ENVIRONMENTAL MANAGEMENT PROGRAMME

for

HEROLDS BAY STORMWATER INFRASTRUCTURE

on

Erven 326, 318 and 139 Herolds Bay, George

In terms of the

National Environmental Management Act (Act No. 107 of 1998, as amended) & 2014 Environmental Impact Regulations

Prepared for Applicant:
George Municipality

Date: 30 May 2024

Appointed EAP: Ms Louise-Mari van Zyl
Assisted by Candidate EAP: Ms Mariska Byleveld
Email: louise@cape-eaprac.co.za / mariska@cape-eaprac.co.za
Report Reference: GEO814/09
Department Reference: 16/3/3/1/D2/29/0018/24
Case Officer: Dorien Werth

Cape EAPrac
Cape Environmental Assessment Practitioners

Tel: +27 44 874 0365 PO Box 2070, George 6530
Fax: +27 44 874 0432 17 Progress Street, George

www.cape-eaprac.co.za

DOCUMENT TRACKING

DOCUMENT HISTORY

DOC REF	REVISION	DATE
GEO814/09	Draft EMPr	2024-05-30

DISTRIBUTION

DESIGNATION	NAME	EMAIL / FAX
DEA&DP, George	Ms Dorien Werth & Admin Registry	Electronic submission
George Municipal Office	Mr Lionel Daniels	Electronic submission
Organs of State	Stakeholder Register	Electronic submission
Potential Stakeholders	Stakeholder Register	Preferred communication

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

***Cape EAPrac* Environmental Assessment Practitioners**

PO Box 2070

George

6530

Tel: 044-874 0365

Appointed EAP: Director **Louise-Mari van Zyl** (MA Geography & Environmental Science [US]); Registered Environmental Assessment Practitioner with the Environmental Assessment Practitioners of South Africa, EAPSA, **Registration Number 2019/1444**. Ms van Zyl has over twenty years' experience as an environmental practitioner.

Assisted by Candidate EAP: Mariska Byleveld (MSc Geology at the University of the Free State). Registered Candidate Environmental Assessment Practitioner with the Environmental Assessment Practitioners of South Africa, EAPASA, **Registration Number 2023/6593**.

PURPOSE OF THIS REPORT:

Environmental Management Programme

APPLICANT:

George Municipality

CAPE EAPRAC REFERENCE NO:

GEO814/09

SUBMISSION DATE

30 May 2024

ENVIRONMENTAL MANAGEMENT PROGRAMME

for

HEROLDS BAY STORMWATER INFRASTRUCTURE

on

Erven 326, 318 and 139 Herolds Bay, George

In terms of the

National Environmental Management Act (Act No. 107 of 1998, as amended) & 2014 Environmental Impact Regulations (as amended)

Submitted for:

Stakeholder Review & Comment

Report Issued by:

Cape Environmental Assessment Practitioners

Tel: 044 874 0365

Web: www.cape-eaprac.co.za

PO Box 2070

17 Progress Street

George 6530

ORDER OF REPORT

Environmental Management & Maintenance Plan

Appendix 1	:	Locality Plans
Appendix 2	:	Site Plans
Appendix 3	:	Environmental Guidelines for construction
Appendix 4	:	EAP Company Profile
Appendix 5	:	Environmental Authorisation (Pending)

TABLE OF CONTENTS

FIGURES

TABLES

ENVIRONMENTAL MANAGEMENT PROGRAMME REQUIREMENTS

Appendix 4 of Regulation 982 of the 2014 EIA Regulations contains the required contents of an Environmental Management Programme (EMPr). The checklist below serves as a summary of how these requirements were incorporated into this EMPr.

Table 1: Checklist in terms of Appendix 4 of Regulation 982 of 2014 EIA Regulations

Requirement	Description
Details and expertise of the EAP who prepared the EMPr; including curriculum vitae.	Ms Louise-Mari van Zyl for Cape Environmental Assessment Practitioners. See Appendix 4.
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that must be avoided, including buffers	Appendix 1
A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all the phases of the development including – (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) Where relevant, operation activities.	Section 4 – Environmental Impacts & Mitigations Section 5 - Responsibilities Section 6 – Pre-Construction Design Section 7 – Construction Phase Section 8 – Operation Phase
A description and identification of impact management outcomes required for the aspects contemplated above.	Section 4
A description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated above will be achieved and must, where applicable include actions to – (i) Avoid, modify, remedy control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practises; (iii) Comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.	Section 4 Section 6 Section 7 Section 8
The method of monitoring the implementation of the impact management actions contemplated above.	Section 9 Section 11
The frequency of monitoring the implementation of the impact management actions contemplated above.	Section 9

Requirement	Description
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 5
The time periods within which the impact management actions must be implemented.	Not Applicable
The mechanism for monitoring compliance with the impact management actions.	Section 9
A program for reporting on compliance, taking into account the requirements as prescribed in the Regulations.	Section 9
An environmental awareness plan describing the manner in which – (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 5 Section 6 Section 7 Section 8 Section 9
Any specific information that may be required by the competent authority.	Not Applicable.

ABBREVIATIONS AND ACRONYMS

BSP Biodiversity Sector Plan - to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity.

CARA Conservation of Agricultural Resources Act (Act 43 of 1983) - provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

CBA Critical Biodiversity Area - areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan.

DFFE National Department of Forestry, Fisheries & the Environment – the national authority responsible for the sustainable environmental management and integrated planning.

DEA&DP Department of Environmental Affairs and Development Planning – the provincial authority for sustainable environmental management and integrated development planning. The competent authority is this case.

DWS Department of Water & Sanitation Affairs – National authority mandated to enforce the National Water Act (NWA).

EA Environmental Authorisation – Authorisation obtained on completion of an Environmental Impact Assessment in terms of the National Environmental Management Act (NEMA).

ECA Environment Conservation Act, 1989 - To provide for the effective protection and controlled utilization of the environment and for matters incidental thereto.

ECO Ecological Control Officer – independent site agent appointed to observe and enforce the implementation of environmental policies and principles on a development site.

EIA Environmental Impact Assessment - a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

EMPr Environmental Management Programme – an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented and that positive benefits of the projects are enhanced.

GIS Geographic Information System - system designed to capture, store, manipulate, analyse, manage, and present all types of geographical data.

GPS Global Positioning System - a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.

NEMA National Environmental Management Act (Act 107 of 1998, as amended) – national legislation that provides principles for decision-making on matters that affect the environment.

NEM:BA National Environmental Management: Biodiversity Act (Act No.10 of 2004) – provides for the management and conservation of South African biodiversity within the framework of NEMA.

NFA National Forestry Act (Act No.84 of 1998) - provides for the protection of forests, as well as specific tree species within South Africa.

NSBA National Spatial Biodiversity Assessment – aims to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors.

NWA National Water Act (Act No.36 of 1998) - ensures that South Africa's water resources are protected, used and managed.

1. INTRODUCTION

Cape Environmental Assessment Practitioners (Cape EAPrac) was appointed by the Applicant, George Municipality to develop an Environmental Management Programme (EMPr) which will be used to promote and ensure environmental monitoring and control during all relevant phases (pre-construction, construction, operational as well as maintenance) associated with the proposed activity. The proposed project entails the formalisation of an **existing municipal stormwater channel** through erven 326, 318 and a small portion of erf 139 Herolds Bay, George District Municipality (Western Cape Province) (Figure 1).

Erven 326, 318 and 139 are zoned **Public Open Space**. The affected stormwater channel experienced intensive erosion following high velocity stormwater runoff during recent rainfall events in the greater George area. The channel is bordered by residential erven along Slaapplek street and Voëlklip street (Figure 1).

Erf 326 is densely vegetated and as a result the extend of erosion along this portion of the channel is minimal with the exception for the southern boundary which is also the lowest point of the erf.

Where the channel runs through **erven 318 & 139** erosion is significant. Erosion in this area has resulted in damage to the boundary walls of neighbouring properties (most notably erf 319).

Figure 1: Enlarged figure showing the locality of the Municipal Open Space Erven 319, 318 and 326.

George Municipality appointed **EAS Infrastructure Engineers** to provide an engineering solution to the current erosion and stormwater management issues affecting the open space erven and neighbouring properties.

According to EAS infrastructure, the drainage system at these erven has both operational and hydraulic deficiencies. The potential of flooding due to blocked and damaged infrastructure was evident at these erven.

The **proposed activity** entails the following:

Erf 326

- A **subsoil drain** will be installed on erf 326 to collect runoff from higher lying erven (erven 125 and 327) (Figure 2 – Green Arrows).
- A 2m high **gabion basket wall** will be constructed just outside the southern boundary of erf 326 to prevent further erosion (Figure 2– Purple Box).
- The subsoil drain will run underneath the gabion structures where it will be tied in at **a reconstructed and enlarged catchpit** structure (Figure 2).
- The **crossing pipe** which extends underneath Voëlklip street will be upgraded to a 750mm diameter pipe.

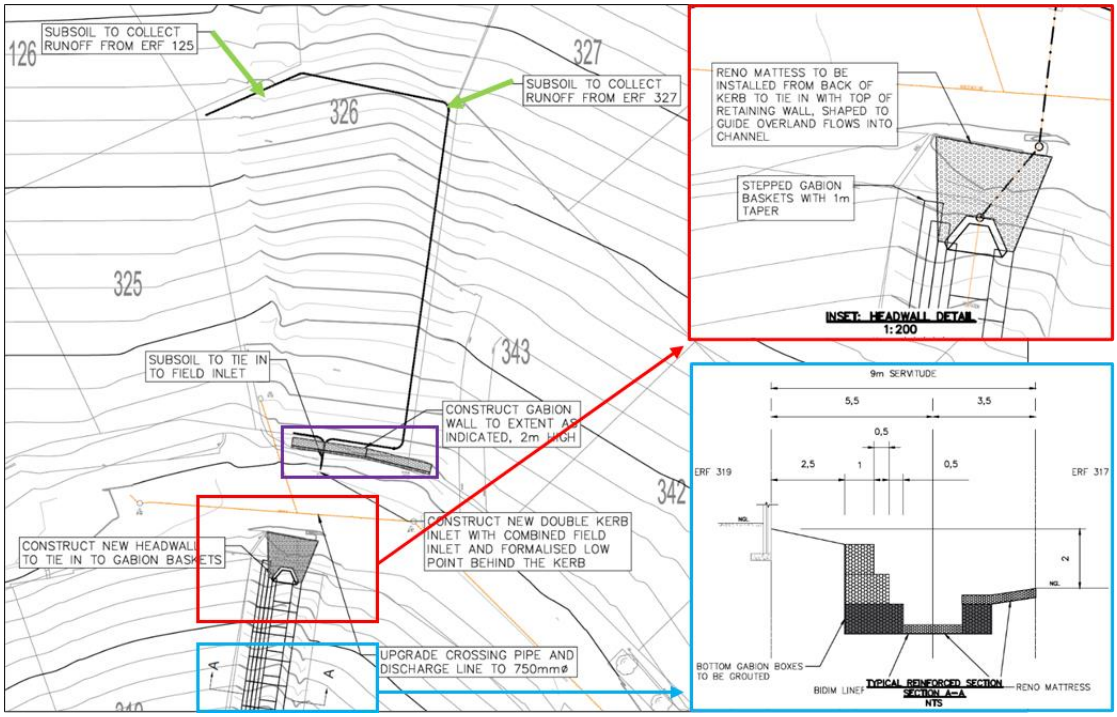


Figure 2: Erosion protection layout for Erven 326 & 318 – subsoil drains, gabion basket and reno mattress (source: EAS Infrastructure Engineers).

Erf 318 and a portion of Erf 139

It is proposed to construct a **stepped gabion basket channel** and associated infrastructures (reno mattresses, retaining walls) on erf 318 and a small portion of erf 139 to control erosion and stormwater runoff (Figure 2 – Red & Blue Boxes). The western section of this gabion channel will be further extended to the west to provide additional support to the boundary wall of erf 319 (Figure 2 – Blue Box) (Figure 3). The outlet of the gabion basket channel will be on erf 139, approximately 2m beyond an existing sewer line (Figure 3). As per the aquatic specialist recommendation, a **stilling basin** will be constructed at this outlet to further reduce stormwater energy and minimise erosion of the slope (Figure 3– Blue Arrow).

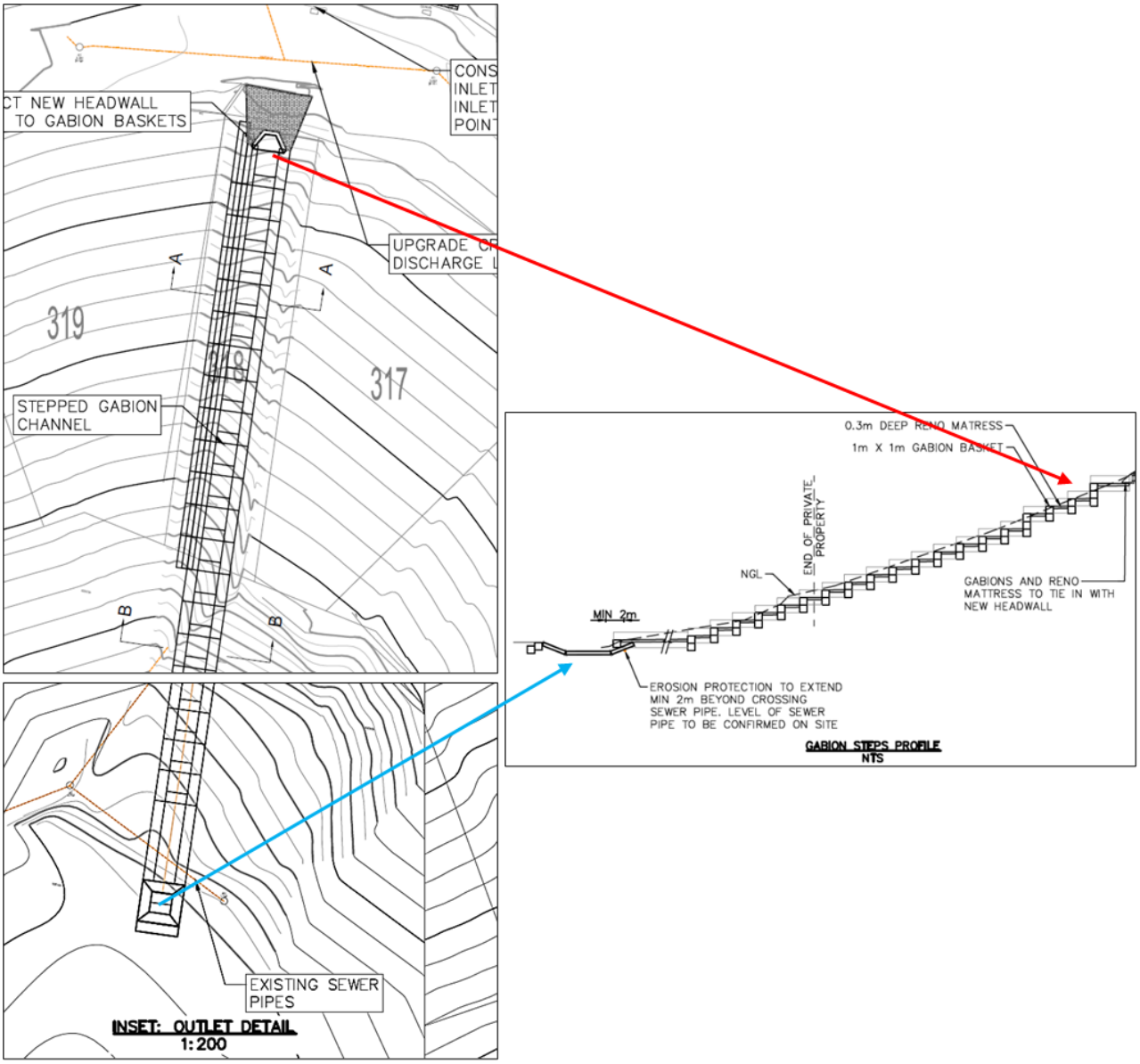


Figure 3: Erosion Protection for erven 318 & 139 (Plan & Section View) – stepped gabion channel ending with a stilling basin approx. 2m beyond the existing sewer pipeline.

This activity requires an Environmental Authorisation in terms of the National Environmental Management Act (NEMA, Act 107 of 1998), before commencing, as well as for future maintenance and repairs of the structure.

This document provides part of a series of documents that is being circulated for public and stakeholder input as part of the Basic Assessment process, before being provided to the provincial competent authority, the provincial Department of Environmental Affairs & Development Planning (DEA&DP) for decision making.

This EMPr contains **management requirements** and **recommendations** made by *Cape EAPrac*, the appointed specialist as well as in terms of the regulations contained in the **National Environmental Management Act** (NEMA, Act 107 of 1998) and environmental best practice principles.

This EMPr must be updated to include any conditions of the **Environmental Authorisation** (EA) as issued.

1.1 PURPOSE OF THE EMPR

The purpose of this EMPr is to ensure that the environmental impacts and management of the various phases, of the proposed activity, on the receiving environment are managed, mitigated and kept to a minimum (ie. the **outcome** of implementing the EMPr). The EMPr must provide easily understood and clearly defined **actions** that must be implemented during each phase of the proposed activity. The EMPr is a dynamic document that is flexible and responsive to new and changing circumstances.

The document is binding on the Applicant (George Municipality), all contractors and sub-contractors to the site.

It must be included as part of any documents / agreements, as well as contractual documents between the Applicant and any contractors.

Copies of this EMPr must be kept on site and all **senior personnel** are expected to familiarise themselves with the content of this EMPr.

Any changes or deviations to this EMPr must be authorised by the competent authority in the event that any environmental outcomes are amended.

1.2 STATUS OF THE EMPR

It is of utmost importance that this EMPr be read in conjunction with any legally obtained authorisations such as an Environmental Authorisation (EA). This EMPr is viewed as a dynamic document that must be reviewed and updated on a continual basis.

The EMPr is valid for the duration of the project (both for construction as well as future maintenance) with each applicable phase corresponding to the identified requirements.

2 EMPR PHASING

2.1 PRE-CONSTRUCTION PHASE

The pre-construction phase refers to the design phase of the project. This will ensure that any requirements and best practise mechanisms are built into the planning / design phase to be developed in the construction and operational phase. In term of this application, the pre-construction can be considered as the site selection and engineering designs and mitigations.

2.2 CONSTRUCTION PHASE

The construction phase refers to the actual construction of the development on the property, and includes all earthworks and installation of bulk services (water, sewerage, roads, stormwater, electricity etc.). In terms of this application, this phase relates to the construction of the subsoil drains, 2m high gabion basket wall and gabion basket channel with a stilling basin at the outlet.

2.3 OPERATIONAL PHASE

The Operation Phase of this project relates to the ongoing management and maintenance required to ensure sustainable development. In terms of this application, this refers to all activities that are undertaken once construction is completed and the site is handed over to the Municipality.

All future maintenance of the structure (i.e. after flooding, erosion, breakage of gabions etc) must be implemented in accordance with this EMPr (procedures for construction activities to be followed).

The Applicant must ensure that the Operational Phase maintains the underpinning principles 'Duty-of-Care-to-the-Environment' and ideals of sustainable development.

Maintenance of the structure, once installed, must be undertaken in accordance with this management & maintenance plan.

2.4 CLOSURE AND DECOMMISSIONING PHASE

Decommissioning refers to the process of removing the operating assets of any development after completion of the operating life cycle.

The decommissioning phase is not applicable because the proposed activity involves the formalisation of an existing stormwater channel.

Should the need arise in future to remove the structure wholly, the Applicant must consult with the Competent Authority to ensure compliance with legislation applicable at the time.

3 LEGISLATIVE REQUIREMENTS

The project Applicant is required to comply with all necessary legislation and policies applicable to development and management of the development. These include but are not limited to:

3.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA, ACT 107 OF 1998)

The National Environmental Management Act (**NEMA**, Act 107 of 1998, as amended), makes provision for the identification and assessment of **activities** that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the provincial Department of Environmental Affairs & Development Planning (DEA&DP)) based on the findings of an Environmental Impact Assessment (EIA).

NEMA embraces the notion of sustainable development as contained in the Constitution of South Africa (Act 106 of 1996) in that everyone has the right:

- to an environment that is not harmful to their health or wellbeing; and
- to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures.

NEMA aims to provide for cooperative environmental governance by establishing principles for decision-making on all matters relating to the environment and by means of Environmental Implementation Plans (EIP) and Environmental Management Plans/Programmes (EMPr), of which this EMPr is one.

Principles contained in Section 2 of the NEMA, amongst other things, prescribe that environmental management must:

- In order of priority aim to: avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
- Avoid degradation of the environment and avoid jeopardising ecosystem integrity;
- Pursue the best practicable environmental option by means of integrated environmental management;
- Protect the environment as the people's common heritage;
- Control and minimise environmental damage; and

- Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

It is incumbent upon the landowner, to ensure that the abovementioned principles, entrenched in this EMPr are upheld and complied with.

3.2 ENVIRONMENT CONSERVATION ACT, 1989 (ECA)

The EIA regulations contained in the Environmental Conservation Act (ECA) have been replaced by NEMA. However, property owners must comply with the draft regulations pertaining to noise as published in the province of Western Cape Provincial Extraordinary Gazette as provision made in section 25 of the ECA), as well as Section 24 of the ECA regarding waste management and Section 20 of the ECA dealing with waste management under Part IV, Control of Environmental Pollution.

3.3 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEM:BA) (ACT 10 OF 2004)

This Act controls the management and conservation of South African biodiversity within the framework of NEMA. Amongst others, it deals with the protection of species and ecosystems that warrant national protection, as well as the sustainable use of indigenous biological resources. Sections 52 & 53 of this Act specifically make provision for the protection of critically endangered, endangered, vulnerable and protected ecosystems that have undergone, or have a risk of undergoing, significant degradation of ecological structure, function or composition as a result of human intervention through threatening processes.

The National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No. 32689, 6 November 2009) was gazetted in 2014. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the National Spatial Biodiversity Assessment (NSBA) 2004 & 2011.

In addition to the management of ecosystems, this Act makes provision for the management and control of alien invasive vegetation. This includes the listing of invasive species that are a threat to natural ecosystems. These species must be strictly controlled and / or eradicated. The property has been significantly transformed due to grazing practises but does not contain many alien vegetation species. Only indigenous vegetation should be permitted for landscaping by the proposed HOA and future landowners.

According to the botanical/biodiversity specialist, the vegetation on site is more consistent with a thicket than with fynbos. Large sections of erf 326 was occupied by garden escapee plants and was no longer a natural thicket. The vegetation on erf 318 is undergoing unnatural disturbance, with severe erosion on the site. Erf 139 consists of natural thicket vegetation except for the portion within the development footprint which is highly degraded.

3.4 NATIONAL WASTE MANAGEMENT STRATEGY

The National Waste Management Strategy presents the South African government's strategy for integrated waste management for South Africa.

It deals among others with: Integrated Waste Management Planning, Waste Information Systems, Waste Minimisation, Recycling, Waste Collection and Transportation, Waste Treatment, Waste Disposal and Implementing Instruments.

It is advisable that an integrated waste management system be adopted, which includes waste minimisation, waste recycling and the proper storage and disposal of waste, which does not impact of the health of the environment and human health.

All waste must be collected and disposed of at a waste facility. No waste material may be left on site once construction/maintenance is completed.

3.5 NATIONAL WATER ACT (NWA, ACT 36 OF 1998)

The National Water Act (NWA) gives effect to the constitutional right of access to water. The Act's overall purpose is to ensure that South Africa's water resources are protected, used and managed in ways which take into account a number of factors, including inter-generational equity, equitable access, redressing the results of past racial and gender discrimination, promoting sustainable and beneficial use, facilitating social and economic development, and providing for water quality and environmental protection.

The NWA makes persons who own, control, occupy or use land responsible for taking measures to prevent pollution of water resources, and empowers Government authorities to take measures to enforce this obligation.

According to the Aquatic Specialist, neither a GA nor WULA is applicable to the proposed activity.

3.6 NATIONAL FOREST ACT (ACT 84 OF 1998)

The NFA provides for the **protection of forests**, as well as **specific tree species**, quoting directly from the Act: "no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated". The Department of Agriculture, Forestry & Fisheries (DAFF) is responsible for the implementation and enforcement of the NFA, which includes **prohibition of damage to indigenous trees in any natural forest without a licence** (Section 7 of the NFA), as well as the prohibition of the cutting, disturbing, damaging destroying or removing **protected trees** without a licence (Section 15 of the NFA).

Although none were noted by the Botanist during her site inspection, potential for finding small, protected trees in the undergrowth that may require clearing/removal to enable a working/construction area cannot be eliminated altogether given the thick undergrowth and steepness of the site.

Potentially the National Forestry Act for trimming/removal of protected tree species.

The purpose of the National Veld and Forest Fire Act is to **prevent and combat veld, forest and mountain fires** throughout the RSA and to provide institutions, methods and practices for achieving this purpose. Institutions include the formations of such bodies as **Fire Protection Associations** (FPA's) and **Working on Fire**. The Act provides the guidelines and constitution for the implementation of these institutions as well as their functions and requirements.

The proposed activity is located within the urban area and does not require any kind of firebreak.

3.7 NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

The purpose of the National Heritage Resources Act is to:

- Introduce an integrated and interactive system for the management of the national heritage resources;

- Promote good government at all levels,
- Empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations;
- To lay down general principles for governing heritage resources management throughout South Africa;
- To introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa;
- To establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources at national level;
- To set norms and maintain essential national standards for the management of heritage resources in South Africa and to protect heritage resources of national significance;
- To control the export of nationally significant heritage objects and the import into South Africa of cultural property illegally exported from foreign countries;
- To enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources;
- To provide for the protection and management of conservation-worthy places and areas by local authorities; and
- To provide for matters connected therewith.

The proposed stormwater infrastructure does not trigger any of the development activities listed in terms of Sections 34(1) and 38(1) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

3.8 OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993)

The Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work.

In terms of this Act, a Health and Safety Officer and Protocol must be implemented on any sites. The appointment of a Health and Safety Officer is the responsibility of the proponent and contractor and is included in this report to ensure due diligence on construction sites. It is the responsibility of the appointed to HSO to conduct any required audits and as such only the appointment of an HSO will be auditable in terms of this document.

4 ENVIRONMENTAL IMPACTS & MITIGATIONS

The following aquatic related specialist impact assessments / studies were undertaken for the proposal:

- Aquatic Compliance Statement (Dr James Dabrowski).
- Faunal Compliance Statement (Willem Mathee).
- Botanical Impact Assessment (Bianke Fouche).
- Terrestrial Biodiversity Compliance Assessment (Bianke Fouche).

The following environmental impacts of the proposed activity were identified and considered during the environmental process, based on which the associated mitigation measures were recommended for implementation (to reduce negative impacts & enhance positive ones):

Botanical Potential Impacts

- Construction phase impact 1 - A loss of the small stand of Erica glandulosa fourcadei due to the construction of the 2m high gabion wall north of the existing road between erven 326 and 318.
- A loss of SCC (Erica glandulosa fourcadei) due to ongoing site maintenance (or lack of maintenance) practices. A no-go option is not presented as it is assumed the construction phase has taken place for this impact.

4.1 MITIGATIONS

Table 2: List of Mitigation Measures & Associated Management Requirements

Mitigation	Condition of Approval	Included in EMPr	Construction Phase	Operational /Maintenance Phase	Decomissioning Phase
Mitigations / Recommendations					
A construction schedule must be developed and clearly defined to avoid multiple sites being exposed and unattended to at any moment in time. The completion date for each phase of the construction must be indicated and all clearing, excavation, and stabilisation operations must be completed before moving onto the next phase.		✓	✓		
Dry working conditions must be established in the channel. Stormwater originating from the outlet on Voëlklip street must be temporarily diverted around the construction site and safely discharged into the channel below.		✓	✓		
A temporary straw-bale check dam must be placed across the channel, immediately downstream of the construction area as a back-up to trap high levels of sediment in the event of a high rainfall event. The check dam and any accumulated sediment must be removed by hand as soon as construction is complete.		✓	✓		
No construction materials or topsoil must be stockpiled within the eroded channel. Stockpiles of construction materials must be placed outside of the channel (on as flat an area as possible) and protected (e.g. through use of sandbags and/or tarpaulins) to prevent materials being washed into the channel.		✓	✓		

Mitigation	Condition of Approval	Included in EMPr	Construction Phase	Operational /Maintenance Phase	Decomissioning Phase
Construction of a stilling basin at the outlet of the gabion channel should be considered so as further reduce stormwater energy and minimise erosion of the slope and watercourse downstream of the channel.		✓	✓		
Applicant must appoint an ECO to oversee construction.	✓	✓	✓	✓	
Conduct a search and rescue of the Erica glandulosa fourcadei population north of the existing road only where they will be impacted by the proposed development.		✓	✓		
A permit may need to be applied for from CapeNature in order to conduct the Erica search and rescue operation.		✓	✓		
Ensure that the plants are watered about an hour before rescuing them.		✓	✓		
Find an area outside of the project area of influence, in an open canopy area somewhere on the erven, and dig holes large enough to support the Ericas using an excavator. Soil dug out of these holes must be kept in a pile next to the holes. The soil piles must either be on driveways or elsewhere in an already disturbed area. The potential replanting spots on the site include around Erf 326 are illustrated in Figure below.  		✓	✓		
When rescuing the Ericas, it is imperative that the soil be removed with the roots. For this reason, an excavator must carefully dig up Ericas where they fall within the proposed gabion wall or pipeline footprint.		✓	✓		

Mitigation	Condition of Approval	Included in EMPr	Construction Phase	Operational /Maintenance Phase	Decomissioning Phase
The rescued Ericas in the excavator, with soil & roots relatively undisturbed, must then be transplanted into the hole/s dug for them. If there are any spaces left in the holes, spades can be used to fill the gaps with the soil.		✓	✓		
The rescued Ericas must be watered daily during the construction phase unless it is raining.		✓	✓		
Demarcate the transplanted Ericas, and any that have remained in their original place (i.e., the plants that will not be affected by the construction). These are no-go areas for the project.		✓	✓		
No cut vegetation slash may be dumped into any watercourses nearby. All waste material must be disposed of responsibly.		✓	✓		
Mixing of materials such as concrete may only occur within the permanent disturbance footprint of this project.		✓	✓		
Alien species must be kept under control, especially along the road verges.		✓	✓	✓	
No gardens may be planted in the areas where the Ericas are located.		✓	✓	✓	
Fertilisers and pesticides must be avoided on the road verge, and when used it must be done with caution and may not become routine practice.		✓	✓	✓	
Kikuyu grass (Cenchrus clandestinus) may not be planted following the construction of the stormwater infrastructure, rather buffalo grass (Stenotaphrum secundatum) or Eragrostis capensis could be considered.		✓	✓	✓	
Sections that are bare after construction, should be rehabilitated with indigenous thicket species, allowing the property to continue functioning as a potential habitat within an increasingly fragmented landscape.		✓	✓	✓	
An ECO must walk the site prior to vegetation removal / construction to ensure no animals are present in the area.		✓	✓		
In the very unlikely event, a nest of the Knysna Warbler is found within the development footprint, the nest should be fenced off (10m from the nest), an no disturbance to occur within the exclusion zone.		✓	✓	✓	
Construction material previously dumped on Erf 318 must be removed (infill of eroded stormwater channel as a result of building material).		✓	✓	✓	
Chemical toilets (1 toilet / 10 persons).		✓	✓		
Waste from chemical toilets must be disposed of regularly by a registered waste contractor.		✓	✓		
No mixing of cement / concrete on bare ground or within the watercourse.		✓	✓		
Instruct workers & contractors properly of the environment (environmental inductions).		✓	✓	✓	
All waste generated on-site must be adequately managed.		✓	✓		
Separation and recycling of different waste materials should be supported.		✓	✓		

Mitigation	Condition of Approval	Included in EMPr	Construction Phase	Operational /Maintenance Phase	Decomissioning Phase
All gabions must be inspected on a routine basis. Any faults must be immediately asap to prevent unwanted environmental damages.		✓		✓	
Scouring or undercutting caused by gabion weirs must be rehabilitated following the inputs of an aquatic ecologist.		✓		✓	
Following completion and during annual inspection to determine the need for maintenance, ensure that all disturbed areas are – (a) cleared of construction debris and other blockages; (b) re-vegetated with indigenous vegetation suitable to the area		✓		✓	
Gabions must be inspected regularly and after every large storm, to detect damages or abnormalities. Any vegetation growing out of the gabion boxes must be removed. Broken or damaged panels can be repaired on site. If several gabion baskets are broken advice should be sought from the Engineer and maintenance must be undertaken under supervision of an ECO.		✓		✓	
Gabion baskets must be inspected for differential settlement caused by major storm events.		✓		✓	
Best Practise					
Construction work must take place during normal work hours.		✓	✓	✓	
Traffic management must be in place during construction		✓	✓		

5 RESPONSIBILITIES

This section deals with the responsibilities of various parties during the Construction Phase of any development.

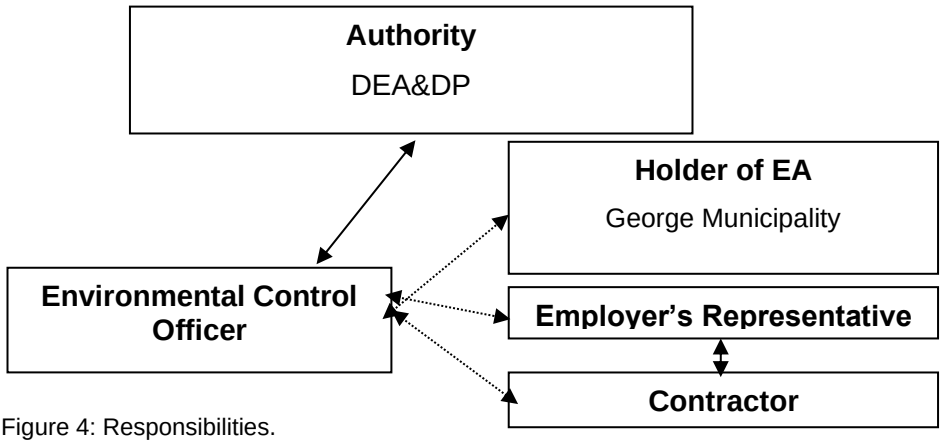


Figure 4: Responsibilities.

5.1 HOLDER OF THE EA

The holder of the EA / property owner is the overseeing entity responsible for ensuring that all activities undertaken on the property comply with the Environmental Authorisation (EA) and associated Environmental Management Programme (EMPr) (& any other approval / licence / permit), as well as the management and maintenance of the open space areas and river habitat.

The responsibilities of the holder of the EA / property owner include, but are not limited to the following:

- Ensure that **all tender documentation** include reference to, and the need for compliance with, the EA and EMPr as well as any other legally binding documentation, which include and are not limited to Approval/s.
- Be conversant with, and ensure that all Contractors, Sub-contractors, Engineers (and future senior site managers / personnel) are made aware of, and understand the conditions and recommendations, contained in the abovementioned documentation;
- Ensure that all Contractors, Sub-contractors and Engineers (during construction activities) are made aware of their 'Duty of Care to the Environment' and that any damage or degradation of the natural environmental within the bounds of the property will be not be tolerated and must be dealt with / remedied at the cost of the perpetrator;
- Take remedial and/or disciplinary action in circumstances where persons are found to be in contravention of the abovementioned legally binding documentation.

5.2 ENGINEERS AND CONTRACTORS

The Engineers and Contractors are often the parties responsible for physically carrying out the activities for which majority of the recommendations in this EMPr are intended. Service providers and Contractors include: services, building contractors, 'handy-men' and engineers overseeing the installation and maintenance of services etc. The responsibilities indicated here are also relevant to Sub-Contractors.

The responsibilities of these parties include but are not limited to the following:

- Be conversant and compliant with the EA, the EMPr, and any relevant License, Permit or any legally binding documentation relevant to their operations;
- Have a responsibility to adhering to any conditions and recommendations laid out in above mentioned documentation;
- Prevent actions that may cause harm to the environment;
- Be responsible for any remedial activities in response to an environmental incident within their scope of influence;
- Liaise with the holder of the EA in complying with the EMPr, and in the event that any industry regulated standards are in contradiction with the EMPr or any other authorisations.
- Review and amend to any construction activities to align with the EMPr and Best Practice Principles;
- Ensure compliance of all site personnel and / or visitors to the EMPr and any other authorisations.

5.3 ECOLOGICAL CONTROL OFFICER (ECO)

It is recommended that a suitably qualified Environmental Control Officer (ECO) be appointed to oversee all activities for the duration of the construction phase (i.e. construction activities, rehabilitation) as well as any maintenance work that must be undertaken that will involve

earthworks or machine works. The ECO must have at least 3 years' experience and proven competency as an ECO.

The responsibilities of the ECO include but are not limited to the following:

- Provide environmental induction training to Contractors on site prior to construction activities commencing
- Provide maintenance, update and review of the EMPr if necessary;
- Liaison between the Project Holder of the EA, Contractors, Authorities and other lead stakeholders on all environmental concerns, including the implementation of the EMPr;
- Compilation of Environmental Control Reports (ECR) to ensure compliance with the EA, EMPr and duty of care requirements, where necessary;
- Compilation of the Environmental Audit Report or Environmental Completion Statement, after completion of construction (or as otherwise defined in the Environmental Authorisation), where necessary;
- Ensuring / guiding and monitoring compliance with the EA and EMPr and any legally binding documentation;
- Facilitating consultation with relevant environmental authorities (e.g. DEA&DP, DFFE, CapeNature or Municipality);
- Facilitating the application for any required amendment of the EA/EMPr;
- Provide guidance and interpretation of the EA and EMPr where necessary;
- Issuing site instructions to the contractor for corrective actions required;
- The ECO is required to conduct regular site visits for the duration of the construction period, in order to ensure the Contractor receives the necessary induction and that all procedures are in place. Additional visits may be undertaken in the event of any unforeseen environmental accidents;
- The duration and frequency of these visits may be increased or decreased at the discretion of the ECO;
- Attendance of site meetings if required;
- Maintain a record of environmental incidents (e.g. spills, impacts, legal transgressions etc.) as well as corrective and preventative measures taken. This information must also be included in the ECR;
- Maintain a public complaints register in which all complaints and action taken must be recorded. This information must also be included in the ECR.

5.4 ECO SITE VISIT FREQUENCY

The following site frequency for ECO site visits has been determined:

- Daily during site clearance and demarcation.
- Every week during the installation of subsoil drains and construction of gabion baskets.
- Maintenance activities must be monitored on an ad hoc basis depending on the type of maintenance.

Ad hoc site visits may be undertaken in the event of any incidents or specific requests from the project holder of the EA or project team.

5.5 ENVIRONMENTAL INDUCTION & TRAINING

The holder of the EA in consultation with the Contractor shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers receive an induction presentation on the importance and implications of the EA and EMPr. The presentation shall be conducted, as far as is possible, in the employees' language of choice. The Contractor must provide a translator from their staff for the purpose of translating, if this is deemed necessary.

As a minimum, training must include:

- Explanation of the importance of complying with the EA and EMPr and the employees accountability;
- Discussion of the potential environmental impacts of construction activities;
- The benefits of improved personal performance;
- Employees' roles and responsibilities, including emergency preparedness ;
- Explanation of the mitigation measures that must be implemented when carrying out their activities;
- Explanation of the specifics of this EMPr and its specification (no-go areas, etc.);
- Explanation of the management structure of individuals responsible for matters pertaining to the EMPr.

Where staff turnover is high and with additional appointment of sub-contractors, it may be necessary to undertake additional induction training sessions. The Contractor must keep records of all environmental training sessions, including names, dates and the information presented.

6 PRE-CONSTRUCTION DESIGN CONSIDERATIONS

It is recommended that sustainable design considerations are implemented during the planning phase to ensure that the impacts associated with the development are avoided, minimised or managed before construction commences.

6.1 STORMWATER MANAGEMENT PREPARATION

Management Statement	Impacts & Risks Avoided
To prepare the site to minimise the negative impacts of stormwater	Damage to the environment caused by stormwater runoff

Management Actions

a. A construction schedule must be developed and clearly defined to avoid multiple sites being exposed and unattended to at any moment in time. The completion date for each phase of the construction must be indicated and all clearing, excavation, and stabilisation operations must be completed before moving onto the next phase.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance

Site Plans	Once off	Contractor / Engineer	Prior to construction	Audit	Once off

7 CONSTRUCTION CONSIDERATIONS

These Construction Phase requirements are aimed at using Best Practise Principles and / or specialist recommendations to manage the impacts on the environment during the construction of the development.

7.1 STORMWATER MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To minimise the generation of contaminated stormwater.	Minimise sedimentation, erosion and / or undercutting

Management Actions

a. Dry working conditions must be established in the channel. Stormwater originating from the outlet on Voëlklip street must be temporarily diverted around the construction site and safely discharged into the channel below.

b. A temporary straw-bale check dam must be placed across the channel, immediately downstream of the construction area as a back-up to trap high levels of sediment in the event of a high rainfall event. The check dam and any accumulated sediment must be removed by hand as soon as construction is complete.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method Statement	Once off	Contractor	Pre implementation	Audit	Once off

Any areas that are identified by the ECO as being prone to erosion must be suitably protected. During construction, the contractor shall protect all areas susceptible to erosion by installing temporary works (e.g., sandbags) and by taking any other measures necessary to prevent stormwater from concentrating in streams and scouring slopes, banks, etc.

In areas where construction activities have been completed and where no further disturbance would take place, rehabilitation and re-vegetation should commence as soon as possible. A suitable rehabilitation method statement must be submitted to the ECO for approval.

7.2 DUST CONTROL

Management Statement/Outcome	Impacts & Risks Avoided
To ensure there is no health risk or loss of amenity due to emission of dust to the environment.	Ensure land coverage with biomass chips / vegetation / damping to minimise dust

Management Actions

a. Implement a dust prevention strategy, developed at the project planning stage

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method Statement	Once off	Developer / contractor	Pre implementation	Audit	Once off

The strategy should include the following amongst others:

- Speed control to minimise dust on site.
- Exposed stockpile materials must be adequately **protected** against wind (covered) and should be sited taking into consideration the prevailing wind conditions.
- Trucks bringing in materials must be covered to prevent dust and small particles escaping and potentially causing damage to people and property.

7.3 NOISE

Management Statement/Outcome	Impacts & Risks Avoided
To ensure nuisance from noise and vibration does not occur.	Nuisance impacts to neighbours and visitors.

Management Actions

a. Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance

As required	Initially when vehicle or machinery is introduced to the site and thereafter monthly. As required if complaints registered.	Contractor	During construction and operation	Audit	As required
b. Enclose noisy equipment such as generators and pumps.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
As required	Initially when vehicle or machinery is introduced to the site and thereafter monthly. As required if complaints registered.	Contractor	During construction	Audit	As required
c. Provide noise attenuation screens, where appropriate.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
As required	Initially when vehicle or machinery is introduced to the site and thereafter monthly. As required if complaints registered.	Contractor	During construction	Audit	As required
d. Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 1 pm Saturday, except where, for practical reasons, the activity is unavoidable.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance

As required	As required if complaints registered.	Contractor	During construction	Audit	As required

7.4 TRAFFIC CONTROL

Management Statement/Outcome	Impacts & Risks Avoided
To manage and minimise the nuisance effect created by construction traffic.	Nuisance Impacts & Risks

Management Actions

a. Implement a traffic management strategy during construction.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method Statement	Daily	Contractor	During construction	Audit	As required

- Construction related activities should be timed where possible to avoid peak periods.
- No construction workers, apart from security personnel, should be allowed to stay on site overnight.
- Contractors appointed by the developer must ensure that workers are transported to and from the site daily.
- Construction related activities should comply with all relevant building regulations. In this regard activities on site should be restricted to between 07h00 and 18h00 during weekdays and 08h00 and 13h00 on Saturdays. No work should be permitted after 13h00 on Saturdays and on Sundays.
- Temporary access to be rehabilitated once construction is complete.

7.5 WASTE MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To minimise the waste load discharged to the environment.	Improve waste disposal methods during construction. Reduce waste volumes to landfill sites

Management Actions

a. Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing	Time period	Mechanism for monitoring Compliance	Programme for reporting

		management action			on Compliance
Record of volumes of material removed	As required	Contractor	As required	Audit	Records
b. Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Photographic	Weekly	Contractor	As required	Audit	Records
c. Provide bins for construction workers and staff at locations where they consume food.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Photographic	Weekly	Contractor	As required	Audit	Records
d. Conduct ongoing awareness with staff of the need to avoid littering.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Induction	Once off	Contractor	As required	Audit	Attendance register

7.6 STOCKPILE MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To manage soil stockpiles so that dust and sediment in run-off are minimised.	Pollution due to dust and sediment run off
Management Actions	

a. Minimise the number of stockpiles, and the area and the time stockpiles are exposed. b. No construction materials or topsoil must be stockpiled within the eroded channel. Stockpiles of construction materials must be placed outside of the channel (on as flat an area as possible) and protected (e.g. through use of sandbags and/or tarpaulins) to prevent materials being washed into the channel.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Photographic	As required	Contractor	As required	Audit	Records
c. Keep topsoil and underburden stockpiles separate.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual inspection of stockpiles	Daily when stripping topsoil	Contractor	Continuously during construction	Audit	Records
d. Ensure that stockpiles and batters are designed with slopes no greater than 2:1 (horizontal/vertical).					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual inspection of stockpiles	As required	Contractor	Continuously during construction	Audit	Monthly
e. Stabilise stockpiles and batters that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual inspection of stockpiles	As required	Contractor	Continuously during construction	Audit	Monthly

f. Establish sediment controls around unstabilised stockpiles and batters.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual inspection of stockpiles	As required	Contractor	Continuously during construction	Audit	Monthly
g. Suppress dust on stockpiles and batters, as circumstances demand.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual inspection of stockpiles	As required	Contractor	Continuously during construction	Audit	Monthly

7.7 STORING FUELS & CHEMICALS

Management Statement/Outcome	Impacts & Risks Avoided
To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage.	Avoid hydrocarbon pollution to soil and watercourses / coastal environments

Management Actions					
a. Minimise fuels and chemicals stored onsite.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records

b. Install bunds and take other precautions to reduce the risk of spills.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records

c. Implement a contingency plan to handle spills, so that environmental damage is avoided.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records

7.8 MINIMISING EROSION

Management Statement/Outcome	Impacts & Risks Avoided
To minimise the quantity of soil lost during construction due to land-clearing.	• Avoid overland flow by capture and store water from roof • Avoid siltation by installing silt traps

Management Actions

a. Schedule measures to avoid and reduce erosion by phasing the work program to minimise land disturbance in the planning and design stage.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records

b. Keep the areas of land cleared to a minimum, and the period areas remain cleared to a minimum					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records
c. Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records
d. Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	As required	Audit	Method statement records
e. Keep vehicles to well-defined haul roads.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Site plan	As required	Contractor	As required	Audit	Final site plan

f. Rehabilitate cleared areas promptly.					
Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual / photographic	As required	Contractor	Continuously during construction	Audit	Final Rehabilitation statement

7.9 BOTANICAL & BIODIVERSITY MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To ensure that degradation to existing botanical/aquatic components are minimised and that any rehabilitation is undertaken with conservation orientated approach.	To minimise the disturbance to existing flora To minimise the introduction and/or spread of weed species

Management Actions

a. Conduct a search and rescue of the Erica glandulosa fourcadei population north of the existing road only where they will be impacted by the proposed development.
   - A permit may need to be applied for from CapeNature in order to conduct the Erica search and rescue operation.
   - Ensure that the plants are watered about an hour before rescuing them.
   - Find an area outside of the project area of influence, in an open canopy area somewhere on the erven, and dig holes large enough to support the Ericas using an excavator. Soil dug out of these holes must be kept in a pile next to the holes. The soil piles must either be on driveways or elsewhere in an already disturbed area.
   - When rescuing the Ericas, it is imperative that the soil be removed with the roots. For this reason, an excavator must carefully dig up Ericas where they fall within the proposed gabion wall or pipeline footprint.
   - The rescued Ericas in the excavator, with soil & roots relatively undisturbed, must then be transplanted into the hole/s dug for them. If there are any spaces left in the holes, spades can be used to fill the gaps with the soil.
   - The rescued Ericas must be watered daily during the construction phase unless it is raining.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	As required	Contractor	Continuously	Audit	Visual / photographic

b. Demarcate the transplanted Ericas, and any that have remained in their original place (i.e., the plants that will not be affected by the construction). These are no-go areas for the project.
c. No cut vegetation slash may be dumped into any watercourses nearby. All waste material must be disposed of responsibly.
d. Mixing of materials such as concrete may only occur within the permanent disturbance footprint of this project.
e. Alien species must be kept under control, especially along the road verges.
f. No gardens may be planted in the areas where the Ericas are located.
g. Fertilisers and pesticides must be avoided on the road verge, and when used it must be done with caution and may not become routine practice.
h. Kikuyu grass (Cenchrus clandestinus) may not be planted following the construction of the stormwater infrastructure, rather buffalo grass (Stenotaphrum secundatum) or Eragrostis capensis could be considered.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual / photographic	As required	Contractor	Continuously	Audit	Visual / photographic

7.10 FAUNA MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To ensure that impacts to native faunal species is minimised and / or avoided.	To minimise the impact to fauna

Management Actions

a. Prevent unnecessary mortalities of indigenous fauna

b. Sections that are bare after construction, should be rehabilitated with indigenous thicket species, allowing the property to continue functioning as a potential habitat within an increasingly fragmented landscape.

c. An ECO must walk the site prior to vegetation removal / construction to ensure no animals are present in the area.

d. In the very unlikely event, a nest of the Knysna Warbler is found within the development footprint, the nest should be fenced off (10m from the nest), an no disturbance to occur within the exclusion zone.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance

Ad hoc	As required	Contractor	Continuously	Audit	Visual / photographic

7.11 SOCIAL REQUIREMENTS

Management Statement/Outcome	Impacts & Risks Avoided
To ensure equitable, fair and safe social interaction on construction sites	Loss of employment opportunities to the region

Management Actions

a. It is strongly recommended that the Contractor make use of local labour as far as possible for the construction phase of the project.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Employment records	Ad hoc	Contractor	Ad hoc	Audit	Once off

b. Theft and other crime associated with construction sites is not only a concern for surrounding residents, but also the Developer and the Contractor.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Site records	Ad hoc	Contractor	Ad hoc	Audit	Once off

Targets

- The contractor should endeavour to source local suppliers.
- The contractor must ensure that suitable procurement policies are in place that supports local economic growth.
- Locally manufactured products must be used as far as possible.

Site Security

Theft and other crime associated with construction sites is not only a concern for surrounding residents, but also the developer and the contractor.

Considering this, contractors need to be proactive in order to curtail theft and crime on and resulting from the construction site. It is recommended that the contractor develop a jobsite security plan prior to commencement of construction. This jobsite security plan should take into account protection of the construction site from both internal and external crime elements as well as the protection of surrounding

communities from internal crime elements. All incidents of theft or other crime should be reported to the South African Police Service, no matter how seemingly insignificant.

7.12 METHOD STATEMENTS

Management Statement/Outcome	Impacts & Risks Avoided
To ensure efficient communication mechanisms in the implementation of environmental performance requirements	Prevention of potential impacts are avoided during construction by means of correct communication

Management Actions

a. Method statements are written submissions by the Contractor to the ECO in response to the requirements of this EMPr or to a request by the ECO. The Contractor shall be required to prepare method statements for several specific construction activities and/or environmental management aspects.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Method statement	Ad hoc	Contractor	As required	Audit	Once off

Based on the specifications in this EMPr, the following method statements are required as a minimum (more method statements may be requested as required at any time under the direction of the ECO):

- Demarcation of No-Go areas
- Site clearing
- Hazardous substances and their storage.
- Materials requirements & Sourcing.
- Solid waste control system.
- Fire control and emergency procedures
- Petroleum, chemical, harmful and hazardous materials storage, if any.
- Stormwater Management and Water Quality Control.
- Erosion Control.

8 OPERATIONAL/MAINTENANCE PHASE ENVIRONMENTAL MANAGEMENT REQUIREMENTS

The Operational/Maintenance Phase of this EMPr refers to the day to day management activities that are required to ensure sustainability and the achievement of the principles and objectives of the development. The requirements are applicable to the proponent, any HOA that is put in place, all employees and all visitors to the property.

8.1 STORMWATER MANAGEMENT

Management Statement/Outcome	Impacts & Risks Avoided
To ensure management of stormwater during operation phase	• To prevent erosion due to stormwater impact

Management Actions

a. No stormwater runoff should be allowed to concentrate onto open spaces and roadways.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Ensure soft landscaping	Ongoing	Developer / HOA	As required	Audit	Audit

- Concentration of stormwater runoff will be minimised through the application of landscaping techniques, i.e. by creating grass lined swales, undulations and depressions, vegetation.

8.2 BOTANICAL / LANDSCAPING / REHABILITATION

Management Statement/Outcome	Impacts & Risks Avoided
To ensure that indigenous vegetation is encouraged within urban areas.	• Ongoing spread of alien invasive species. • Ensure protected species are taken into consideration.

Management Actions

a. No gardens may be planted in the areas where the Ericas are located.

b. Fertilisers and pesticides must be avoided on the road verge, and when used it must be done with caution and may not become routine practice.

c. Kikuyu grass (Cenchrus clandestinus) may not be planted following the construction of the stormwater infrastructure, rather buffalo grass (Stenotaphrum secundatum) or Eragrostis capensis could be considered.

Method of monitoring implementation	Frequency of Monitoring	Responsible Party for implementing management action	Time period	Mechanism for monitoring Compliance	Programme for reporting on Compliance
Visual / photographic	Ongoing	Owner	As required	Audit	Audit

d. Retain and manage protected and indigenous vegetation.

- Rehabilitate with appropriate indigenous vegetation to promote soft landscaping.
- Replace vegetation if it dies off.

9 MONITORING

9.1 MONITORING

Monitoring is an important tool in determining the effectiveness of management actions by measuring changes in the environment. These could be in the form of fixed-point photography where an area is photographed on a regular / seasonal basis to ascertain changes, monitoring of a particular aspect such as landscape integrity parameters, recordings of animal movement from fixed point etc. The most important aspect of any monitoring programme is **consistency and continuity**. This will ensure a level of scientific accuracy to determine baselines / thresholds and measure changes / deviations, which then drive management reactions.

Any required monitoring reports must be made available to the competent authority as required.

The type and frequency of monitoring must include:

- During construction photographs must be taken from pre identified fixed points and a comprehensive record maintained by the ECO;
- Incident Reports;
- Site meeting minutes.

9.2 MONITORING TIMEFRAMES SUMMARY

Table 3: Monitoring Timeframe Summary

MONITORING TIMEFRAMES		
Type	Frequency	Criteria
ECO visits	As per section 5.4	Site photographs / site diary
Record keeping	Monthly	Site photographs, method statements, site meeting minutes (if applicable)
	3 month post construction	Completion Statement
Auditing	One year post construction	Compliance with the EA, EMPr, municipal permits. Note that GA compliance is the responsibility of the BGCMA.

9.3 ENVIRONMENTAL AUDITS

A final construction phase Completion Statement must be submitted within 3 months of completion of construction / site handover.

This Completion Statement must include the monitoring results as above, where applicable to construction.

An independent Environmental Audit must be undertaken one (1) year post construction.

9.4 AUDIT REPORTS FREQUENCIES AND FORMAT

The table below provides a summary of the timeframes for the various Audit Reports specified in the EA.

Table 4: Audit Reports Timeframe Summary

ENVIRONMENTAL AUDIT TIMEFRAMES		
Type	Frequency	Criteria
Construction Audit	One year post construction	Audit on operational aspects of the EA and EMPr
Future audits	Competent Authority to confirm	Compliance with the Environmental Regulations for Audits

In terms of the 2014 EIA Regulations, Audit Reports must be submitted to the registered Interested & Affected Parties within 7 days of submission to the competent authority.

In order to comply with the 2014 EIA Regulations, any audits must be undertaken using the following format:

Table 5: Environmental Audit Requirements

Appendix 7 of Regulation 326 of the 2014 EIA Regulations, as amended contains the required contents of an Environmental Audit Report. The checklist below serves as a summary of how these objectives & requirements were incorporated into this Audit Report.	
Objective	**Description**
The objective of the environmental audit report is to -	
(a) Report on – (i) the level of compliance with the conditions of the environmental authorisation and the EMPr, and where applicable, the closure plan; and (ii) the extent to which the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan achieve the objectives and outcomes of the EMPr, and closure plan.	
(b) Identify and assess any new impacts and risks as a result of undertaking the activity.	
(c) Evaluate the effectiveness of the EMPr, and where applicable, the closure plan.	
(d) Identify shortcomings in the EMPr, and where applicable, the closure plan.	
(e) Identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan.	
Requirement	**Description**
(1) An Environmental audit report prepared in terms of these Regulations must contain -	
(a) Details of – (i) The independent person who prepared the environmental audit report; and (ii) The expertise of independent person that compiled the environmental audit report.	
(b) A declaration that the independent auditor is independent in a form as may be specified by the competent authority.	
(c) An indication of the scope of, and the purpose for which, the environmental audit report was prepared.	
(d) A description of the methodology adopted in preparing the environmental audit report.	
(e) An indication of the ability of the EMPr, and where applicable the closure plan to – (i) Sufficiently provide for the avoidance, management and mitigation of	

Appendix 7 of Regulation 326 of the 2014 EIA Regulations, as amended contains the required contents of an Environmental Audit Report. The checklist below serves as a summary of how these objectives & requirements were incorporated into this Audit Report.	
Objective	**Description**
environmental impacts associated with the undertaking of the activity on an on-going basis; (ii) Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and (iii) Ensure compliance with the provisions of environmental authorisation, EMPr, and where applicable, the closure plan.	
(f) A description of any assumptions made, and any uncertainties or gaps in knowledge.	
(g) A description of an consultation process that was undertaken during the course of carrying out the environmental audit report.	
(h) A summary and copies of any comments that were received during any consultation process.	
(i) Any other information requested by the competent authority.	

Any other requirements of the EA or any other authorisations must be incorporated into an Audit where necessary.

10 DECOMMISSIONING PHASE ENVIRONMENTAL MANAGEMENT REQUIREMENTS

Not Applicable.

11 NON-COMPLIANCE

Any person is liable on conviction of an offence in terms of regulation 49(a) of the National Environmental Laws Second Amendment Act (Act 30 of 2013) to imprisonment for a period not exceeding ten (10) years or to a fine not exceeding R10 million or an amount prescribed in terms of the Adjustment of Fines Act, 1991 (Act No. 101 of 1991).

It is the responsibility of the ECO to report matters of non-compliance to the Employer's Representative or the Holder of the EA if no representative is in place. It is the responsibility of the Holder of the EA, and not the ECO, to report such matters of non-compliance to the competent Authority.

11.1 PROCEDURES

The Holder of the EA shall comply with the environmental specifications and requirements of this EMPr, any Approval / License issued and Section 28 of NEMA, on an on-going basis and any failure on his part to do so will entitle the authorities to **impose a penalty**[1].

In the event of non-compliance the following recommended process shall be followed:

- The competent authority shall issue a **Notice of Non-compliance** to the Holder of the EA, stating the nature and magnitude of the contravention.
- The Holder of the EA shall **act to correct the transgression** within the period specified in by the authority.
- The Holder of the EA shall provide the competent authority with a **written statement** describing the actions to be taken to discontinue the non-conformance, the actions taken to mitigate its effects and the expected results of the actions.
- In the case of the Holder of the EA failing to remedy the situation within the predetermined time frame, the competent authority may recommend halting the activity.
- In the case of non-compliance giving rise to physical environmental damage or destruction, the competent authority shall be entitled to undertake or to cause to be undertaken such **remedial works** as may be required to make good such damage at the cost of the Project applicant.
- In the event of a dispute, difference of opinion, etc. between any parties in regard to or arising out of interpretation of the conditions of the EMPr, disagreement regarding the implementation or method of implementation of conditions of the EMPr, etc. any party shall be entitled to require that the issue be referred to **specialists and / or the competent authority** for determination.
- The competent authority shall at all times have the right to **stop work** and/or certain activities on site in the case of non-compliance or failure to implement remediation measures.

[1] A penalty may not necessarily be a monetary fine but could also be a stoppage in work time, additional mechanisms to prevent pollution or degradation at the cost of the proponent or even a directive to cease activities from the competent authority.

12 REFERENCES

Aquanotion, 2008. www.twoflush.com/conservbody.htm. Aquanotion Ltd, Alberta, Canada.

Cape EAPrac, 2022. *Basic Assessment Report for Herolds Bay Stormwater Infrastructure.* Cape Environmental Assessment Practitioners, George, South Africa.

Eartheasy, 2008. www.eartheasy.com - Solutions for Sustainable Living.

eHow Home, 2011. www.eHow.com - *How to Safely Dispose of Energy Efficient Light Bulbs*.

Lochner, P. 2005. *Guideline for Environmental Management Plans.* CSIR Report No ENV-S-C 2005-053H, Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

Locality of Erven 139, 318 and 326

Legend

Map Center: Lon: 22°23'53.1"E
Lat: 34°3'5.3"S

Scale: 1:7,970

Date created: 2023/09/11

Western Cape Government
FOR YOU

Locality of Erven 139, 318 and 326

Legend

Erf

km
0 0 0 0 0 0.1 0.1

Map Center: Lon: 22°24'E
Lat: 34°3'3.2"S

Scale: 1:1,601

Date created: 2023/11/09

Western Cape Government
FOR YOU

RENO MATTESS TO BE INSTALLED FROM BACK OF KERB TO TIE IN WITH TOP OF RETAINING WALL, SHAPED TO GUIDE OVERLAND FLOWS INTO CHANNEL

STEPPED GABION BASKETS WITH 1m TAPER

INSET: HEADWALL DETAIL
1:200

SUBSOIL TO COLLECT RUNOFF FROM ERF 125

SUBSOIL TO COLLECT RUNOFF FROM ERF 327

SUBSOIL TO TIE IN TO FIELD INLET

CONSTRUCT GABION WALL TO EXTENT AS INDICATED, 2m HIGH

CONSTRUCT NEW DOUBLE KERB INLET WITH COMBINED FIELD INLET AND FORMALISED LOW POINT BEHIND THE KERB

CONSTRUCT NEW HEADWALL TO TIE IN TO GABION BASKETS

UPGRADE CROSSING PIPE AND DISCHARGE LINE TO 750mmø

STEPPED GABION CHANNEL

EXISTING SEWER PIPES

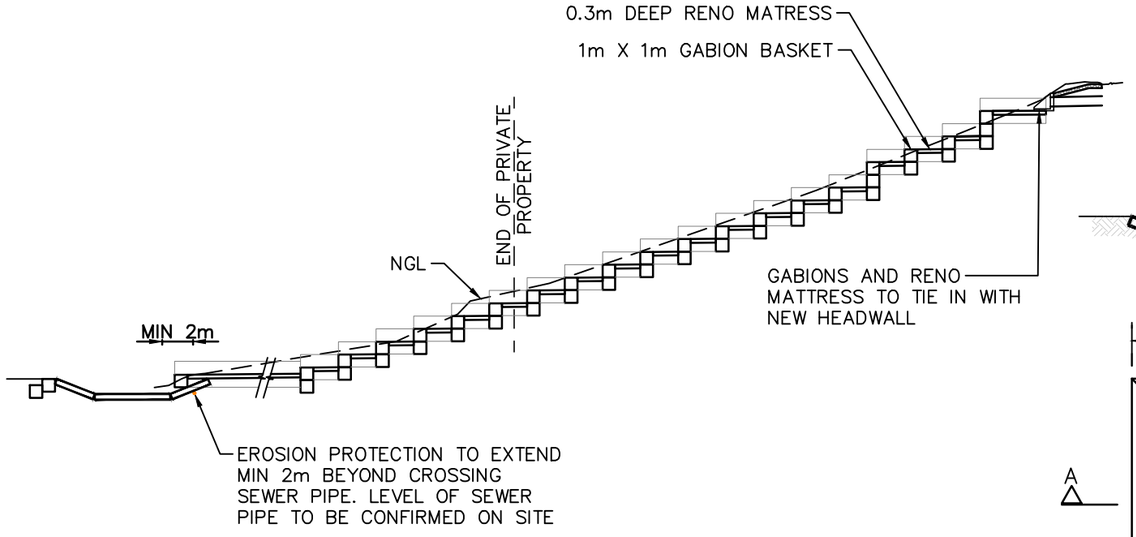
INSET: OUTLET DETAIL
1:200

125 126 327 326 328 325 329 324 343 323 330 342 341 320 319 318 317 340 316

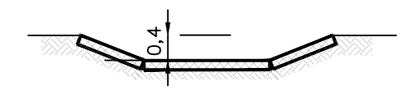
GEORGE THE CITY FOR ALL REASONS

INFRASTRUCTURE ENGINEERS

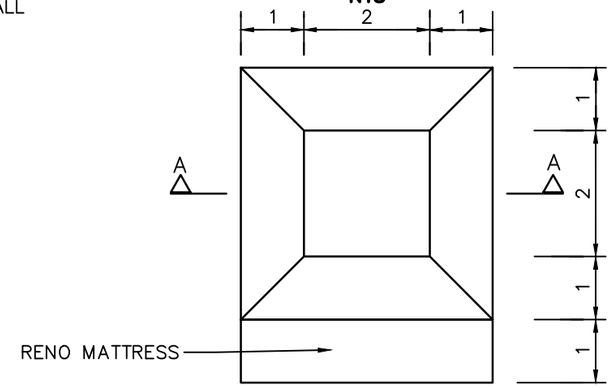
FIG: 5.1 EROSION PROTECTION LAYOUT AREA 11 1:500



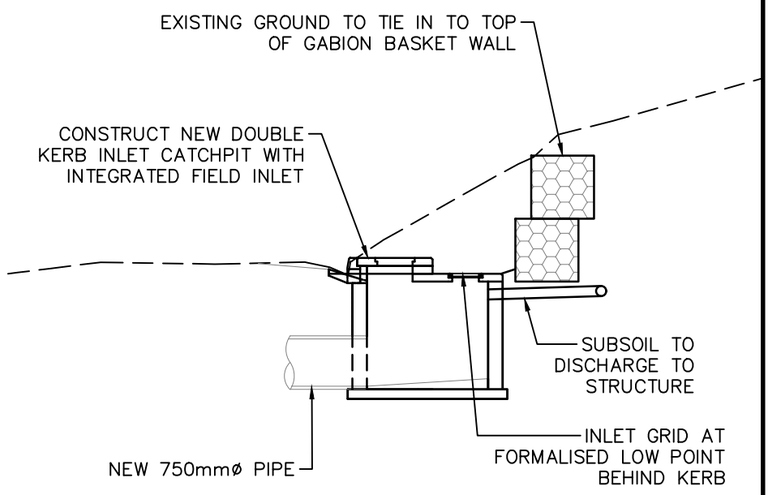
GABION STEPS PROFILE
NTS



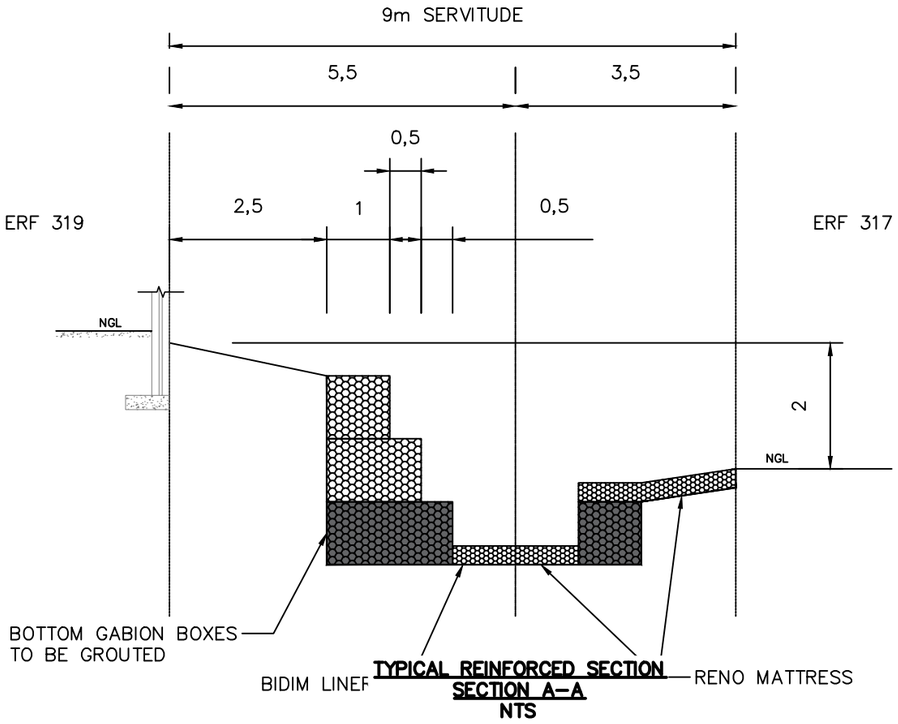
SECTION A–A
NTS



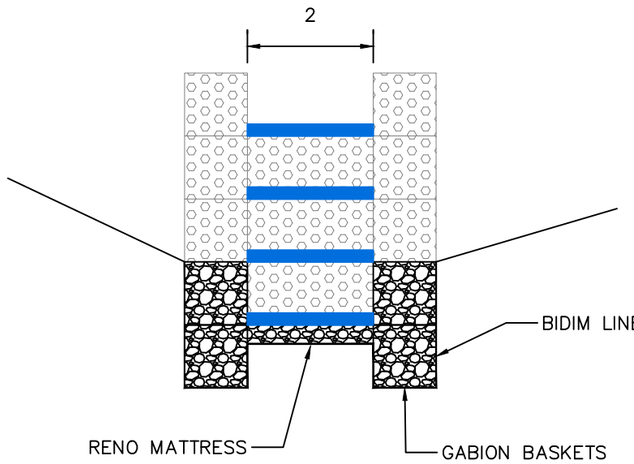
STILLING BASIN
NTS



NEW CATCHPIT/FIELD INLET DETAIL
NTS

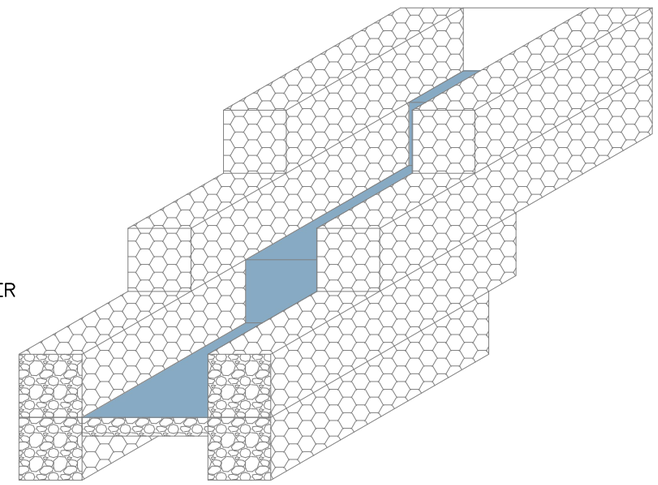


TYPICAL REINFORCED SECTION
SECTION A–A
NTS



TYPICAL UNREINFORCED SECTION
SECTION B–B
NTS

NOTE:
1. BIDIM LINER BELOW ALL GABION BASKETS AND RENO MATTRESSES
2. BASE GABIONS TO BE ANCHORED TO BEDROCK



RENDER: UNREINFORCED GABION CHANNEL

GEORGE THE CITY FOR ALL REASONS

INFRASTRUCTURE ENGINEERS

FIG: 5.2 EROSION PROTECTION DETAILS
AREA 11
NOT TO SCALE

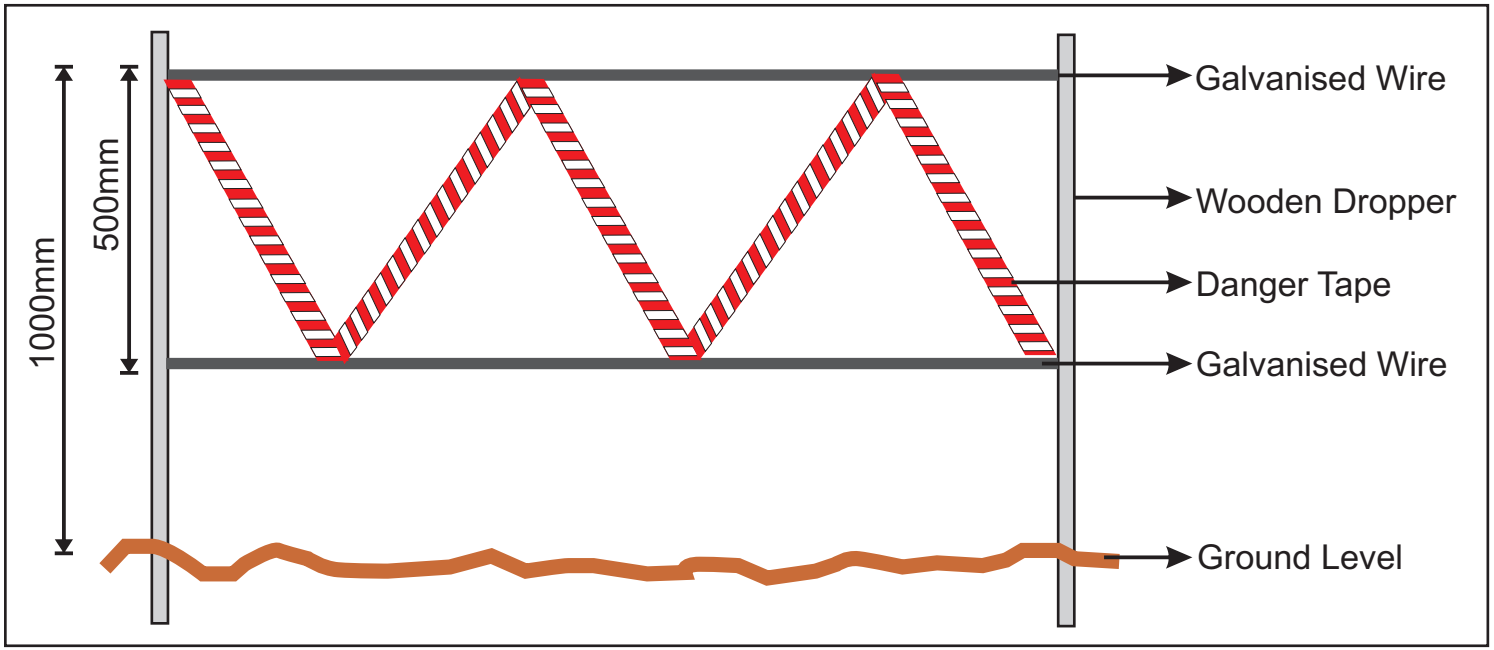


Plate A: Showing a cross section of a typical method of demarcation of no-go areas.

Where demarcation is required on a down slope, it can be more cost effective to include the required silt protection mechanisms on the same support structure as the demarcation. This is detailed in **Plate B** below and must be read in conjunction with the details on erosion control included in the previous diagram.

GENERAL CONSIDERATIONS FOR DEMARCATION OF NO GO AREAS

- The demarcation must include all areas that are going to be disturbed in the total construction (including all service lines)
- The no -go areas may not be accessed by any person (including lunch, tea breaks etc.). Without the explicit written permission from te ECO.
- Maximum fines will be issued for any non compliance with regards to the no go policy.

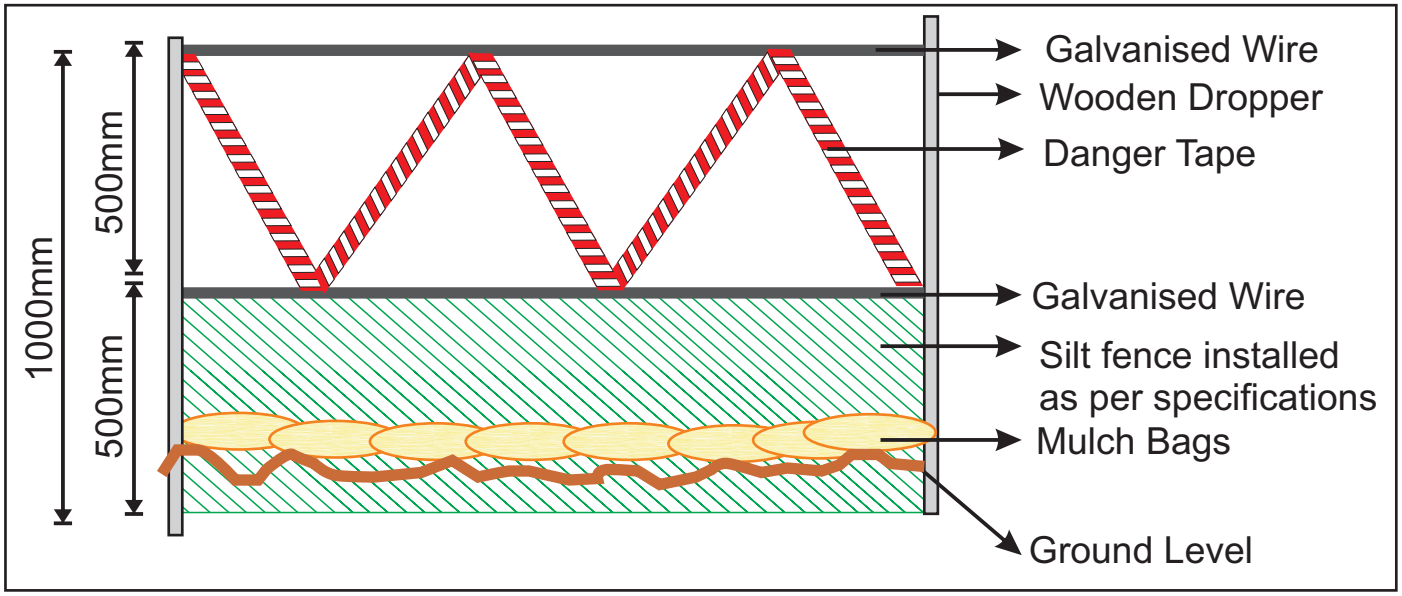
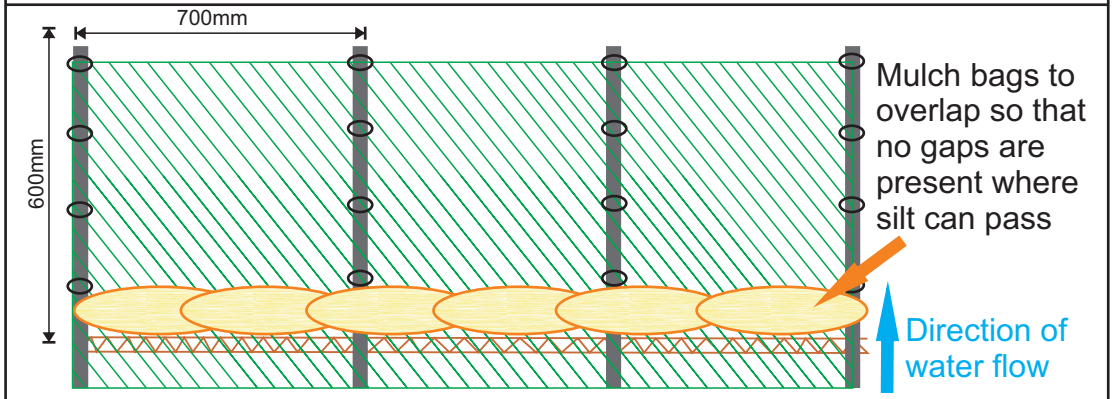


Figure 1: Demarcation of No - Go Areas During Construction

Cape Environmental Assessment Practitioners (Pty) Ltd

Frontal View



The purpose of a silt fence is to create a temporary barrier to maintain sediment on a construction site in order to prevent soil erosion and pollution through sediment and nutrient loading. Silt fences are designed to detain sediment from the disturbed construction area and also prevent sheet erosion by decreasing the velocity of the run off.

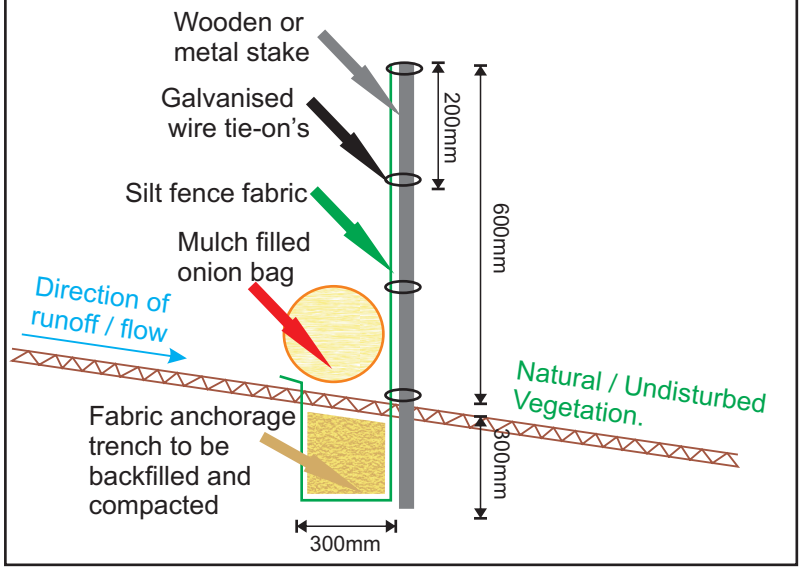
Technical Specifications

- Silt fence fabric to consist out of 50% shade cloth or a geotextile such as biddim (if biddum is used, it is not necessary to place mulch bags).
- Wooden droppers are suitable for the stakes. If the construction program takes place over an extended time frame it may be necessary to use treated droppers or metal stakes.
- The support stakes should not be placed further than 700mm apart on the down slope side of the fabric.
- The fabric should be secured to the stakes using galvanised wire ties not further than 200mm apart.
- The fabric anchorage trench should be at least 300mm deep.

Planning, Placing and Maintenance

- The silt fence is to be installed on all disturbed slopes where sheet erosion may take place.
- This type of silt fence is not suitable for areas where water is concentrated. i.e. gulleys and storm-water outlets.
- The silt fences should be along the contour lines
- The rows of silt fences should be bowed to prevent erosion and loss of silt on the ends of the fence line.
- Silt fences should be inspected weekly and before every forecast rainfall event. Any damage must be repaired immediately.
- Silt deposits should be cleared after each rainfall event. CLEARED SILT MUST NOT BE PLACED DOWN SLOPE OF THE FENCE.

Cross-section View



Top View

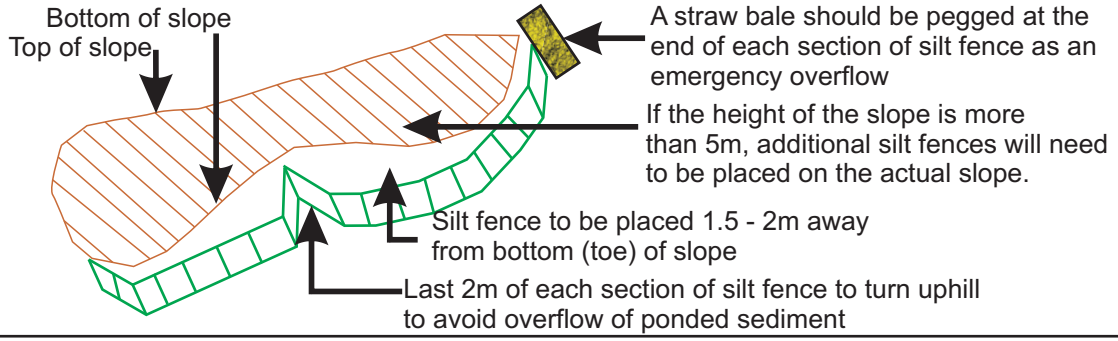
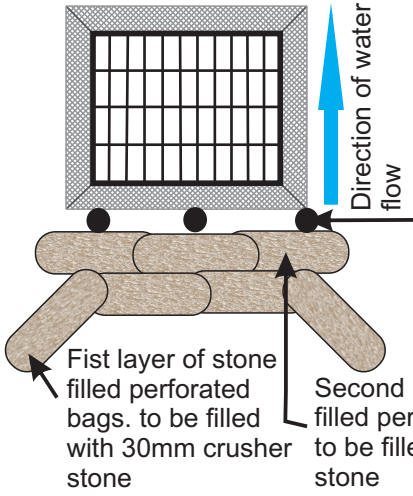


Figure 2: Specifications for Silt Fences

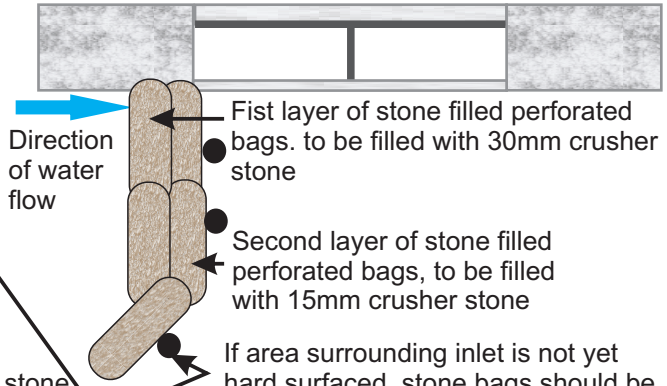
Cape Environmental Assessment Practitioners (Pty) Ltd

Inlet Protection

Drop Inlets



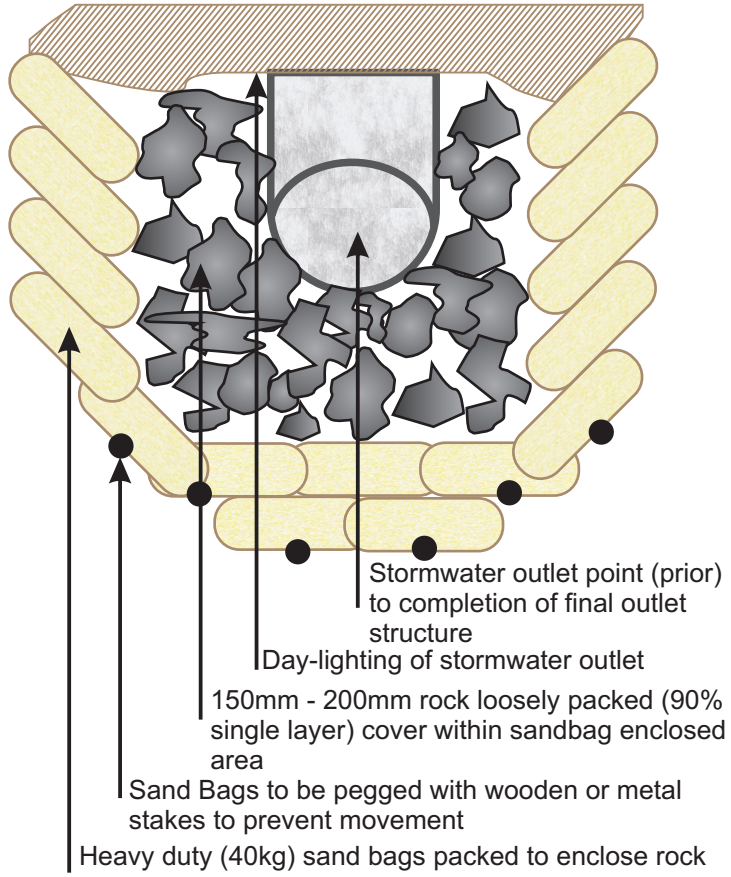
Kerb Inlets



- Should the inlet be positioned at a low point with water entering from a number of sides, a double row of stone bags (as detailed above) should be placed at each side where water enters.

- In low flow, high sediment areas, consideration should be given to cover the inlet structures with biddum (this will only work in low flow areas.)

Outlet Protection



- The methodology referred to above is effective as a temporary measure to be used during construction and is in no way intended to replace the permanent measures that must be installed. These permanent measures must be constructed as per the engineers specifications.
- Stormwater systems should ideally be constructed during low rainfall periods in order to allow for permanent protection measures to be put in place before the rainy season.
- Consideration should be given to encase the outlet structure with a geo-fabric such as biddum. This should first be clarified with the site engineer to ensure compatibility with the stormwater system.

Figure 3: Specifications for Temporary Stormwater Management During Construction

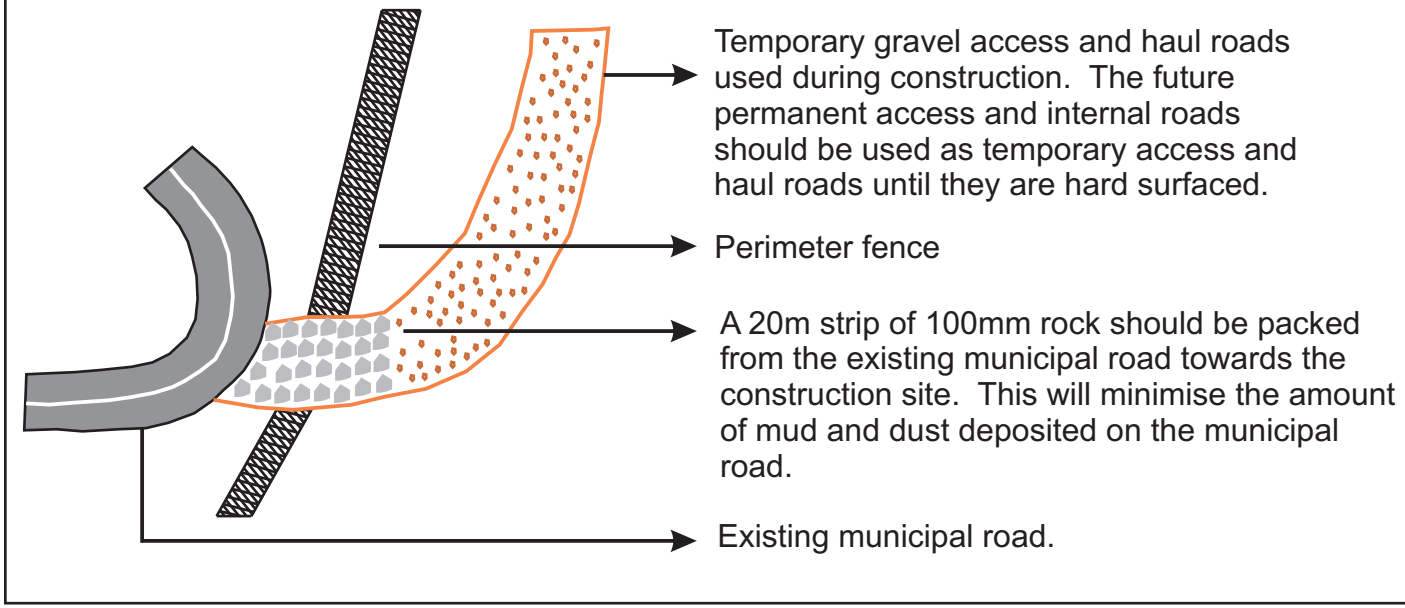
Cape Environmental Assessment Practitioners (Pty) Ltd

Key Environmental Considerations for Haul Roads

The most important environmental factor to be considered regarding access and haul roads, is the location thereof. Haul roads should be designed to make use of future permanent internal roads and access points.

The haul roads should never be construction in areas that will not be permanently transformed with the development. Nor should they be constructed in any sensitive area.

Another safety and environmental hazard caused by haul road surface is dust problems. Roads should be designed with enough fines to act as binders for the larger particles. However, an excess of fines will result in these particles being released to the atmosphere when repeated stress is applied by the equipment tires. All haul roads that do not have a "sealed" surface, will create dust. The dust problem is mainly dealt with by application of water.



Minimisation of Dust on Haul Roads

- Every effort to minimize dust pollution on the site must be undertaken.

- Construction vehicles must adhere to speed limits and minimization of haul roads must be implemented. During dry, dusty periods haul roads should be kept dampened to prevent excess dust.

- No potable water may be used for damping haul roads.

- As an alternative, products such as road environment dust suppressants (Reds) would be recommended in order to minimize the use of water for controlling dust pollution. This is to be determined by the ECO during construction as required.

Figure 4: Management of Haul and Access Control During Construction

Cape Environmental Assessment Practitioners (Pty) Ltd

Cape Environmental Assessment Practitioners (Pty) Ltd

Cape EAPrac
Company Profile

Cape Environmental Assessment Practitioners (Pty) Ltd was established in March 2008 by Directors **Doug Jeffery** (EAPASA Reg. No 2019/1746) and **Louise-Mari van Zyl** (EAPASA Reg. No. 2019/1444). The full time professional team includes: **Dale Holder** (Senior Environmental Practitioner (EAPASA Reg.No 2019/301)/GIS/ECO), **Siân Holder** (Practitioner/ECO/Environmental Education), **Paul Buchholz** (Environmental Consultant/Professional GIS Practitioner), **Mariska Nicholson** (Intern Environmental Consultant**), Onke Nandipha** (Junior Consultant/ECO), **Charmaine Mudau** (Environmental Consultant/ECO) and **Carin Naudé** (Business Administrator).

The firm implements legislation under the National Environmental Management Act (NEMA), National Environmental Management: Waste Act (NEM:WA) and the National Environmental Management: Air Quality Act (NEM:AQA).

Our main services include:

- Environmental Impact Assessments (EIA's & Basic Assessments)
- Environmental Management Policies & Plans (EMMP's)
- Environmental Control & Monitoring(ECO)
- Environmental Audits
- Environmental Education & Interpretation
- Environmental Constraints Analysis
- Public Participation & Stakeholder Engagement
- Outeniqua Sensitive Coastal Area Permits (OSCA)
- Forestry Applications (for removal/pruning of protected species)
- GIS & Mapping
- Retrospective Damage Assessment (Section 24G)
- Rehabilitation Plans
- Coastal Water Discharge Permits
- Air Quality Licence Applications (AEL's)
- Waste Management Licence Applications (Waste Licence)

PROJECT EXPERIENCE INCLUDES

Reverse Osmosis Desalination; Sensitive Environmental Management including National Parks/Conservation Areas & World Heritage Sites; Renewable Energy Projects (Solar & Wind); Waste Management License Applications for Waste Disposal Sites, Sewerage Plants & Abattoirs; Waste-to -Energy Projects including Biogas Facilities; Marine Aquaculture; Filling Stations; Air Emission Processes for Sawmills, Brick Works & Processing Plants; ECO responsibilities on Private & State Housing Developments, Provincial & Municipal Roads and Infrastructure, Private, Provincial & Municipal applications for development of infrastructure, housing & commercial components

LIST OF ONGOING ***CAPE EAPRAC*** PROJECTS IS AVAILABLE ON REQUEST. PLEASE VISIT OUR WEBSITE FOR MORE DETAILS

PO Box 2070
6530 George

17 Progress Street
6529 George

www.cape-eaprac.co.za

Tel: +27 44 874 0365
Cell: +27 71 603 4132

The Team

Doug Jeffery - Director

Doug Jeffery obtained a Bsc with majors in Botany and Zoology at the University of Cape Town (UCT) and went on to obtain his MSc in Botany also at UCT. He has worked extensively in the Western-, Southern- and Eastern Cape both as a professional Botanist and co-ordinating EIA processes for over 20 years. He has been registered with the South African Council for Natural Scientific Professions as a Natural Scientist since 1990. He is also registered with the Environmental Assessment Practitioners Association of South Africa.

email: doug@dougjeff.co.za

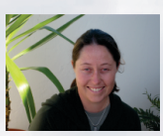
Dale Holder

Senior Practitioner / GIS / ECO

Dale graduated from the Technicon Pretoria in 1999 with a National Diploma in Nature Con-servation. He worked as a Socio-Ecologist for SANParks and as Project Manager for the Department of Marine and Coastal Management. He started working as an environmental practitioner in 2002. His focus is currently on Renewable Energy Infrastructure Assessment, but is also involved with other Assessment, Public Participation & Stakeholder Engagement, GIS & Mapping, Biophysical Inventories, Retrospective Damage Assessment, Air Quality License Applications, Waste Management License Applications, Environmental Impact Assessments, Environmental Management Policies and Plans, Environmental Control, Monitoring and Auditing, Environmental Awareness and Training Programs, Environmental Education and Interpretation and Environmental Feasibility Assessments. Heis registered as and EAP with the Environmental Assessment Practitioners Association of South Africa.

email: dale@cape-eaprac.co.za

Siân Holder - Consultant / ECO



Siân has a National Diploma in Nature Conservation, a BTech Nature Con (NMMU) and a Masters Degree in Environmental Education (Rhodes University). She worked at Tsitsikamma National Park as an Environmental Education Officer on environmental education programmes for Wilderness Foundation SA. She then served as the Experiential Education Manager and wilderness guide for Wilderness Foundation. She joined the environmental consulting vocation in 2008.

email: sian@cape-eaprac.co.za

Onke Nandipha - ECO

Onke obtained a BSc in Environmental Sciences (2017) and a BSc Honours in Geography in 2018. Hw joined Cape EAPrac in July 2019, as an intern, and after gaining experience on various projects, has taken on the responsibility as full time On-Site Environmental Control Officer for a renewable energy development in Kenhardt, Northern Cape. His excellent communication skills in both English and Xhosa, combined with his knowledge and understanding of environmental management makes him a valuable asset on projects where language barriers are a constraint.

email: onke@cape-eaprac.co.za

Louise-Mari van Zyl

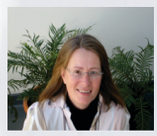
Director / Principal Practitioner

Louise-Mari van Zyl holds a Masters degree in Geography & Environmental Sciences from the University of Stellenbosch. She worked as an Environmental Assessment Practitioner (EAP) since 2002 on projects in the Eastern, Southern, Western & Northern Cape provinces. She is registered as and EAP with the Environmental Assessment Practitioners Association of South Africa.

email: louise@cape-eaprac.co.za

Carin Naudé

Business Administrator



Carin obtained a BBA degree through UNISA. She gained extensive experience in business management and administration since 1988. She joined *Cape EAP*rac in June 2008 and is responsible for the day to day administrative functions of the business. Her acquired knowledge and leadership skills enables the rest of the team to function efficiently in their respective fields.

email: carin@cape-eaprac.co.za

Paul Buchholz

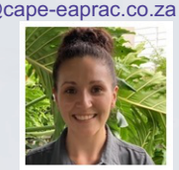
GIS Practitioner / Environmental Consultant

Paul joined Cape EAPrac in September 2022. He holds a MA in Environmental Management from the University Stellenbosch (2009). He is an experienced Geo-informatics and Environmental Specialist who has worked on multidisciplinary environmental and engineering projects in Africa since 2002. Paul is Registered GIS Practitioner with the South African Council for Professional & Technical Surveyors.

email: paul@cape-eaprac.co.za

Mariska Nicholson

Project Assistant / Trainee Environmental Consultant



Mariska joined Cape EAPrac in April 2022 . She completed her BSc in Geology in 2016, BSc Honours in 2017 and holds a MSc in Geology from the University of the Free State (2020). After working a Geologist for two years, she joined our team as Project Assistant and is training to become an Environmental Assessment Practitioner.

email: mariska@cape-eaprac.co.za

Charmaine Mudau - ECO

Charmaine Mudau joined Cape EAPrac in September 2022. She holds a BA in Geography and Environmental Management from the University of the Free State (2014) and a BSc Honours in Geography from UNISA (2020). She joined our team as full time On-Site Environmental Control Officer for a renewable energy development in Kenhardt, Northern Cape.

email: charmaine@cape-eaprac.co.za