		
Performance Indicator	No-go areas, working areas and areas for site camp facilities have been identified and appropriately demarcated to the satisfaction of the ECO, before construction activities commences on site.	

10.2 OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITIES

Impact Management Objective: To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.

Potential impact to avoid	- An inadequate location for the site camp facilities may result in impacts to sensitive resources. - Failure to properly demarcate and set up site facilities may result in disorganised construction activities and unnecessary disturbance to the site. - Failure to provide the necessary site facilities and/or failure to equip these facilities with the necessary equipment/materials may impede good environmental management & compromise ability to respond to emergencies.
Impact Management Outcome	Site camp facilities do not impact significantly on environment. The equipment required to implement the provisions of the EMPr are provided on site.

IMPACT MANAGEMENT ACTIONS

Mitigation measure	Responsible party	Time period
- The site camp and associated site facilities must be set-up and managed in accordance with the general environmental management measures specified in Chapter 8 of this EMPr. - The site camp must be strategically set up, away from freshwater resources, in a manner that will promote good environmental management during construction/ demolition, and to respond to potential emergencies (including fires, spillage of hazardous substances etc.) that may arise. - 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. - Frequent stormwater outlets must be designed to prevent erosion at discharge points. - Following the receipt of the Environmental Authorisation for the project, a detailed Stormwater Management Plan has been compiled. This report has been attached as Appendix F of this report. - Please refer to Section 8.16 for further Design phase mitigations provided by the Aquatic Biodiversity Specialist.	Contractor / The Home Market NPC	Pre-construction phase (prior to start of construction activities)

All development, except for stormwater outlet structures and slope stabilisation structures, must be situated outside of the 10-metre aquatic buffer zone (i.e. south of the development setback line). The area on the watercourse side of the development setback line, must be managed as a No-Go area for development.		
Performance Indicator	Appropriate, well organised, and properly equipped site facilities are available on site prior to commencement of construction activities. The location and set up of the facilities don't impact on the natural resources.	

10.3 OBJECTIVE 3: PRE-CONSTRUCTION ECO INSPECTION

It is essential that the appointed ECO be advised of the intended construction start date before construction activities commence on site, in order for the ECO to conduct an initial site inspection to assess the pre-commencement condition of the site. The ECO can also advise on the appropriate siting and demarcation of the site facilities, and the identification and demarcation of the no-go areas. The ECO may also conduct the first round of environmental awareness training at this stage, if the construction workers are present on site.

<u>Impact Management Objective:</u> Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.			
Potential impact to avoid	• Failure to appoint ECO or to notify ECO of commencement prior to commencement may result in non-compliance with the EA. • If a pre-commencement ECO inspection is not performed, the Construction Contractor may be held liable for environmental degradation that took place prior to the Contractor commencing work on site.		
Impact Management Outcome	• Good environmental management is promoted and enforced by the ECO during the full 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 party	Time period
• The appointed ECO must be advised of 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.		Contractor	Start of construction phase
Performance Indicator	A pre-commencement site inspection is conducted by the appointed ECO before construction activities commence on site.		

11. Environmental Impact Management: Construction Phase

A number of potential environmental impacts may arise during the construction phase of the development. These impacts have been identified and assessed during the Environmental Impact Assessment process. Environmental Management objectives and actions that will prevent the identified potential impacts from arising – or where avoidance is not possible, that will minimise and mitigate the impacts – are provided in this section.

The environmental management actions and mitigation measures prescribed in this section must be implemented throughout the construction phase and must be implemented in conjunction with the general management measures specified in Chapter 8 of this EMPr, as well as any other conditions which may be stated in the Environmental Authorisation. The Environmental Control Officer must monitor and enforce the implementation of the relevant environmental management measures and may provide guidance on the implementation of these environmental management measures as and when required.

The environmental management objectives (goals) for the Construction phase are:

- Reduce sedimentation and erosion within the Wetland habitat
- Prevent pollution of the Wetland habitat
- Avoid excessive disturbance/loss of aquatic vegetation and habitat within the Wetland
- Prevent flow modification
- Maintain sense of place (noise, dust and lifestyle)
- Traffic safety
- Prevent the loss of terrestrial vegetation / habitat
- Creation of multiple job opportunities & capital expenditure
- Reduce the visual impact

The environmental management actions that must be implemented in order to achieve the desired objectives and avoid/minimise potential impacts are discussed in more detail in the sections below.

11.1 OBJECTIVE 1: REDUCE SEDIMENTATION AND EROSION WITHIN THE WETLAND HABITAT

Impact Management Objective: To prevent soil loss on site and prevent increased turbidity / sediment load in watercourses.

Potential impact(s) to avoid	Vegetation clearing and exposure of bare soils adjacent to the wetland habitat during construction will decrease the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope. The majority of the site has a gentle slope. However, the terrace slope at the wetland habitat is steeper which will increase velocity of runoff into the wetland. Coupled with poor stormwater management can lead to: • Erosion and burying of aquatic habitat depending on the sediment load of runoff. • The wetland ceasing to function. • Soil erosion from confined flows. • The formation of rills and gullies from increased concentrated runoff can also be expected.
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	The volume and velocity of runoff increases the particle carrying capacity of the water flowing over the surface.		
Impact Management Outcome	Aquatic and Stormwater systems are not impacted significantly as a result of soil erosion. Wetland habitat remains in a healthy state.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
<u>General</u> - Establish 10m aquatic buffer zone / no-go area as per specified coordinates in Appendix C, identify or demarcate with a physical barrier and signage, ie: danger tape/fencing, extent of development footprint closest to the sensitive aquatic vegetation. - The working area and site camp must be clearly demarcated during the pre-construction phase. - Land clearing and construction activities must be restricted to within the demarcated working area to prevent unnecessary disturbance, exposure or compacting of surrounding areas. - Any erosion runnels/ gulley's/ channels that form on site must be infilled with appropriate material, compacted, rehabilitated as needed and appropriate erosion control measures put in place to prevent recurrent erosion at that site. Rehabilitation of erosion channels should be ongoing during the construction phase and not left until the end of the construction period. ECO supervision required. - Construction must be avoided during rainy days, to prevent excessive turbidity. - Manual labour must be favoured over mechanical methods. Heavy machinery may only be used as a last resort if manual methods are not feasible or practical. - Construction work must be well-planned and well-managed so that construction work proceeds quickly and efficiently, thus minimising the duration of disturbance. - Silt fences or similar measures must be erected between the construction site and the aquatic buffer, to prevent sediment laden storm water from entering the watercourse. - All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourse. The appointed ECO must be consulted in this regard. - Avoid stockpiling too close to the edge pf the terrace. - Implementation of the Alien Invasive Management Plan (Appendix B)	Contractor	Construction phase	
<u>Cleared surfaces</u> - Soil surfaces must not be left open for lengthy periods to prevent erosion. - If site development does not occur soon after preparation of the site, a suitable cover crop to be established as a temporary measure.			

- Only the area required to accommodate construction activities within the working area should be cleared of surface covering. Unnecessary clearing/ disturbance of land and exposure of soil must be avoided.
- Land clearing, earth-moving and construction activities should not take place during heavy rains, or windy conditions.
- Cleared areas and any other area susceptible to erosion should be provided with a suitable cover and stabilised as soon as possible via the implementation of appropriate erosion control measures. This may include use of cut-off drains, temporary/permanent drainage channels, brush-packing, mulching, planting or sodding, use of environmentally benign soil binders, use of geo-textile or other coverings. The appropriate measures should be selected by the contractor in consultation with the Engineer & ECO.

Vegetation

- No aquatic vegetation or surrounding natural vegetation should be disturbed unnecessarily. If any vegetation is intended for removal that has not been covered in this assessment, it must be brought to the attention of the responsible ECO to address.
- The 10m aquatic buffer should be maintained.
- Establish key personnel to clear alien vegetation in buffer zone, in accordance with the alien vegetation management plan, identifying alien and indigenous species.

Stockpiles

- Designated areas for stockpiling of raw materials must be identified before material is brought onto site. No stockpiling is to occur on or near slopes or water resources (must not be located within the buffer area). All stockpiling areas must be approved by the ECO before stockpiling occurs.
- Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles. Alternatively, the exposed slopes must drain into small temporary stormwater and silt traps/ponds.
- Stockpiles of topsoil & spoil material must be protected from wind & water erosion.
- Stockpiles of earth material may not be located within any storm-water drainage pathways and must be outside of the reach of potential flood waters. Stockpiles cannot be within the buffer area.
- Stockpiles should not be excessively high, particularly stockpiled sediment, these should not exceed 2m's in height.
- Stockpiles must not be located within 50 metres of the edge of the wetland habitat.

Stormwater control

• The SuDS Stormwater management and drainage system should inform the stormwater design of developed areas. • The Storm Water Management Plan should adhere to the principles of sound storm water management. The storm water management system must be implemented on site and must be properly maintained. • Clean and contaminated storm water must be kept separate. Contaminated run-off from the construction site must be prevented from flowing into the streams. • Berms or similar measures must be implemented to slow down the speed of storm water flows into the watercourse. • Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles. Alternatively, the exposed slopes must drain into small temporary stormwater and silt traps/ponds. • A Stormwater Management Plan, prepared by Nadeson Consulting Engineers (Pty) Ltd and supplied by Bitou Municipality, has been used as the basis for the required stormwater infrastructure to accommodate flows within the catchment leading to the proposed development.		
Performance Indicator	The water courses are not significantly impacted as a result of soil erosion.	

11.2 OBJECTIVE 2: PREVENT POLLUTION OF THE WETLAND HABITAT.

Impact Management Objective: To prevent environmental pollution and contamination of soil and water resources			
Potential impact(s) to avoid	- Fuel, oil, lubricant or other pollutants leaking from vehicles/ machinery and contaminate soil, surface water and/or ground water. - Leaking chemical toilets. - Contaminated run-off from site or site camp facilities entering soil or water resources. - Failure of on-site wastewater infrastructure leading to the pollution of watercourses - Waste (solid or liquid) from the construction site blown or washed into surrounding environment. - Alteration of aquatic parameters (pH, turbidity and nutrient levels) - Contamination of soil or water impacting the surrounding and downstream land/water users, biota and livestock.		
Impact Management Outcome	The environment (including soil, surface water and groundwater) is not contaminated. Wetland remains free of pollution.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period

- Please refer to Section 8.16 for further Construction phase mitigations provided by the Aquatic Biodiversity Specialist. <u>General Pollution Management</u> - No pollution of surface water or ground water resources may occur due to any activity on the site. - No storm water runoff from any premises containing waste, or water containing waste emanating from construction activities may be discharged into the environment. Polluted stormwater must be contained on the site. - All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourse. The appointed ECO must be consulted in this regard. - Cement batching / mixing may not take place directly on the soil surface, it must be done on an impervious lining that will prevent cement particles from contaminating the soil. - The proposed buffer zone around the watercourse needs to be strictly adhered to. - Establish buffer zone, identify or demarcate with a physical barrier, ie: danger tape/fencing, extent of development footprint closest to the sensitive aquatic vegetation. - Construction personnel, equipment and materials must be limited to the minimum practical working footprint. - Appropriate stormwater measures must be implemented. - No Pollution may enter the buffer area. <u>General Waste Management</u> - Dedicated waste bins or skips must be provided on site and kept in a demarcated area on an impermeable surface. - Separate waste bins/skips must be provided for recyclable waste, general waste and hazardous waste. Recovered builder's rubble & green waste may be stockpiled on the ground within the site camp, or in separate skips until removal. - Waste must be placed in the appropriate waste bins/skips/ stockpiles. - Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins. - Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust. - Waste bins/skips must be regularly emptied and must not be allowed to overflow.	Contractor	Construction phase
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• Ensure that waste receptacles are weighted down, have weighted covers, are labelled appropriately, and are cleaned by a reputable waste disposal company. Obtain a disposal/cleaning slip for this waste, to file in the Environmental File. • Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site. • The Contractor must ensure that all workers on site are familiar with the correct waste disposal procedures to be followed. • Waste generated on site must be classified and managed in accordance with the National Environmental Management: Waste Act – Waste Classification and Management Regulations (GN No. R. 634 of August 2013). • Disposal of waste to landfill must be undertaken in accordance with the National Environmental Management: Waste Act – National Norms and Standard for the Assessment of Waste for Landfill Disposal (GN No. R. 635 of August 2013). • All waste, hazardous as well as general, resulting from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF). <u>Pollution Management -Hydrocarbons (oil, fuel etc.)</u> • Vehicles and machinery must be in good working order and must be regularly inspected for leaks. • If a vehicle or machinery is leaking pollutants it must, as soon as possible, be taken to an appropriate location for repair. The ECO has the authority to request that any vehicle or piece of equipment that is contaminating the environment be removed from the site until it has been satisfactorily repaired. • 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. • 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. • Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks. • 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. • Where feasible, fuel tanks should be elevated so that leaks are easily detected. • A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site, and workers must be educated on how to utilise the spill kit.		
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- Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste.

Pollution Management – Ablution facilities

- Chemical toilets must be kept at the site camp, on a level surface and secured from blowing over.
- 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.
- Chemical toilets must be regularly emptied, and the waste disposed of at an appropriate waste water disposal/ treatment site. Care must be taken to prevent spillages when moving or servicing chemical toilets.
- Toilet facilities must be supplied by the Contractor for the workers at a ratio of at least 1 toilet per 30 workers in areas approved by the ECO, separate toilets must be supplied as per gender.
- Ablutions should be further a fair distance from the aquatic buffer area.
- Temporary/ portable toilets must be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO.
- Discharge into the environment and burial of waste is strictly prohibited. The Contractor must ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site, disposal/cleaning slips must be filed in the Environmental File, to ensure that these are available for review.
- Toilets shall be emptied before the Contractors' holidays or any other temporary site closure.
- Ablution facilities provided for construction workers must be placed away from the terrace edge.
- Ablutions should be further than 10m from aquatic buffer area.

Pollution Management – Hazardous Substances

- Any hazardous substances (materials, fuels, other chemicals etc.) that may be required on site must be stored according to the manufacturers' product-storage requirements, which may include a covered, waterproof bunded housing structure.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases.
- Hazardous storage and refuelling areas must be bunded with an impermeable liner to protect groundwater quality. The bunding shall be capable of handling a volume 150% the volume of the container storing the substance.

- Adequate hazmat spillage cleaning kits must be readily available in the event of oil and hydraulic spills. <u>Cement Batching</u> - Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, plastic/ bitem 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 - Cement batching should take place on already transformed areas within the footprint of the facility. - 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. - 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. - Construction works must preferably take place in drier months of the year when runoff from the construction site will be minimal, to limit potential dispersal of pollutants.				
Performance Indicator	The site and aquatic system remains free of any pollutants (in accordance with any necessary tests) and any spills that occur are responsibly managed and recorded on file during monitoring.			

11.3 OBJECTIVE 3: AVOID DISTURBANCE/LOSS OF AQUATIC VEGETATION AND HABITAT WITHIN THE WETLAND.

<i>Impact Management Objective: To ensure that the aquatic ecosystem is not significantly impacted on.</i>			
Potential impact(s) to avoid	- Physical disturbance to aquatic ecosystems during the construction phase. - Increase of sedimentation/turbidity in the watercourses, which may impact biota and instream habitats. - Establishment of alien invasive species. - Encroachment within the aquatic buffer. - Reduction in aquatic biodiversity. - Soil erosion within the aquatic ecosystem. - Soil compaction within the aquatic ecosystem.		
Impact Management Outcome	Construction activities do not significantly impact on the aquatic ecosystem of the Wetland.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period

General	Contractor	Construction phase
• The 10m aquatic buffer area around the watercourse is to be adhered to at all times and no construction activities to occur within this buffer. • Demarcation of buffer remains throughout construction period. • Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles. Alternatively, the exposed slopes must drain into small temporary stormwater and silt traps/ponds. • All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level. • All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the buffer zone. The appointed ECO must be consulted in this regard. • Construction personnel, equipment and materials must be limited to the minimal practical working area. • Construction must be avoided during rainy days, to prevent excessive turbidity. • Construction work must be well-planned and well-managed so that construction work proceeds quickly and efficiently, thus minimising the duration of disturbance. • All development, except for stormwater outlet structures and slope stabilisation structures, must be situated outside of the 10-metre aquatic buffer zone (i.e. south of the development setback line). The area on the watercourse side of the development setback line, must be managed as a No-Go area for development. • No indigenous vegetation may be cleared in the no-go area without written environmental authorisation is obtained from the competent authority. • The No-Go areas must be physically and clearly demarcated prior to any earthworks commencing. This area may not be used to store any materials. All construction related activities such as materials storage and site camp establishment must occur within an identified area approved by the ECO. <u>Vegetation</u> • No aquatic vegetation or surrounding natural vegetation should be disturbed unnecessarily. If any vegetation is intended for removal that has not been covered in this assessment, it must be brought to the attention of the responsible ECO to address.		

- Removal of alien invasive species within the buffer area is permitted to control the spread of the alien invasive species, however this activity must be restricted to a few personnel, and monitored by the ECO. <u>Stormwater control</u> - Stockpiles must not be located within the buffer area or be located close enough for direct impacts to occur, should the stockpile collapse. - The stormwater flows must enter the buffer area in a diffuse flow pattern without pollutants. - It is recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS). - Frequent stormwater outlets must be designed to prevent erosion at discharge points. - Stormwater exit points must include a best management practice approach to trap any additional suspended solids and pollutants originating from the proposed development. - The stormwater flows must enter the aquatic areas in a diffuse flow pattern without pollutants. - Contaminated run-off from the construction site must be prevented from flowing into the aquatic system. Please refer to the mitigation measures required to prevent the impact of "pollution and contamination". The same mitigation measures apply to reduce the risk of pollution and contamination of the watercourse(s). - Berms or similar measures must be implemented to slow down the speed of storm water flows into the watercourse. - All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourse. The appointed ECO must be consulted in this regard.		
Performance Indicator	Aquatic ecosystem is free of alien invasive species and the ecosystem is in a healthy state.	

11.4 OBJECTIVE 4: PREVENT FLOW MODIFICATION.

Impact Management Objective: Maintain the hydrological integrity of the water resource.

Potential impact(s) to avoid	- Increased surface runoff volume and velocity - Reduced infiltration rates - Potential rill/gully erosion. - Altered water inputs from upslope disturbances. - Modification of water distribution and retention patterns will ultimately affect the hydrological integrity of water resources
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Impact Management Outcome	The hydrological integrity is maintained.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
- Establishment of a 10m aquatic buffer area/a no-go area around the wetland where no construction activities are allowed. - Construction personnel, equipment and materials must be limited to the minimal practical working area. - Stormwater control measures must be implemented for the duration of the project. - Silt fence must be erected between the construction activities and the watercourse to prevent sediments-laden storm water from entering the watercourse. - Berms or similar measures must be implemented to slow down the speed of storm water flows into the watercourse. - All equipment and materials storage areas must (if practical, reasonable and feasible) be located at a minimum distance of 50m from the watercourse. The appointed ECO must be consulted in this regard. - Utilize impermeable surfaces, where drainage is not directed to the wetland/watercourse system, for machinery/vehicle maintenance. It is preferable to relocate this off site. - Designate an area for storage of materials, particularly fuels/hazardous waste, demarcate, erect signage, and bund any container containing these materials. Ensure there is a cover. - Ensure that hazardous waste bins are weighted down, have weighted covers, are labelled appropriately, and are cleaned by a reputable waste disposal company. Obtain a disposal/cleaning slip for this waste, to file in the Environmental File. - Soil contaminated by spilled oil/ fuel/ lubricant must be excavated and disposed of in the hazardous waste bin. - Cement mixing must be conducted on impermeable surfaces. Utilize shutter boards/tarp, that are appropriately bunded. - Avoid stockpiling too close to the edge of the terrace. - Ensure stockpiles are bunded, utilize sandbags.	Contractor	Construction phase	
Performance Indicator	- No erosion channels - Hydrological integrity of the water resource remains intact		

11.5 OBJECTIVE 5: MAINTAIN SENSE OF PLACE (NOISE, DUST AND LIFESTYLE)***Impact Management Objective: To maintain the sense of place associated with the town of Wittedrift.***

Potential impact(s) to avoid	• Avoid unnecessary noise generated during the undertaking of construction activities, which may present a nuisance to surrounding community and negatively impact the Sense of place. • Dust may cause a nuisance to the surrounding residents. • Dust may smother surrounding vegetation. • Decreased visibility for labourers and operators. • Unsettled community.		
Impact Management Outcome	The construction of the proposed development does not alter the sense of place		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
<u>Noise</u> • A complaints register should be available on site. • Strict operating hours for heavy vehicles and construction activities should be implemented so as to avoid times of day when noise impacts are more likely to affect adjacent landowners, ie: construction activities, including the movement of vehicle should be limited to between 07h30 and 17h30. • No construction related activities should be permitted over weekends. • Work on site must be well-planned and should proceed efficiently so as to limit the duration of the disturbance. • Vehicles and equipment must 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. • Due to the location of the proposed development site to residents, noise levels must be kept to a minimum at all times. If excessive noise is expected on the boundary of the residential erven bordering the site, the residents must be informed in advance of when the high noise levels will occur and for how long they will occur. • Workers should be educated on how to control noise-generating activities that have the potential to become disturbances, particularly over an extended period of time. • Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate. • Affected parties must be informed of the excessive noise factors.	Contractor	Construction phase	

- Maintain European Oak trees and Milkwood trees identified on site.

Dust

- Land clearing and earthmoving activities should not be undertaken during strong winds, where possible.
- Cleared areas should be provided with a suitable cover as soon as possible, and not left exposed for extended periods of time.
- Stockpiles of topsoil, spoil material and other material that may generate dust must be protected from wind erosion (e.g. covered with netting, tarpaulin or other appropriate measures. Note that topsoil should not be covered with tarpaulin as this may kill the seedbank).
- The location of stockpiles must take into account the prevailing wind direction and should be situated so as to have the least possible dust impact to surrounding residents, road-users and other land-users.
- Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution.
- The speed limit should be set at 20-40km/h.
- Dust must be suppressed on access roads and the construction site during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of excessive run off.
- Dust suppression measures such as the wetting down of sand heaps as well as exposed areas around the site must be implemented especially on windy days.
- The use of straw worked into the sandy areas may also help and the ECO must advise when this is necessary.
- If dust appears to be a continuous problem the option of using shade cloth to cover open areas may be necessary or the erecting of shade netting above the fenced off area may need to be explored.
- All vehicles transporting sand need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks.
- Work on site must be well-planned and should proceed efficiently so as to minimise the handling of dust generating material.
- Material loads should be properly covered during transportation.
- Wetting of soils must be considered, if dust dispersal is excessive.
- Dust levels specified in the National Dust Control Regulations (GN 827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m²/day, measured using reference method ASTM D1739;

• A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received.		
Performance Indicator	Noise and dust levels on site remain within acceptable standards. No complaints are received.	

11.6 OBJECTIVE 6: TRAFFIC SAFETY.

Impact Management Objective: To ensure continued community on the roads during construction.		
Potential impact(s) to avoid	• The temporary disturbance to traffic in the area. • Reduced safety on surrounding roads. • Damage to the condition of the of the existing road network. • An increase in crime.	
Impact Management Outcome	The functioning of the surrounding road network remains efficient and the state of the infrastructure isn't hampered.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• All construction vehicles must adhere to traffic laws when travelling to and from the site. • All drivers and machinery operators must be sensitised to the fact that they are working in an area with a potentially high volume of foot and vehicle traffic and must exercise due caution when entering/ exiting the site. • Appropriate signage should be erected to warn other road users about the presence of construction vehicles, particularly at the point where construction vehicles enter/ exit the site from the N2. • Speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. • Where possible, heavy machinery should be parked within a secure demarcated area within the footprint of the site instead of moving the machinery to and from the site each day. • Construction vehicles must adhere to the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. • The Contractor must ensure that any large or abnormal loads (including hazardous materials) that must be transported to/ from the site are routed appropriately, and that appropriate safety precautions are taken during transport to prevent road accidents. • Where possible, construction traffic that may obstruct traffic flow on the surrounding roads should be scheduled for outside of peak traffic times.	Contractor	Construction phase

• If needed, appropriate traffic management measures and/ or points men (traffic marshals) should be utilized to assist vehicles entering/ exiting the site, particularly where vehicles must cross the path of oncoming traffic. • Where possible, heavy machinery should be parked within a secure demarcated area within the footprint of the site instead of moving the machinery to and from the site each day. • Ensure that adjacent property owners are able to access their properties at all times.		
Performance Indicator	• The surrounding road networks infrastructure remains in its current state. • Limited congestion and traffic.	

11.7 OBJECTIVE 7: PREVENT THE LOSS OF TERRESTRIAL VEGETATION / HABITAT.

Impact Management Objective: Reduce the impacts caused by land disturbance and conserve the Indigenous Vegetation on site.

Potential impact(s) to avoid	• Permanent Loss of Indigenous Vegetation caused by construction activities. • Unsuccessful reinstatement of topsoil • Increased susceptibility to erosion caused by construction activities. • Negligence of indigenous vegetation or topsoil that require transplanting.
Impact Management Outcome	The loss of indigenous vegetation on site is minimised and results in no erosion. Any species of conservation concern are conserved. The seven existing mature European Oak trees along the street boundary and few young Milkwood trees have been retained.

IMPACT MANAGEMENT ACTIONS

Mitigation measure	Responsible party	Time period
• Strict adherence to 10m aquatic buffer area to preserve vegetation. • Barricade protected trees during construction. • Great care will be taken if cement is to be mixed on site, especially in the proximity of vegetation and watercourses. It will be mixed on thick plastic sheets or in large buckets and not allowed to spill onto bare ground. Any spillage will be cleaned up immediately. Cement water will also be contained in the above manner and allowed to dry out and then removed from site. Cement water, which is highly alkaline, poses a definite threat to the soil and seed banks. • Blanket clearing of vegetation must be limited to the approved development footprint, and the area to be cleared must be demarcated before any clearing and grubbing commences. • No clearing outside of development and infrastructure footprint area to take place. • Rescued plants should be replanted into a nearby disturbed area of similar habitat or for open space rehabilitation, as per the Rehabilitation Plan in Appendix E.	Contractor	Construction phase

• Ensure the open space is kept clear of alien plant species through the adoption of an Alien Management plan. • Trees located in areas where sidewalks, open areas or gardens are proposed are to be barricaded and not cleared. ◦ 7 European Oak trees and Milkwood trees identified on site to be effectively barricaded. Barricade to remain throughout the construction phase. • Provide provisions in the detailed design of the layout to accommodate protected trees. • If removal/trimming/cutting is required, for a SCC (Species of Conservation Concern), a permit should be obtained from the Department of Forestry and Fisheries. • An Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here and will be on site regularly. • Final siting of footprint should be undertaken in consultation with respective specialists, including a botanist. • Open Space to be incorporated in final plan to include ecological corridors and riparian as described in the report. • Removed topsoil should be used in rehabilitation of transformed areas that are within the open space areas. • Ensure the open space is kept clear of alien plant species through the adoption of an Alien Management plan. • Alien vegetation should be removed, and disposed off-site, at a registered waste facility, disposal slips must be obtained for waste disposal.		
Performance Indicator	• Construction team limit disturbance to the indigenous vegetation as far as possible for the duration of the construction phase. • Indigenous vegetation transplanted successfully and remains in a healthy state. • There is no evidence of erosion.	

11.8 OBJECTIVE 8: CREATION OF MULTIPLE JOB OPPORTUNITIES AND CAPITAL EXPENDITURE.

<i>Impact Management Objective: To create employment opportunities with potential for skills transfer, for members of the local community.</i>	
Potential impact(s) to be promoted.	• A number of job opportunities will be created during the construction phase of the development. • There transfer skills from more experienced workers to less experienced workers. • Increase in business for local businesses within the construction industry.
Impact Management Outcome	The local community benefits from the employment opportunities created during the construction phase.
IMPACT MANAGEMENT ACTIONS	

Mitigation measure	Responsible party	Time period
- The Home Market NPC should establish a database of local construction companies in the area, specifically SMME's owned and run by HDI's (Historically Disadvantaged Individuals) and local individuals, prior to the commencement of the tender process for the development. These companies should be notified of the tender process and invited to bid for project related work. - The Home Market NPC in consultation with the appointed contractor/s should seek to ensure that a percentage of the labour required for the construction phase is sourced from local area in order to maximize opportunities for members from the local HD communities. - Ensure specialist reports and input are available to the public and can be referenced/reviewed for future developments in the surrounding area. - The developer in consultation with the appointed contractor/s will look to employ a percentage of the labour required for the construction phase from local area in order to maximize opportunities for members from the local HD communities.	The Home Market NPC / Contractor	Construction phase
Performance Indicator	The majority of the construction team is from the local community, with preference given to historically disadvantaged individuals. Skills transfer from experienced to less experienced workers is actively encouraged on site.	

11.9 OBJECTIVE 9: VISUAL IMPACT MANAGEMENT.

Impact Management Objective: To prevent the site from presenting an unnecessary visual impact to the surrounding public.

Potential impact(s) to avoid	• Temporary loss of the sense of place.		
Impact Management Outcome	The site does not present a significant visual impact and the sense of place is maintained during the construction period. The seven existing mature European Oak trees along the street boundary have been retained, thereby softening the visual impact of the proposed development.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• Consult with the ECO when determining the appropriate site for the site camp. • The site camp must be kept neat and tidy and free of litter at all times. • Waste must be managed according to this EMP 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. • 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.		Contractor	Construction phase

• Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time. • The site camp, storage facilities, stockpiles, waste bins, elevated tanks 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. • The site camp may require visual screening via shade cloth or other suitable material. • Special attention should be given to the screening of highly reflective material. • Use of lighting (if required) should take into account surrounding residents and land users and should present little or no nuisance. Downward facing, spill-off type lighting is recommended. • Construction vehicles must enter and leave the site during working hours. • Working areas, storage facilities, stockpiles, waste bins, elevated tanks 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. • Ensure indigenous vegetation has been sourced, if not moved to site, to be established as soon as construction activity has concluded, and re-grassing of natural surfaces, ie: grassed road reserves, pathways, etc, commence as soon as possible. • Alien vegetation monitoring and clearance must be implemented daily. • Maintain oak and milkwood trees identified on site. • Implementation of the Alien Invasive Management Plan (Appendix B).		
Performance Indicator	• Good "housekeeping" is evident on site. • The site does not pose a visual impact to surrounding community.	

12. Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase

After all construction activities have ceased, the sites must be cleared of all construction related equipment, materials, facilities and waste. In addition, all disturbed surfaces – including disturbed areas around the structures and all areas utilised for site facilities – must be stabilised, rehabilitated and provided with a suitable cover. All temporary access roads constructed must be rehabilitated and access must be restricted from the public.

The environmental management objectives (goals) for this phase are:

- Rehabilitate & stabilise disturbed areas and ensure environmentally sensitive closure of the construction sites.
- Reduce loss of aquatic habitat within the Wetland.

- Reduce visual impact.
- Reduce traffic impact.
- Provision of affordable housing.
- Creation of Business and Employment Opportunities.
- Local economic revenue.
- Maintain sense of place.
- Remain fire wise.

12.1 OBJECTIVE 1: REHABILITATE & STABILISE DISTURBED AREAS

Impact Management Objective: To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner.			
Potential impact(s) to avoid	• Failure to remove all construction related waste and materials may result in environmental pollution. • Failure to remove all construction related equipment, machinery and site facilities may pose an impact to the natural environment specifically the watercourses. • Failure to stabilise disturbed surfaces may result in soil erosion and increased storm water run-off, which may limit successful revegetation of the site.		
Impact Management Outcome	• The site is neat and tidy, all exposed surfaces are suitably covered/ stabilised. • There is no construction-related waste or pollution remaining on site. • Successful implementation of the Rehabilitation Plan in Appendix E.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• 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. • Implementation of the Rehabilitation Plan (Appendix E). • Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. • Any contaminated soil must be collected and disposed of as hazardous waste. • 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. • All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities should be scarified or ripped.		Contractor	Construction phase

• Topsoil removed during the establishment of the site camp and the working area must be spread evenly over the entire site camp area and all other disturbed/ exposed areas after those areas have been ripped, scarified, shaped and contoured (as required). • Where necessary seeding and planting of vegetation can take place after the replacement of the topsoil. Hardy, drought tolerant, non-invasive plant species must be selected. If needed, a layer of mulch can be applied to the newly shaped/ landscaped and topsoiled areas. The mulch will serve to limit erosion and will promote the re-vegetation of the site by retaining moisture in the soil and providing organic material (compost) for new plant growth. • All exposed soils and recently topsoiled areas are to be re-vegetated or stabilised to the satisfaction of the ECO, to protect these areas from wind and water erosion. No areas are to be left exposed to erosive forces. Erosion protection measures that can be applied include mulching (described above), the placement of geotextile, onion bags filled with wood chips, brush-packing or other similar measures. • Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and reused elsewhere on the property or disposed of at an appropriate disposal site. • Disturbed soils must be revegetated with the local indigenous vegetation such as that which occurs at the site, or provided with other suitable cover. • Erosion features that have developed due to construction within the aquatic habitat due to the project are required to be stabilised. • Implementation of Rehabilitation Plan compiled for the onsite Wetland (Appendix E), if disturbance has occurred.		
Performance Indicator	• All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site. • Successful implementation of the Rehabilitation Plan (Appendix E) • Compacted soils have been scarified/ ripped and stabilised. • All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised. • No alien vegetation is evident on site.	

12.2 OBJECTIVE 2: REDUCE LOSS OF AQUATIC HABITAT WITHIN THE WETLAND

Impact Management Objective: Management of the Wetland in order to reduce loss of Aquatic Habitat

Potential impact(s) to avoid	• Loss of aquatic habitat within the wetland.
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	• Establishment of alien invasive species within the riparian zone. • Erosion within the riparian habitat	
Impact Management Outcome	• Minimal loss of Aquatic Habitat and Associated Biota	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• Engage with the community to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. Spread awareness around the management of the Wetland. • No structures, permeable / temporary or not, may be placed within the buffer area. This includes the erven bordering the buffer area. ◦ Yard area of erven within the buffer area will be cleared of alien vegetation, as per the Alien Invasive Management Plan in Appendix C. ◦ No additional vegetation is to be planted within the buffer area, unless part of approved rehabilitation efforts. ◦ Yards encroaching into the buffer area to be maintained. • Implementation of Rehabilitation Plan compiled for the onsite Wetland (Appendix E). • Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. • Information can include a description and visual of alien invasive plant species. • Place waste bins prior to the entry of the buffer zone for the disposal of litter. • Aquatic habitat area must be maintained through alien invasive plant species removal. • The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion. • Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area. • The recommended use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater. • Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment.	Developer	Operational phase

- Implement gabions at the base of the slope, to provide slope stability/support, as well as attenuation of surface runoff. - Implementation of the Alien Invasive Management Plan (Appendix B) - Maintenance of the aquatic habitat and buffer are must be implemented, preventing encroachment of any further infrastructure or vehicles. - Identify the buffer zone. Erect signage, with the relevant information: - Brief description of wetland habitat. - Prohibited activities. - Identify alien invasive species to be aware of, with photos.		
Performance Indicator	- All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised. - A healthy aquatic habitat - Minimal waste within the aquatic habitat - Minimal alien vegetation present	

12.3 OBJECTIVE 3: REDUCE VISUAL IMPACT.

Impact Management Objective: Reduce the visual impact caused by the proposed development.

Potential impact(s) to be avoided.	• Change in the sense of place. • Community tension.		
Impact Management Outcome	• The proposed development once constructed blends in with the community.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party		Time period
• Unnecessary use of lighting should be avoided. • The state of the onsite vegetation should be maintained and kept in a healthy state. • Collection of refuse must be maintained. • Colours should be kept natural. • The possible visual impact should be considered when painting the units. • Infrastructure should be maintained. • The introduction of the tree line in order to create a vegetated screen between Saasveld Road, and the development, must be maintained and kept free of alien vegetation. • Residential developments must utilize natural colours where possible, so as to not clash with the surrounding natural environment.	Developer		Operational phase

• Green spaces/surfaces should be favoured over hardened surfaces, where possible. • Maintain oak and milkwood trees identified on site. • Implementation of the Alien Invasive Management Plan (Appendix B) • Ensure the following is adopted by the developers and their architects: ◦ An appropriate coordinated colour scheme has been developed. ◦ The face brick plinths have been changed to plastered plinths. ◦ The plaster finishes have been limited to smooth and scratch plaster. ◦ The colour scheme of the pavers have been pinned down and standardized to a design of gray and red. ◦ The Vibacrete internal walls have been replaced with plastered brick walls. ◦ Fencing options have been narrowed down to picket fencing on plinth walls. ◦ An appropriate standard design for balustrades has been developed by the architects, and not left open ended. ◦ An appropriate boundary wall, as well as an entrance and fence detail design has been developed by the architects, and not left open ended. ◦ The geysers placed on flat roof slabs have been changed and are now accommodated in the roof spaces.		
Performance Indicator	• The proposed development forms part of the community and the visual impact is dissipated.	

12.4 OBJECTIVE 4: REDUCE TRAFFIC IMPACT.

Impact Management Objective: Reduce the traffic impact caused by the proposed development.

Potential impact(s) to be avoided.	• Damage to road infrastructure. • Community tension.
Impact Management Outcome	• Surrounding road networks remain safe to use and free of excessive congestion.

IMPACT MANAGEMENT ACTIONS

Mitigation measure	Responsible party	Time period
• Alternative routes such as Loerie Street may be utilized, in terms of access to the Lumbar Mill. • Ensure that sufficient signage and road markings are incorporated into the internal road network. • Consideration may be given to the addition of pedestrian crossings and speed bumps.. • Consideration should be given to establishing a bus stop for the local transport service provider, outside the development to encourage the use of public transport.	Developer	Operational phase

Performance Indicator	The proposed development forms part of the community and the visual impact is dissipated.
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12.5 OBJECTIVE 5: PROVISION OF AFFORDABLE HOUSING.

Impact Management Objective: The proposed development will increase the amount of housing within the urban edge of the Bitou Municipality, and address the backlog identified in the Bitou Local Municipality draft SDF, 2019.

Potential impact(s) to be promoted.	- Improved quality of life. - An increase in the rates base for the municipality. - Provision of assisted facilities for the elderly		
Impact Management Outcome	Improved quality of life.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party		Time period
Positive impact therefore mitigation is not required. Should be noted that it can be further enhanced by establishing a community group who can engage with stakeholders and maintain an open line of communication to ensure that the community is functioning optimally.	Developer / Bitou Municipality		Operational phase
Performance Indicator	A well-balanced community living in a safe and healthy environment.		

12.6 OBJECTIVE 6: LOCAL ECONOMIC REVENUE.

Impact Management Objective: Increased economic revenue for local businesses and industries.

Potential impact(s) to be promoted.	• Increase in local economic revenue. • Decreased unemployment levels.		
Impact Management Outcome	• Creation of Business and Employment Opportunities.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party		Time period
Positive impact, therefore to further enhance this impact, the developer/7 Oaks Community group is encouraged to source local labour, particularly those of Historically Disadvantaged Backgrounds, given that they have the necessary skills or experience (for the 6 – 10 potential permanent jobs that may occur on site, including gardening, administration, etc.), as well as utilize local suppliers and businesses.	Developer / Bitou Municipality		Operational phase
Performance Indicator	• Increase in employment of local community members and utilization of local businesses and suppliers.		

12.7 OBJECTIVE 7: MAINTAIN SENSE OF PLACE.

Impact Management Objective: Creation of Business and Employment Opportunities			
Potential impact(s) to be promoted.	• Increase in local economic revenue. • Decreased unemployment levels.		
Impact Management Outcome	• Creation of Business and Employment Opportunities.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party		Time period
• Appropriate signage to indicate speed limits, and establishment of speed bumps, to reduce noise from traffic. • Road network should be considered in municipalities future planning, for expansions, etc. • The development is predicted to have minimal nuisances in terms of sense of place, as the development will match the surrounding residential land uses.	Developer / Bitou Municipality		Operational phase
Performance Indicator	• Increase in employment of local residents.		

12.8 OBJECTIVE 8: CREATION OF BUSINESS AND EMPLOYMENT OPPORTUNITIES.

Impact Management Objective: Creation of Business and Employment Opportunities			
Potential impact(s) to be promoted.	• Increase in local economic revenue. • Decreased unemployment levels.		
Impact Management Outcome	• Creation of Business and Employment Opportunities.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• Positive impact, therefore to further enhance this impact, the developer/7 Oaks Community group is encouraged to source local labour, particularly those of Historically Disadvantaged Backgrounds, given that they have the necessary skills or experience (for the 6 – 10 potential permanent jobs that may occur on site, including gardening, administration, etc.), as well as utilize local suppliers and businesses. • The developer should inform local community leaders, organisations and councillors of the potential job opportunities associated with the different components associated with the operational phase of the development.		Developer / Bitou Municipality	Operational phase
Performance Indicator	• Increase in employment of local employees from the surrounding communities. • Increase in small businesses/services.		

12.9 OBJECTIVE 9: REMAIN FIRE WISE.

Impact Management Objective: Reduce the potential for the spreading and starting of a wildfire		
Potential impact(s) to be avoided.	• Loss of vegetation and habitats (Wetland habitat). • Risk to human life. • Risk to infrastructure.	
Impact Management Outcome	• Development remains fire wise. • Development protected from wildfires. • Implementation of the National Veld and Forest Fire Act (Act No. 101 of 1998)	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• Removal of dead vegetation. • Clearing of alien vegetation. • Detract from growing bushes, climbers and trees close to windows, glass doors, wooden decks or beams. • Ensure that gas is stored according to industry standards. • Maintain fire hoses and extinguishers. • Appoint a Fire Wise Committee, and encourage community to join the Southern Cape Fire Protection Association. • No burning of garden waste is permitted. • Treat wooded decks with fire-retardant. • Erect signage. • Implementation of the Alien Invasive Management Plan (Appendix B) • Maintain 10m Aquatic Buffer, and prohibit encroachment of housing infrastructure including gardens. This buffer can act as defensible space in the event of a fire occurrence, as the clearance of alien vegetation will allow for some space. • Gardens abutting the aquatic buffer should be maintained with short vegetation, and fences should not encroach into the aquatic buffer.	Developer / Bitou Municipality / Community	Operational phase
Performance Indicator	• No alien vegetation present. • No dead vegetation present. • Fire Wise Committee appointed. • Increase in small businesses/services. • Maintenance of the aquatic buffer and implementation of the alien invasive management plan.	

13. Emergency Preparedness

13.1 Emergency response procedures

The potential environmental risks that may arise as a result of construction activities, or during the maintenance of the structures must be identified, and appropriate emergency response procedures must be compiled for each emergency scenario. Potential environmental emergencies that require an emergency response include, but are not limited to, unplanned fires, sewage spills, spills of hazardous chemicals, snake bites etc.

- The construction contractor is responsible for identifying potential significant environmental risks that may arise as a result of pre-construction, construction and rehabilitation activities, and the contractor must formulate emergency response procedures for these potential incidents.
- The ECO, the contractor and the Holder are responsible for ensuring that all construction workers are aware of the emergency procedures and are properly trained on how to identify and respond to an emergency incident during construction.
- An emergency procedure must clearly indicate who will take charge during an emergency, and the roles and responsibilities of workers and authorities during an emergency.
- The construction contractor is responsible for ensuring that the requirements of the Occupational Health & Safety Act (OHSA) are adhered to during the construction phase. The Holder is responsible for ensuring compliance with the OHSA during the undertaking of maintenance activities.

13.2 Emergency preparedness

The following measures must be implemented, as appropriate, to ensure effective responses to emergencies:

- All workers on site during the construction and operational phase must be properly educated about possible emergency incidents that may arise, how to avoid such incidents and how to respond in the event of an incident. "Refresher" training sessions on emergency procedures must be held if needed.
- All workers must ideally be given basic fire-awareness training, as well as be advised on basic firefighting and safety techniques. Fire-fighting equipment must be available on-site during construction and maintenance activities (see section 8.3).
- All workers must be trained on how to respond in the event of a spill of a hazardous substance (fuel, chemicals etc.), if hazardous substances are to be used on site.
- A spill kit for containing and/or neutralising spills of hazardous substances (e.g. hydrocarbons) must be available on site at all times, when hazardous substances are present.
- Any incidents of pollution or spillage of hazardous materials during construction must be reported to the ECO as soon as possible. The ECO must then (depending on the nature of the spill) notify the relevant authorities, if needed. During the operational phase of the development, the Holder is responsible for notifying the relevant authorities of any pollution incidents that arise as a result of maintenance activities.
- A first aid kit must be available on site at all times.
- Emergency contact numbers (including the fire department, police and ambulance) must be prominently displayed on site at all times and regularly updated.
- All emergency incidents must be recorded in a site incident log. The cause of the incident, the measures taken in response to the incident and the efficacy of those measures must also be recorded. This information must be used to inform future emergency preparedness planning, and to avoid prevent similar incidents from arising again.

14. Method statements

The Competent Authority and/or the ECO may require the Holder or Construction Contractor to submit Method Statements for one or more construction-related activity, or any aspect of the management of the site, before the activity is undertaken or during the performance of the activity, if the activity is causing or may cause significant environmental damage, or pose a health and safety risk.

Method Statements need not be complex and lengthy, but must clearly state **how**, **when** and **where** the activity concerned will be undertaken, and must specify **who** will be responsible for undertaking each component of that activity. Method Statements must be prepared by the Construction Contractor and submitted to the ECO for approval before undertaking the activity concerned.

The ECO and / or Competent Authority have the authority to request method statements for activities, including but not limited to:

- Establishment of site camp and stockpile area.
- Cement/ concrete batching, disposal and emergency contingencies.
- Topsoil and sub-soil storage/ stockpiling.
- Storage of fuels and hazardous chemicals and emergency contingencies.
- Waste management system.
- Storm water management and control.
- Alien invasive plant species management.
- Fire Control & Fire Emergency Plan.
- Emergency preparedness plan / emergency response procedure (see Chapter 14).
- Post-construction rehabilitation.

The ECO has the authority to prevent activities from being undertaken until such time as a satisfactory Method Statement has been submitted to the ECO and approved by the ECO.

15. Roles and Responsibilities

This EMPr, once approved by the competent authority (DEA&DP), must be seen as binding to the Holder, and any person acting on the Holder's behalf, including but not limited to agents, employees, associates, contractors and service providers.

The Holder and all other persons who may be directly involved in the development are also bound by their general Duty of Care, as stated in Section 28 of the National Environmental Management Act, 1998:

Duty of Care:

"Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment"

15.1 Duties and Responsibilities of the Holder

The Holder is ultimately responsible for ensuring that the environmental management measures specified in this EMPr, as well as any other conditions specified by the competent authority, are implemented and

adhered to during the construction and operational phase (maintenance activities) of the proposed development

The Holder or delegated party is responsible for monitoring and maintenance during the operational phase. The Holder must ensure that all appointed service providers, contractors and maintenance workers are capable of complying with all statutory requirements of this EMPr and the conditions of the Environmental Authorisation. The Holder is responsible for ensuring that this EMPr and the conditions of the Environmental Authorisation are implemented and adhered to during construction.

The Holder or appointed consultant is responsible for identifying emergency situations that may arise during operational and maintenance activities and must formulate appropriate emergency response procedures for these emergency scenarios.

15.2 Duties and Responsibilities of the Contractor

The "Construction Contractor" is the entity responsible for undertaking the physical construction of the residential development. The construction contractor is responsible for ensuring that all environmental management measures specified in this EMPr and in the EA are implemented during the pre-construction, construction and post-construction rehabilitation phases, unless agreed otherwise with the Holder. The contractor will be responsible for all costs incurred in the rehabilitation of the site and for ensuring effective environmental management during construction. The contractor must therefore make adequate financial provision for the implementation of all prescribed measures.

It is strongly recommended that the Construction Contractor appoint an Environmental Site Officer (ESO), who will act as the Contractor's representative to monitor and enforce compliance with the conditions of this EMPr, throughout all phases of construction.

In addition to the above, the Construction Contractor is responsible for the following:

- Identify emergency situations that may arise as a result of construction activities, and formulate appropriate emergency response procedures.
- Ensure that all construction workers, including sub-consultants and service providers, undergo environmental awareness training prior to commencing work on site, or as soon as possible thereafter.
- Compile the required method statements, which must be to the satisfaction of the ECO, before commencing with the activity to be governed by the method statement.
- Respond to concerns or issues identified by the ECO, as relates to environmental management, and implement the appropriate management or remediation measures, at the Contractor's own expense (unless agreed otherwise)
- Should third parties be called to the site to perform clean up and rehabilitation procedures, the Construction Contractor will be responsible for all associated costs.

Note that failure to comply with the requirements and conditions of this EMPr and the Environmental Authorisation may result in fines or other penalties being levied against the Construction Contractor by the Competent Authority.

15.3 Duties and Responsibilities of the ECO

The appointed Environmental Control Officer (ECO) is responsible for undertaking regular site visits to monitor and report on the implementation of the EMPr and adherence to the conditions of the Environmental Authorisation during the pre-construction, construction and post-construction rehabilitation phases. The ECO is not required to monitor the site during the operational (maintenance) phase of the development.

15.3.1 Competency of the ECO

The ECO must be independent of the Holder, Engineer, Construction Contractor and their service providers. The appointed ECO must be suitably qualified and experienced, and must be able to demonstrate that he / she is of sufficient competency to undertake the required task. The ECO must preferably be a resident in close proximity to the development area to ensure quick response if required. The ECO must work in close co-operation with the Construction Contractor, resident engineer or ESO (where applicable) and all contractors in order to identify potential problems before they occur, and provide suitable guidance as to how the identified problems (environmental impacts) can be avoided.

15.3.2 Duties of the ECO

The duties of the ECO include, but are not limited to:

- Conduct a pre-construction site inspection to ascertain the pre-commencement condition of the site (i.e. the status quo);
- Conduct environmental awareness training, which must include;
 - A brief description of the surrounding environment
 - Importance of the EMPr
 - Roles and responsibilities
 - Identified environmental risks
 - Mitigation measures to be implemented
 - No-go areas
 - Emergency procedures (Hydrocarbon spill)
- Undertake regular site visits to monitor compliance with all mitigation, monitoring and management measures contained in the EMPr and the Environmental Authorisation, during the pre-construction, construction and rehabilitation phases of the development;
- Evaluate the achievement of the performance indicators associated with each impact management objective specified in this EMPr;
- Liaise with site contractors, engineers and other members of the development team with regard to the requirements of the EMPr;
- Provide guidance as and when required regarding the implementation of the environmental management measures contained in the EMPr and EA, so as to assist the Holder and contractor in remaining compliant with these measures;
- Assist in finding environmentally acceptable solutions to construction problems;
- Ensure that the working areas, site camp facilities, access roads and no-go areas are properly demarcated;
- Ensure that proper topsoil management practices are adhered to on site;
- Ensure that proper waste management & pollution prevention strategies are practised on site;
- Examine method statements, where required;
- Recommend additional environmental protection measures, should this be necessary;
- Furnish contractors with verbal warnings in case of contravention of the EMPr;
- Recommend that the competent authority furnish errant contractors with predetermined fines, when verbal and / or written warnings are ignored;
- Ensure satisfactory rehabilitation of disturbed areas on site, after construction is complete;
- Keep detailed records of all site activities that may pertain to the environment, and produce compliance-monitoring reports (ECO Reports) for submission to the Holder, and the Competent Authority at regular intervals during the construction phase;

- Submit a final post-construction inspection report, within 6 months of completion of the construction phase. The audit report must detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.
- All ECO Reports and Inspection Reports must be submitted to the Holder and Competent Authority.
- Implementation of the Alien Invasive Management Plan (Appendix B)

15.3.3 Frequency of ECO visits

The ECO must conduct **weekly** site visits during the construction phase, in addition to the start-up and closure inspections.

The ECO has the discretion to undertake additional visits if he / she feels this is justified due to the actions of the contractors, and to make *ad hoc* visits in order to ensure compliance.

The ECO must also undertake a **final inspection (audit) 6 months of completion of construction activities**. The purpose of this final inspection is to ensure that the rehabilitation measures applied at the conclusion of the construction phase have been sufficient to promote the successful rehabilitation of the site, and to identify any further issues that require attention or follow-up.

15.3.4 Authority of the ECO

The ECO has the authority to recommend to the authorities that they suspend all works (or part thereof) occurring on site, should any action being undertaken on site not comply with the environmental requirements, and where such actions pose a serious threat to any element of the surrounding environment.

The ECO has the authority to issue instructions to the Construction Contractor and/or Holder, regarding measures that must be implemented on site in order to ensure compliance with the EMPr and Environmental Authorisation, and/or to prevent environmental degradation or pollution from occurring.

The ECO has the authority to issue verbal and written warnings to contractors. Should verbal and written instructions and/or warnings be ignored, the ECO has the authority to request the Competent Authority to issue pre-determined fines or other penalties.

The ECO has the authority to report incidents of non-compliance to the Competent Authority at any time.

16. Environmental Awareness Plan

Environmental Awareness Training must be conducted prior to the commencement of construction activities. It is the holder's responsibility to familiarise himself/herself with the content and requirements of this EMPr. The holder is also responsible to ensure that the contractor and all labourers working on site during the construction phase are familiar with the content of this EMPr.

The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

1. This EMPr must be kept on site at all times.

2. The provisions of this EMPr and the conditions of the Environmental Authorisation must be explained in detail to all staff during Awareness Training.
3. Training booklets will be handed out to all labourers and must be explained to them.
4. Weekly checks to be done by the Holder's environmental representative who must be on site at all times.
5. The ECO to conduct frequent site visits.
6. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the holder, contractor and the competent authority).

The Construction Contractor must 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 EMPr fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The demarcated "No-Go" areas;
- 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 construction materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)
- General "best practice" principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase, and must 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 must be utilised where needed.

17. Monitoring, Record Keeping and Reporting

17.1 Environmental Auditing

In accordance with the requirements of the Environmental Impact Assessment Regulations, 2014 (as amended), the holder of the Environmental Authorisation must, for the period that the Environmental Authorisation is valid, appoint a suitably qualified independent person to conduct an environmental audit to audit compliance with the conditions of the Environmental Authorisation and the EMPr.

The holder is responsible for appointing, managing and remunerating the appointed auditor. The auditor may be the appointed Environmental Control Officer (ECO), provided the ECO is sufficiently qualified and experienced to fulfil the auditing requirements specified below.

The appointed auditor must undertake regular environmental audits according to the frequency specified in the Environmental Authorisation. Following each audit the environmental auditor must submit an audit report to the Competent Authority (in this instance the DEA&DP).

- Environmental auditing and environmental audit reports must adhere to the requirements of the amended 2014 Environmental Impact Assessment Regulations, in particular Section 34 (*Auditing of Compliance with Environmental Authorisation, Environmental Management Programme*) and Appendix 7 (*Objective and Content of Environmental Audit Report*)
- The audit report must provide verifiable findings on the level of compliance with the provisions/ conditions of the Environmental Authorisation and the EMPr, and must also comment on the ability of the measures contained in this EMPr to sufficiently avoid, manage and mitigate environmental impacts.
- Where the findings of the audit report indicate that the impact management measures stated in the EMPr are insufficient to adequately address environmental impacts, recommendations as to how the EMPr must be amended so as to address the identified shortcomings must be made and submitted to the competent authority together with the audit report.

Compliance requirements in terms of the EA

During the period which the activities have been commenced with on site until the construction of the bulk internal service infrastructure (i.e. internal roads; water—, sewer—, electricity reticulation, bulk stormwater and stormwater outlet structures) as well as the slope stabilization measures have been completed on site, the Holder must undertake **annual** environmental audit(s) and submit the Environmental Audit Report(s) to the Competent Authority.

A final Environmental Audit Report for the construction phase (i.e. internal and external civil services construction and platforming) must be submitted to the Competent Authority within **three (3) months** of completion of the post construction rehabilitation and monitoring requirements.

The final auditing requirements should be completed and submitted at least **three (3) months** prior to expiry of the validity period of the environmental authorisation to ensure the Holder is able to comply with all the environmental auditing and reporting requirements and for the competent authority to be able to process it timeously.

17.2 Construction phase monitoring, reporting and record keeping

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals during the construction phase, in order to ensure that the provisions of this EMPr and the Environmental Authorisation are adhered to and that sound environmental management is ensuing on site.

The ECO must compile a monthly ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Holder and to the Competent Authority is so requested by that authority. The ECO inspection reports must include both photographic and written records.

17.2.1 ECO Inspections - Photographic Records

The condition of the surrounding natural environment must be monitored regularly in order to ensure that construction and management activities are not impacting negatively on the condition of the landscape and any sensitive ecosystems. The most effective way to achieve this is by means of a detailed photographic record. In this way, a record of any shift in ecosystem condition can be maintained and potential impacts be detected at an early stage. It is thus recommended that fixed-point photo-monitoring sites could be set up, and photographs must be taken at these sites during each ECO inspection. Where necessary, the entire working area must be well documented and photographed.

17.2.2 ECO Inspections - Written Records

The following record-keeping during the pre-construction, construction and rehabilitation phases of the development is recommended:

- The ECO must complete an ECO Checklist after each ECO site visit.
- The ECO must compile an ECO monitoring report and submit this to the Holder, the Contractor and the Competent Authority (the latter only if required by the Competent Authority). The monthly reports must be a summary of the ECO inspections from the preceding month, and must highlight the key concerns/ issues on site, instances of non-compliance with the EA and EMPr, all instructions issued to the contractor, actions taken and aspects that still require attention.
- All ECO reports and ECO instructions must be retained on file at least for the duration of the construction period (retaining reports for a period of at least 5 years is recommended, in the event that the Competent Authority must request information).
- A record (minutes) of construction site meetings, liaison site meetings between the ECO and resident engineer or contractor, monitoring reports, ECO instructions and ECO observations must be clearly documented and filed on a master file off-site for safe keeping.
- It is recommended that a site register (incident register) be kept on site at the site office for the recording of any environmental incidents (e.g. fires, spills etc.), observations which are contrary to the stipulations within the EMPr and any other contravention deemed necessary for the attention of the resident engineer. Actions taken to remedy the incidents must also be recorded.
- A complaints register must be kept on site in which complaints by any member of the public must be logged.
- The ECO must compile a final post-construction audit report, within 6 months of completion of each construction phase. The audit report must detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.

17.2.3 Construction Phase Record Keeping

A copy of the approved EMPr, the Environmental Authorisation and any relevant construction method statements must be kept on site at all times during pre-construction, construction and rehabilitation activities. The ECO Reports must be retained by the Holder for a period of at least 5 years, and must be provided to the Competent Authority upon request.

The set up and organisation of the site camp is paramount to ensuring compliance. An environmental file is to be created by the contractor and be situated within the site camp throughout the construction phase and with the applicant thereafter. The environmental file is to include the following;

- A copy of the Environmental Authorisation
- A copy of General Authorisation or any other relative permits
- A copy of the approved EMPr
- Updated Waste slips
- Disposal slips or cleaning slips (ablution cleaning)
- All EMR's (Environmental Monitoring Reports) and ECO instructions
- Copies of Environmental induction register/s
- The Protocol for chance Palaeontological Findings
- A complaints register
- Updated method statements
- Any and all emergency procedure/s applicable to site activities
- An Incident Register

18. Penalties, Claims and Damages

The contractor will be responsible for all costs incurred in the rehabilitation of the site and for ensuring that all procedures required to rehabilitate the site are implemented. If third parties are called to the site to perform clean up and rehabilitation procedures, the contractor will be responsible for all costs. The competent authority may impose penalties on the Holder or any of the contractors if conditions contained in this EMP are contravened. This would be based on an agreement or contract between the Holder and the contractor.

Penalties could be imposed in terms of Chapter 11 of the Western Cape Bill on Planning and Development as published in the Extraordinary Provincial Gazette No 5183, 3 October 1997, and would be applicable for any action which leads to damage to the natural environment. Please note that the payment of any fines in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

In cases where severe environmental damage occurs, the competent authority law enforcement division may take legal action against the responsible parties. The reasons for this could include, among others:

- Not implementing the conditions of the EMP;
- Spillage that result in environmental damage;
- Incorrect handling and storage of construction materials and chemicals;
- Sensitive areas that are not clearly demarcated;
- Performing ablutions in areas other than facilities provided for such actions; and
- Occurrence of unattended and out of control fire.

The Contractor shall comply with the environmental specifications and requirements on an ongoing basis and any failure on his part to do so will entitle the ECO to issue the contractor with penalty / fine as described in the following section.

The following offences, level of severity and value of the financial fines have been drafted according to the sensitivities on the proposed site, the mitigation measures proposed, and the construction methods proposed. It must be noted that the level of severity is at the discretion of the ECO and any offences or fines will be recorded in the ECO's monitoring report. The fineable offences are not limited to the table below, additional offences may be applied by the ECO with prior agreement with the EA holder.

The following fine structure shall apply:

Table 6 Fines and offences.

Finable Transgression	Min Fine	Max Fine
Failure to notify the ECO of the commencement of construction or pre-construction activities, prior to the commencement of such activities.	R1 000	R2 000
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
Failure to demarcate the buffer area	R1000	R5 000
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

Environmental Management Programme

Failure to provide secured ablution facilities (1:30 ratio) on site.	R500	R15 000
Failure to comply with the provisions relating to the clearance of vegetation on site.	R2 000	R5 000
Clearance of indigenous vegetation (regardless of the density of alien vegetation present) outside of the demarcated boundaries of the working area and site camp.	R2 500	R15 000
Failure to apply herbicide to alien vegetation when required to do so.	R500	R2 000
Failure to adhere to designated access routes and/or the driving of vehicles through undeveloped vegetation outside of the demarcated working area or site camp.	R1 000	R5 000
Movement of vehicles and/or construction workers in no-go areas;	R1 000	R10 000
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
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
Failure to comply with the provisions relating to the management of topsoil and subsoil.	R1 000	R5 000
Excessive excavation of material in areas not depicted for such purpose / activity on the approved design plans.	R2 500	R10 000
Failure to comply with the provisions relating to waste management on site i.e. recycling of wastes.	R500	R5 000
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
Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching.	R1 000	R5 000
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
Refueling of vehicles, machinery or equipment outside of the designated refueling area.	R500	R2 000
Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies.	R500	R2 000
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

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
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The above does not absolve the transgressor from being prosecuted in terms of the **National Environmental Management Act (Act 107 of 1998)** which may result in further penalties and other actions by State Departments.

19. Conclusion

The recommendations and mitigation measures prescribed in this EMPr have been formulated with the intention of addressing potential pre-construction, construction and operational phase impacts on the environment. It is likely that if the conditions, requirements and recommendations of the above EMPr are implemented as described and the relevant stakeholders adhere to the various mitigation measures, then the project will be completed without unforeseen negative environmental impacts.

Familiarity with the contents of this EMPr by the contractors and other individuals involved in the development project will assist in achieving "environmental best-practice", which ultimately ensures that the project arrives at a sustainable outcome.

Appendix A: Curriculum Vitae of EAPs

CURRICULUM VITAE

AMEESHA SANKER

PERSONAL

Profession: Environmental Assessment Practitioner, Sharples Environmental Services cc, Cape Town.

Nationality: South African

Date of Birth: 27 December 1990

Languages: English (read, write and speak) - Fluent

Marital Status: Single

Drivers' License: Code B

Health: Excellent

WORK EXPERIENCE

March 2020 – Present: Sharples Environmental Services cc, Cape Town, WC
Environmental Assessment Practitioner

- Basic Assessments Reports
- Amendment Applications
- Administration.

July 2014 – March 2020: Dartingo Consulting Engineers (Pty) Ltd, Durban, KZN
Part-time GIS Technician

- Management and compilation of GIS database.
- Layout/map creation.

June 2013– March 2020: EnAq Consulting.cc
Environmental Assessment Practitioner

- Basic Assessment Applications
- Water Use License Applications
- Environmental Monitoring/Auditing
- Stakeholder Engagement
- Reporting
- Environmental Management Plans
- Public /Contractor Awareness Training
- Biodiversity Offsets
- Rehabilitation and Protected Areas
- Project Management
- GIS management
- Administration

TERTIARY EDUCATION

2019: UNISA

- Bachelor of Science Honours Degree specialising in Environmental Management.

2014: University of Kwa-Zulu Natal

- Bachelor of Science Degree specialising in Geological Science (Engineering and Environmental).

PROJECTS

Sharples Environmental Services.cc

2020-George Groenkloof Ontwikkelings (Pty) Ltd

- Partial completion of the Amendment for the Proposed Development of a Retirement Village and Associated Infrastructure on Portion 3 of the Farm Kraaibosch 195, George, Western Cape.

2020-Wittedrift The Home Market NPC

- Completion of the Basic Assessment Report for the Proposed Retirement Village and Service Infrastructure on Erf 103, 104 and a Portion of Rotterdam Street. Wittedrift, Bitou Municipal Area, Western Cape.

2020-Mossel Bay Mossel Bay Local Municipality

- Basic Assessment Report for the Proposed Construction of Walvis Street, Western Cape.

2020-Beaufort West Beaufort West Local Municipality

- Basic Assessment Report for the Expansion of the Existing "Goue Akker" Cemetery in Beaufort West, Beaufort Local Municipality, Western Cape.

2020-Melkhoutfontein Hessequa Local Municipality

- Basic Assessment Report for the Expansion of the Existing Melkhoutfontein Cemetery on ERF 566 and portion 141/480, Hessequa Local Municipality, Western Cape.

2020-Umzimkhulu Leratong Victim Empowerment Co-operative Ltd.

- Basic Assessment Report for the Construction of a Roof Sheeting Factory, Umzimkhulu Local Municipality, KwaZulu-Natal.

Previous Employment (2013 – 2020)

Margate Ugu District Municipality

- BAR, WULA, GIS and ECO for the Proposed Southern Mains Bulk Water Upgrade: Gamalakhe to Margate, Ugu District Municipality, KZN.

Port Shepstone Ray Nkonyeni Local Municipality

- Project screening, assistance with BAR preparation, public participation, GIS and ECO for the proposed Acacia Road Storm Water Network Update, Ray Nkonyeni Local Municipality, KZN.

Ixopo Harry Gwala District Municipality

- Project screening, assistance with BAR preparation, and GIS for the Upgrade of Ixopo Sewer Network, Harry Gwala District Municipality, KZN.

KwaDukuza	KwaDukuza Local Municipality
▪	Project screening, EMPr preparation and ECO for the KwaDukuza Beach Upgrades: Life- Guard and Ablution Facilities, KwaDukuza Local Municipality, KZN.
KwaDukuza	KwaDukuza Local Municipality
▪	Project screening, EMPr preparation and ECO for the A/C Mains Replacements, KwaDukuza Local Municipality, KZN.
Mzumbe	Mzumbe Local Municipality
▪	Project screening, BID and Public Participation for the Proposed Mzumbe Access Road Upgrades, Mzumbe Local Municipality, KZN.
uMtumvuna	Ray Nkonyeni Local Municipality
▪	Project screening, Public Participation and BID for the Proposed uMtamvuna Water Treatment Works Upgrade, Ray Nkonyeni Local Municipality, KZN.
Mkholombe	Ray Nkonyeni Local Municipality
▪	Project screening for the Proposed Upgrade of Mkholombe Sewer Network Upgrade, Ray Nkonyeni Local Municipality, KZN.
Phoenix	Ethekwini Municipality
▪	Project screening, Assistance with the initiation of the Section 24G for the Viewhaven Housing Development, Ethekwini Municipality, KZN.
Margate	Ugu District Municipality
▪	Project screening, and application for Amendment to the Margate Sewer Pipeline Replacement: Upgrade of Pump Station 3A and the Augmentation of Margate Effluent Main, Part 1 & 2, Ugu District Municipality, KZN.
Ballito	Siza Water
▪	Project screening, initiation of BID and WULA for the Ballito Hills Water and Sanitation, KwaDukuza Local Municipality, KZN.
Mzumbe	Umzumbe Local Municipality
▪	Project screening for the Proposed Constrction of Ward 20 Community Hall, Umzumbe Local Municipality, KZN.
▪	Project screening for the Proposed Construction of R102 Bus Shelters, Umzumbe Local Municipality, KZN.
▪	Project screening for the Proposed Construction of Dweshula Community Hall, Umzumbe Local Municipality, KZN.

LLOYD BARNES

PERSONAL

Profession: Environmental Assessment Practitioner, Sharples Environmental Services cc, Cape Town.

Nationality: South African

Date of Birth: 10 November 1994

Languages: English (read, write and speak) - Fluent

Marital Status: Single

Drivers License: Code B

Health: Excellent

WORK EXPERIENCE

April 2019 – Present: Sharples Environmental Services cc
Environmental Assessment Practitioner

- EMPr's
- Basic Assessments Reports
- Amendment Applications
- Administration.

Jan-March 2017 & December 2018 – April 2019: NCC Environmental services -Environmental Control Officer and junior EAP

- Report writing.
- Compilation of the Great Fish Nature Reserve Protected Area Management Plan.
- Administration and operations of the Guttural toad and Mallard duck programs.

October 2018-December 2018: EOH Coastal and Environmental Services-Junior Environmental Assessment Practitioner.

- Map making (Arc GIS and QGIS), preparing proposals, BID's, PPP documents, scoping reports and NOI's.
- ECO work, creating I&AP data bases, and Environmental Authorization applications.
- I was included in a team of EAPs who travelled to Malawi for a month to complete a Socio-Economic Audit. October 2018-December 2018.

January 2018- October 2018: Junior Environmental Assessment Practitioner.

- Drafting Integrated Waste Water Management Programmes's, EMP's, NID's and the compilation of WULA's.
- Environmental Auditing.
- Dust monitoring, map making, facilitating public participation and general project administration.

TERTIARY EDUCATION

2016: Cape Peninsula University of Technology

- Bachelor's Degree in technology in Environmental Management

2015: Cape Peninsula University of Technology

- National Diploma in Environmental Management

PROJECTS

Sharples Environmental Services.cc

2020-George Groenkloof Ontwikkelings (Pty) Ltd

- Contribution towards the proposed Amendment for the Proposed Development of a Retirement Village and Associated Infrastructure on Portion 3 of the Farm Kraaibosch 195, George, Western Cape.

2020-Wittedrift The Home Market NPC

- Contribution towards the completion of the Basic Assessment Report for the Proposed Retirement Village and Service Infrastructure on Erf 103, 104 and a Portion of Rotterdam Street. Wittedrift, Bitou Municipal Area, Western Cape.

2020-Mossel Bay Mossel Bay Local Municipality

- Contribution towards the Basic Assessment Report for the Proposed Construction of Walvis Street, Western Cape.

2020-Beaufort West Beaufort West Local Municipality

- Contribution towards the Basic Assessment Report for the Expansion of the Existing "Goue Akker" Cemetery in Beaufort West, Beaufort Local Municipality, Western Cape.

2020-Sedgefield Knysna Local Municipality

- Compilation of NOI, EMPr and BAR

2020- Kranshoek Status Homes Property Developers

- Compilation of EMPr

2020- Knysna Knysna Local Municipality

- Maintenance Management Plan.

2019- Milnerton City of Cape Town

- ECO for the destruction of biofilters

2019- Mossel Bay Mossel Bay Municipality

- Notice of intent.

Previous Employment (2016 – 2019)

Harrismith quarry- KZN

- Water Use License Application

Ulundi quarry- KZN

- Water Use License Application

Multiple quarries-Gauteng

- Environmental Performance Assessment of over 20 quarries

Lilongwe, Malawi

- MCA Malawi Resettlement Action Plan Audit: Completion Audit Report- Auditor

Great Fish Nature Reserve- Eastern Cape

- Update of the Great Fish River Protected Area Management Plan

Appendix B : Alien Invasive Management Plan

1. INTRODUCTION

The following Alien Plant Management Plan has been prepared for the proposed development of a Retirement Village on Portion 103, 104 and a section of Rotterdam Street, Wittedrift, Bitou Local Municipality, Western Cape. All landowners, whether private or public, are required to control invasive species on their land. The main purpose and scope of this invasive alien plant management plan is to provide an implementation guideline for the removal and management of invasive alien vegetation which occur on the erven in terms of the regulations contained in the National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2004), the Invasive Species Regulations (October 2014), the Conservation of Agricultural Resources Act (CARA, Act 43 of 1983) and the Duty of Care / Best Practice principles (NEMA).

2. OBJECTIVE

The objective of the Alien Plant Management Plan is to bring the recorded invasive alien plants under control through systematic, integrated and appropriate control methods within (1-10) years that will allow indigenous vegetation to recover and re-establish, reduce fire risk, reduce visual impact and improve water security.

The main purpose and scope of this Alien Plant Management Plan is to provide an implementation guideline for the removal and management of invasive alien vegetation which occur on the property in terms of the regulations contained in the National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2004), the Invasive Species Regulations (October 2014), the Conservation of Agricultural Resources Act (CARA, Act 43 of 1983) and the Duty of Care / Best Practice principles (NEMA).

The purpose of the alien invasive plant control plan is:

- To provide guidance on the removal of existing alien invasive species on site;
- To ensure that alien invasive plants do not become established on site;
- To ensure that alien invasive species do not become dominant in the landscape; and
- To implement a monitoring programme to detect the presence of alien plant species as well as to monitor the success of the alien management plan.

3. RELEVANT LEGISLATION

South Africa has comprehensive national regulations to manage alien plant invasions. In 1996, South Africa adopted a new Constitution (Constitution of the Republic of South Africa Act, Act 108 of 1996). The Bill of Rights (Chapter 2) is central to this Constitution as it enshrines the rights of all people in the country. Section 24 of the Bill of Rights guarantees the right to an environment that is not harmful to people's health or well-being, and provides for environmental protection for the benefit of future generations through reasonable legislative and other measures that prevent "ecological degradation, promote conservation, and secure ecologically sustainable development". In alignment with this, invasive alien plant species are regulated under the National Environmental Management: Biodiversity Act, 10 of 2004 (NEM:BA). Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEM:BA. According to this act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Categories listed are shown in Table 1 below.

Invasive alien species categories according to the National Environmental Management: Biodiversity Act,

Category 1a:	Invasive species requiring compulsory control. Any specimen of a Category 1a listed species must, by law, be eradicated.
Category 1b:	Invasive species requiring compulsory control as part of an invasive species control program. These species must be removed and destroyed.
Category 2:	Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
Category 3:	Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: Import, possess, grow, breed, move, sell, buy or accept as a gift. No permits will be issued for Category 3 plants to exist in riparian zones.

Also of relevance are the regulations under the Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983), which provides for the regulation of control over the utilisation of natural agricultural resources to promote the conservation of soil, water and vegetation and provides for combating weeds and invader species.

In terms of the above act, alien invasive plants are ascribed to one of the following categories:

Invasive alien species categories according to the Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983)

Category 1:	Prohibited and must be controlled.
Category 2:	May be grown in demarcated areas provided that there is a permit in place and steps taken to prevent spread.
Category 3:	May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent spread, except within the flood line of watercourses and wetlands

Additionally, the National Veld and Fire Forest Act (Act 101 of 1998) states that a landowner must manage the fuel load on land under their control. This includes the removal of invasive alien vegetation from the area, as well as other vegetation that creates unwanted fire fuel loads.

4. ALIEN INVASIVE PLANTS

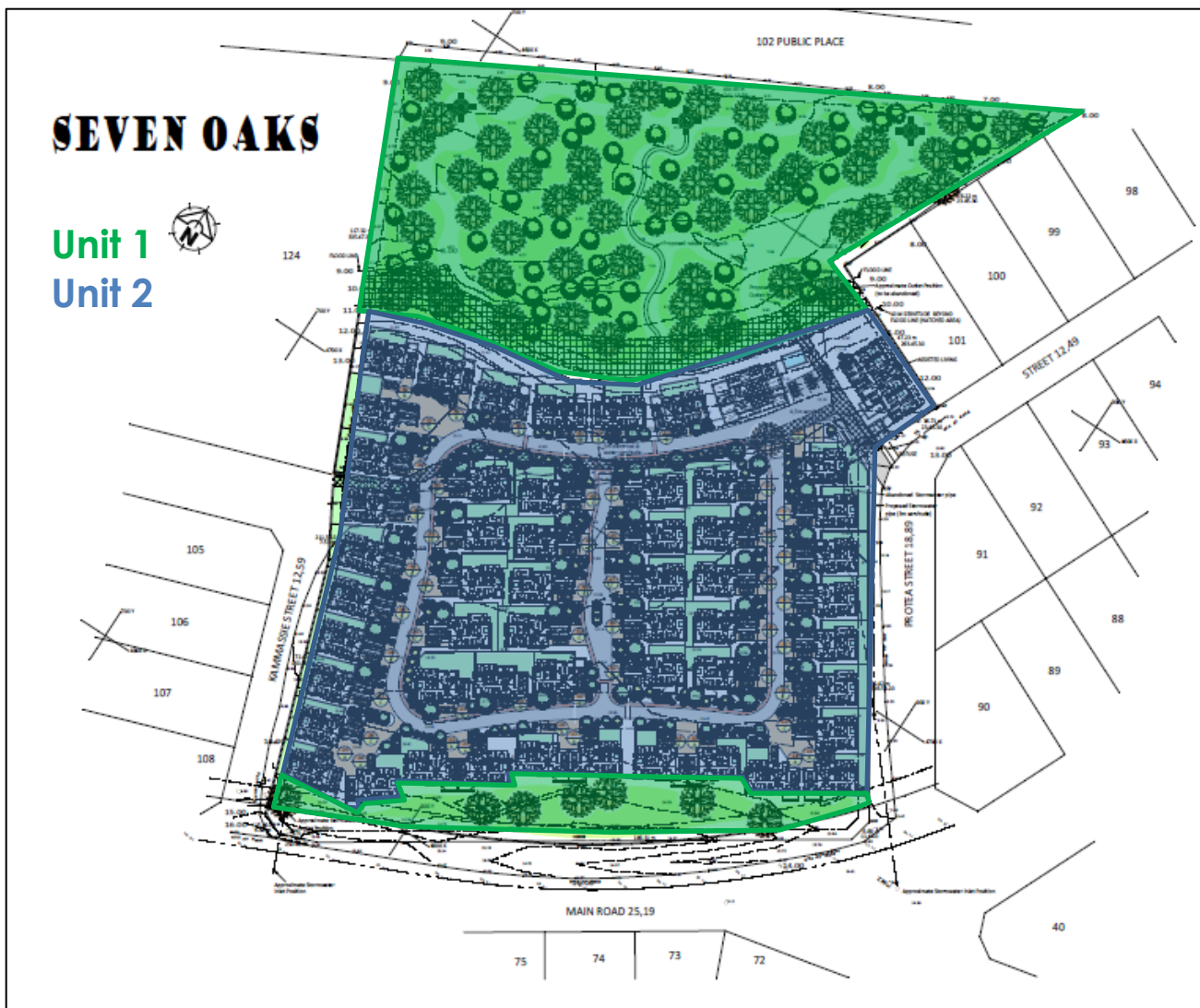
The table below shows the Alien Invasive Plant Species that were identified on Erf 103 and 104 by the Aquatic Habitat Impact Assessment completed by Sharples Environmental Services (2019).

Scientific name	Common name
<i>Acacia mearnsii</i>	Black wattle
<i>Bidens pilosa</i>	Blackjack
<i>Cestrum laevigatum</i>	Inkberry
<i>Melia azedarach</i>	Syringa tree
<i>Pennisetum clandestinum</i>	Kikuyu grass
<i>Pinus sp.</i>	Pine tree
<i>Populus alba</i>	White poplar
<i>Quercus sp.</i>	Oak
<i>Rubus cuneifolius</i>	Bramble
<i>Verbena bonariensis</i>	Tall verbena

5. MANAGEMENT UNITS

A management unit is an area of the land which is mapped and divided into logical compartments that are size and structure appropriate to allow for coherent management interventions. Existing area 'compartments' can be used, such as quinary catchment areas, or new compartments can be determined based on zones/area types (e.g. riparian areas, plantations, land-use, etc.). Once defined, the compartments are given a name or number so that it can be easily referred to. The invasive species in each compartment can then be mapped when a survey is undertaken.

The map below indicates the identified management units based on the intended land use proposed for the area. The management units are concentrated towards the areas proposed as Open Space Zone which encompasses an area of **1.3Ha**. Other areas, such as the Community Centre, Residential Units and Transport Zones will still need to be managed once construction has completed. The Map shows that Management Unit 1 is delineated from the start of the aquatic buffer (see Appendix C for the buffer coordinates) and encompasses the remainder of the north-eastern region of Erf 103, while also including the open space along Main Road. The remainder of the extent of the proposed development is categorised as Management Unit 2.



6. IDENTIFIED PROBLEM PLANTS

As part of the Environmental Impact Assessment process, it was found that the 7 mature oak trees found on site contribute towards maintaining the unique sense of place within the town of Wittedrift. Therefore, the mature oak trees will not be removed, but maintained and further propagation prevented.

The table below shows the Alien Invasive Plant species identified on site and requiring removal.

SPECIES NAME	COMMON NAME	NEMBA CATEGORY
<i>Acacia mearnsii</i>	Black wattle	Category 2
  		
<i>Bidens pilosa</i>	Blackjack	N/A
 		

<i>Cestrum laevigatum</i>	Inkberry	Category 1b
  		
<i>Melia azedarach</i>	Syringa tree	Category 1b
  		

<i>Pennisetum clandestinum</i>	Kikuyu grass	NEMBA Category 1b
		
<i>Pinus sp.</i>	Pine tree	Category 2
		

<i>Populus alba</i>	White poplar	Category 2
 		
<i>Rubus cuneifolius</i>	Bramble	Category 1b
 	 	

<i>Verbena bonariensis</i>	Tall verbena	Category 1b
		

7. CONTROL STRATEGY

The Department of Environmental Affairs defines invasive alien plants as plant species that are exotic, non-indigenous or non-native to an ecosystem. Due to the lack of natural enemies, anthropogenic activities and the resistance to local diseases, these plants tend to spread aggressively, which then threatens biodiversity, reduce water availability and increase the risk and intensity of wildfires. The management of invasive alien plants on developed sites is of utmost importance as it can increase runoff, improve water quality, minimize fire risk, preserve the quality of remaining indigenous vegetation and prevent the extinction of our indigenous vegetation.

The control programme for alien vegetation must include the following 3 phases:

- **Initial control:** drastic reduction of existing population;
- **Follow-up control:** control of seedlings and coppice growth;
- **Maintenance control:** sustain low alien plant numbers with annual control.

Invasive alien plant clearing methods are generally divided into three main categories, namely, physical (or mechanical) control, chemical control and biocontrol. A combination of approaches may however be recommended in the case of some invasive plant species. Each method has been shown to be successful but nearly all require follow-up control.

It is important to note that an accurate estimate of the financial costs of clearing should be prepared and the landowner must ensure that there are sufficient funds to achieve a successful outcome. Initial clearing operations are the most costly and control costs gradually reduce over time. The actual costs of alien vegetation clearing will differ depending on labour costs, area to be cleared and requirements of the client.

It is important to remove both young plants (saplings) and old trees that are seed bearing. The best method of clearing small plants is by hand pulling them, however some plant species react more effectively to chemical agents. The removed alien vegetation is to be temporarily stockpiled and protected from rain and wind, the stockpiling area cannot be near any watercourses, hazardous waste storage areas, flammable liquids storage area and must be within Management Unit 2 during construction. Alien invasives not to be stockpiled for longer than 2 weeks. The removed plants can also be chipped if necessary. Alien trees must be cut down with chain saws and then chopped into smaller portions. Some species of alien plants are typically coppicing species and will re-grow from roots and stumps. This means that a chemical will need to be used to prevent the trees from re-sprouting. These chemicals can either be sprayed onto the stump with a knapsack sprayer or painted on with a paintbrush. Another alternative to prevent re-growth is to strip the bark from the remaining part of the stump. Any application of chemicals must be done by a suitably qualified person.

All vegetation clearance must be undertaken with utmost care to ensure that only that vegetation, which needs to be removed, is removed. The best way to prevent invasion by alien invasive plant species is to manage the natural vegetation in such a way as to reduce the opportunity for these plants becoming established.

8. TIMEFRAMES AND STRATEGY.

In order to ensure the effective implementation of this Alien Plant Management Plan, control measures and strategy need to run concurrently and be integrated into the construction programme.

Initial control: Drastic reduction of existing population

The initial control of vegetation within the development footprint establishes the base for effective implementation of the strategy. As delineated in the management unit map above, the two management units need to be identified and understood by the contractor and appointed ECO. Management Unit 1 must be clearly demarcated to prepare for the removal of alien vegetation and minimize the spread of alien vegetation.

Prior to the removal of alien vegetation within the demarcated Management Unit 1, a survey of the area to identify alien vegetation is to be completed by the ECO in conjuncture with the information described in Section 6 of this Management Plan. The ECO is to consult with local nurseries or a botanical specialist if unsure of the identification vegetation. Once surveyed, Management Unit 1 must be cleared of all Alien vegetation within the first 4 months of commencement of construction.

It is understood that dense populations of alien vegetation may be present on site, in order to access such areas, or due to the sheer density of the vegetation, the trimming/cutting/removal of indigenous vegetation may be required. If the trimming/cutting/removal of any other vegetation not specified to be alien is required, the ECO is to be informed and it must be determined whether the plant is a Species of Conservation Concern (SCC) (local nursery to be consulted). If the vegetation species type is identified to be a SCC by the ECO, a permit must be obtained from the Department of Agriculture, Forestry and fisheries, the trimming/cutting/removal conducted under the guidance of the ECO.

No removal of alien vegetation is required within Management Unit 1 prior to completion of construction as this area will be cleared of all vegetation and therefor it would not be practical to remove alien vegetation prior to clearing. No brush piles, chipped vegetation, topsoil stockpiles, removed alien vegetation or any organic material is to be stored (temporarily or permanently) within Management Unit 1 at any stage of construction. This is to prevent the further propagation of alien vegetation and aid with

future management and maintenance. Cleared material must be taken to a registered landfill as soon as practically possible. Weigh slips to be kept in the Environmental File.

Follow-up control: Control of seedlings and coppice growth

Follow up clearing of alien vegetation within Management Unit 1 is required every 2 months until construction has completed (irrespective of any breaks in construction). Identification of seedlings to be conducted with the ECO and review of initial survey completed to identify any regrowth.

Maintenance control: Sustain low alien plant numbers with annual control.

Maintenance control is to be implemented in Management Units 1 and 2 immediately after the completion of construction and integrated into rehabilitation and maintenance efforts. It is important to note that the inclusion of Management Unit 2 in maintenance control is conducted in order to effectively manage the site as a whole. Landscaping of the various land use zones must promote the use of indigenous plant species only and avoid alien plant species. Maintenance control must identify any unintended alien plant species and be removed accordingly. A register of intended alien plant species is to be kept on site and monitored for any further propagation. As this is a residential development, many homeowners may unintentionally plant alien invasive plants in their gardens. In order to minimize this, information boards should be placed within the Open Space to provide educational information to residents regarding alien invasive plant species, the threat they pose and indigenous alternatives.

A Maintenance audit is to be conducted by an ECO twice a year at the cost of the developer, for the duration of the life span for the development. This is important due to the high fire risk posed by alien vegetation. Once between September and November and once between March and May. A record and report of annual maintenance control is to be created by the ECO and kept on file by the ECO and relevant Home-Owners Association.

Maintenance and control may be aided by incorporative monitoring by involving the residents in the monitoring of vegetation through Environmental Awareness Programs and info boards.

Successful alien plant control depends on continuous maintenance.

9. CONTROL METHODS

As mentioned above, invasive alien plant clearing methods are generally divided into three main categories, namely, physical (or mechanical) control, chemical control and biocontrol.

When herbicides are chosen as the preferred control method the guidelines of Working for Water (DWS) as stipulated in the Policy on the Use of Herbicides for the Control of Alien Vegetation must be followed:

- Herbicides selected for control shall be registered for use on that species under the conditions specified.
- Protection of the environment is of prime importance.
- Empty herbicide containers must be disposed of as hazardous waste and may not be used for any other purpose.
- Equipment must be washed where there is no danger of contamination of a water source or natural vegetated area. It is proposed that washing be restricted to the wash bay/off site.
- Product and spray mixtures should be stored so that it is inaccessible to the public. Site management must ensure that the Safety Data Sheet of the product is available on site.
- The application of herbicides should only be sprayed/used on site by a registered pest control officer.

The following guideline methods for each alien plant type occurring on the site are detailed below.

- *Acacia mearnsii* (Black wattle)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas.

Mature plants

Hand pulling or hoeing:

- Where appropriate saplings can be removed manually as described above.

Herbicides:

- Chemical control is possible with several herbicides in dense areas.

- *Bidens pilosa* (Blackjack)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing/ slashing is to be carried out as soon as the plant can produce seed.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas.

Mature plants

Hand pulling or hoeing:

- Where appropriate saplings can be removed manually as described above.

Herbicides:

- Chemical control is possible with several herbicides in dense areas.
- Chemical control of *B. pilosa* includes the use of herbicides such as glyphosate-trimesium, oxyfluorfen, atrazine, 2,4-D glyphosate, pendimethalin, metribuzin, diuron, paraquat, nicosulfuron, and simazine.

- *Cestrum laevigatum* (Inkberry)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

Mature plants

Hand pulling or hoeing:

- Where appropriate plant can be removed manually as described above.

Herbicides:

- Mature *Cestrum laevigatum* plants can be killed by applying concentrate suitable herbicide to stumps cut 10 cm above ground level.
- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).
- Basal bark herbicidal treatment is effective throughout the year and does not require cutting of the plant.
- Cut stump treatment is effective (Active ingredient- Imazapyr)

- *Melia azedarach* (Syringa tree)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- The entire root system, or as much of it as possible, should be removed to prevent resprout from fragments.
- Larger seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

Mature plants

Hand pulling, hoeing or Girding:

- *M. azedarach* has the ability to send root and stem suckers from underground storage organs. Physical methods of control may therefore be ineffective in controlling the spread and extent of *M. azedarach*.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).
- Basal bark herbicidal treatment is effective throughout the year and does not require cutting of the tree.
- Cut stump treatment of with 8% Garlon 4 or Pathfinder II is effective.
- A foliar treatment using a registered herbicide (Garlon 3A)

- *Pennisetum clandestinum* (Kikuyu grass)

- Manual: Hand clearing that disturbs the soil promotes alien grass growth and is therefor discouraged.
- Herbicide: Applying herbicide is the most effective alien grass control method. Pre-emergent systemic herbicides, like the following, are most effective: 1) Snapshot, Dow Agro-Sciences (active ingredients include Trifluralin and Isoxaban) at a dosage of 2.5kg/100m². Cost per ha including labour is approximately R13 400 (as calculated in 2005). 2) Gallant Super (@-2-(4_(-3-chloro-5-(trifluoromethyl)-3-pyridinyl-oxy-phenoxy-propanoic acid methyl)). Cost per ha including labour is approximately R36 000 (as calculated in 2005).

- *Pinus sp.* (Pine tree)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- The entire root system, or as much of it as possible, should be removed to prevent resprout from fragments.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

Mature plants

Hand pulling, hoeing or Girding:

- Where appropriate, plant can be removed manually as described above.
- Girdling of the tree as well as any plants larger than 5 cm in diameter.
- Hand felling- In hand felling, an axe, saw, or chainsaw is used to fell a tree, followed up by limbing and bucking in traditional applications. In the modern commercial logging industry, felling is typically followed by limbing and skidding.

Herbicides:

- Basal bark herbicidal treatment is effective throughout the year and does not require cutting of the tree.

- *Populus alba* (White poplar)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- The entire root system, or as much of it as possible, should be removed to prevent resprout from fragments.
- Larger seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

Mature plants

Hand pulling, hoeing or Girdling:

- Where appropriate plant can be removed manually as described above.
 - Girdling of the parent tree as well as any plants larger than 5 cm in diameter.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).
- The cut stump herbicidal method may be applied when treating individual trees or where the presence of desirable species precludes the use of foliar herbicides. Stump treatments can be made at any time of year as long. After cutting the tree near ground level, a solution of herbicide and water is applied to the stump by spray bottle or brush, making sure to cover the outer 20% of the stump.
- Basal bark herbicidal treatment is effective throughout the year and does not require cutting of the tree.

- *Rubus cuneifolius* (Bramble)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas where plants are shorter than 1 meter (to be applied by a qualified professional only).

Mature plants

Hand pulling or hoeing:

- Where appropriate plant can be removed manually as described above.
- Where plants are above shoulder height, slashing may be conducted prior to full plant removal.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only)
- If plant is above shoulder height, plant to be slashed to shorter than 1 meter before applying herbicide.

- *Verbena bonariensis* (Tall verbena)

Seedlings

Hand pulling or hoeing:

- Hand pulling/hoeing should be carried out in sparse areas.
- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

Mature plants

Hand pulling or hoeing:

- Where appropriate plant can be removed manually as described above.

Herbicides:

- Chemical control is possible with several herbicides in dense areas (to be applied by a qualified professional only).

10. FOLLOW-UP AND REHABILITATION

Proper follow-up after initial alien plant clearing is essential to the sustainability of any clearing plan, and without it, the positive effects of invasive alien removal may disappear over a very short period of time. The following should be implemented:

- Continuous control every 2 months after initial removal of alien plants (within 4 months of commencement of construction) until construction is completed– irrespective of temporary closure of site.
- Follow-up control will involve a combination of hand pulling and foliar spraying.
- Seedlings, saplings and coppice can be foliar sprayed.
- Follow-up spray operation when sufficient regeneration has taken place.
- Blanket or foliar spray.
- If the herbicide solution or mixture is to be applied to stumps with a paintbrush, it is recommended that the chemicals are coloured with a dye (e.g. EcoRed/ Sudan Red) to indicate which stumps have been treated). Otherwise the use of any paint indicator can be used.
- If follow-up clearing is not done, the effort of the removal of the adult trees will have been wasted, as the alien vegetation problem will intensify.
- Maintenance control is to be implemented in Management Units 1 and 2 immediately after the completion of construction and integrated into rehabilitation and maintenance efforts
- A Maintenance audit is to be conducted by an ECO twice a year at the cost of the developer to assess the effectiveness of this plan and level of alien plant population, for the duration of the life span for the development.
- ECO to make recommendations regarding further alien control.

11. MAINTENANCE AND MONITORING

It is important to implement a maintenance programme that allows for regular revisiting of the site, and removal or other treatment of emerging seedlings before they effect habitat transformation or become so large that the cost of their removal increases. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented. It is recommended that an independent ECO be appointed for the monitoring of the success of each phase of alien plant clearing. The ECO should approve the completion of the initial clearing phase, before continuing with the follow-up clearing (after 2 months), and maintenance (twice a year).

The ECO must comment of the level of success and amount of progress made, at regular intervals of 2 months from the period of construction and twice a year for the remainder of the developments operational timeline. Monitoring should focus on avoiding sensitive areas during clearing and the complete removal of all the alien tree material from the open space. Records should be kept of the time and costs required for each clearing intervention, and the approximate volume and life stage (e.g. seedling or mature plant) of the bulk of material removed on each occasion. Records to be kept on file by the ECO and relative Home Owners Association. This information will allow quantification of the costs

of invasive alien removal, show landscape changes resulting from invasive alien removal and potentially inform decisions that are required around changes in clearing frequency, area or approach. It is important to assess monitoring and where necessary revisit methods and adapt management. Maintenance and control of Alien vegetation plays a vital role in reducing the risk of fire, therefore a Fire Wise Committee should be created and the community encouraged to join the Southern Cape Fire Protection Association. Maintenance and control may be aided by incorporative monitoring by involving the residents in the monitoring of vegetation through Environmental Awareness Programs and info boards.

Appendix C : Buffer coordinates

	X-Coordinates	Y-Coordinates
Aquatic No-Go Zone located along Erf 103	23,33248587	-34,00883173
	23,33252939	-34,00879585
	23,33259571	-34,00875703
	23,3327814	-34,00868445
	23,33289079	-34,00865992
	23,332983	-34,00864437
	23,33310069	-34,00861229
	23,33318656	-34,00858096
	23,33320745	-34,00856784
	23,33323071	-34,00856037
	23,33328631	-34,00853088
	23,33334352	-34,0085184
	23,3333626	-34,00850744
	23,33338721	-34,00849126
	23,33343849	-34,00844013
	23,3334515	-34,00842767
	23,3334587	-34,00841105
	23,33347061	-34,00837925
	23,3334801	-34,00836837
	23,33349108	-34,00836709
	23,33350249	-34,00836303
	23,33354668	-34,00833506
	23,33356231	-34,00831765
	23,33357294	-34,00830581
	23,33358158	-34,00828297
	23,33358872	-34,008261
	23,33363162	-34,00821593
	23,33365349	-34,00820452
	23,33366589	-34,0081962
	23,33368023	-34,0081738
	23,33369174	-34,0081636
	23,3337156	-34,0081536
	23,33374642	-34,00815015
	23,33377325	-34,0081337
	23,33378676	-34,00811694
	23,33379907	-34,0080796
	23,33379962	-34,00805732
	23,33379447	-34,00803953
	23,33376671	-34,00799975
	23,33376987	-34,00796599
	23,33405115	-34,00737457



Map showing the recommended 10m buffer from aquatic habitat overlaid on the amended proposed layout.

Appendix D : Environmental Awareness Plan

Environmental Awareness Training must be conducted prior to the commencement of construction activities. It is the Holder's responsibility to familiarise himself/herself with the content and requirements of this EMPr. The Holder is also responsible to ensure that the contractor and all labourers working on site during the construction phase are familiar with the content of this EMPr.

The following actions must be taken to ensure that all relevant parties are aware of their environmental role and duties:

1. This EMPr must be always kept on site (during both the construction and the operational phases).
2. The provisions of this EMPr and the conditions of the Environmental Authorisation must be explained in detail to all staff during Awareness Training.
3. Training booklets must be handed out to all labourers and must be explained to them.
4. The initial training must be done by the independent ECO, subsequent environmental awareness training must be conducted by the Holder's environmental representative.
5. Weekly checks to be done by the Holder's environmental representative.
6. The ECO to conduct monthly site visits.
7. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the Holder, contractor, and the competent authority where required).

The Construction Contractor must 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 EMPr fits into this process. Other items relating to sound environmental management which must be discussed and explained during the environmental awareness training sessions include:

- The importance of remaining within the proposed development site footprint.;
- 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 construction materials and equipment etc.;
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)
- General "best practice" principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase, and must 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 must be utilised where needed.

Operational environmental awareness training must be compiled prior to the commencement of the operational phase and all employees working on site following the conclusion of the construction phase must be trained in line with this plan. This training must be done with every new employee taken on in the operational phase of the project. The training must include, but not be limited to:

Environmental Management Programme

- 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
- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)

General “best practice” principles, with regards to the protection of environmental resources

Appendix E : Rehabilitation Plan as submitted with the WULA

Annexure E

Rehabilitation Plan



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WATER USE LICENSE APPLICATION

FOR THE

PROPOSED DEVELOPMENT OF A RETIREMENT
VILLAGE ON ERF 103 AND 104, WITTEDRIFT

Rehabilitation Plan

23 June 2020

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Reviewer: Debbie Fordham
Sharples Environmental Services cc
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Ref: WUL/WD/RP/06/20

Prepared for:

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6001
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1 INTRODUCTION

Sharples Environmental Services cc (SES) has been appointed by The Home Market NPC to conduct a Water Use License Application for the proposed residential development on Erf 103 and 104, Wittedrift, Plettenberg Bay. This report was compiled as part of the technical information requirements for the WULA.

The need for wetland rehabilitation is of national importance since large scale loss of wetlands and riparian areas has occurred (Russell, 2009). In response to this the Water Research Commission (WRC) developed a series of tools to assist those that wish to undertake wetland rehabilitation. Wetland rehabilitation is defined as the process of assisting in the recovery of a wetland that has been degraded or in maintaining the health of a wetland that is in the process of degrading (Kotze *et al.* 2009). In this case the wetland has been impacted by agricultural and forestry activities within its catchment for decades.

It is important to note that the proposed development does not include any construction within the wetland and therefore impacts on the wetland are likely to be indirect. It is unlikely that rehabilitation of the wetland due to construction will be required. There are, however, rehabilitation measures that should be implemented in the buffer zone to ensure appropriate buffer capacity of the open space. Furthermore, rehabilitation of the wetland from existing impacts could improve the system's health and increase the benefits the residents can get from the open space.

1.1 Location

The proposed development will be within the town of Wittedrift, near Plettenberg Bay in the Western Cape (Figure 1). The developer proposes to consolidate the erven and the portion of Rotterdam Road that separates the erven, into one erf for the development of a retirement village. The development will encompass 53 residential units, a community centre, an assisted living facility and open space. This development will help to address the ever increasing demand for affordable housing in the area.

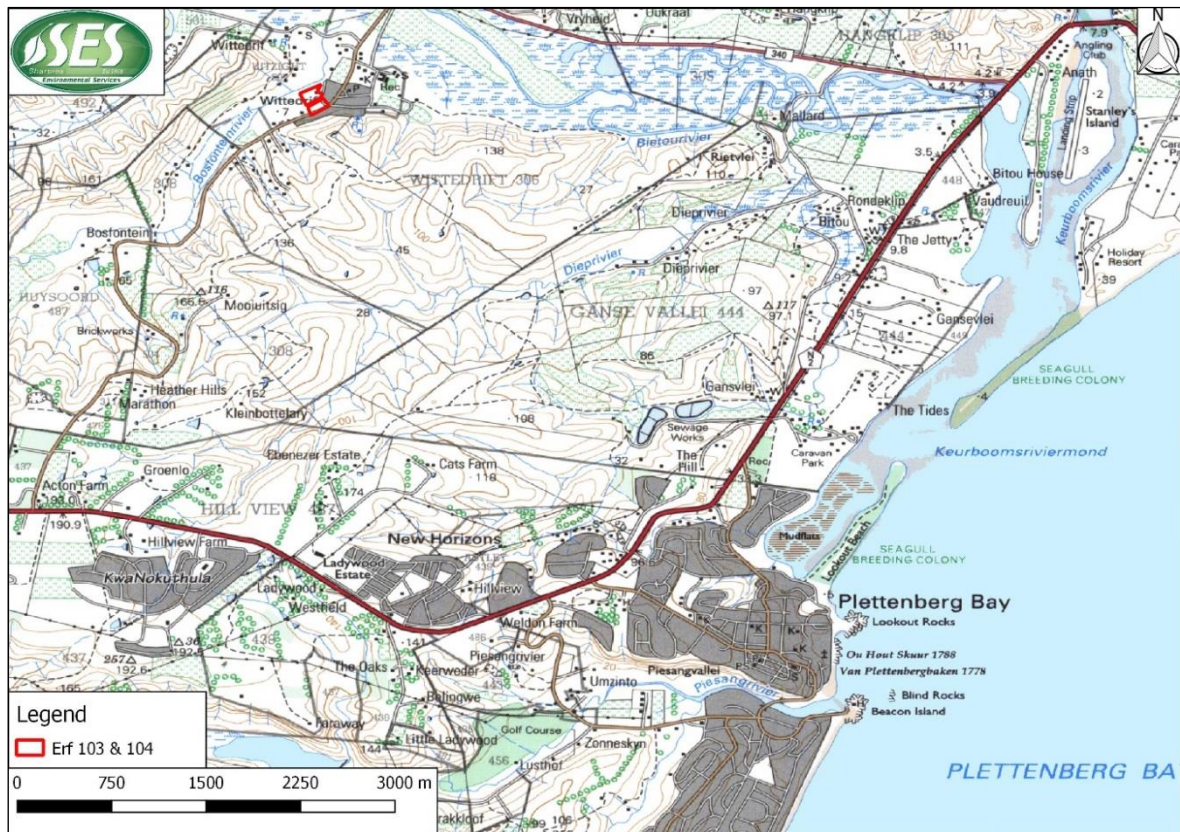


Figure 1: Cadastral map showing the location of the development in relation to Plettenberg Bay

1.2 Objectives

According to the Aquatic impact report (SES, 2020), the management objective should be to at least maintain the system in its current state. The objective for the rehabilitation plan was set with this in mind.

The objective of the rehabilitation plan is to provide measures on how the wetland can be rehabilitated should degradation due to the proposed construction activities take place. This report also provides suggestions on how the current negative impacts can be improved and how the open space should be designed to protect the viable future of the wetland.

1.3 Relevant legislation

- The **South African Constitution**, 1996 (Act no. 108 of 1996) includes the right to have the environment protected. This is applicable since the rehabilitation of wetland habitat ensures that the system is able to provide necessary ecosystem services.
- The **National Environmental Management Act** (Act no. 107 of 1998) outlines the principles for decision-making on matters that affect the environment, including the rehabilitation of wetlands. The developer and contractors are bound by the Duty of Care, as stated in Section 28 of the act:

Duty of Care:

"Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such

pollution or degradation from occurring, continuing or recurring, or, in so far as such harm cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment"

- The **National Water Act** (Act no. 36 of 1998) describes the need to have a water use licence for developments within the regulated area of a wetland.
- The **Conservation of Agricultural Resources Act** (Act 43 of 1967) stipulates the need to control the utilisation of the natural agricultural resources in order to promote the conservation of soil, the water sources and the vegetation and the combating of weeds and invader plants.

1.4 Wetland description

The Bosfontein River flows in an easterly direction across the northern portion of the site before joining the Bitou River system. Historically it is likely that the watercourse was a floodplain wetland system. However significant degradation has resulted in only fragmented wetland habitat remaining on the valley floor. There has been a disconnect between the incised channel and lateral wetland habitat resulting in an altered ecological state and decreased ecological functioning of the remaining pockets. The degraded habitat within the rest of the valley is presently more characteristic of a lowland river than its estimated historic wetland state. The small fragments of remaining wetland habitat are the only indicator of the former wetland type of the entire valley floor and are most similar to the natural reference condition of the area.

One such pocket of remaining wetland habitat is situated within the northern section of the site proposed for development (Figure 2). It lies within the low lying relic channel, a floodplain meander cut-off, at the base of the floodplain terrace. The linear, bow-shaped depression is intermittently inundated by periodic overbank flooding from the channel but also receives surface runoff from the terrace and increased water inputs from the nearby stormwater outlet. This wetland area is likely to capture sediments and nutrients from upstream during peak flows, but it mainly serves as a buffer between the urban area and the channel. Due to the importance of the downstream Bitou and Keurbooms River and wetland systems it is essential that functions of this habitat are not further compromised. Therefore, an aquatic buffer area and stringent mitigation must be adopted in order to maintain the present state of the wetland and avoid any further degradation of the system.



Figure 2: Map indicating the 100-year Recurrence Interval floodline, wetland habitat, as well as the relic and active channel and the floodplain of the Bosfontein River.

2 REHABILITATION

There is more than one opportunity for rehabilitation as part of the proposed development. The official rehabilitation phase will occur once construction is completed. This will mainly entail the rehabilitation of negative impacts caused by the construction. During the operational phase, on-going rehabilitation efforts within the open space can greatly benefit the wetland and will help limit deterioration. Impacts to the wetland will mainly be indirect as no construction within the wetland is proposed.

2.1 Post construction rehabilitation

Once construction has been completed, the objective will be to promote the re-establishment of the ecological functioning of any area disturbed by construction activities and maintain a healthy system throughout operation. This is the responsibility of the contractor.

Although it is recommended that no construction should be allowed to occur within or impact upon watercourses under the current proposal, there is always potential for accidental disturbance therefore guidelines for rehabilitation of the aquatic habitat and buffer zone is provided. The plan will promote the re-establishment of the ecological functioning of any area disturbed by construction activities. Also consult WET-RehabEvaluate, WET-RehabMethods (Cowden and Kotze, 2009), and the river rehabilitation manual developed by Day *et al.* 2016, for further information on wetland rehabilitation.

All disturbed areas, including the working area (disturbance corridor), temporary access road, and all areas utilised for the site camp and associated site camp facilities will require rehabilitation as follows:

- All areas that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped to improve filtration and reduce run-off.
- All demarcation fencing, including all droppers, wires, netting and barrier tape must be removed from site and taken to an appropriate site for re-use or disposal.
- Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. Any soil contaminated with hydrocarbons (oil, fuel, etc.) or other hazardous substance must be collected and disposed of as hazardous waste to a licenced disposal facility.
- Topsoil that was removed and stockpiled before construction, must be replaced by spreading it evenly over the areas from which it was removed. This topsoil (and the seedbank it contains) will facilitate the re-vegetation of the site.
- Disturbed areas, especially areas where excavations have taken place, must be shaped as appropriate (original topography must be restored where possible), and covered with a layer of stockpiled topsoil as soon as possible.
- The disturbed, newly rehabilitated surfaces (particularly steeper slopes and areas recently covered with topsoil) must be protected from wind & water erosion using mulch, brush packing or other appropriate erosion protection measures. Brush-packing/ mulching is done by covering the exposed surface with organic plant material such as branches, plant cuttings and leafy material. Ideally the vegetation removed from site at the start of the construction must be utilised. Brush-packing/ mulching plays a valuable role in erosion control, while also promoting re-vegetation of the site by retaining moisture in the soil, introducing seeds and/or trapping wind-blown seeds and providing organic material (compost) to promote new plant growth.
- The buffer area should be rehabilitated with the help of a botanist by planting indigenous vegetation. The establishment of indigenous vegetation cover will filter run-off before it enters the freshwater habitat.
- Final landscaping and rehabilitation of the site must be done to the satisfaction of the ECO.
- During the post-construction and operational phase of the development, erosion features that have developed are required to be stabilised. This may also include the need to deactivate any erosion headcuts/rills/gullies that may have developed.
- Alien species that established during construction must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.

Although most of the activities associated with construction will only lead to indirect impacts on the wetland, these impacts might still be significant enough to require rehabilitation of the wetland.

2.2 General

The following general rehabilitation measures should be implemented:

- Alien trees within the riparian area must be removed.
- During the operational phase, key personnel need to be established by *The Home Market NPC* to clear alien vegetation in buffer zone, with an alien vegetation management plan, identifying alien and indigenous species. The establishment of indigenous vegetation cover will filter run-off before it enters the freshwater habitat. Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species.
- Alien/ invasive species shall not be stockpiled. It should be removed from site and dumped at an approved site.
- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use, for the necessity, type proposed to be used, effectiveness and impacts of the product on aquatic biota.
- Any evidence of erosion from the stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area.
- The use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater is recommended.
- Implementation of gabions at the base of the slope, to provide slope stability/support, as well as attenuation of surface runoff can be done if needed.

3 CONCLUSION

This report should be used to ensure rehabilitation of the wetland habitat on site. It provides measures to rehabilitate damage caused directly by the construction as well as sources of long term negative impacts, such as alien trees. The measures within this report will go a long way to ensure the current health of the wetland system is maintained.

4 REFERENCES

Fraser Consulting Civil Engineers cc. 2019. Proposed development on Erven 103 and 104, Wittedrift, Plettenberg Bay: Floodline Information.

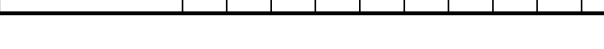
Kotze, D., Ellery, W., Rountree, M., Grenfell, M., Marneweck, G., Nxele, I., Breen, C., Dini, J., Batchelor, A. & Sieben, E. 2009. WET-RehabPlan: National guidelines and methods for wetland rehabilitation. WRC Report TT 336/09, Water Research Commission, Pretoria.

Russell, W. 2009. WET-RehabMethods: National guidelines and methods for wetland rehabilitation. WRC Report TT 341/09, Water Research Commission, Pretoria.

Sharples Environmental Services cc, 2019. Aquatic Habitat Impact Assessment for the proposed development of Erf 103 and Erf 104, Wittedrift, Plettenberg Bay.

Sharples Environmental Services cc, 2020. Environmental Management Programme for the proposed development of a retirement village on Erf 103, 104 and a section of Rotterdam street, Wittedrift, Plettenberg Bay, Western Cape.

Appendix E : Stormwater Management Plan



- ALL BUILDING SETTING OUT AS PER ARCHITECTS DRAWINGS

1:25 TYPICAL BULK EARTHWORKS SPEC

- CONVENIENCE EARTH
DRAIN TO DISCHARGE
INTO EXIST. CATCHPIT.
CREATE 250x400mm
OPENING INSIDE OF MANHOLE
FOR WATER INFLOW

FOR APPROVAL

SIGNATURE OF _____

PROFESIONAL ENGINEER

FI WANDI F DRAWING NUMBER

Q 1433 - CIVIL - 001

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