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PRE-CONSTRUCTION, CONSTRUCTION AND
 POST-CONSTRUCTION PHASE

**ENVIRONMENTAL MANAGEMENT
 PROGRAMME**

FOR THE

THE PROPOSED DEVELOPMENT OF A
 RETIREMENT VILLAGE AND ASSOCIATED
 INFRASTRUCTURE ON PORTION 3 OF THE
 FARM KRAAIBOSCH 195, GEORGE,
 WESTERN CAPE.

APPLICANT:	Groenkloof Ontwikkelings (Pty) Ltd PO Box 1935 George 6530
ENVIRONMENTAL CONSULTANT:	Sharples Environmental Services cc Primary Author: Lloyd Barnes
DEA & DP PROJECT REFERENCE:	EG12/2/4/1-D2/11-0010/11 &16/3/3/5/D2/19/005/16
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CONTENTS

DOCUMENT DETAILS.....	i
1. Introduction.....	1
2. About this EMPr.....	1
2.1 Important caveat to the report.....	1
3. How to use this document	2
4. Description of the Activity	2
Internal Civil Services.....	3
5. Description of Environmental Setting	9
5.1 Vegetation	9
5.2 Freshwater features	12
6. Legal Framework.....	16
6.1 The NEMA, Act No 107 of 1998, as Amended, and the EIA Regulations (2014)	16
6.2 Other applicable legislation.....	22
7. Scope of this EMPr.....	22
8. General Environmental Management.....	22
8.1 Site access and traffic management	24
8.2 Site demarcation.....	24
8.3 Site camp and associated facilities	26
8.4 Search and Rescue.....	28
8.5 Indigenous vegetation clearing and protection.....	28
8.6 Topsoil and subsoil management.....	29
8.7 Integrated waste management approach.....	29
8.8 Erosion control and stormwater management	30
8.9 Construction near a watercourse	31
8.10 Excavations and Earthworks.....	32
8.11 Visual Impact.....	32
8.12 Noise management.	32
8.13 Dust management.	33
8.14 Heritage Resources	33
8.15 Site closure and rehabilitation.....	33
9. Environmental Impact Management: Planning and Design Phase.....	35
9.1 OBJECTIVE 1: APPOINTMENT OF AN ENVIRONMENTAL CONTROL OFFICER AND ENVIRONMENTAL AUDITOR.....	35
9.2 OBJECTIVE 2: DETAILED DESIGN AND SITE LAYOUT PLAN	36
10. Environmental Impact Management: Pre-construction Phase.....	37
10.1 OBJECTIVE 1: IDENTIFY & DEMARCATÉ NO-GO AND WORKING AREAS	37
10.2 OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITES.....	38
10.3 OBJECTIVE 3: PRE-CONSTRUCTION ECO INSPECTION	39
11. Environmental Impact Management: Construction Phase	39
11.1 OBJECTIVE 1: PREVENT SOIL EROSION AND SEDIMENTATION.	40
11.2 OBJECTIVE 2: PREVENT POLLUTION AND SOIL/ WATER CONTAMINATION.	43
11.3 OBJECTIVE 3: PROTECTION OF AQUATIC ECOSYSTEM.	46
11.4 OBJECTIVE 4: PROTECTION OF AQUATIC ECOSYSTEM WHEN CONSTRUCTING THE PROPOSED 200MM DIAMETER UPVC GRAVITY SEWER PIPELINE WITHIN THE AQUATIC HABITAT AND WATERCOURSE	48
11.5 OBJECTIVE 5: MINIMISE LAND DISTURBANCE AND PROTECTION OF INDIGINOUS VEGETATION	50
11.6 OBJECTIVE 6: CREATION OF BUSINESS & EMPLOYMENT OPPORTUNITIES.	51
11.7 OBJECTIVE 7: MINIMISE FAUNAL IMPACT.....	51
11.8 OBJECTIVE 8: NOISE IMPACT MANAGEMENT.	52
11.9 OBJECTIVE 9: VISUAL IMPACT MANAGEMENT.....	53
11.10 OBJECTIVE 10: DUST IMPACT MANAGEMENT.	54
11.11 OBJECTIVE 11: MINIMISATION OF THE TRAFFIC & SAFETY IMPACT.....	56
12. Environmental Impact Management: Post Construction Rehabilitation Phase & Operational Phase.....	58
12.1 OBJECTIVE 1: REHABILITATE & STABILISE DISTURBED AREAS	58

12.2	OBJECTIVE 2: EFFECTIVE INCORPORATION OF THE VISUAL LANDSCAPING SCREEN.....	60
12.3	OBJECTIVE 3: MAINTENANCE OF NATURAL VEGETATION.....	60
12.4	OBJECTIVE 4: REDUCE LOSS OF AQUATIC HABITAT	61
12.5	OBJECTIVE 5: PREVENTION OF FLOW MODIFICATION.	62
12.6	OBJECTIVE 6: PREVENTION OF SURFACE WATER POLLUTION.....	63
12.7	OBJECTIVE 7: REDUCED EROSION & SEDIMENTATION.	64
12.8	OBJECTIVE 8: REDUCE VISUAL IMPACT.....	65
12.9	OBJECTIVE 9: BROADENING OF THE RATES BASE THE RATES BASE.	65
12.10	OBJECTIVE 10: REDUCE IMPACTS CAUSED BY FAULTY INFRASTRUCTURE.	66
12.11	OBJECTIVE 11: CREATION OF BUSINESS AND EMPLOYMENT OPPORTUNITIES.....	68
13.	Emergency Preparedness.....	70
13.1	Emergency response procedures	70
13.2	Emergency preparedness.....	70
14.	Method statements.....	71
15.	Roles and Responsibilities	71
15.1	Duties and Responsibilities of the Holder.....	71
15.2	Duties and Responsibilities of the Contractor.....	72
15.3	Duties and responsibilities of the ECO	72
15.4	Environmental Auditor.....	74
16.	Environmental Awareness Plan.....	74
17.	Monitoring, Record Keeping and Reporting.....	75
17.1	Environmental Auditing.....	75
17.2	Construction phase monitoring, reporting and record keeping.....	76
18.	Penalties, Claims and Damages	77
19.	Conclusion	79

List of Tables

Table 1:	Land use description of the proposed development.....	2
Table 2:	Site boundary coordinates	8
Table 3:	Activity Related Amendments	16
Table 4:	Listed Activity – Not Authorized in Original EA.....	20
Table 5:	Fines and offences.....	78

List of figures

Figure 1:	The proposed site for the affordable housing development (red border).....	8
Figure 2:	Site boundary coordinates.....	9
Figure 3:	Vegetation Map of SA.	10
Figure 4:	Vlok map.....	11
Figure 5:	CBA and ESA areas identified by the Western Cape Spatial Plan.....	12
Figure 6:	Delineation of aquatic habitat on Portion 3, Kraaibosch 195.....	13
Figure 7:	Overview of the drainage line from a point east of the dam. A & B show the area upstream of the dam and C & D show the area downstream.	14
Figure 8:	Map of NFEPA project identified aquatic areas in relation to the study area.	15
Figure 9:	Buffer area surrounding the stream running through the centre of the property.....	26

LIST OF APPENDICES:

Appendix A:	Location Maps.....	80
Appendix B:	Site layout plans.....	81
Appendix C:	Curriculum Vitae of EAP.....	82

DOCUMENT DETAILS

Project Ref. No:	40
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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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1. Introduction

Sharples Environmental Services cc (SES) was appointed by *Groenkloof Ontwikkelings (Pty) Ltd* (the proponent) to compile the Environmental Management Programme for the proposed development of a retirement village and associated infrastructure on Portion 3 of the Farm Kraaibosch 195, George, Western Cape.

The proposed development had initially received environmental authorisation (Ref: EG12/2/4/1-D2/11-0010/11), dated 25 November 2011. This approval was for the establishment of a residential development with associated open spaces to the extent of 33.21Ha on the same property and was valid until 2016. The initial development included 124 single Residential Units and 254 units of Group Housing. Following this approval an amendment followed in 2016 to transfer the EA to *Groenkloof Ontwikkelings (Pty) Ltd* who purchased the property from the Adonai Shammah Trust, the previous owners, and to extend the validity period of the EA. The current RoD is valid until the 21st of November 2021.

This EMPr has been compiled as part of a second amendment which will see the development of housing units for retirement resort purposes and associated infrastructure. The proposed development will include the development of general residential zones, community Zones, business zones, open space zones, transport zones an administration building, cafeteria, and parking.

2. About this EMPr

This document is intended to serve as a guideline to be used by *Groenkloof Ontwikkelings (Pty) Ltd* (as the Implementing Agent) and any person/s acting on *Groenkloof Ontwikkelings (Pty) Ltd* behalf, 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 *Groenkloof Ontwikkelings (Pty) Ltd*, 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 the all

role-players are aware of the constraints that the EMPr places on the development and construction team and are prepared to be actively involved in enforcing these constraints. The end result relies on cooperation and 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. *Groenkloof Ontwikkelings (Pty) Ltd* 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 *Groenkloof Ontwikkelings (Pty) Ltd*, 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

Groenkloof Ontwikkelings (Pty) Ltd proposes to develop housing units and associated infrastructure for retirement resort purposes. The proposed development will be very similar to the nearby Groenkloof retirement village, offering retirement units, varying in size from one bedroom to two bedrooms with varying designs. For the elderly needing continued medical attention there will also be assisted living units. To ensure that the development has a variety of uses, there is also a small business zone and an administrative building that will have a cafeteria, reception area and parking for visitors.

As seen in table 1 below, the proposed development will include the development of general residential zones, community zones, business zones, open space zones, transport zones, an administration building, cafeteria, and parking.

Table 1: Land use description of the proposed development.

General Residential Zone.	<ul style="list-style-type: none"> Retirement Units- 299 group housing erven for retirement resort purposes, varying in sizes from 210m² to 634m². Assisted Living Units- Approximately 3,4753ha is allocated to assisted living units and home nursing, consisting of 256 units, at a density of 77 units per ha in a double storey building with a coverage of 35%.
Open Space	<ul style="list-style-type: none"> Approximately 8,6 ha of the property, will be allocated as private open space. Consisting of 2 erven as private open space - Open Space Zone II. The one erf for purposes as mentioned before and the other erf to make provision to accept storm water from a future development on the adjacent property.
Community Zone	<ul style="list-style-type: none"> Approximately 1,1842ha of will be allocated for a dining area, reception and administration, as well as parking.
Roads and Accessibility	<ul style="list-style-type: none"> The streets inside the proposed development will all be private streets - Transport Zone III.

	<ul style="list-style-type: none"> • 1 erf will be allocated for public street purpose - Transport Zone II, which will be required for future widening of Glenwood Avenue. • At present, and in the future, access will be from the extended Glenwood Avenue past the Groenkloof development. A new road network is being developed for this section of Kraaibosch, to address the traffic generated by all existing and proposed developments for this area.
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Internal Civil Services

Water

The internal water reticulation system will consist of uPVC pipes varying in size between 90 mm and 160 mm diameter with the necessary provision made for isolating valves, pressure reducing valves, fire hydrants as required erf connections and water meters. George Municipality will take over the water reticulation.

Sewerage

A conventional gravity sewerage system will be installed and it is recommended that 160 mm ø uPVC (Class 34) pipes be used as sewer collectors with 110 mm diameter erf connections to the individual erven. The sewer system will consist of the necessary underground pipes, manholes and bulk erf connections to each individual property. George Municipality will take over the internal sewer reticulation and external outfall sewer.

Stormwater

The storm water drainage will be designed in accordance with the philosophy of providing for a minor and major system. Careful attention will be given to the layout of the road reserves to drain captured and overland storm water away from the proposed development. This storm water can then be utilised to supplement the irrigation.

The major system will consist of roads and open channels to ensure overland escape routes for the larger storm run-offs. The minor system will consist of kerb inlet catch pits and underground storm water pipes.

The minor system will be designed to accommodate the 1 in 2-year return period run-offs and the major systems for the 1 in 20 year run-offs. The minimum pipe diameters will be 450 mm for longitudinal runs and catch-pit connections as per the George Municipality's standards. The storm water run-off from most of the area will drain towards a low point (valley) on the North side of the erf. At this point and other major outlet points, structures which will make provision for energy dissipation and erosion protection will be provided where required.

During construction, special attention will be paid to the use of silt traps at storm water inlets and at natural low points to prevent silt and rubbish to be deposited in the river. The required bulk earthworks on the site must be planned as a total project and must incorporate the storm water management for this development.

Roads

In general, all roads are between 3,0 m and 6,8 metres wide as per requirements for the residential developments.

The following pavement structures are envisaged, but are subject to final design:

➤ Bituminous surfacing

- 13,2/6,7 mm double surface treatment (or alternative).
- 150 mm G4 crushed stone base.
- 150 mm G5 crushed stone subbase.
- 150 mm G7 upper selected material.
- 150 mm G7 lower selected material.

➤ Brick paving

- 80 mm Brick paving (Brick and/or cobble pavers).
- 150 mm C4 crushed stone base.
- 150 mm G7 upper selected material.
- 150 mm G7 lower selected material.

The alterations and upgrading of the external and internal road infrastructure will be according to the authorities' requirements and specifications.

Solid Waste

The development will be incorporated in the existing municipal waste infrastructure and the municipality will collect the waste at 2 approved collection points. At a rate of 2 kg/person per day and 2 persons per unit and 4 persons per 100m² of admin/business zones, the approximate mass of waste that will be generated by the development will be 2,92 tons per day.

Electricity

Individual metering of the residential units will be done with the standard municipal prepayment metering system. The Business zone, Reception, Administration, Dining-hall, Parking, Standby Flats & Frail care unit etc. will be metered separately.

Medium voltage network

The development will be supplied from a main 11kV feeder cable between the existing Glenwood 66/11 kV substation and future Groenkloof substation.

Prior to the establishment of Groenkloof substation, the ring system through the development will be closed by connecting to the existing 11kV overhead power line which follows the main road adjacent to the proposed development.

The medium voltage network will consist of a 11kV ring cable system which supply mini substations. The mini substations will be strategically positioned within the development to optimise electrical distribution and to eliminate possible damage by vehicles.

Low voltage network

The low voltage distribution system will be supplied from the mini substations via underground low voltage cables supplying strategically positioned distribution kiosks.

Street lighting

Public road streetlights shall meet Municipal requirements and will, after completion, be taken over by the Municipality for operation and maintenance.

The electricity consumption, maintenance and operation of streetlights inside gated communities and along private roads shall be the responsibility of the homeowner's association or body corporate, even if the developer chooses to install custom streetlights.

- Luminaires will be of the low level, low glare type.
- Mercury vapour, high pressure sodium, fluorescent or incandescent lights shall not be considered.
- Energy efficient LED type luminaires will be utilised.

The development will have no negative effect on the electrical operating costs of the supply authority, since the complete electrical infrastructure required for the development will be supplied, installed and maintained by the developer. Electricity sales to the new customers will in fact contribute to the profits made by the supply authority.

The entire internal electrical distribution network will be carefully designed to blend in with the development as well as the natural environment. All structures, equipment and switchgear will be low profile, following natural contours. The environmental management plan for the development will form an integral part of the specification and requirements for the electrical installation construction work.

Energy savings will be optimised with an energy efficient design approach as well as the utilisation of alternative energy sources. Area and street lighting will be done with energy efficient LED technology.

External Civil Services

Water

The local authority appointed GLS as the master planning consulting engineers for the water infrastructure. The availability of potable water will be from the South via an existing 200 mm diameter pipe along the main access road, Glenwood Avenue. New internal 160 mm diameter pipelines will connect to the existing 200 mm diameter supply pipeline. The new 160 mm diameter pipelines will also make provision for future developments to the east of this development as indicated by GLS (See Annexure B of Appendix D.1. of this report).

The total annual average daily demand will therefore be 368.80 Kl/day (4,3L/s) with a peak demand of 13 l/s. The George Municipality confirmed in writing that sufficient water resources at the treatment plants will be available (See Annexure G of Annexure D.1. of this report). Letter needs to be updated.

The following water saving devices will be employed:

- 2 500 litre rain water tanks at each unit;
- Low flow shower heads;
- Small capacity toilet cisterns.

Sewage

The proposed sewage discharge for the development will be 277 Kl/day (3,2 L/s) which equates to 75% of the water demand with a peak flow of 9,6 L/s, calculated as per the red book principles. In addition, an allowance will be made in the outfall sewer line capacity for the sewage from a portion of Portion 21/195 Kraaibosch from the west and a portion of Portion 62/195 Kraaibosch from the east.

The George Municipality confirmed in writing that the proposed sewage discharge from a medium density development can be accommodated and that sufficient effluent treatment capacity at the treatment plant will be available (See Annexure G of Appendix D.1 of this report) and this by the end of 2022/2023 when the current upgrades to the Outeniqua WWTW should be completed.

As per the previous services report (Annexure F of Appendix D.1 of this report) the following proposed bulk sewer is still required until an outfall sewer connection is available on the east side on Portion 62/195 Kraaibosch as per the GLS Masterplan. Due to the following reasons connecting to an outfall sewer on Portion 62/195 Kraaibosch as per GLS proposal has been discussed with George Municipality and was found to not be practical at this time:

- The preliminary designs of the sewer system for Portion 62/195 Kraaibosch (See Annexure E of Appendix D.1 of this report) shows pump stations picking up the sewerage versus the masterplan

gravity outfall sewer line (See Annexure B of Appendix D.1 of this report) that would have to be installed too high because of rock cliffs located on the south-east end of the erf making the installation of a gravity sewer impractical there;

- The time schedule for the development on Portion 62/195 Kraaibosch is too far behind that of Portion 3/195 Kraaibosch, and Portion 3/195 Kraaibosch would therefore have to handle their own sewerage via an own pump station and rising main pumping to the existing outfall sewer of Groenkloof Retirement Village on Portion 57/195 Kraaibosch (See Annexure C & D of Appendix D.1 of this report).

Therefore, the preferred recommendation for the handling of the sewer outfall of Portion 3/195 Kraaibosch, is therefore outlined below (See Annexure C & D):

- Internal outfall sewer of Portion 3/195 Kraaibosch to accumulate at the lowest point of the site which is at the north eastern corner of the site;
- A new pump station will then pump the sewage from this lowest point along the eastern site boundary across Glenwood Avenue and will connect to the existing outfall sewer of Groenkloof Retirement Village on Portion 57/195 Kraaibosch ;
- The capacity of this pump station will be designed to, besides the peak sewage flow from Portion 3/195 Kraaibosch , also accommodate relevant portions of Portion 21/195 Kraaibosch and Portion 62/195 Kraaibosch in future and thus be able to act as a regional pump station;
- A diesel-powered generator will be provided at the proposed sewer pump station as backup in case of power failures;
- The new pump station will pump to Portion 57/195 Kraaibosch (Groenkloof Retirement Estate) until the development on Portion 62/195 Kraaibosch to the east may install a main outfall sewer to receive this development's sewage as per the GLS masterplan (See Annexure B of Appendix D.1. of this report).
- If the development on Portion 62/195 Kraaibosch chooses to rather install a private sewer pump station (Annexure E of Appendix D.1. of this report) than the proposed GLS gravity outfall sewer (Annexure B of Appendix D.1. of this report) then the pump station on Portion 3/195 Kraaibosch will continue to permanently pump to the existing outfall sewer of Groenkloof Retirement Village on Portion 57/195 Kraaibosch .

The 200mmØ uPVC gravity sewer pipeline and 110mmØ uPVC rising main is proposed to complete the sewer network within this site.

The 200mmØ uPVC gravity sewer pipeline, as referenced above, forms the internal sewer network of the proposed development. It will be located just north of the proposed residential housing, gravitating from the North-Western border of the site, toward the proposed pump station located in the North East. This pipeline will traverse the aquatic habitat and watercourse.

- The 110mmØ uPVC rising main will begin at the proposed sewer pump station in the North-East, and the sewage will be pumped South, along the eastern boundary of the site, across Green Avenue, toward the proposed sewer connection at an existing manhole, contributing to the existing external sewer network.

The long-term option would be for the George Municipality to take over the proposed sewer pump station on Portion 3/195 Kraaibosch as a regional pump station as soon as portions of Portion 21/195 Kraaibosch and/or Portion 62/195 Kraaibosch connects to the pump station. This would then become an alternative to the outfall sewer proposed by GLS on Portion 62/195 Kraaibosch (Annexure D of Appendix D.1. of this report) and has been accepted by George Municipality to be included in Service Agreements with the developers.

Access

Permanent access to this development will be from the newly built road, Glenwood Avenue, on the south side of the development. During the construction phase, construction vehicles will also enter the site via the existing Glenwood Avenue Road on the southern side of the site.

Stormwater management

The overall natural drainage direction of the site is towards the Klein Swart River to the north and will be incorporated in the internal network's detail design phase where erosion protection measures are also described.

Electrical Services

The development is within the licensed electricity distribution area of George Municipality. The existing main infrastructure in the area consists of 11kV overhead line networks and underground cables. It has been confirmed that there is adequate capacity at the point of supply to accommodate the development.

With the implementation of the electrical master plan for the area, the municipality has confirmed that adequate capacity will be available for the development. The development will be supplied from the existing 185mm² Aluminium 11kV cable between Glenwood 66/11 kV substation and the ring main unit that supply Kraaibosch Ridge (Erf 26012).

The complete electrical distribution network shall comply with the Municipality's standard requirements, and technical specifications. On completion, the electrical distribution network will be handed over to the Municipality, which will then be responsible for the maintenance of the network.

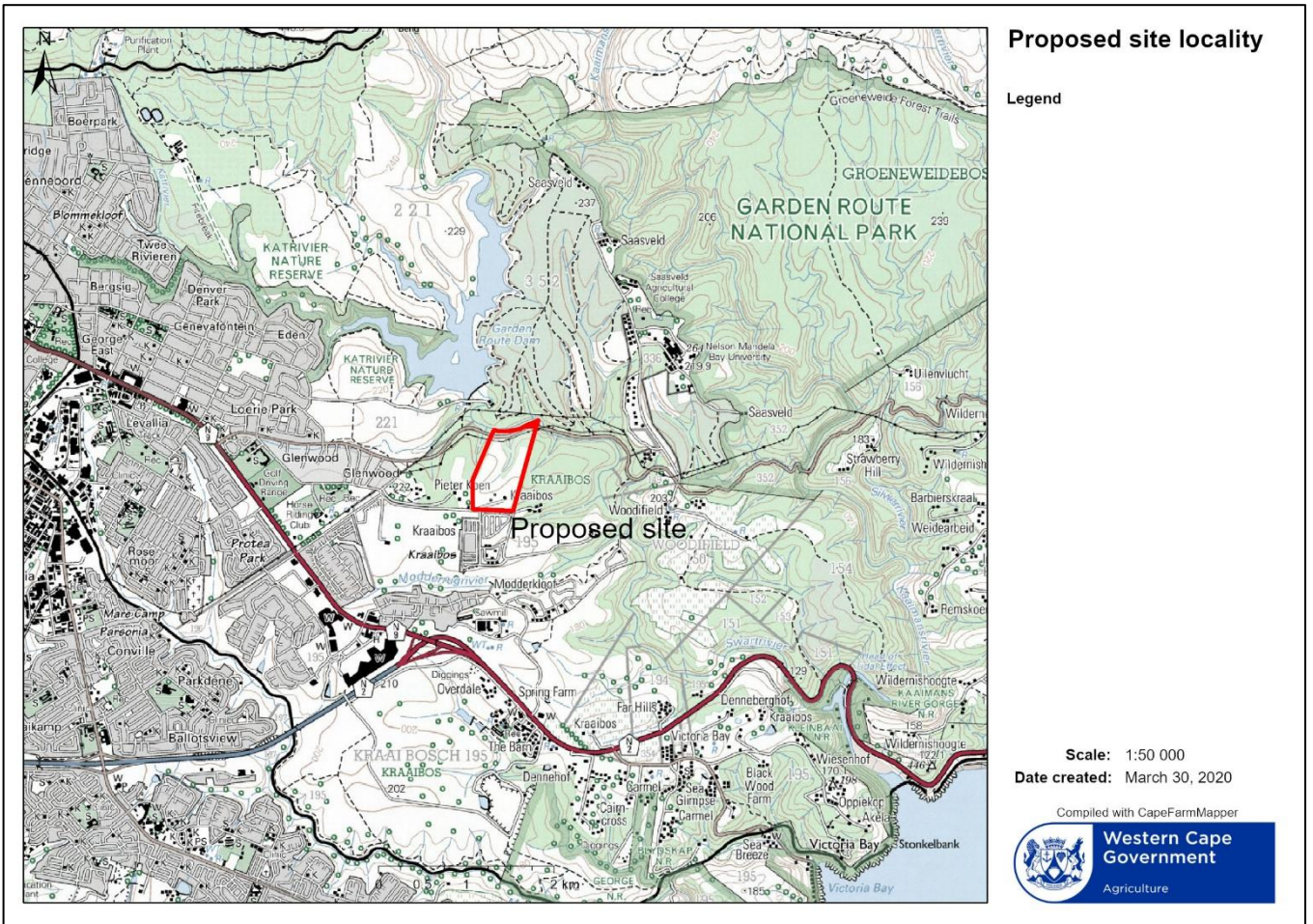
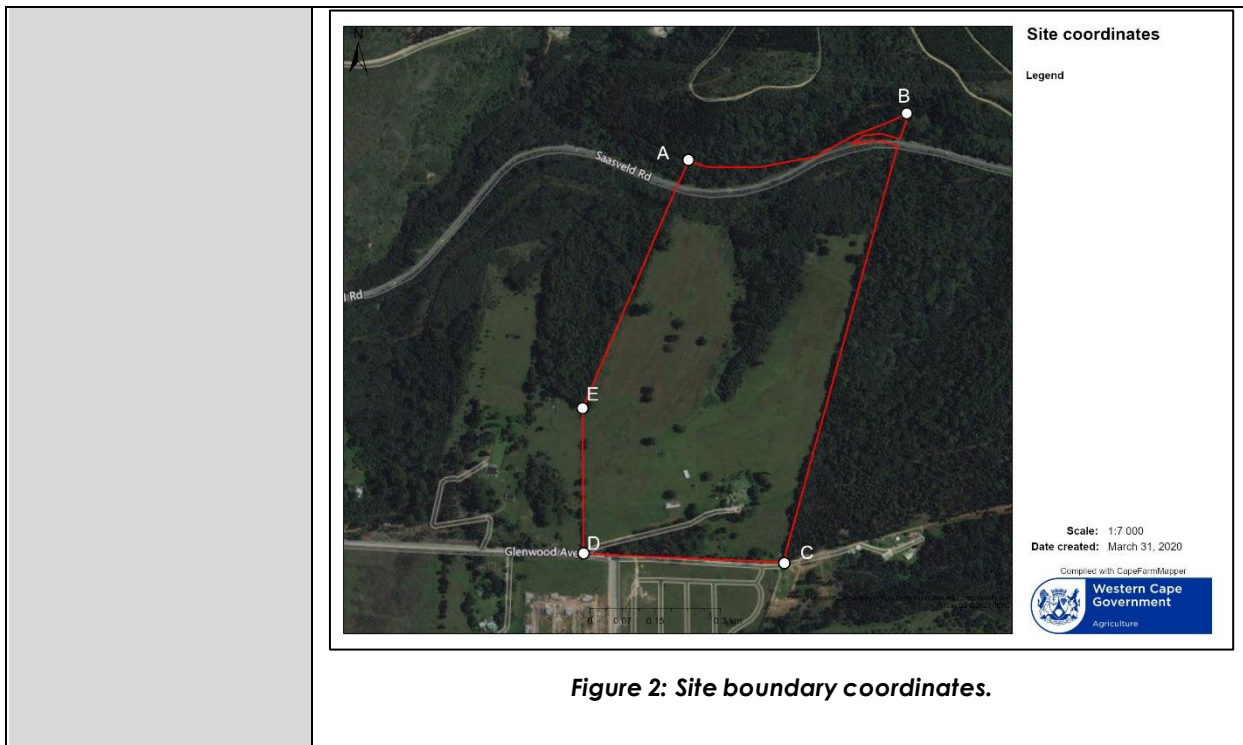


Figure 1: The proposed site for the affordable housing development (red border).

Portion 3 of the Farm Kraaibosch 195 is depicted in figure 1 below and is located approximately 4km east of the centre of George along Glenwood Avenue and approximately 1km north-east of the new Kraaibosch Residential Estate. The northern boundary of the property is adjacent to the existing Saasveld Road. The property is also across from the Groenkloof Retirement Village. The property forms part of the Kraaibosch area that has been included within the latest urban edge of George.

Table 2: Summary Table: Site and Farm Details

Province	Western Cape	
District Municipality	Eden District Municipality	
Local Municipality	George Local Municipality	
Ward number(s)	Ward No 11	
Nearest town(s)	George – directly adjacent	
SG Code	C0270000000019500003	
Co-ordinates of the farm boundaries as shown in the adjacent table and figure:	Table 2: Site boundary coordinates	
	A	34° 4' 54.79" S 23° 18' 11.88" E
	B	34° 5' 20.57" S 23° 18' 15.13" E
	C	34° 5' 19.35" S 23° 18' 2.54" E
	D	34° 5' 9.82" S 23° 18' 4.08" E
	E	34° 5' 9.24" S 23° 17' 56.59" E



5. Description of Environmental Setting

5.1 Vegetation

5.1.1 Vegetation description

According to CapeFarmMapper (Accessed March 2020) the vegetation map of SA (Figure 3) indicates that the two vegetation units primarily affected by the proposed development is Garden Route Granite Fynbos which has a Critically Endangered (CR) threat Status. The second vegetation unit affected by the development is Garden Route Shale Fynbos which has an Endangered (EN) threat Status.

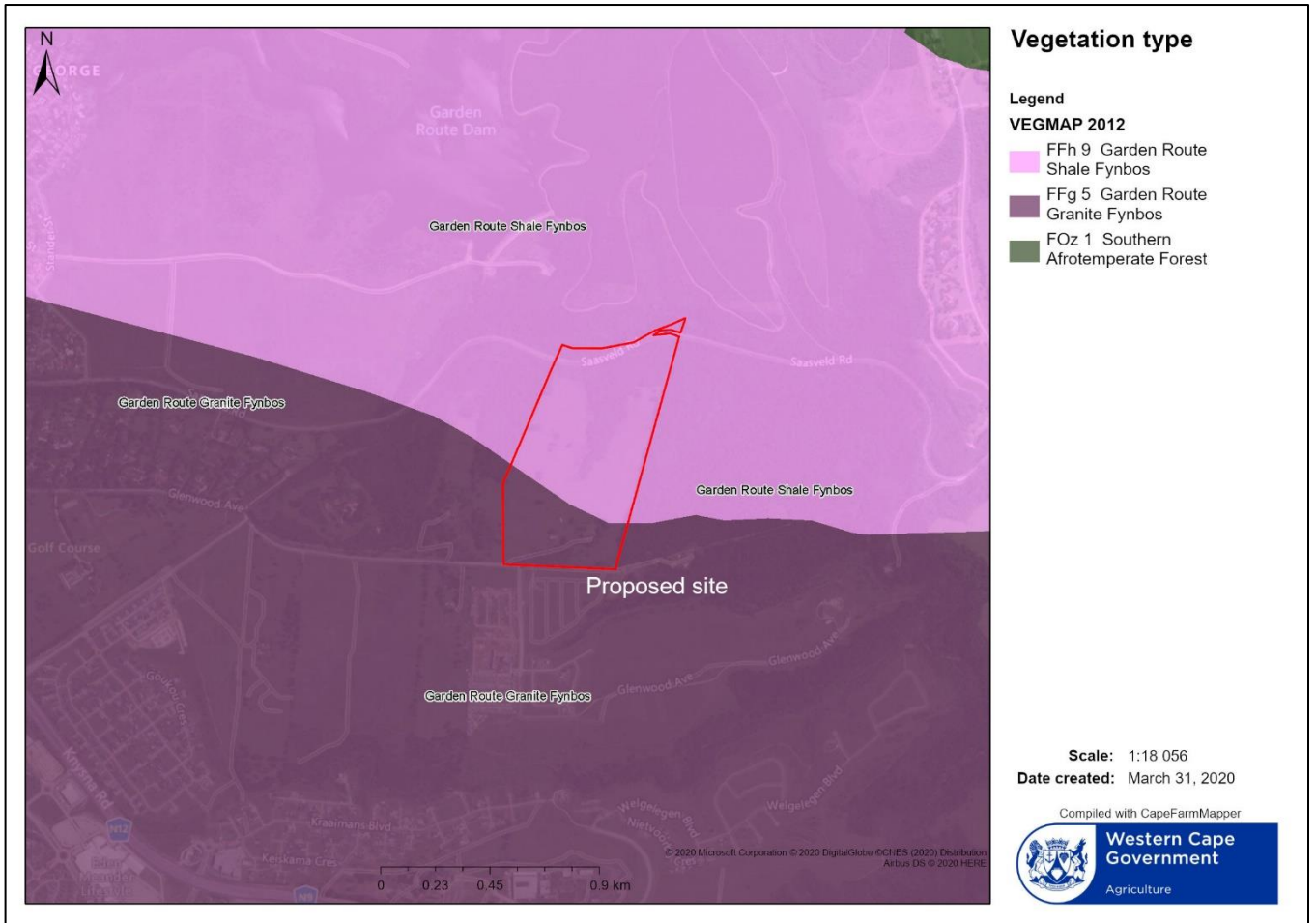


Figure 3: Vegetation Map of SA.

As part of the initial application for environmental authorisation, a Botanical Report was completed by Regalis Environmental Services in 2010. The Botanical Report stated that virtually all the vegetation on the property had been completely transformed to establish pastures for intensive agricultural purposes. The majority of the area consisted of alien grass species such as Kikuyu (*Pennisetum clandestinum*) and Paspalum (*Paspalum dilatatum*). No rare or threatened plant species were found to occur on the property or were expected to be found here, even when all the alien vegetation has been cleared. The Freshwater Habitat Impact Assessment completed by Sharples Environmental Services CC (2019) supports the Botanical Reports findings with reference to the level of transformation and amount of alien invasive species throughout the site.

According to CapeFarmMapper (Accessed in March 2020) in a more fine-scale study Vlok et al (2008) mapped the vegetation as “Wolwedans Grassy Fynbos” (figure 4).

The Botanical Report completed by Regalis Environmental Services (2010) noted that the steep north facing slopes contained some indigenous species typical of Wolwedans Grassy Fynbos (e.g. *Erica sparsa*, *Osteospermum monilifera*, *Phyllica axillaris* and *Passerina falcifolia*). It was however noted that this vegetation had been severely transformed through the infestation of alien species (mostly *Acacia mearnsii* and *Pinus pinaster*) and grazing by domestic stock. This vegetation has been subjected to the impacts of the alien vegetation and grazing over so many years that it lost most of its biodiversity.

The Botanical Report completed by Regalis Environmental Services (2010) mentions that only a portion of the Groot Brak River and floodplain vegetation, north of the George-Saasveld road, is still in a near-pristine condition. Here typical riverine trees dominate the vegetation, with species such as *Nuxia floribunda*, *Rapanea melanophloeos*, *Searsia chirindensis*, *Searsia laevigata* and *Virgilia divaricata* most abundant, along with lianas such as *Rhoicissus tomentosus* and the sprawling shrub *Cliffortia odorata*. Alien trees, mostly *Acacia mearnsii* and *Acacia melanoxylon* also invaded this area, but not to the point that the vegetation lost most of its biodiversity.

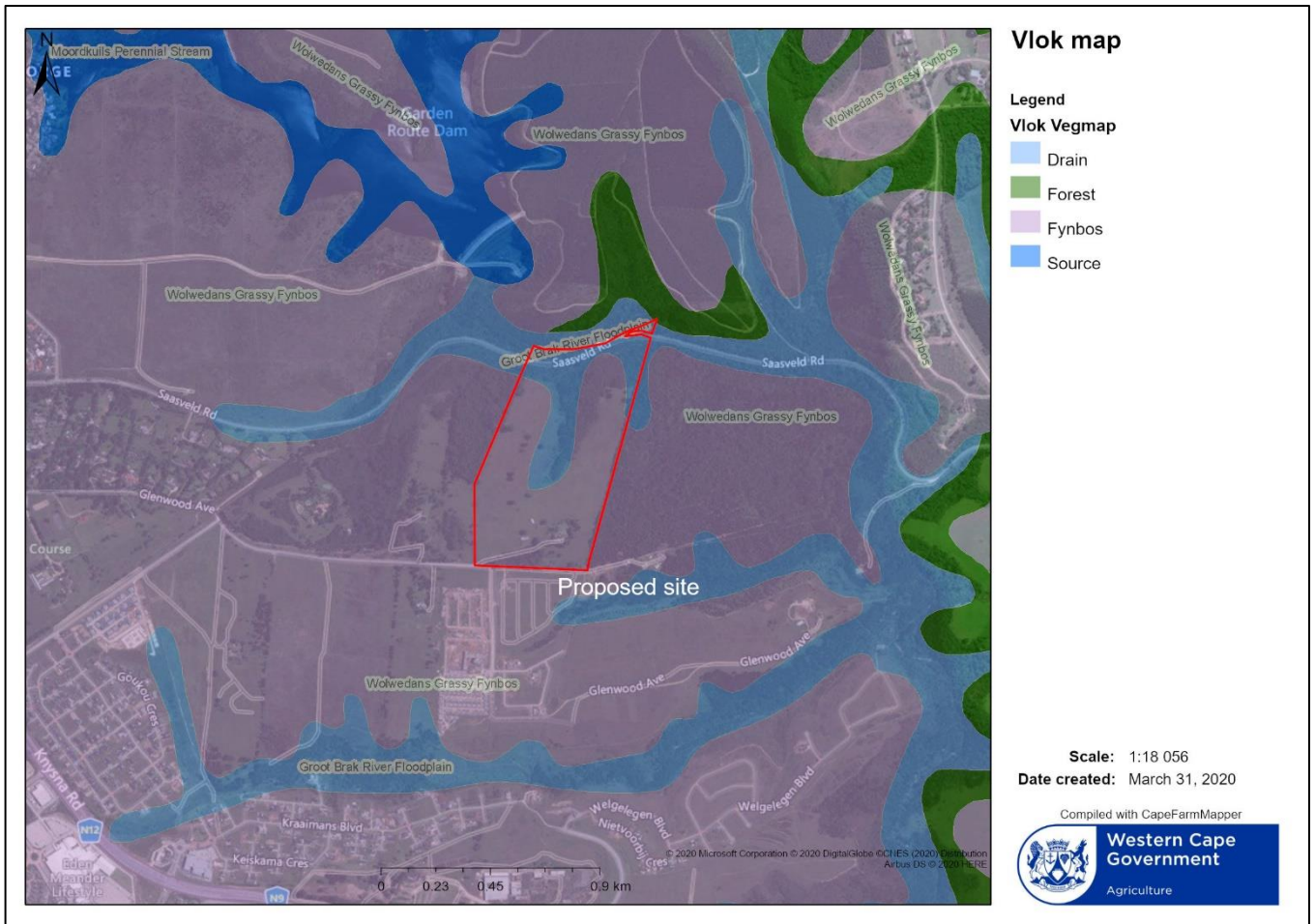


Figure 4: Vlok map.

5.1.2 Critical Biodiversity Areas

According to the CapeFarmMapper (Accessed March 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 5 below. The presence of the Swart river north of the proposed property has resulted in the categorization of the area as a category 1 Aquatic CBA and a category 2 River CBA. The northern area within the property (north of Seven Passes Road) slightly encompasses the southern area surrounding the Swart river. This area has been categorised as a category 1 Terrestrial CBA and a category 2 Forest CBA. Contours within the northern region of the site reveal a drainage area that forms a small tributary of the Swart River, this area is categorised as a category 1 Terrestrial CBA. The majority of the property is further classified as a category 1 Terrestrial ESA. Therefore, most of the site is considered to be in natural or at least functional condition, however certain areas in need of restoration remain. The data does not indicate any strictly aquatic areas within the property.

However, water resource protection is provided as a reason for classifying parts of the property as important biodiversity areas.

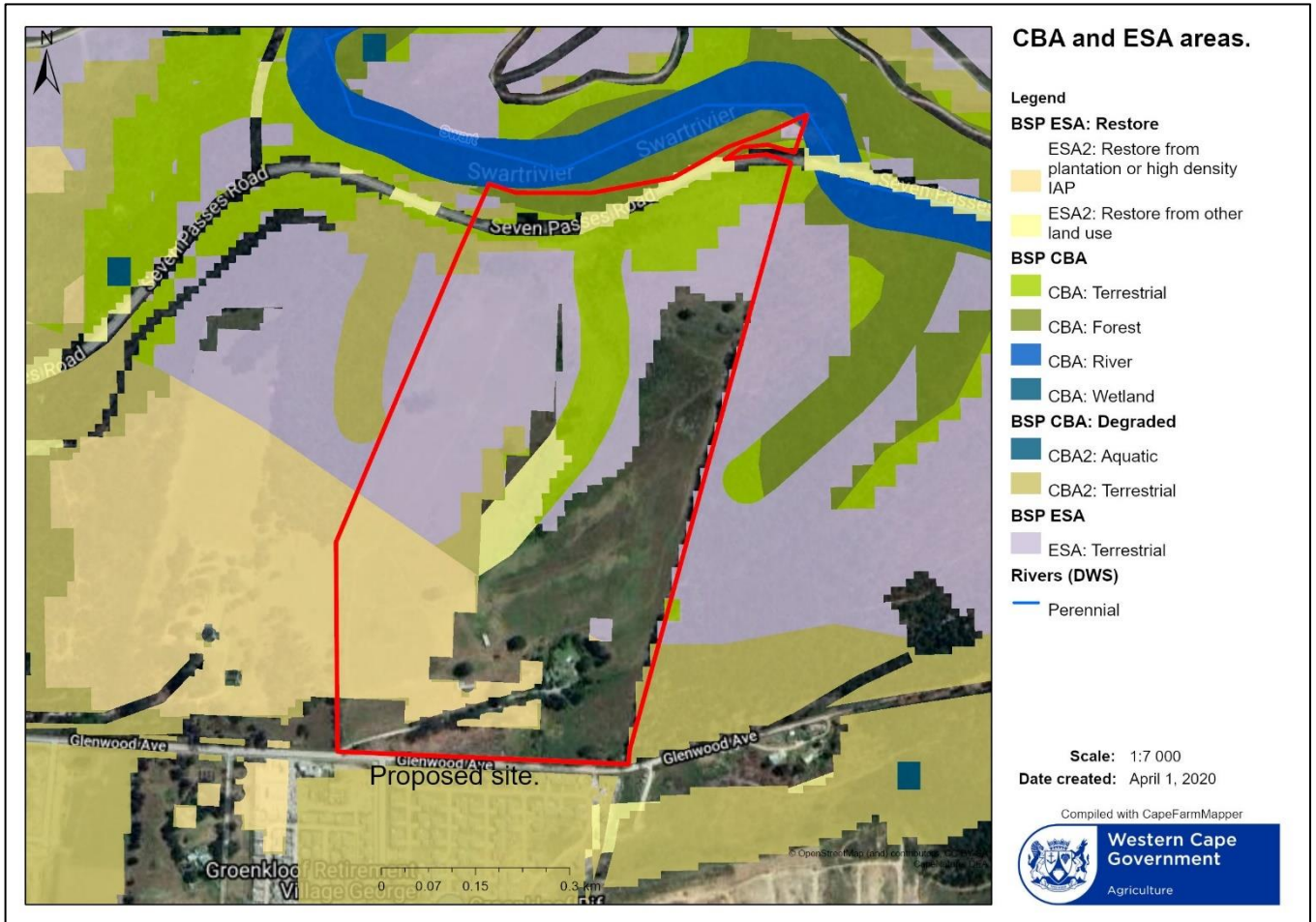


Figure 5: CBA and ESA areas identified by the Western Cape Spatial Plan.

5.2 Freshwater features

5.2.1 The Aquatic Environment

According to the Freshwater Habitat Assessment Report completed Sharples Environmental Services CC (2019) the proposed site is located within the DWS Quaternary Catchment K30C and falls within the Gouritz Water Management Area. The Freshwater Habitat Assessment Report (2019) makes mention of a prominent drainage line running down the middle of the property in a northern direction (Figure 6). A small instream dam, covered in waterlilies (*Nymphaea sp.*), is located near the head of the drainage line. Downstream of the dam the valley steepens significantly, as can be seen in Figure 7. The watercourse flows in a fairly straight north easterly direction, curves slightly west around a rock outcrop, flows through the Seven Passes Road culvert and merges with the Swart River at the northern boundary of the property. The stream has an ephemeral flow pattern which entails flows for very short periods of time after high rainfall. The riparian vegetation provides habitat for biota such as birds. No wetland habitat was found on site.

The catchment is predominantly covered in grass species such as alien Kikuyu (*Pennisetum clandestinum*) and indigenous *Stenotaphrum secundatum*. The dense cover in these areas limit erosion rates but not as well as the natural indigenous vegetation would have. The north facing slopes, however, are much more sparsely vegetated as a result of the recent fire that left the vegetation burnt. These slopes are largely bare and vulnerable to erosion.

In the upper reach, the small instream dam has caused headward erosion forming a narrow gully approximately half a meter deep. Terrestrial vegetation, such as native *Conyza scabrida* and *Paspalum urvillei*, invasive bracken fern (*Pteridium sp.*) and alien bugweed (*Solanum mauritianum*), are dominant in the area. The dam itself is covered in waterlily (*Nymphaeaceae sp.*) with sedges such as *Cyperus sp.*, *Juncus sp.* and *Typha capensis* reeds. Historically, before agriculture modified the habitat, it is likely that the freshwater habitat extended higher up, upslope of the dam.

The Freshwater Habitat Assessment Report (2019) notes that below the dam wall, a combination of alien and indigenous species occur along the banks of the stream. Alien vegetation dominates as a result of the level of disturbance in the surrounding area. Indigenous vegetation includes Camphor tree (*Cinnamomum camphora*), *Rhus chirindensis*, *Gymnosporia buxifolia* and Bracken fern (*Pteridium aquilinum*). Black wattle (*Acacia mearnsii*), *Syringa tree (Melia azedarach)*, Rooikrans (*Acacia cyclops*) and *Rubus cuneifolius* are some of the alien species present. The stream becomes an eroded gully as it progresses down slope towards the Swart River. The size of the gully is approximately 9 x 2 m in width. It increases in size as the valley deepens in the direction of the Swart River.

A small patch of indigenous forest remains as part of the riparian zone of the stream upslope of the Seven Passes road. It has species typical of Temperate Southern Montane forest and provides habitat for birds. This forest vegetation is likely to have covered the entire slope and only transitioned to Fynbos on top of the hill. Currently, most of the slope in this area is unvegetated, with only a few burnt, cut-down stumps of alien trees (presumably Black wattle and Pines) remaining. The alien species are re-establishing in the burnt area, but efforts to control this are evident.



Figure 6: Delineation of aquatic habitat on Portion 3, Kraaibosch 195.

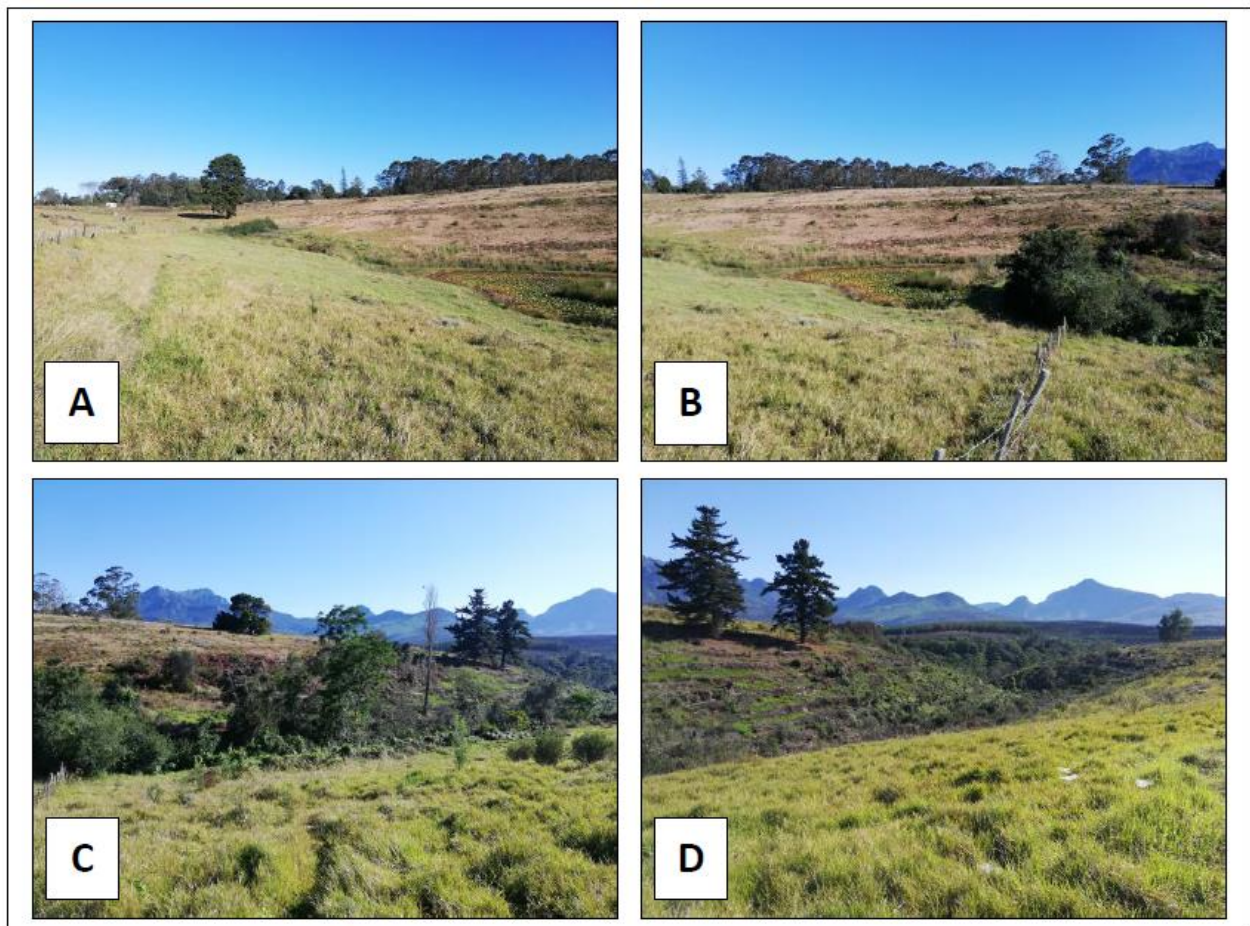


Figure 7: Overview of the drainage line from a point east of the dam. A & B show the area upstream of the dam and C & D show the area downstream.

The Present Ecological State (PES) refers to the health or integrity of river systems and includes both instream habitat as well as riparian habitat adjacent to the main channel. The rapid Index of Habitat Integrity (IHI) tool (Kleynhans, 1996) was used to determine river PES by comparing the current state of the in-stream and riparian habitats (with existing impacts) relative to the estimated reference state without anthropogenic impacts.

The Freshwater Habitat Assessment Report (2019) notes that the alien invasive plant infestation and agricultural land-use have significantly modified the river system from the natural condition. In the upper reach, habitat has been transformed to pastures for livestock grazing and there is a dam impounding flows. This has resulted in an incised middle reach, that has a narrow and alien infested riparian zone. However, the water quality is not likely to substantially differ from the estimated reference condition (especially due to the non-perennial nature of the stream). In the lower reach, the burnt alien vegetation on the banks (as a result of a recent fire) have been cleared but is re-establishing. Efforts to prevent this re-establishment are evident. It was determined that a loss and change of natural habitat and biota have occurred, resulting in a PES score of 'C'. This indicates that the stream is in a fair condition.

5.2.2 Habitat Integrity, Ecological Importance & Sensitivity

The Ecological Importance and Sensitivity (EIS) of riparian areas is a representation of the importance of the aquatic resource for the maintenance of ecological functioning, and ability to recover from disturbance (Kleynhans & Louw, 2007). As a result of the nature of the stream (episodic flows, uniform types, degraded etc.) it has limited EIS. The vast disturbances within the stream assessed have resulted in

the dominance of disturbance tolerant species and thus the species/taxon richness is not expected to be significant at any scale. The topography and substrate of the channel is largely uniform. The stream is not classified as a FEPA river system, it is not within a conservation area and the current impacts have limited its contributions to ecological diversity.

The Freshwater Habitat Assessment Report (2019) therefore states that the ecological importance and sensitivity category of the stream was determined as being 'Low'. It is small and limited natural habitat or diversity remains. However, it does support the important larger downstream systems of the Swart and Kaaimans Rivers and provides habitat for biota in the lower reaches to a moderate degree.

The recommended ecological category (REC) is used to inform future management objective for an aquatic ecosystem. The management objective for this stream is to maintain the current health of the system. However, it is the recommendation of the specialist that alien trees be managed, erosion halted, and indigenous riparian vegetation left to establish.

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 does not identify any wetland or river ecosystems within the study area. The Swart River, flowing on the northern boundary of the property, was identified by NFEPA but not classified further (Figure 8).



Figure 8: Map of NFEPA project identified aquatic areas in relation to the study area.

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 Groenkloof Ontwikkelings (Pty) Ltd 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 3: Activity Related Amendments

Activity: Approved Development	Activity: New Development	Status of Change
<p>Government Notice No 544 of 18 June 2010 Activity Number: 11 Activity Description: The Construction of:</p> <p>(i) Canals (ii) Channels (iii) Bridges (iv) Dams (v) Weirs (vi) <u>Bulk stormwater outlet structures</u> (vii) Marinas (viii) Jetties exceeding 50 square metres in size (ix) Slipways exceeding 50 square metres in size (x) Buildings exceeding 50 square metres in size; or (xi) Infrastructure or structures covering 50 square metres or more</p> <p>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the setback line.</p>	<p>Government Notice Regulation 327 of 2017 (as amended) Activity Number 12: Activity Description: The development of—</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and watersurface area, exceeds 100 square metres; or (ii) <u>infrastructure or structures with a physical footprint of 100 square metres or more;</u></p> <p>where such development occurs— <u>(a) within a watercourse;</u> <u>(b) in front of a development setback; or</u> <u>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</u></p> <p>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;</p>	<p>Activity number and description change.</p> <p><u>Relevant activities underlined.</u></p> <p>-The activities have been addressed in the original environmental authorization, therefore do not require reassessment.</p>

Activity: Approved Development	Activity: New Development	Status of Change
	<p>(dd) where such development occurs within an urban area; [or] (ee) where such development occurs within existing roads, [or] 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</p>	
<p>Government Notice No 544 of 18 June 2010 Activity Number 22 Activity Description: The construction of a road, outside urban areas, i. with a reserve wider than 13.5 metres or, ii. where no reserve exists where the road is wider than 8 metres or for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 454 of 2010.</p>	<p>Government Notice Regulation 327 of 2017 (as amended) Activity Number: 24 Activity Description: The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which [are] is identified and included in activity 27 in Listing Notice 2 of 2014 (b) <u>where the entire road falls within an urban area; or</u> (c) Which is 1 kilometre or shorter</p>	<ul style="list-style-type: none"> - The internal road network widths have been reduced, from a maximum of 16m's wide to 13m's, inclusive of road reserve. - The Kraaibosch Farm 195/3 is located within the urban edge. - Therefore, the original activity is excluded - Activity 24 does not apply as the road would be less than 1km in length.
<p>Government Notice No 544 of 18 June 2010 Activity Number: 23 Activity Description: <u>The transformation of undeveloped, vacant or derelict land to-</u> i. Residential, retail, commercial, recreational, industrial or institutional use inside an urban area, and where the total area to be transformed is 5 hectares or more but less than 20 Hectares, or ii. Residential, retail, commercial, recreational,</p>	<p>Government Notice Regulation 327 of 2017 (as amended) Activity Number: 27 or 28 Activity Description: Activity No.27: <u>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—</u> (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<ul style="list-style-type: none"> - Activity number and description change. - Relevant activities underlined. - The activities have been addressed in the original environmental authorization, therefore do not require reassessment.



Activity: Approved Development	Activity: New Development	Status of Change
<p>industrial or institutional use inside an urban area, and where the total area to be transformed is bigger than 1 hectare but less than 20 Hectares</p>	<p>Activity No.27: <i>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</i> (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	
<p>Government Notice No. 546 of 18 June 2010 Activity Number 4 (a)(ii)(gg): Activity Description According to RoD: <i>The construction of a road wider than 4 metres with a reserve less than 13.5 metres, in the Western Cape, outside urban areas, in Areas within 10 kilometres from national parks or world heritage sites or 5 km from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.</i></p>	<p>Government Notice Regulation 324 of 2017 (as amended) Activity Number 4 <i>Activity description:</i> <i>The construction of a road wider than 4 metres with a reserve less than 13.5 metres.</i> (ii) Western Cape ii. 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</p>	<ul style="list-style-type: none"> - Activity should remain as is in RoD. - The current activity is not applicable, as the site has been transformed and there is no indigenous vegetation present within the proposed road development.
<p>Government Notice No. 546 of 18 June 2010 Activity Number: 16 <i>Activity description:</i> <i>The construction of:</i> (i) jetties exceeding 10 square metres in size; (ii) slipways exceeding 10 square metres in size; (iii) buildings with a footprint exceeding 10 square metres in size; or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from</p>	<p>Government Notice Regulation 324 of 2017 (as amended) Activity Number 14: <i>Activity description:</i> <i>The development of-</i> (i) dams or weirs, where the dam or weir including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 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 has been adopted, within 32</p>	<ul style="list-style-type: none"> - Activity number and description change. - The activities have been addressed in the original environmental authorization, therefore do not require reassessment.

Activity: Approved Development	Activity: New Development	Status of Change
<p>the edge of a watercourse, excluding where such construction will occur behind the development setback line</p> <p>(d) Western Cape:</p> <p>i. In an estuary;</p> <p>ii. Outside urban areas, in:</p> <p>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ee) Sites or areas identified in terms of an International Convention;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Core areas in biosphere reserves;</p> <p>(hh) <u>Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;</u></p> <p>(ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.</p> <p>iii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space;</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by</p>	<p>metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p>i. Western Cape</p> <p>i. Outside urban areas:</p> <p>(aa) A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(ee) Sites or areas listed in terms of an international convention;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Core areas in biosphere reserves; or</p> <p>(hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.</p>	

Activity: Approved Development	Activity: New Development	Status of Change
<p>the competent authority or zoned for a conservation purpose;</p> <p>(cc) Areas seawards of the development setback line or within 100 metres of the high-water mark where no setback line occurs.</p>		

The following activities were found to be applicable to the proposed development amendment, in terms of the National Environmental Management Act, 1998 (Act 107 of 1998), Environmental Impact Assessment Regulations, 2014 (as amended on 07th April 2017).

Table 4: Listed Activity – Not Authorized in Original EA.

Applicable Activity	Relevance to Proposed Development as per Amendment	EAP Recommendation
<p>Government Notice Regulation 327 of 2017 (as amended in April 2017), Listing Notice 1</p> <p>Activity Number: 19</p> <p>Activity Description: <i>The infilling or depositing of any material of more than [5] 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than [5] 10 cubic metres from [–(i)] a watercourse;</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p> <p><i>a) will occur behind a development setback;</i></p> <p><i>b) is for maintenance purposes undertaken in accordance with a maintenance management plan; [or]</i></p>	<p>The new proposed development will entail the construction of a 200mm diameter uPVC, gravity sewer pipeline. A portion of this pipeline will fall within the aquatic habitat, and will cross the identified watercourse (Appendix D2).</p> <p>This pipeline does form a part of the municipal master plan, it would be located just north of the proposed housing infrastructure. Traversing the site from the western border, through the aquatic habitat and watercourse, to tie into the proposed sewer pump station located along the eastern border of the site.</p>	<p>Following the Part 2 amendment investigations, the following was established:</p> <ul style="list-style-type: none"> The aquatic habitat and watercourse, related to this impact has been assessed by the specialist, and has been included in the Freshwater Impact Assessment report (Appendix E1.1), completed by Debbie Fordham. The relevant impact on this aquatic habitat and watercourse, has been addressed by the Freshwater Specialist, (Debbie Fordham). A statement as has been issued, by the specialist (Appendix E1.2), on the 17th of January 2020, to be combined with the formal report (Appendix E1.1), addressing the watercourse crossing. As per the aforementioned statement, the Specialist has made the following comments: <ul style="list-style-type: none"> <i>Pg.1. Pnt 2: Although it is ideal to keep all infrastructure outside of freshwater habitat, the crossing will not have a detrimental impact since only a small portion of the watercourse will be affected and the duration of disturbance is limited.</i> <i>Pg.2. The development is deemed acceptable from a freshwater</i>

<p>c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>		<p>perspective since no detrimental impact should occur if the mitigation measures, contained in the Freshwater report and this statement, are adhered to.</p> <p>While it is acknowledged that the activity is applicable to the new development, and the activity does not fully align with the previously authorized triggered activities, the following points need to be considered:</p> <ul style="list-style-type: none"> • The Freshwater Specialist has assessed the receiving environment and surrounding environment, proposed to be disturbed by this impact, and has addressed the level of impact. • The Freshwater Specialist has advised that the new development is acceptable, when implemented with the advised mitigation, which is included in this report, as well as the amended EMPr. • Construction within a watercourse has been addressed in previously authorized triggered activities (refer to Table 1), including activity number 11 and 16 of Government Notice No 544 and 546, respectively, of 18 June 2010 Environmental Impact Assessment Regulations, 2008. • According to the engineering designs and calculations, approximately 9.9m³ of soil will be excavated from the watercourse, during construction (Appendix D2): <ul style="list-style-type: none"> - Excavation across the watercourse: 3m x 1m wide x 1,5m deep = 4,5m³ - Gabion mattress: 6m length x 3m width x 0,3m depth = 5,4m³ (can accommodate a reduction in length). <p>Considering the above. It is advised that the Amemndment report and the relevant appendices, for the application for amendment of the original environmental authorization, be sufficient to address the proposed activity, and will not incur an additional, in-depth environmental assessment.</p>
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6.2 Other applicable legislation

Groenkloof Ontwikkelings (Pty) Ltd 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);

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.

This development proposal is within 100m of a watercourse. It is therefore required to apply for Water Use Authorisation in terms of section 21 of the National Water Act (Act 36 of 1998).

The above listed legislation have general applicability to most development applications, and it is Groenkloof Ontwikkelings (Pty) Ltd responsibility to ensure that all contractors and employees are aware of their obligations in terms of these Acts. This EMPr 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 EMPr

This EMPr 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 9 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 EMPr.

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 input by the ECO. In addition to the EMPr, the environmental controls comprise 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 than 2m high, away from construction activities.

- **Site tidiness**
 - The contractor must keep the appearance of his building 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

At present, and in the future, access will be from the extended Glenwood Avenue past the Groenkloof development. A new road network is being developed for this section of Kraaibosch, to address the traffic generated by all existing and proposed developments for this area.

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.
- 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.

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. If practical, the demarcation boundary should typically allow a working area of no more than 2.5m around the development footprint unless otherwise agreed with the ECO. 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.

If desired or deemed necessary by the ECO, the outer boundary of the working area can be enclosed with orange barrier netting fencing, shade netting, droppers & wire/ danger tape, or similar – as feasible and practical. The fencing should be retained and maintained for the duration of the construction period, and should not be moved during construction unless agreed otherwise with the ECO. 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 of natural colours, i.e. green or brown biddum, to ensure less visual impact during construction. 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, 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, 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. 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 22 m was determined using the tool and is indicated in Figure 9 below.



Figure 9: Buffer area surrounding the stream running through the centre of the property

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 100m 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-authorized 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. 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.

8.3.5 Potable Water

An adequate supply of potable water must be provided to construction workers at the site camp.

8.3.6 Ablution Facilities

Chemical toilets should be kept at the site camp, 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 abluion facility for every 8 male workers and 2 abluion facilities for every 8 female workers will be provided.

Toilets must be placed a fair distance from the aquatic buffer. The abluion 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. Performing abluions 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.

8.3.7 Eating Area & Rest Area

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

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 Search and Rescue

The ECO and a suitably qualified specialist should visit the site and conduct Faunal and Flora search and rescue. Rescued plants should be replanted into a nearby disturbed area of similar habitat or for open space rehabilitation. Rescued plants should be provided with sufficient water and handled in accordance with the botanist and ECO. Rescued fauna should be released into a nearby area of similar habitat away from any construction.

8.4.1 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 personal before any construction. No faunal species are to be trapped, kept 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.

8.5 Indigenous vegetation clearing and protection.

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

- 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.
- 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 in consultation with the ECO, unless the cleared alien vegetation does not contain seeds in which case it may be retained for use in site rehabilitation.
- Only the areas required to accommodate the construction and access to the construction site must be cleared/trimmed of vegetation.
- After any clearing is completed, 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.
- Land clearing and earthmoving activities should not be undertaken during strong winds, where possible.

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.
- 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 Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here and will be on site regularly.

When constructing the proposed Sewer Pump Station and Generator. There is an increased potential for the permanent loss of indigenous vegetation and erosion. In order to construct the necessary infrastructure, a strict working corridor must be established in conjunction with the ECO. Stockpiled materials should be located South of the pump station development, closer to the developed portion. construction activities and the open area to the north of the site, to prevent sediment-laden storm water from flowing downslope. Silt fencing must be erected between the construction activities and the open area to the north of the site, to prevent sediment-laden storm water from flowing downslope.

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.

- Removed 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.
- The removed topsoil must be stockpiled in a berm, in a demarcated area as agreed with the ECO.
- Stockpiles must not be located within the buffer area.
- The topsoil berm may be a few meters wide but must ideally not be more than 2m high to allow light and air penetration.
- Removed 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.
- 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.

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 30m from watercourses.

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 soil 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. In order 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

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 in order 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.

Areas must be rehabilitated and a suitable cover crop planted once specific phases of construction is completed.

8.9 Construction near a watercourse

A demarcated buffer of 22m should be implemented as seen in figure 9 to protect the aquatic system and maintain the present ecological processes. This buffer area should be regarded as a no-go area. No stockpiles are to be located within the buffer area and 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 EMP throughout the construction phase.

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 public 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 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.

The protection of aquatic ecosystem when constructing the proposed 200mm diameter UPVC gravity sewer pipeline within the aquatic habitat and watercourse is imperative. A walk through of the route within this area, should be completed prior to construction, although it's is scarce, any indigenous vegetation within the construction corridor should be temporarily transplanted on site, and re-established during rehabilitation, along with new vegetation. A working corridor is to be established and demarcated in conjunction with the ECO. Within the working corridor, extra care and precautions are to be followed in order to minimise the impact. Silt fencing must be erected along the downslope working corridor barrier, between the construction activities and the aquatic habitat downslope, to prevent sediment-laden storm water from flowing downslope

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 finding should be handled and/or removed from site as per instructions issued by the Heritage Authority or delegated heritage specialist.

8.11 Visual Impact.

The proposed development has the potential to cause a visual impact during the construction and operational periods. In order 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.

An evident visual impact from Saasveld was identified in the BAR, in order to mitigate this visual impact, it is proposed that a visual landscaping screen is to be incorporated into the design of the development to block off the view from Saasveld road. Saplings are to be planted and maintained in order to act as an effective visual screen.

The visual landscaping screen is to utilise vegetation and tree types that are indigenous to the area, drought resistant, can be sourced from local nurseries, presents itself as an effective visual screen and is conducive to growing in urban environments, in accordance with the ECO.

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 – 18:00) 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 of dust complaints that may have been received.

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 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

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.

- Establishment of the saplings that are to act as the visual screen.
- 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.

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 an additional conditions which may be included in the Environmental Authorisation.

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

- Appoint an 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 ENVIRONMENTAL CONTROL OFFICER AND ENVIRONMENTAL AUDITOR

Impact Management Objective: To appoint a suitably qualified and experienced Environmental Control Officer and Environmental Auditor.		
Potential impact to avoid	Failure to appoint an ECO and Environmental Auditor 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.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • A suitably qualified and experienced Environmental Auditor must be appointed before any activities commence on site. • A suitably qualified and experienced ECO 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. 	Groenkloof Ontwikkelings (Pty) Ltd	During design phase

<ul style="list-style-type: none"> 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. 		
Performance Indicator	A qualified ECO and Environmental Auditor 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: <ul style="list-style-type: none"> 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
<p><u>General</u></p> <ul style="list-style-type: none"> 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). 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 received 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 be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS). 	Groenkloof Ontwikkelings (Pty) Ltd / Consulting Engineer	During design phase



<ul style="list-style-type: none"> • Attention must be given to the 22m buffer, construction work and the site camp must be planned in accordance with measures relative to the buffer area (stockpiles, ablutions etc.) <p><u>Visual landscaping screen</u></p> <ul style="list-style-type: none"> • A visual landscaping screen is to be incorporated into the design of the development to block off the view from Saasveld road. • The visual landscaping screen is to utilise vegetation and tree types that are indigenous to the area, drought resistant, can be sourced from local nurseries, presents its self as an effective visual screen and is conducive to growing in urban environments, in accordance with the ECO. 		
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:

- Identify 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

<i>Impact Management Objective: Identify and demarcate no-go areas, working areas and site facilities.</i>		
Potential impact to avoid	<ul style="list-style-type: none"> • 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



<ul style="list-style-type: none"> 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 EMPr. Site camp facilities must be situated as far away from the No-Go areas as possible. 	Contractor	Pre-construction phase (prior to arrival of construction equipment, machinery, or workers on site)
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	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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. It is recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS). 	Contractor / Groenkloof Ontwikkelings (Pty) Ltd	Pre-construction phase (prior to start of construction activities)



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 does not impact on the natural resources.
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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.

Impact Management Objective: Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.		
Potential impact to avoid	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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:

- Prevent soil erosion and sedimentation.
- Prevent pollution and soil/ water contamination.
- Protection of aquatic ecosystem
- Minimise Land Disturbance and Protection of indigenous vegetation.
- Creation of business & employment opportunities.
- Minimise faunal impact.
- Noise impact management
- Visual impact management
- Dust impact management
- Minimisation of the traffic & safety 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: PREVENT SOIL EROSION AND SEDIMENTATION.

Impact Management Objective: To prevent soil loss on site and prevent increased turbidity / sediment load in watercourses.		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Degradation of downstream watercourses. • Damage to Stormwater infrastructure • Decreased soil binding capacity and cohesion of the upslope soils • Formation of rills and gullies 	
Impact Management Outcome	Aquatic and Stormwater systems are not impacted significantly as a result of soil erosion.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<u>General</u> <ul style="list-style-type: none"> • Establish buffer zone, identify or demarcate with a physical barrier, ie: danger tape/fencing, extent of development footprint closest to the sensitive aquatic vegetation. 	Contractor	Construction phase



<ul style="list-style-type: none"> • Construction personnel, equipment and materials must be limited to the minimum practical working footprint. • It is advised that an Environmental Control Officer visit the construction site before construction occurs within any of the watercourses and possibly during construction within the watercourses. • 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/ 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. • 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. <p><u>Cleared surfaces</u></p> <ul style="list-style-type: none"> • 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. 		
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<p><u>Vegetation</u></p> <ul style="list-style-type: none"> • 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 <p><u>Stockpiles</u></p> <ul style="list-style-type: none"> • 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 must be demarcated, and bunded, to avoid accidental spillage and runoff. • 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 stockpiles sediment, these should not exceed 2m's in height. <p><u>Stormwater control</u></p> <ul style="list-style-type: none"> • 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. • No dumping of soil and / or any other material within close proximity of the aquatic habitat. 		
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Performance Indicator	The water courses are not significantly impacted as a result of soil erosion.
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11.2 OBJECTIVE 2: PREVENT POLLUTION AND SOIL/ WATER CONTAMINATION.

Impact Management Objective: To prevent environmental pollution and contamination of soil and water resources		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • 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. • Loss of aquatic biota. 	
Impact Management Outcome	The environment (including soil, surface water and groundwater) is not contaminated.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • It is recommended that the Stormwater Management Plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS). <p><u>General Pollution Management</u></p> <ul style="list-style-type: none"> • 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. • 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. <p><u>General Waste Management</u></p> <ul style="list-style-type: none"> • 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. 	Contractor	Construction phase



<ul style="list-style-type: none"> • Hazardous waste bins must be kept on an impermeable banded surface capable of holding at least 150% 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. • 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). <p><u>Pollution Management -Hydrocarbons (oil, fuel etc.)</u></p> <ul style="list-style-type: none"> • 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. 		
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<ul style="list-style-type: none"> • 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. • Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste. <p><u>Pollution Management – Ablution facilities</u></p> <ul style="list-style-type: none"> • 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. • 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. <p><u>Pollution Management – Hazardous Substances</u></p> <ul style="list-style-type: none"> • 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. 		
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<ul style="list-style-type: none"> • 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. <p><u>Cement Batching</u></p> <ul style="list-style-type: none"> • 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: PROTECTION OF AQUATIC ECOSYSTEM.

<i>Impact Management Objective: To ensure that the aquatic ecosystem is not significantly impacted on.</i>	
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Alteration of the flow modification. • Physical disturbance to aquatic ecosystems during the construction phase. • Increase of sedimentation/turbidity in the watercourses. • Reduction in aquatic biodiversity. • Soil erosion within the aquatic ecosystem. • Soil compaction within the aquatic ecosystem. • Reduced infiltration rates and increase the surface runoff volume and velocity.
Impact Management Outcome	Construction activities do not significantly impact on the aquatic ecosystem.



IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<p>General</p> <ul style="list-style-type: none"> • The 22m Buffer area around the watercourse is to be adhered to at all times and no construction activities to occur within this buffer. • 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. <p><u>Vegetation</u></p> <ul style="list-style-type: none"> • 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. <p><u>Stormwater control</u></p> <ul style="list-style-type: none"> • Stockpiles must not be located within the buffer area. • 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. 	Contractor	Construction phase



<ul style="list-style-type: none"> • 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). 		
Performance Indicator	Aquatic ecosystem is free of alien invasive species and the ecosystem is in a healthy state.	

11.4 OBJECTIVE 4: PROTECTION OF AQUATIC ECOSYSTEM WHEN CONSTRUCTING THE PROPOSED 200MM DIAMETER UPVC GRAVITY SEWER PIPELINE WITHIN THE AQUATIC HABITAT AND WATERCOURSE

Impact Management Objective: To ensure that the aquatic ecosystem is not significantly impacted on when constructing the proposed 200mm diameter UPVC gravity sewer pipeline within the aquatic habitat and watercourse.		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Physical disturbance to aquatic ecosystems during the construction phase. • Reduction in aquatic biodiversity. • Soil erosion within the aquatic ecosystem. • Reduced infiltration rates and increase the surface runoff volume and velocity. 	
Impact Management Outcome	Construction activities do not significantly impact on the aquatic ecosystem.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<p><u>General</u></p> <ul style="list-style-type: none"> • Identify working corridor and demarcate to limit disturbance to the surrounding vegetation. • Utilize only manual labour and hand tools when traversing within the aquatic buffer zone, no heavy construction machinery should be allowed into this area. • Construction must be planned beforehand, and attention must be paid to rainy periods. Attempts must be made to complete the crossing prior to the rainy season, to avoid interference with flows. • Construction along or close to slopes, particularly within the aquatic buffer zone, should be planned ahead, so as to not have exposed soils and exposed stockpiles, during rainy days, to prevent run off of loose material and erosion. • Construction work must be well-planned and well-managed so that construction work proceeds quickly and efficiently, thus minimising the duration of disturbance. • Disturbed areas must be rehabilitated immediately after construction has been completed, within that area, particularly within the aquatic buffer zone. • Allocate specific team of labourers to this area, inform them of the following: 	Contractor	Construction phase



<ul style="list-style-type: none"> - No heavy machinery allowed within this area. - Maintain demarcated working corridor. - various vegetation species, and identify aliens as opposed to indigenous species. - No littering, loitering, smoking or waste disposal within this area. - Rehabilitation needs to commence immediately. <p><u>Stockpiles</u></p> <ul style="list-style-type: none"> • Stockpiled materials should be located away from slopes, and should not be left exposed within the aquatic buffer zone, for prolonged periods of time. • Stockpiles should not exceed more than 2m's in height, and should be bunded. • Stockpiles should not be left exposed, particularly loose material, and should not be positioned close to the stream. <p><u>Vegetation</u></p> <ul style="list-style-type: none"> • Removal of alien invasive species must be undertaken on an on-going basis within this area. • Utilize indigenous vegetation for rehabilitation within this area, as advised by a Specialist or by the ECO. • Source vegetation from local nurseries. • A walk through of the route within this area, should be completed prior to construction, although it's is scarce, any indigenous vegetation within the construction corridor should be temporarily transplanted on site, and re-established during rehabilitation, along with new vegetation. <p><u>Stormwater Control</u></p> <ul style="list-style-type: none"> • Silt fencing must be erected along the downslope working corridor barrier, between the construction activities and the aquatic habitat downslope, to prevent sediment-laden storm water from flowing downslope. • Appropriate stormwater measures must be implemented. • Adequate erosion control measures must be implemented as per this EMPr to minimise sediment containing run-off from entering the river system. • Implementation of the approved stormwater management plan (Appendix D3) must be incorporated. <p><u>Hazardous Materials</u></p> <ul style="list-style-type: none"> • It is advised that no machinery or hazardous materials should be brought into the aquatic buffer zone. <p><u>Waste Disposal</u></p> <ul style="list-style-type: none"> • The labour must be inducted on appropriate behaviour and manner in this area. • No eating, waste disposal, smoking or other personal activities should be allowed within this area. 		
Performance Indicator	Aquatic ecosystem is free of alien invasive species and the ecosystem is in a healthy state.	



11.5 OBJECTIVE 5: MINIMISE LAND DISTURBANCE AND PROTECTION OF INDIGINOUS VEGETATION

Impact Management Objective: Reduce the impacts caused by land disturbance and conserve the Indigenous Vegetation on site when constructing the proposed Sewer Pump Station and Generator.

Potential impact(s) to avoid	<ul style="list-style-type: none"> • Permanent Loss of Indigenous Vegetation caused by construction activities. • Increased susceptibility to erosion caused by construction activities. • Negligence of indigenous vegetation or topsoil that require transplanting.
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Impact Management Outcome	The loss of indigenous vegetation on site is minimised and results in no erosion.
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IMPACT MANAGEMENT ACTIONS

Mitigation measure	Responsible party	Time period
<p><u>General</u></p> <ul style="list-style-type: none"> • Fence off working corridor, to ensure that the labour is aware of the extent of works, considering the pump station is at the furthest point of the development footprint. • Construction personnel, equipment and materials must be limited to the minimal practical working area. • Construction must be avoided during rainy days, to prevent runoff of loose material and erosion. • Construction work must be well-planned and well-managed so that construction work proceeds quickly and efficiently, thus minimising the duration of disturbance. • Disturbed areas must be rehabilitated once construction has been completed. <p><u>Stockpiles</u></p> <ul style="list-style-type: none"> • Stockpiled materials should be located South of the pump station development, closer to the developed portion. • Stockpiles should not exceed more than 2m's in height, and should be banded. • Stockpiles should not be left exposed, particularly loose material. <p><u>Vegetation</u></p> <ul style="list-style-type: none"> • Removal of alien invasive species must be undertaken on an on-going basis. <p><u>Stormwater Control</u></p> <ul style="list-style-type: none"> • Silt fencing must be erected between the construction activities and the open area to the north of the site, to prevent sediment-laden storm water from flowing downslope. • Appropriate stormwater measures must be implemented. • Adequate erosion control measures must be implemented as per this EMPr to minimise sediment containing run-off from entering the river system. <p><u>Hazardous Materials</u></p>	Contractor	Construction phase



<ul style="list-style-type: none"> • Soil contaminated by spilled oil/ fuel/ lubricant must be excavated and disposed of in the hazardous waste bin. Ensure disposal slips are obtained for clearing of these bins. 		
Performance Indicator	<ul style="list-style-type: none"> • 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. 	

11.6 OBJECTIVE 6: CREATION OF BUSINESS & EMPLOYMENT OPPORTUNITIES.

<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.	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Groenkloof Ontwikkelings (Pty) Ltd should establish a database of local construction companies in the area, specifically SMME's owned and run by HDI's 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. • Groenkloof Ontwikkelings (Pty) Ltd 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. 	Groenkloof Ontwikkelings (Pty) Ltd / 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.	

11.7 OBJECTIVE 7: MINIMISE FAUNAL IMPACT.

<i>Impact Management Objective: To minimise the impact on the Fauna currently inhabiting the site.</i>



Potential impact(s) to avoid	<ul style="list-style-type: none"> • Total loss of all Fauna on site. • Unnecessary destruction of habitat supporting Fauna. • Injuries and capturing of fauna 		
Impact Management Outcome	The loss of Fauna is minimised and vegetation remaining on site is able to act as an ecological corridor.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
<ul style="list-style-type: none"> • 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. • Ensure the site is appropriately fenced off, to limit access into site. • Open Space to be incorporated in the final plan to include ecological corridors and riparian zones. • Open Space rehabilitation and removal of invasives should commence before site clearing commences. • Construction workers are to be sensitised to the fact that they may encounter fauna while on site. • No fauna is to be captured or killed. • Rescued fauna should be released into a nearby area of similar habitat away from any construction. 	Groenkloof Ontwikkelings (Pty) Ltd	Construction phase	
Performance Indicator	Fauna is safely removed from site and the remaining indigenous vegetation retains the ecological corridor.		

11.8 OBJECTIVE 8: NOISE IMPACT MANAGEMENT.

<i>Impact Management Objective: To control avoidable noise impacts to the surrounding areas</i>			
Potential impact(s) to avoid	<ul style="list-style-type: none"> • 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 		
Impact Management Outcome	Management of noise emissions to an acceptable level.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure	Responsible party	Time period	
<ul style="list-style-type: none"> • A noise complaints register should be opened. • 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 18h00. • 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. 	Contractor	Construction phase	



<ul style="list-style-type: none"> • 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 even bordering the site they 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. 		
Performance Indicator	Noise levels on site remain within acceptable standards. No valid noise complaints are received.	

11.9 OBJECTIVE 9: VISUAL IMPACT MANAGEMENT.

<i>Impact Management Objective: To prevent the site from presenting an unnecessary visual impact to the surrounding public.</i>		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • 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.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • 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 EMPr and the mitigation measures listed above in terms of waste management. Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy. • 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. • Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time. 	Contractor	Construction phase



<ul style="list-style-type: none"> • 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. • Initiate proposed indigenous tree screening establishment, as soon 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. 		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> • Good "housekeeping" is evident on site. • The site does not pose a visual impact to surrounding community. 	

11.10 OBJECTIVE 10: DUST IMPACT MANAGEMENT.

<p><i>Impact Management Objective: To prevent the generation of significant dust.</i></p>		
<p>Potential impact(s) to avoid</p>	<ul style="list-style-type: none"> • Dust may cause a nuisance to the surrounding residents. • Dust may smother surrounding vegetation. • Decreased visibility for labourers and operators. 	
<p>Impact Management Outcome</p>	<p>The surrounding environment, land users, residents do not experience significant dust-related impacts.</p>	
<p>IMPACT MANAGEMENT ACTIONS</p>		
<p>Mitigation measure</p>	<p>Responsible party</p>	<p>Time period</p>
<ul style="list-style-type: none"> • 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. 	<p>Contractor</p>	<p>Construction phase</p>



<ul style="list-style-type: none"> • 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 are 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. 		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> • Excessive dust does not arise from the site. • No dust complaints are received from any member of the public. • There is no evidence that vegetation surrounding the site is being smothered by dust. 	



11.11 OBJECTIVE 11: MINIMISATION OF THE TRAFFIC & SAFETY IMPACT.

Impact Management Objective: To ensure continued community safety during the construction phase.		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • 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. The safety of surrounding land occupiers and construction site remains intact.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<p><u>Presence of Construction Workers</u></p> <ul style="list-style-type: none"> • Groenkloof Ontwikkelings (Pty) Ltd should seek to appoint local contractors wherever possible. • Groenkloof Ontwikkelings (Pty) Ltd should seek to ensure that the majority of construction workers employed during the construction phase are locally based. • Groenkloof Ontwikkelings (Pty) Ltd in consultation with the appointed contractors should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. • Ensure emergency contact details are available and visible on site. • Ensure fence line and access points are secure. • The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis. • No construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. • All construction vehicles must adhere to traffic laws when travelling to and from the site. • Appropriate signage should be erected to warn other road users about the presence of construction vehicles. <p><u>Traffic</u></p> <ul style="list-style-type: none"> • 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. 	Contractor	Construction phase



<ul style="list-style-type: none"> • 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. • 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. 		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> • The surrounding road networks infrastructure remains in its current state. • Limited congestion and traffic. • Crime levels do not increase. 	



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.
- Effective incorporation of the visual landscaping screen.
- Maintenance of natural vegetation.
- Reduce loss of aquatic habitat.
- Prevention of flow modification.
- Prevention of surface water pollution.
- Reduced erosion & sedimentation.
- Reduce visual impact.
- Broadening of the rates base the rates base.
- Reduce impacts caused by faulty infrastructure.
- Creation of Business and Employment Opportunities.

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The site is neat and tidy and all exposed surfaces are suitably covered/ stabilised. • There is no construction-related waste or pollution remaining on site. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • 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. 	Contractor	Construction phase



<ul style="list-style-type: none"> • 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. • 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. • It is recommended that follow-up alien clearing be conducted 6 months after construction is complete and thereafter annually for 3 years (or longer is alien recruitment is still evident on site). 		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> • All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site. 	



	<ul style="list-style-type: none"> • 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.
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12.2 OBJECTIVE 2: EFFECTIVE INCORPORATION OF THE VISUAL LANDSCAPING SCREEN.

Impact Management Objective: Reduce the visual impact from Saasveld Road		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Change in sense of place within the community. 	
Impact Management Outcome	<ul style="list-style-type: none"> • The proposed development causes minimal visual impact from Saasveld Road. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • Saplings are to be planted in the relative season for optimal growth, in accordance with the ECO. • The saplings are to be provided with the correct soil, in accordance with the ECO. • An informal irrigation plan is to be set up to water the saplings accordingly. • It is recommended that follow-up alien clearing be conducted 6 months after construction is complete and thereafter annually for 3 years (or longer is alien recruitment is still evident on site). 	Developer	Operational phase
Performance Indicator	<ul style="list-style-type: none"> • Sense of place within the local community is maintained. 	

12.3 OBJECTIVE 3: MAINTENANCE OF NATURAL VEGETATION

Impact Management Objective: Encourage natural fauna and flora to flourish, and natural ecosystems to develop.		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Establishment of alien vegetation. • Deterioration of flora. • Unsightly open spaces. 	
Impact Management Outcome	<ul style="list-style-type: none"> • Fauna and flora to flourish, and natural ecosystems to develop 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • An Environmental Control Officer will oversee compliance with all the prescribed environmental requirements and mitigation measures listed here and will be on site regularly. • Alien plants must be removed from the site as per NEMBA requirements. • A suitable weed management strategy to be implemented in construction and operation phases to eradicate and control regeneration. • Ensure signage is erected with information on the buffer area, the identification of alien vegetation and indigenous vegetation. 	Developer	Operational phase



<ul style="list-style-type: none"> • After any clearing is completed, an appropriate cover crop should be planted where any weeds or exotic species are removed from disturbed areas timeously. • The specialist has advised that walkways can be accommodated following the contours through fynbos vegetation or a bird hide near the indigenous forest for bird viewing and to take in the scenic landscape are potential uses in this specific project. • The Home Owners Association could be involved in the monitoring and Fynbos rehabilitation. 		
Performance Indicator	<ul style="list-style-type: none"> • Indigenous fauna and flora to flourish 	

12.4 OBJECTIVE 4: REDUCE LOSS OF AQUATIC HABITAT

<i>Impact Management Objective: Reduce loss of Aquatic Habitat</i>		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Loss of aquatic habitat within the watercourse. • Establishment of alien invasive species within the riparian zone. • Erosion within the riparian habitat 	
Impact Management Outcome	<ul style="list-style-type: none"> • Minimal loss of Aquatic Habitat and Associated Biota 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • 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. • 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. • The Home Owners Association could be involved in the on-going monitoring. 	Developer	Operational phase



<ul style="list-style-type: none"> Maintenance of the aquatic habitat and buffer area must be implemented, preventing encroachment of any further infrastructure or vehicles. 		
<p>Performance Indicator</p>	<ul style="list-style-type: none"> 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 	

12.5 OBJECTIVE 5: PREVENTION OF FLOW MODIFICATION.

<i>Impact Management Objective: No Impairment of Surface Water Quality</i>		
<p>Potential impact(s) to avoid</p>	<ul style="list-style-type: none"> Deteriorated aquatic habitat. Increased erosion. Loss of ecosystem functioning. Degraded quality of downstream aquatic systems. 	
<p>Impact Management Outcome</p>	<ul style="list-style-type: none"> No impairment of surface water quality as a result of the development. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area and open space 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 stormwater flows must enter the aquatic areas in a diffuse flow pattern. Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment. Consideration must be given to implementing a permanent rip-rap erosion control measure along the outer edge of the aquatic vegetation, to create a multifunctional barrier, to slow down any additional flow from the development portion, as well as creating an aesthetically pleasing barrier indicating the edge of sensitive vegetation. 	<p>Developer</p>	<p>Operational phase</p>
<p>Performance Indicator</p>	<ul style="list-style-type: none"> No visible signs of erosion. Aquatic ecosystem within the aquatic buffer remains healthy and functioning. 	



12.6 OBJECTIVE 6: PREVENTION OF SURFACE WATER POLLUTION.

Impact Management Objective: No Impairment of Surface Water Quality		
Potential impact(s) to avoid	<ul style="list-style-type: none"> • Pollution of the watercourse. • Loss of aquatic life. • Deteriorated aquatic habitat. • Loss of ecosystem functioning. 	
Impact Management Outcome	<ul style="list-style-type: none"> • No impairment of surface water quality as a result of the development. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • The developer must implement litter clean-up operations from the buffer area on a regular basis. In addition the storm water infrastructure (ponds and discharge infrastructure and litter traps etc) must be serviced regularly. • The storm water management system must be implemented on site and must be properly maintained. • The permanent storm water management plan must be properly monitored and maintained throughout the operational phase. Blockages in the system must be cleared timeously. • Monitoring and rehabilitation or blockages (litter clean-ups) in the stormwater infrastructure must be ongoing throughout the operational phase. • 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. • The use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater are recommended. • Engage with the community to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. This could be targeted at learners to prevent the dumping of solid waste and other activities that threaten the watercourses and buffer zones. • 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. • Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment. 	Developer / George Municipality	Operational phase
Performance Indicator	<ul style="list-style-type: none"> • Continual Stormwater Management. • No impairment of surface water quality on site or downstream as a result of the development. 	



12.7 OBJECTIVE 7: REDUCED EROSION & SEDIMENTATION.

Impact Management Objective: Reduced Erosion & Sedimentation.		
Potential impact(s) to avoid	<ul style="list-style-type: none"> Increased sedimentation of downstream watercourses as a result of soil erosion problems and bank instability. 	
Impact Management Outcome	<ul style="list-style-type: none"> Prevention of excessive sediment entering the watercourse. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> The increased intensity of the runoff from the site that would result from the hardening of surfaces within the site should be mitigated by encouraging infiltration where possible within the developed site. Consideration must be given to implementing a permanent rip-rap erosion control measure along the outer edge of the aquatic vegetation, to create a multifunctional barrier, to slow down any additional flow from the development portion, as well as creating an aesthetically pleasing barrier indicating the edge of sensitive vegetation The area will need to be monitored to ensure that erosion of the streams downstream of the site does not become eroded, especially at the proposed storm water discharge points. If erosion and scouring is noted then erosion rehabilitation measures must be installed as follows: The scale and nature of the erosion and storm water control measures implemented on site should be appropriate to the conditions on site, and sufficient to achieve the desired outcomes (soil preservation, prevention of flooding, storm water control) to the satisfaction of the ECO and consulting engineer. Small-scale control measures: This may include the use of shade netting, geo-fabric or similar barriers in areas susceptible to erosion and along exposed slopes. The netting/fabric is placed directly across the path of flow of storm water. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used. Medium-scale control measures: This may entail the establishment of small berms and benches cut into affected slopes, as well as the placement of poles and logs along the contours of the slope. Berms can be created to divert storm water run-off into surrounding vegetated areas. 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. 	Developer / consulting engineer	Operational phase



<ul style="list-style-type: none"> 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. Constructing water tanks to catch rainwater runoff from the roof for irrigating purposes will reduce stormwater runoff and possible erosion associated therewith. The same system can be put in place at the communal buildings. The runoff can be used for watering open space. Ensure open areas along slopes are grassed and reduce the number of hardened slope surfaces from the development portion, leading to the aquatic habitat. 		
Performance Indicator	<ul style="list-style-type: none"> There is no evidence of erosion and the watercourse remains healthy. 	

12.8 OBJECTIVE 8: REDUCE VISUAL IMPACT.

Impact Management Objective: Reduce the visual impact caused by the proposed development.		
Potential impact(s) to be avoided.	<ul style="list-style-type: none"> Change in the sense of place. Community tension. 	
Impact Management Outcome	<ul style="list-style-type: none"> Surrounding road networks remain safe to use and free of excessive congestion. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> 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. 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. Green spaces/surfaces should be favoured over hardened surfaces, where possible. 	Developer	Operational phase
Performance Indicator	<ul style="list-style-type: none"> The proposed development forms part of the community and the visual impact is dissipated. 	

12.9 OBJECTIVE 9: BROADENING OF THE RATES BASE THE RATES BASE.

Impact Management Objective: Increase the rates base for the local municipality.



Potential impact(s) to be promoted.	<ul style="list-style-type: none"> Improved financial stability for the local municipality. 	
Impact Management Outcome	<ul style="list-style-type: none"> Local municipality has improved cash flow. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> The proposed development represents an enhancement measure on its own. 	George Municipality	Operational phase
Performance Indicator	<ul style="list-style-type: none"> The financial security for the local municipality is improved. 	

12.10 OBJECTIVE 10: REDUCE IMPACTS CAUSED BY FAULTY INFRASTRUCTURE.

Impact Management Objective: Reduce the negative impact caused by possible faults to the Proposed 200mØ Gravity Sewer Pipeline and Proposed Sewer Pump Station on site.

Potential impact(s) to be promoted.	<ul style="list-style-type: none"> Unpleasant odour. Compromised air quality Contamination of the land surface and vegetation, affecting the downslope forest vegetation and fauna. Contamination of downslope vegetation, soils and major watercourse, Swart River (downslope). 	
Impact Management Outcome	<ul style="list-style-type: none"> Infrastructure is sufficiently managed and monitored so that infrastructure is unlikely to fault 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<p><u>Proposed 200mØ Gravity Sewer Pipeline</u></p> <p>General:</p> <ul style="list-style-type: none"> Ensure a service provider is identified for maintenance purposes. Monitor watercourse crossing during operational phase, particularly after heavy rain events, to ensure there is no disturbance to infrastructure, that can lead to erosion, downslope. Ensure the route of the pipeline is recorded/updated on the development plans and municipal plans, to ensure that any future maintenance/planning can be accurate. Ensure that the community is aware of the location of the manholes, (particularly residents in the northern most housing units) should there be any signs of spillage/overflow, ie: overflowing manholes leading to foul sewage odours. <p>Stormwater Management:</p> <ul style="list-style-type: none"> Ensure open areas along slopes are grassed and reduce the number of hardened slope surfaces from the development portion, leading to the aquatic habitat. 	Developer	Operational phase



<ul style="list-style-type: none"> • The use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater are recommended. • Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment. • Consider creating a bunded structure around the manholes to capture any overflow. <p><u>Proposed Sewer Pump Station on site.</u></p> <p>General:</p> <p>Monitoring and maintenance of this pump station must be undertaken on an ongoing basis.</p> <ul style="list-style-type: none"> • The developer and residents will be responsible for the management and maintenance of the sewer pump station. The long-term option would be for the George Municipality to take over the proposed sewer pump station on Portion 3/195 Kraaibosch as a regional pump station and as soon as portions of Portion 21/195 Kraaibosch and/or Portion 62/195 Kraaibosch connects to the pump station. • Fence off pump station, to limit access. • The developer must ensure that a service provider is appointed for scheduled monitoring and/or emergency call outs in case of failure. • Ensure odour control mechanisms/measures are implemented. • Ensure appropriate signage is erected, identifying sewer pump station, with contact details for residents to report issues, if it should occur. • Alert the community of the pump station location, and request that they be aware of any hazardous activities, ie: foul smells, any unauthorized person tampering with the infrastructure, animal encroachment, etc. <p>Engineering proposal design</p> <ul style="list-style-type: none"> • The pump station sump will be designed with an emergency storage capacity to handle 4 hours of sewer flow. • Two pumps (a duty and standby pump) will be accommodated in case one pump breaks. • A back-up generator will be located on site, in case of a power failure. <p>Stormwater Management:</p>		
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<ul style="list-style-type: none"> • Implement effective stormwater drainage measures to ensure the runoff from the development is not highly concentrated before entering the vegetated area downslope. • The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion. • Constructing water tanks to catch rainwater runoff from the roof for irrigating purposes will reduce stormwater runoff and possible erosion associated therewith. • Ensure open areas along slopes are grassed and reduce the number of hardened slope surfaces from the development portion, leading to the aquatic habitat. • The use and maintenance of grease traps/oil separators to prevent pollutants from entering the environment from stormwater are recommended. • Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment. 		
Performance Indicator	<ul style="list-style-type: none"> • Infrastructure on site is well maintained and is in working order. 	

12.11 OBJECTIVE 11: CREATION OF BUSINESS AND EMPLOYMENT OPPORTUNITIES.

Impact Management Objective: Creation of Business and Employment Opportunities		
Potential impact(s) to be promoted.	<ul style="list-style-type: none"> • Increase in local economic revenue. • Job creation will result in opportunities for people of various skill levels, to become employed, and offer a better quality of life for themselves and their families. • Decreased unemployment levels. • An increase in the need for services and bulk infrastructure. 	
Impact Management Outcome	<ul style="list-style-type: none"> • Creation of Business and Employment Opportunities. 	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
<ul style="list-style-type: none"> • 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. • Small medium and micro enterprises (SMME's) owned and run by historically disadvantaged individuals (HDI's) that are on the George Municipality database should be notified of the development and invited to bid for project related work. 	Developer / George Municipality	Operational phase
Performance Indicator	<ul style="list-style-type: none"> • Increase in employment of local residents. 	





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, and 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.
- Construction within a watercourse.

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 Officer (EO) as a member of the construction team, who will act as the Contractor's representative to monitor, manage 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;
- 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.

15.3.3 Frequency of ECO visits

The ECO must conduct weekly to fortnightly 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.

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 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.

15.4 Environmental Auditor.

An environmental auditor is to be appointed by the applicant. As per Section 34 of the EIA Regulations (GN R326 of 2017), the duty of an Environmental Auditor is to be independent and is responsible for:

- Ensuring compliance with the conditions of the environmental authorisation and the EMPr; and
- Submit an environmental audit report to the relevant competent authority, which provides verifiable findings, in a structured and systematic manner, as per Appendix 7 of GN R326.

The Environmental auditor must undertake an audit as per Appendix 7 of GN R326 at the following stages;

- At 50% completion of the project timeline.
- At practical completion of the construction period.
- 3 months after practical completion of the construction period.
- Once a year, for the following 5 years after practical completion of the construction period.

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 not 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.

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 if 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 monitoring report on practical completion of the project.

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.

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 EMPr 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 EMPr;
- 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

finances 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 5: 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 comply with the provisions relating to the demarcation of all "no-go" areas, and the maintenance of the demarcated boundaries.	R2 000	R5 000
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	R1 000	R10 000

of hydrocarbons or hazardous substances on site leading to environmental damage.		
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

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.

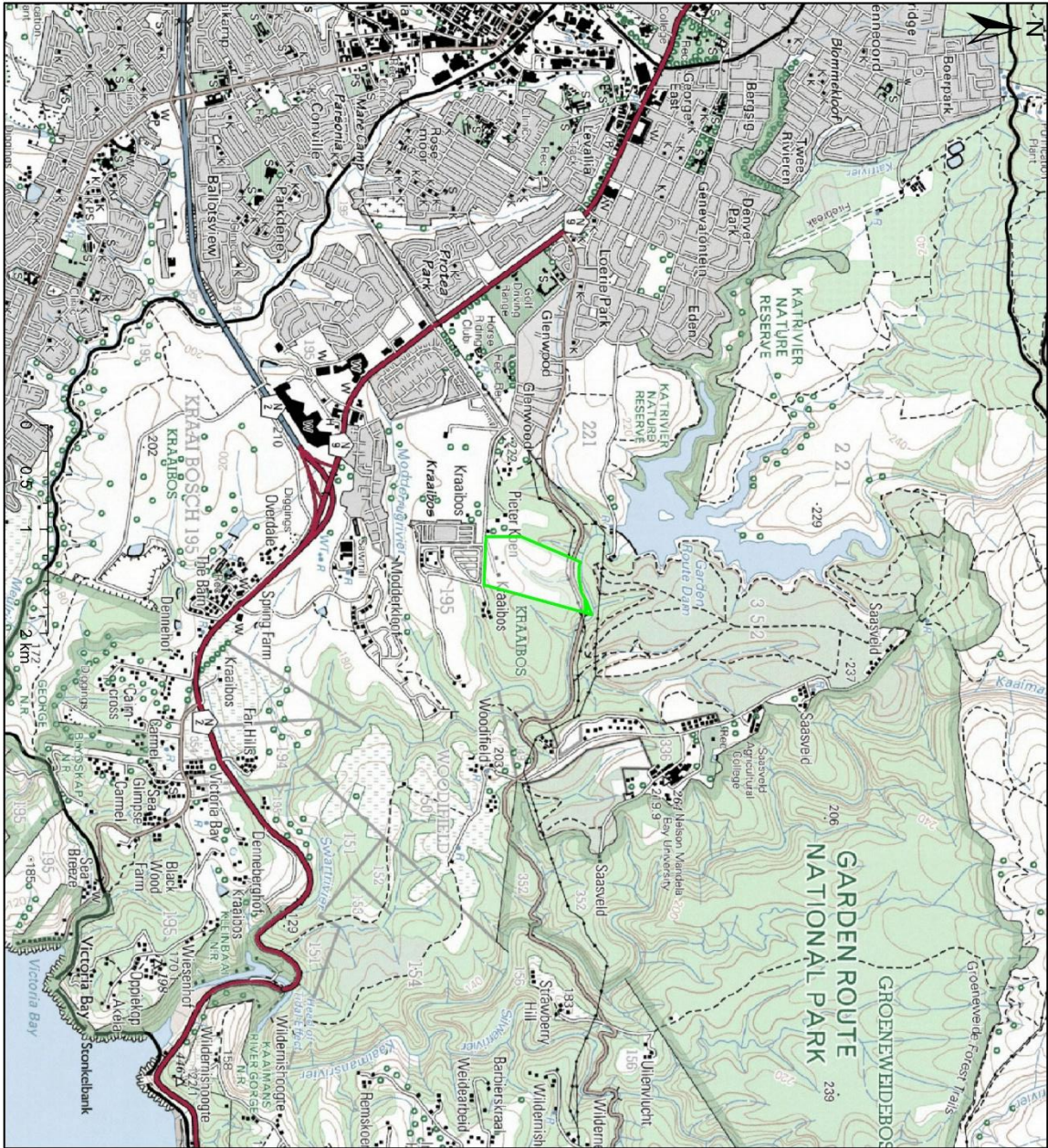
19. Conclusion

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: LOCATION MAP





**1: 50 000 LOCATION
MAP OF THE**

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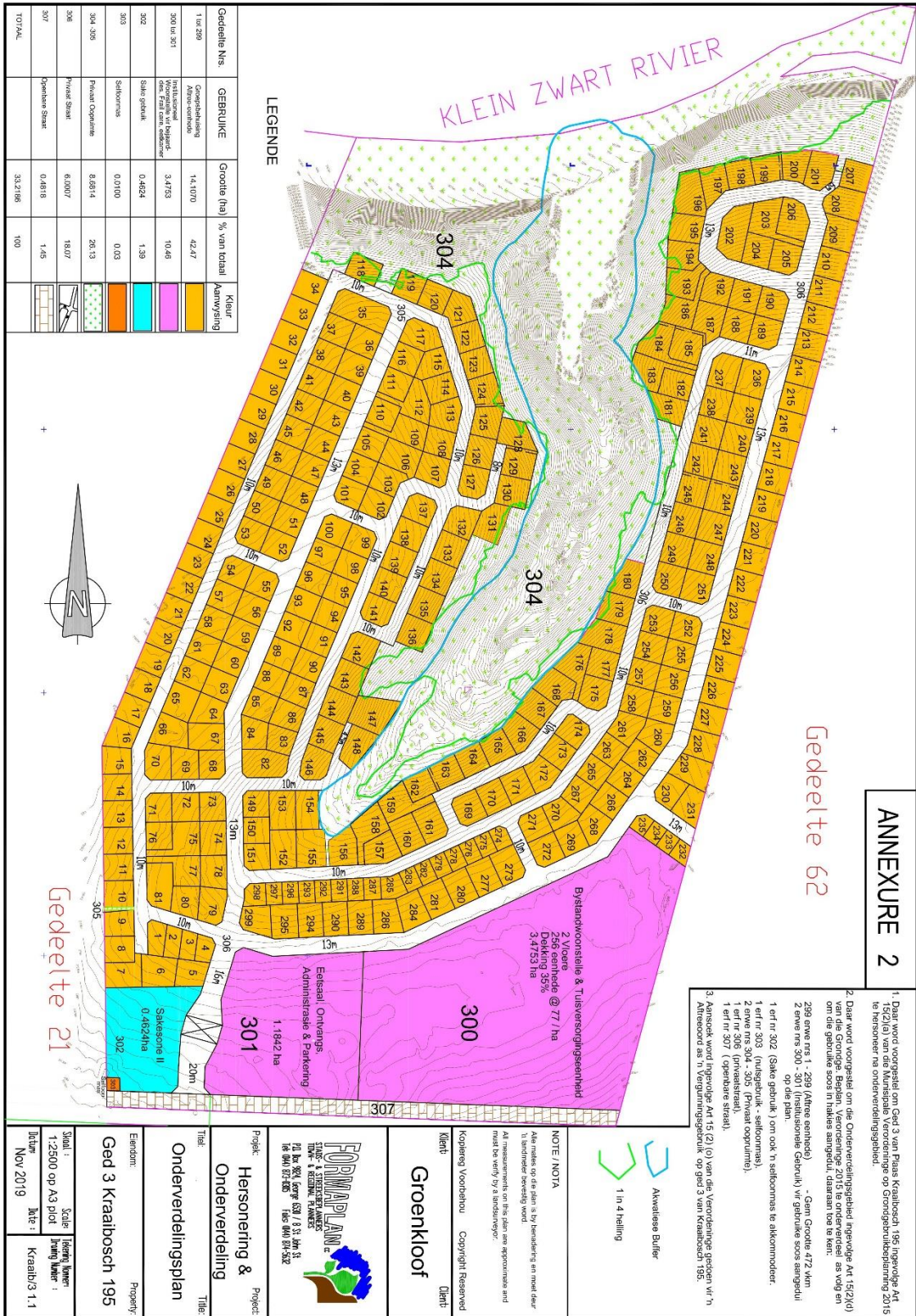
Scale: 1:50 000
Date created: March 13, 2020

Compiled with CapeFarmMapper



APPENDIX B: SITE LAYOUT PLANS





APPENDIX C: CURRICULUM VITAE OF EAP

