

**GEORGE****TEL:** +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953**EMAIL:** info@sescs.net **WEBSITE:** www.sescs.net**ADDRESS:** Unit 17 Cathedral Square,
Cathedral Street, George, 6530**PO BOX:** 9087, George, 6530**CAPE TOWN****TEL:** +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869**EMAIL:** betsy@sescs.net **WEBSITE:** www.sescs.net**ADDRESS:** Tableview, Cape Town, 7441**PO BOX:** 443, Milnerton, 7435

ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR THE

**THE PROPOSED UPGRADING OF THE BULK SEWERAGE LINE FROM AMY
SEARLE STREET / GREENHAVEN TO THE CRICKET FIELD SEWERAGE
PUMPSTATION, ON ERVEN 4808, 4809, 4807, 770, 733, 83 AND REMAINDER
OF FARM 4812, STREET PARCEL RE/131 AND STREET PARCEL RE/4893, GROOT
BRAKRIVIER, MOSSEL BAY MUNICIPALITY, WESTERN CAPE PROVINCE.**

APPLICATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998
(ACT NO. 107 OF 1998), AS AMENDED, AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014

PREPARED FOR: Mossel Bay Municipality
Private Bag X29
Mossel Bay
6500

DATE: 25 November 2025

SES REF NO: EMPR/ASP/GB/MBM/11/25

-
- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
 - Environmental Control & Monitoring • Water Use License Applications • Aquatic Assessments



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Appendix 4 of the EIA Regulations 2014 (as amended 2017).

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

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

Environmental Management Programme

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

DOCUMENT DETAILS

Project Ref. No:	EMPR/ASP/GB/MBM/11/25
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DETAILS OF PERSONS WHO COMPILED THIS DOCUMENT:

Role:	Name:	E-Mail Address:	Qualifications:
Author:	Michael Bennett	michael@sesc.net	- B.Sc. Environmental and Geographical Sciences, Ocean and atmospheric Science (UCT) - EAPASA # 2021/3163
Co-Author	Christiaan Smit	Christiaan@sesc.net	- MPhil in Environmental Management (SU) - PGD in Environmental Management (SU) - B.Sc in Biodiversity and Ecology (SU)

Sharples Environmental Services cc (SES) has been actively engaged since 1998 in the fields of environmental planning, assessment and management. Clients include private, corporate and public enterprises on a variety of differing land use applications ranging from large-scale residential estates and resorts to golf courses, municipal service infrastructure installations and the planning of major arterials. The consultants have over 40+ years of combined experience and operate in the Southern, Eastern and Western Cape regions.

MICHAEL BENNETT (**Director - Environmental Assessment Practitioner, Report Writer**):

Michael studied at the University of Cape Town completing a Bachelor of Science degree majoring in Environmental and Geographic Science and Ocean and Atmospheric Science. Michael joined SES in 2014 and has extensive experience in assessments and monitoring and has worked on a variety of technical projects. See Appendix G for his curriculum vitae. Michael is registered with EAPASA as a certified Environmental Practitioner (EAPASA # 2021/3163).

CHRISTIAAN SMIT (**Candidate Environmental Practitioner, Co-Writer**)

Christiaan graduated from the University of Stellenbosch completing his Masters on the Ocean Economy and also holds a BSc in Biodiversity and Ecology with a post graduate Diploma in Environmental Management. Christiaan joined the SES team in 2024 and is gaining experience in conducting assessments by working with and being mentored by his experienced colleagues.



1. Introduction

Sharpley Environmental Services cc (SES) has been appointed by the *Mossel Bay Municipality*, to complete the Environmental Management Programme (EMPr) as part of the Basic Assessment Process for the proposed upgrading of the bulk sewerage line from Amy Searle Street / Greenhaven to the Cricket Field Sewerage Pumpstation, on Erven 4808, 4809, 4807, 770, 733, 83 and Remainder of Farm 4812, Street Parcel RE/131 and Street Parcel RE/4893, Groot Brakrivier, Mossel Bay Municipality, Western Cape.

The proposed upgrade will trigger listed activities in terms of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.324 - 327 of 7 April 2017). Environmental Authorisation is therefore required from the competent authority (Western Cape Government: Department of Environmental Affairs and Development Planning) before construction can commence.

2. About this EMPr

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

This EMPr has been prepared in accordance with the requirements of an EMPr as specified in the Amended Environmental Impact Assessment Regulations, 2014 (GN No. R. 326 of 7 April 2017), and with reference to the "Guidelines for Environmental Management Programmes" published by the Department of Environmental Affairs and Development Planning (2005).

It is important to note that the EMPr is not designed to manage the physical establishment of the upgrade and development *per se* but should rather be seen as a tool which can be used to manage the environmental impacts of the development.

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

2.1 Important caveat to the report

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

The Implementing Agent and the attitude of the construction team play an integral role in determining the impact that the development will have on the environment. The ECO (see Chapter 15) needs to ensure that all role-players are "on board" with regard to the constraints that the EMPr places on the development and construction team. The end result relies on cooperation and mutual respect and understanding of all parties involved.

3. How to use this document

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

This EMPr must be included in all contracts compiled for contractors and subcontractors employed by the *Mossel Bay Municipality*, as this EMPr identifies and specifies the procedures to be followed by engineers and other contractors to ensure that the adverse impacts of construction activities are either avoided or reduced. *The Mossel Bay Municipality* and any appointed contractors must make adequate financial provision to implement the environmental management measures specified in this document.

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

4. Background and Location of the activity

4.1 Background and description

Sharples Environmental Services cc (SES) has been appointed by the *Mossel Bay Municipality*, to complete the Environmental Management Programme (EMPr) as part of the Basic Assessment Process for the proposed upgrading of the bulk sewerage line from Amy Searle Street / Greenhaven to the Cricket Field Sewerage Pumpstation, on Erven 4808, 4809, 4807, 770, 733, 83 and Remainder of Farm 4812, Street Parcel RE/131 and Street Parcel RE/4893, Groot Brakrivier, Mossel Bay Municipality, Western Cape.

The proposed development entails the installation of a sewage pipeline from the pump station south east of Long Street to the connection point located towards the north along Amy Searl Street. Please see the figures below for the proposed pipeline route and Site Development Plan (SDP). The pipe to be installed has a diameter of 300mm and the pipeline route will be approximately 1100m.



Figure 1: Proposed pipeline route.

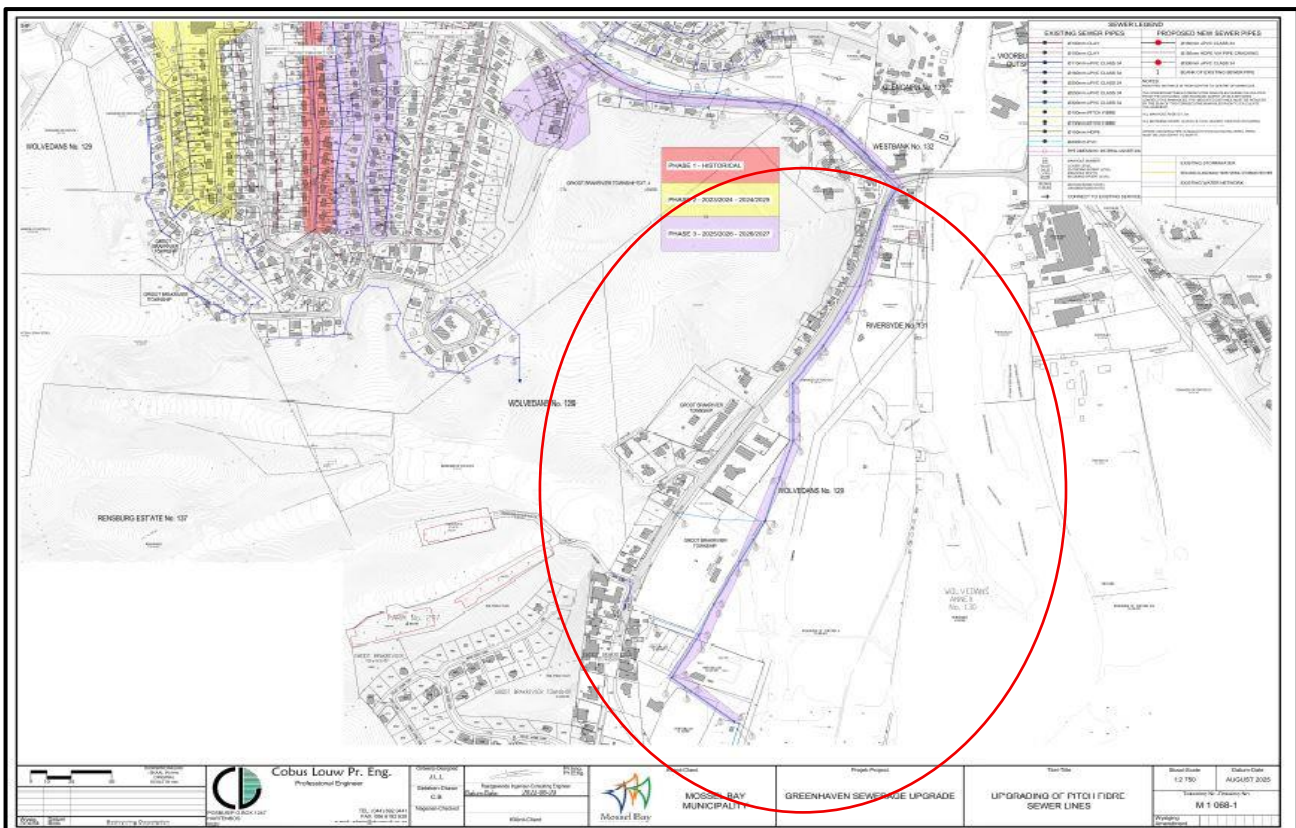


Figure 2: SDP - Total layout.

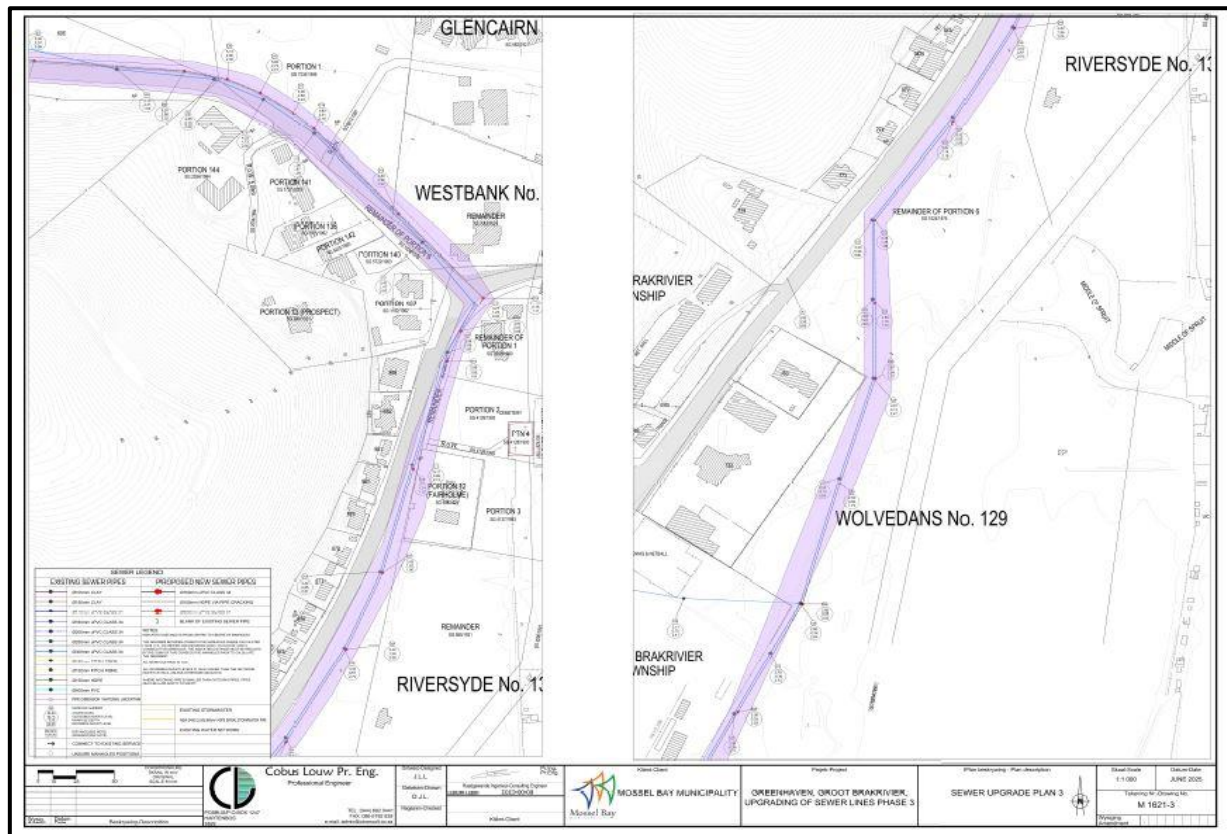


Figure 3: SDP- Cross Section 3.

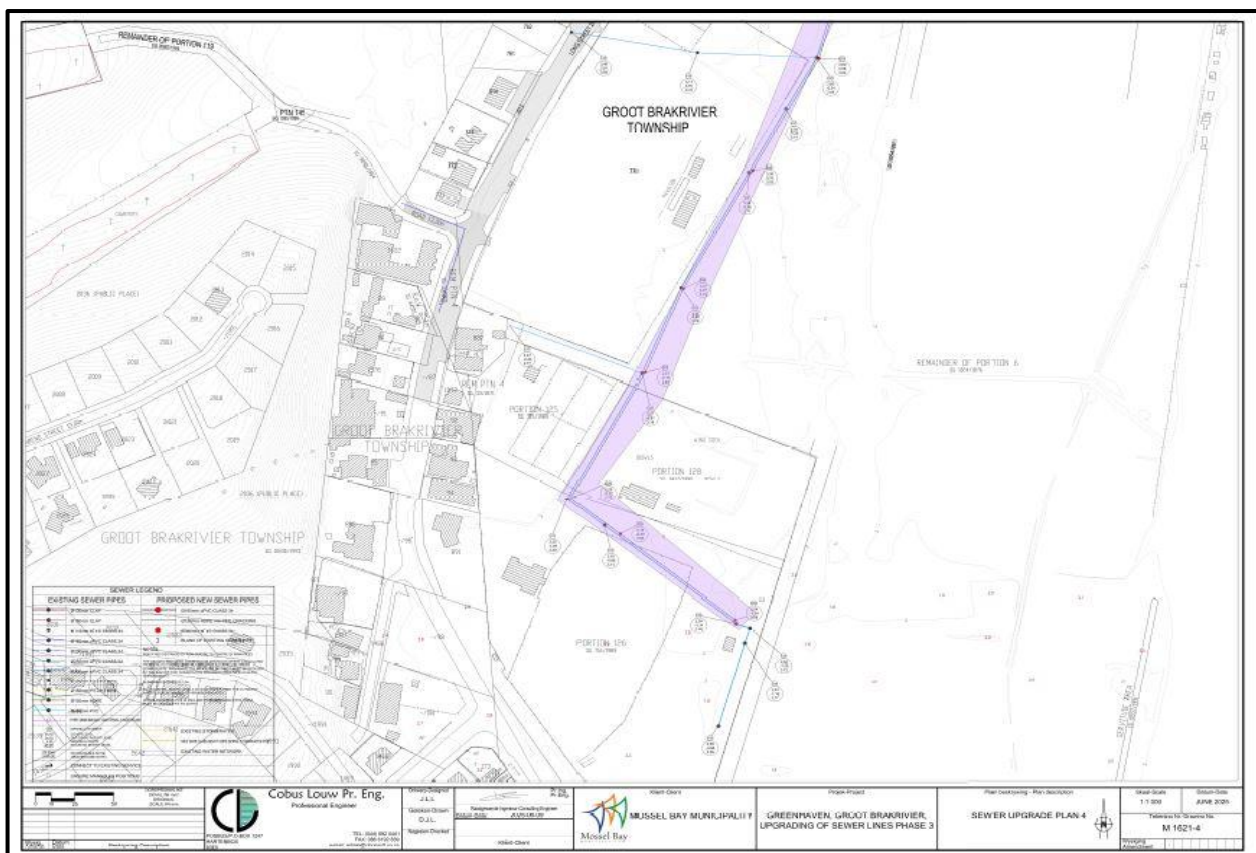


Figure 4: SDP- Cross Section 4.

The northern section of the pipeline, from Amy Searle Street (below Botha Street) to the Stasie Way intersection (from manhole D2-D14) does not trigger any Listed Activities in terms of NEMA, this section of the pipeline can also function on its own and does not require the other sections of the pipeline to be developed for it to be functional. There are also no National Water Act triggers for this section of the pipeline as confirmed by BOCMA. The upper section of the pipeline (Manhole D1) will however require a Water Use Licence Application, and this process is underway. The middle and southern section of the pipeline (from manhole D15 onwards) will trigger Listed Activities in terms of NEMA, and therefore this section will be applied for in this application.

Table 1: Summary Table: Site and Erf Details

Province	Western Cape
District Municipality	Garden Route District Municipality
Local Municipality	Mossel Bay Municipality
Ward number	Ward 4
Erf name	• Erf 4808 • Erf4809 • Erf 4807 • RE/4812 • Erf 770 • Erf 733 • Erf 83 • Street Parcel RE/131 • Street Parcel RE/4893

5. Legal Framework

5.1 Environmental Impact Assessment Regulations (2017)

The following listed activities, in terms of the amended Environmental Impact Assessment Regulations, 2017 (GN No. R. 324 – 327) will be triggered by the proposed development:

Table 2: Listed activities in terms of the amended Environmental Impact Assessment Regulations (2017)

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.
17	Development— (i) in the sea; (ii) in an estuary; (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of— (a) fixed or floating jetties and slipways; (b) tidal pools; (c) embankments; (d) rock revetments or stabilising structures including stabilising walls; or (e) infrastructure or structures with a development footprint of 50 square metres or more — but excluding—

	(aa) the development of infrastructure and structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) the development of temporary infrastructure or structures where such structures will be removed within 6 weeks of the commencement of development and where coral or indigenous vegetation will not be cleared; or (dd) where such development occurs within an urban area.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.
19A	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from— (i) the seashore; (ii) the littoral active zone, an estuary or a distance of 100 metres inland of the highwater mark of the sea or an estuary, whichever distance is the greater; or (iii) the sea; — but excluding where such infilling, depositing , dredging, excavation, removal or moving— (f) will occur behind a development setback; (g) is for maintenance purposes undertaken in accordance with a maintenance management plan; (h) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (i) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. i. Western Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or v. On land designated for protection or conservation purposes in an Environmental

	Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.
14	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a Physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.

5.2 Other applicable legislation

The *Mossel Bay Municipality*, is responsible for ensuring that all contractors, labourers and any other appointed person/entity acting on their behalf, remain compliant with the conditions of the received environmental authorisation and water-use authorisations, as well as the provisions of all other applicable legislation, including *inter alia*:

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

The above listed legislation have general applicability to most development applications, and it is the *Mossel Bay Municipality's* responsibility to ensure that all contractors and employees are aware of their obligations in terms of these Acts. This EMPr does not detract from any other legal requirements.

6. Scope of this EMPr

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

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

General environmental management measures that must be applied throughout the project lifecycle (as and where applicable) are described in Chapter 8. Additional management measures that must be

implemented to address specific impacts that may arise during each phase are provided in **Chapters 9-12** of this EMPr.

7. General Environmental Management

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

7.1 Site access and traffic management

Access to the routes will be obtained via existing dirt roads next to Long Street and Amy Searle Street.

In general, all construction vehicles need to adhere to traffic laws. The speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users. As far as possible care must be taken to ensure that the local traffic flow pattern is not too significantly disrupted, and all vehicle operators therefore need to be educated in terms of “best-practice” operation to minimise unnecessary traffic congestion or dangers. Construction vehicles must therefore not unnecessarily obstruct the access point or traffic lanes used to access the site. Construction vehicles also need to consider the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles. Adequate signage that is both informative and cautionary to passing traffic (motorists and pedestrians) warning them of the construction activities. Signage would need to be clearly visible and need to include, among others, the following:

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

Other mitigation measures include:

- ECO to do awareness training with the contractor and labourers before construction commences.
- Ensure appropriate behaviour of operators of construction vehicles.

7.2 Site demarcation

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

7.2.1 Construction working area

Prior to the commencement of any construction activities, the outer boundary of the development area must be surveyed and pegged. The demarcation boundary must be tight around the site, typically allowing a working area of no more than 2.5m around the development footprint or as small as feasibly possible. This demarcation boundary is to ensure that construction activities are restricted to only that

area strictly required for the proposed development, and to prevent unnecessary disturbance of soil surfaces and vegetation outside of the development footprint.

7.2.2 No-go areas

Prior to the commencement of any construction activities, all No-Go areas, must be demarcated and must not be disturbed during the construction phase.

No-go areas must be off-limits to all construction workers, vehicles, and machinery during all phases of the development. No vegetation may be cleared from within the no-go areas, and no dumping of any material (waste, topsoil, subsoil etc.) may occur in these areas. Construction workers must be informed of the no-go areas, and if necessary appropriate signage and/or temporary fencing (e.g., droppers with danger tape) can be used to enforce the no-go areas. All areas outside of the development footprint of the site and a reasonable working area to undertake the upgrades, must be regarded as no-go. Existing access roads, disturbed areas, and areas that won't trigger listed activities are excluded from the no-go areas (i.e if the contractor comes to an agreement with nearby landowners to use disturbed areas for storage areas or site camps).

It is important to note that as per the Estuarine Assessment the width of the working area through Zone D (as indicated in Appendix G1 of the BAR) must be as narrow as possible and must be clearly demarcated. Estuarine habitat outside of this demarcated area must be considered as No-Go areas.

Please refer to the figure below for the Sensitivity Zones and the No-Go Map:



Figure 5: Sensitivity Zones.

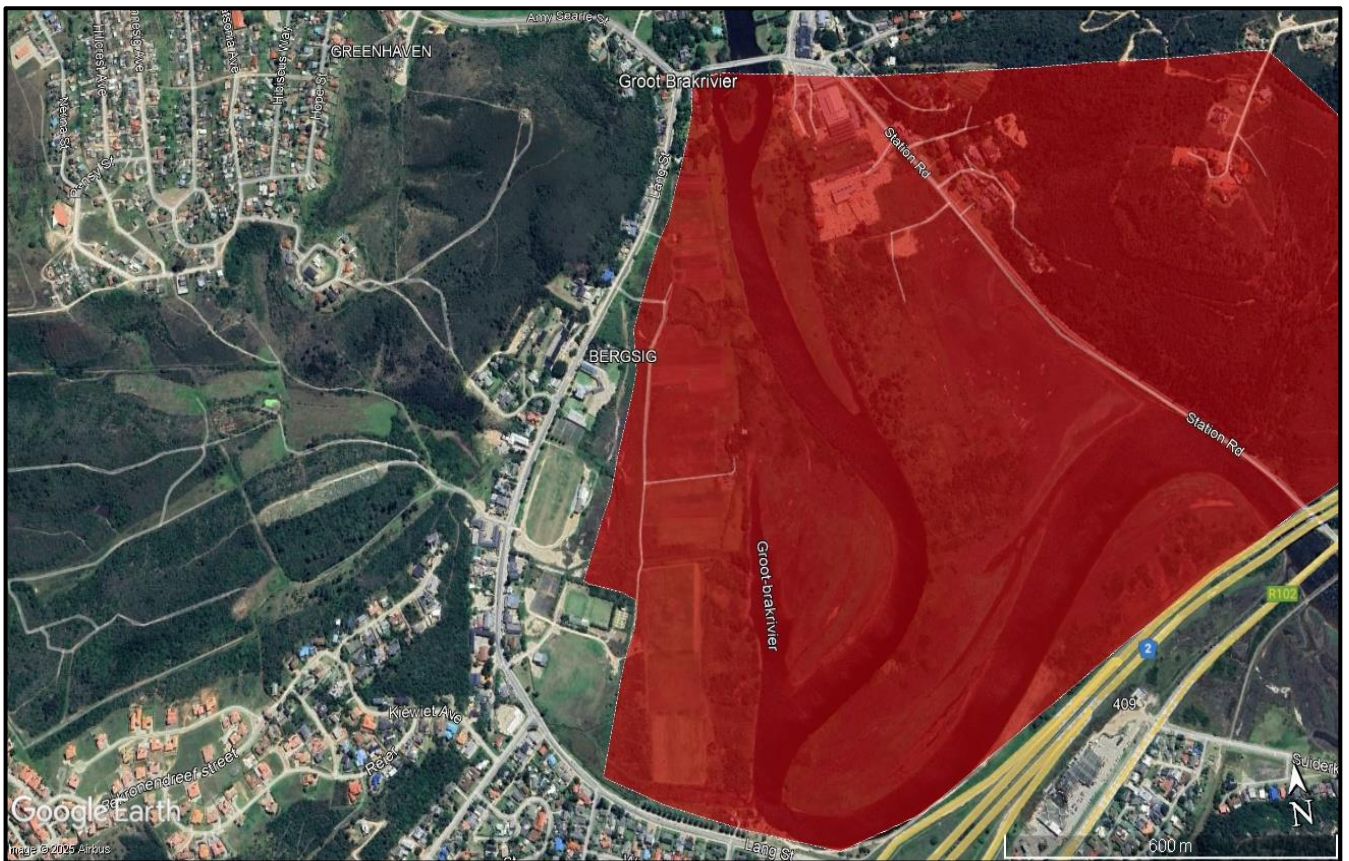


Figure 6: No-Go Map.

7.2.3 Demarcation of the site camp

The area chosen for the site camp and associated facilities must be the minimum area reasonably required to accommodate the site camp facilities, and which will involve the least disturbance to the environment.

7.3 Site camp and associated facilities

The following general management measures pertaining to the set-up, operation and closure of a site camp must be applied where appropriate, reasonable and practicable:

7.3.1 Fencing & Security

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

7.3.2 Fire Fighting Equipment

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

7.3.3 Waste Storage Area

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

7.3.4 Hazardous Substances Storage Area

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

7.3.5 Potable Water

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

7.3.6 Ablution Facilities

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

The ablution facilities must not be linked to the estuary system in any way. Toilets must be serviced regularly and kept in an orderly state. The contractor must ensure that no spillage occurs when the toilets are cleaned, serviced or moved. The toilet facilities should be emptied on a weekly basis, by an appropriately registered service provider. Proof of this weekly servicing must be obtained and filed in the Environmental File on site. Performing ablutions outside of the provided toilet facilities is strictly prohibited.

7.3.7 Eating Area & Rest Area

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

7.3.8 Vehicle & Equipment Maintenance Yard

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

7.3.9 House-keeping

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

7.4 Vegetation clearing

Where vegetation must be cleared the following measures must be implemented where applicable, reasonable and practical:

- Where feasible vegetation must simply be trimmed to facilitate access/ construction, rather than being completely cleared or removed.
- Vegetation clearing/trimming must be cleared by hand if possible (i.e. brush cut). Please note that the development footprint is excluded from this requirement. Cleared vegetation should be stockpiled for use as mulch/ brush-packing during rehabilitation of the site. Any alien vegetation that is cleared must be disposed of in consultation with the ECO, unless the cleared alien vegetation does not contain seeds in which case it may be retained for use in site rehabilitation.
- No bulldozing must be undertaken for the purpose of vegetation clearing.
- Only the areas required to accommodate the construction activities and access to the construction site must be cleared/trimmed of vegetation.
- Vegetation outside of the construction footprint, reasonable working area and beyond any No-Go areas must not be cleared.
- Protected tree species that will be affected, namely *Sideroxylon inerme* and *Pittosporum viridiflorum* **will require a permit from the department of forestry for trimming or removal.**

7.5 Topsoil and subsoil management

It is recommended that topsoil be removed from any area where physical disturbance of the surface will occur, including within the footprint of the development site (working area) and possibly within the site camp, ablution area, vehicle maintenance yard, refuelling area and temporary waste storage area. Topsoil removal and stockpiling must be undertaken only after consultation with the ECO.

- Removed topsoil and subsoil must be stockpiled for the duration of the active construction period and utilised for the final landscaping and rehabilitation of disturbed areas on site.

- The removed topsoil must be stockpiled in a berm, in a demarcated area as agreed with the ECO.
- Removed subsoil must be stockpiled separately from topsoil.
- The topsoil & subsoil storage area must be located on a level area outside of any surface drainage channels and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.
- Where applicable topsoil and subsoil stockpiles must be adequately protected from being blown away or eroded by storm water. If necessary, shade cloth or other suitable measures must be used to stabilise and protect the stockpile from wind/water erosion. Topsoil stockpiles must not be covered with tarpaulin, as this may smother and decrease the virility of topsoil.
- Handling of topsoil must be minimised as much as possible, and the location of the topsoil berm must be chosen carefully to avoid needing to relocate the topsoil berm at a later date. The ECO must be consulted with regards to the placement of the stockpiles, to ensure that the selected location is in compliance with this EMP and EA (once granted).
- Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify.
- If soil stockpiles will be stored for an extended period of time, the stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding, (or application of herbicides if agreed with the ECO).
- Spoil material that will not be re-utilised on site may be removed from site and taken to an appropriate site for re-use or disposal.
- Note that the topsoil must be the final layer applied to a rehabilitated/ re-landscaped site, after subsoil/ spoil material has been placed and shaped on the site.

7.6 Integrated waste management approach

It is required that an integrated waste management system is adopted on site. The system must be based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Waste bins for the different categories of recyclable waste (i.e., paper, plastic, metal) must be provided on site. These bins must be emptied, and the waste must be taken to a registered recycling facility. The receipts from the facility must be kept on file and must be available on request. Images 1 and 2 show two such systems within a construction site.

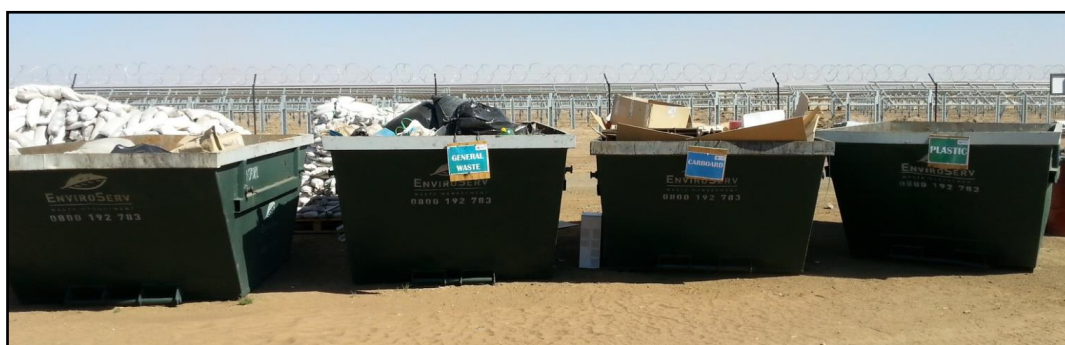


Image 1: Recycling system implemented on a construction site. Skips provided for general waste, plastic, cardboard and metal.



Image 2: Recycling system implemented on a construction site. Lidded bins provided for general waste, plastic, cardboard, and metal.

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

7.7 Hazardous substances and fuels

If hazardous substances and fuels such as diesel, oil, lubricant, detergents etc. are to be stored on site for construction purposes, a designated area must be set aside for this within the site camp.

- All hazardous substances must be stored in the designated area within the site camp.
- The area selected for storage of hazardous fuels must be located on a level area, well outside of any water courses, water bodies or surface drainage channels.
- The designated area must be clearly demarcated and secured by use of fencing and/or cages, to prevent access by un-authorised persons and/or animals.
- Access to the hazardous material storage area must be restricted to authorised personnel only and must be treated as a no-go zone to unauthorised personnel.
- Appropriate hazard signage indicating the nature of the stored materials must be prominently displayed at the storage area.
- Those persons tasked with handling any hazardous substances must be equipped with the knowledge, equipment, and safety gear necessary to handle the substance/s safely.
- Material Safety Data Sheets (MSDSs) must be available on site for all hazardous chemicals and hazardous substances to be used on site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes
- Storage vessels of hazardous substances must be situated in an impermeable bunded area large enough to accommodate at least 110% of the capacity of the tank in question. If plastic sheeting is used to line the bunded area, care must be taken to ensure it is not punctured in any way during the course of the construction period.
- Fuel tanks must ideally be elevated so that leaks can easily be detected.
- No smoking may be permitted at or surrounding the area where fuels and hazardous substances are stored.
- Firefighting equipment must be located in close proximity to the storage area.

7.8 Cement and concrete batching

Cement and concrete batching is permitted on site, but may only take place on designated impermeable, bunded surfaces, as agreed with the ECO.

- Cement/ concrete must not be mixed on bare ground.
- Cement/concrete must not be mixed within any drainage lines.
- The impermeable/ bunded area must be established in such a way that cement slurry, runoff and cement water will be contained and will not flow into the surrounding environment or contaminate the soil.
- Cement run-off and excess cement slurry must be collected in the designated impermeable area, allowed to dry and then disposed of at an appropriate facility. Alternately, the contaminated water can be collected in sealed tanks and transported to an appropriate disposal site for disposal.
- Empty cement bags are currently not recycled within the Garden Route and must be disposed of in the un-recyclables waste bins on site.

7.9 Erosion control and stormwater management

Appropriate measures must be implemented to control the flow of storm water across the construction site, to prevent possible flooding, soil loss and dispersion of pollutants. All exposed earth surfaces must also be protected from wind and water erosion. Stripped areas must not remain uncovered for extended periods of time and must be provided with a suitable cover (vegetation, mulch, brush-packing) as soon as possible.

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

It may be necessary to implement small-scale erosion protection measures at the construction site, to prevent soil erosion. Such measures may include the use of shade netting, geo-fabric, brush-packing, logs and stakes or similar barriers in areas susceptible to erosion and along exposed slopes. The netting/fabric is placed directly across the path of flow of storm water. Poles and logs, staked in along the contours of a slope susceptible to erosion may also be used.

7.10 Construction near a watercourse

Construction within the vicinity of the estuary needs to be conducted in a conscious manner. The Estuarine Assessment completed by Confluent explains that impacts to the estuary can be avoided through the implementation of the mitigation measures and adherence to the EMPr. The following mitigation measures must be adhered to during construction:

- Air valves along sewer lines must be elevated above the 1:100-year flood line.
- Sewer manhole covers should not be made of metal because of the risk of theft.
- Manholes must be designed to be watertight to prevent environmental contamination from leaking sewage and to avoid ingress of surface water during rainfall and flood events. Watertight manholes achieve this seal using components like gaskets on the manhole cover, proper joint sealing between sections, and leak-resistant pipe-to-manhole connections, which are essential for system integrity and cost efficiency.
- An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase to monitor and report back on compliance with conditions of the environmental authorisation.

- Consult weather forecasts daily and weekly. Do not work during rainfall and minimise the storage of mobile materials in low-lying areas. Plan the construction area as if it could be inundated with floodwaters in the event of a significant rainfall event.
- Construction access for the pipeline through Zone D (see Figure 5 of this EMPr and Appendix F) should utilise existing access points from Long Street. No new roads should be necessary.
- The width of the working area through Zone D (see Figure 5 of this EMPr and Appendix F) must be as narrow as possible and must be clearly demarcated. Estuarine habitat outside of this demarcated area must be considered as No-Go areas.
- Revegetation of the pipeline through Zone D (see Figure 5 of this EMPr and Appendix F) must be actively encouraged. The route is currently well covered by indigenous vegetation (e.g. sedges, *P. australis*, *Stenotaphrum secundatum* etc.). It is recommended that when trenching, a top layer of vegetation in association with 20-30 cm of soil should be removed and set aside for replanting or covering the filled in trench.
- Open trenching for sewer lines should be done in as short a stretch as possible and backfilled with material as soon as possible to reduce the likelihood of material loss in the event of flooding.
- Keep a skip on site so that any waste materials can be conveniently discarded and removed. This includes small amounts of dirty water, such as that used for mixing concrete.
- Equipment and materials lay-down areas should be located away from estuarine habitat and stormwater channels leading into the estuary. Minimise the storage of loose materials in case of a flood event that could wash them into the estuary.
- Post-construction site clean-up must be completed to ensure the entire site footprint and surrounding area has been cleared of litter and any waste materials associated with construction. The ECO should be informed of the construction close-out and complete an inspection to ensure this measure has been implemented.
- The pipeline route through Zone D (see Figure 5 of this EMPr and Appendix F) must be routinely inspected for the establishment of alien invasive plant species. This must be done at a high frequency following construction (i.e. monthly) and can be reduced once natural vegetation along the pipeline has recovered. These must be controlled by hand. No aerial application of herbicides is permitted. Herbicides may only be applied to cut-stumps and must be registered for use on the target plant species.

7.11 Excavations and Earthworks

Any major earthworks with heavy machinery must be under constant supervision and operators are to be aware of all the environmental obligations, as there is always the potential to inflict damage to the sensitive areas. Any unnecessary or excessive heavy machinery movement must be kept to a minimum i.e., only what is absolutely necessary. Areas to be excavated must be clearly demarcated. It may be necessary to demarcate excavations or earthworks along busier haulage routes with orange barrier netting (or a similar product).

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

7.12 Heritage Resources

the installation of the pipeline is not anticipated to significantly impact palaeontological heritage, due mainly to re-excavation of disturbed ground. Nevertheless, an occurrence of fossil bones cannot be entirely dismissed. It is advisable that a protocol for finds of bones, the Fossil Finds Procedure (FFP), is included in the Environmental Management Plan (EMP) for the project (Appendix H of this EMP).

The Project Manager, foremen and workers involved in earthmoving must be informed of the need to watch for fossil bones, and this must be included in the pre-construction Environmental Awareness Training. Workers seeing potential objects are to cease work at that spot and report to the Project Manager and/or the Environmental Control Officer (ECO) who must report the find to Heritage Western Cape (HWC), following the FFP. Heritage Western Cape will assess the information and liaise with an archaeological or palaeontological specialist, as appropriate. The intersection of a shelly bed must also be reported to HWC as per the FFP. The Mossel Bay Museum should be informed.

7.13 Site closure and rehabilitation

Upon completion of the construction phase, all disturbed areas, including the working area (disturbance corridor), temporary access roads, and all areas utilised for the site camp and associated site camp facilities will require rehabilitation as follows:

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

vegetation of the site by retaining moisture in the soil, introducing seeds and/or trapping wind-blown seeds and providing organic material (compost) to promote new plant growth.

- Final rehabilitation of the site must be done to the satisfaction of the ECO, and must adhere to all conditions/ requirements of the Environmental Authorisation.
- The location of the site camp must be rehabilitated.

8. Environmental Impact Management Planning and design phase

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

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

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

- Appoint an Environmental Control Officer.
- Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site

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

OBJECTIVE 1: APPOINTMENT OF AN ENVIRONMENTAL CONTROL OFFICER

<i>Impact Management Objective: To appoint a suitably qualified and experienced Environmental Control Officer.</i>		
Potential impact to avoid	Failure to appoint an ECO will result in non-compliance with the Environmental Authorisation and the requirements of the EMPr.	
Impact Management Outcome	The conditions of Environmental Authorisation and the requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• A suitably qualified and experienced Environmental Control Officer must be appointed before any activities commence on site. • The appointed ECO must adhere to the requirements stated in Chapter 15 and 17 of the EMPr and any other requirements specified in the Environmental Authorisation. • The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.	Mossel Bay Municipality	During design phase

Performance Indicator	A qualified ECO is appointed prior to the commencement of any construction activities (including pre-construction set-up activities) on site.
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OBJECTIVE 2: UPDATE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Authorisation issued for the development may require certain amendments to be applied to the EMPr. In addition, the final site layout and detailed design may also necessitate the amendment of the EMPr, in order to ensure that the development is accommodated in the EMPr.

<u>Impact Management Objective:</u> To ensure the EMPr adheres to the requirements of the Environmental Authorisation and makes provision for the final detailed site layout.			
Potential impact to avoid	• Failure to update the EMPr in accordance with conditions specified in the EA may result in non-compliance with the EA. • Failure to update the EMPr to accommodate the final detailed site layout may result in non-compliance with the EA.		
Impact Management Outcome	Good environmental management is promoted on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• An independent Environmental Consultant must be appointed to amend the EMPr. • All amendments to the EMPr specified in the EA must be applied to the EMPr unless agreed otherwise in writing with the Competent Authority. • Amendments to the EMPr must be approved in writing by the Competent Authority. • Public participation may be required on the proposed EMPr amendments. The Competent Authority must be consulted for clarity on these requirements.		Mossel Bay Municipality	During design phase
Performance Indicator	An updated EMPr that adheres to the conditions of the EA and that reflects the requirements of the final detailed site layout is approved by the Competent Authority prior to commencing activities on site.		

9. Environmental Impact Management Pre-Construction Phase

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

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

- Demarcation of no-go areas and working areas.
- Establishment of site camp and associated site facilities.
- Pre-construction ECO visit.
- Sewer line design in the flood line

OBJECTIVE 1: IDENTIFY & DEMARCATE NO-GO AND WORKING AREAS

<i>Impact Management Objective: Identify and demarcate no-go areas, working areas and site facilities.</i>			
Potential impact to avoid	• Insensitive location of working areas and site facilities may result in environmental impacts during construction phase. • Failure to accurately demarcate working areas may result in increased disturbance footprint. • Failure to demarcate no-go (open spaces) areas may result in disturbance to these areas during construction.		
Impact Management Outcome	Future construction activities will be restricted to within the designated areas & environmentally sensitive areas (no-go areas) will be protected from disturbance.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The no-go areas must be identified. • Demarcation of working area and no-go areas must be done in accordance with Section 7.2 of this EMPr. • Site camp facilities must be situated as far away from the No-Go areas as possible. However, if the contractor makes arrangements for other areas which do not trigger listed activities, these areas may also be used.		Engineer / Contractor	Pre-construction phase (prior to arrival of construction equipment, machinery, or workers on site)
Performance Indicator	No-go areas, working areas and areas for site camp facilities have been identified and appropriately demarcated to the satisfaction of the ECO, before construction activities commence on site.		

OBJECTIVE 2: ESTABLISH ENVIRONMENTALLY SENSITIVE SITE CAMP & SITE FACILITIES

<i>Impact Management Objective: To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.</i>			
Potential impact to avoid	• Inappropriate siting of site camp facilities may result in impacts to sensitive resources (e.g. contaminated run-off from refuelling area may contaminate soil). • Failure to properly demarcate and set up site facilities may result in disorganised construction activities and unnecessary disturbance to the site. • Failure to provide the necessary site facilities and/or failure to equip these facilities with the necessary equipment/materials may impede good environmental management & compromise ability to respond to emergencies.		
Impact Management Outcome	Site camp facilities do not impact significantly on environment. The equipment required to implement the provisions of the EMPr are provided on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The site camp and site facilities described in Section 8 of this EMPr must be provided on site. • The site camp and associated site facilities must be set-up and managed in accordance with the general environmental management measures specified in Section 8 of this EMPr.		Contractor	Pre-construction phase (prior to start of construction activities)
Performance Indicator	Appropriate, well organised and properly equipped site facilities are available on site prior to commencement of construction activities. The location and set up of the facilities does not impact on the natural resources.		

OBJECTIVE 3: PRE-CONSTRUCTION ECO INSPECTION

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

<i>Impact Management Objective: Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site.</i>			
Potential impact to avoid	- Failure to appoint ECO or to notify ECO of commencement prior to commencement will result in non-compliance with the EA. - If a pre-commencement ECO inspection is not performed, the Applicant may be held liable for environmental degradation that took place prior to the Contractor commencing work on site.		
Impact Management Outcome	Good environmental management is promoted and enforced by the ECO during the full pre-construction and construction phases. Site facilities are appropriately located on site. Construction workers receive environmental awareness training before commencing work on site.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
The appointed ECO must be advised of the construction start date, before any activities commence on site so that the ECO can perform a pre-commencement inspection and plan for environmental awareness training of construction workers.		Contractor	Start of construction phase
Performance Indicator	A pre-commencement site inspection is conducted by the appointed ECO before construction activities commence on site.		

OBJECTIVE 4: SEWER LINE DESIGN IN THE FLOODLINE

<i>Impact Management Objective: To prevent leakage of sewerage during flooding events which could pollute the wetland and estuary.</i>			
Potential impact to avoid		• Leakage of sewerage during flooding events, resulting in pollution of the wetland and estuary.	
Impact Management Outcome		Sewer line design prevents leakage during flooding events.	
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- Air valves along sewer lines must be elevated above the 1:100-year flood line. - Sewer manhole covers should not be made of metal because of the risk of theft. - Manholes must be designed to be watertight to prevent environmental contamination from leaking sewage and to avoid ingress of surface water during rainfall and flood events. Watertight manholes achieve this seal using components like gaskets on the manhole cover, proper joint sealing between sections, and leak-resistant pipe-to-manhole connections, which are essential for system integrity and cost efficiency.		Engineer / Contractor	Pre-construction phase (prior to arrival of construction equipment, machinery, or workers on site)
Performance Indicator		Mitigation measures of the Estuarine Assessment are adhered to.	

10. Environmental Impact Management Construction Phase

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

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

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

- Limit the impact on terrestrial biodiversity
- Limit the impact on plant species
- Limit the impact on animal species
- Limit the disturbance of estuarine and wetland habitat caused by construction activities
- Job creation

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

OBJECTIVE 1: LIMIT THE IMPACT ON TERRESTRIAL BIODIVERSITY

<i>Impact Management Objective: To limit the impact on terrestrial biodiversity from the construction site.</i>			
Potential impact to avoid	• Permanent or temporary loss of indigenous vegetation due to clearance activities. • Permanent or temporary loss of indigenous vegetation outside of the construction footprint.		
Impact Management Outcome	Impact on terrestrial biodiversity is limited to the construction footprint and only to what is required to undertake the activities.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• The proposed development footprint should be fully demarcated (stakes and danger tape) during the construction phase, and all construction activities must be done within this demarcated area.		Contractor	Construction phase

- In the areas as displayed in Figures 11 to 14 (Appendix G of this EMPr), the topsoil that is removed during construction must be kept separate from the lower soil and replaced accordingly - Alien invasive trees (<i>Acacia</i> spp.) within the proposed development footprint in the section, as displayed in Figures 11 to 14 (Appendix G of this EMPr), should be removed.			
Performance Indicator	Impact on terrestrial biodiversity is limited to the construction footprint and only to what is required to undertake the activities.		

OBJECTIVE 2: LIMIT THE IMPACT ON PLANT SPECIES

Impact Management Objective: To limit the loss of indigenous flora and SCC during the construction process			
Potential impact to avoid	Loss of plant species during construction.		
Impact Management Outcome	Only the approved footprint and a reasonable working corridor is disturbed by construction activities.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- The proposed development footprint should be fully demarcated (stakes and danger tape) during the construction phase, and all construction activities must be done within this demarcated area. - In the areas as displayed in Figures 11 to 14 (Appendix H of this EMPr), the topsoil that is removed during construction must be kept separate from the lower soil and replaced accordingly - Alien invasive trees (Acacia spp.) within the proposed development footprint in the section, as displayed in Figures 11 to 14 (Appendix H of this EMPr), should be removed.		Contractor	Construction phase
Performance Indicator	Only the approved footprint and a reasonable working corridor is disturbed by construction activities.		

OBJECTIVE 3: LIMIT THE IMPACT ON ANIMAL SPECIES

<i>Impact Management Objective: To prevent the direct mortality of, or displacement of fauna during the construction process</i>			
Potential impact to avoid		• Loss of and/or displacement of animal species during construction.	
Impact Management Outcome		Trapped animals must be relocated outside of the development footprint.	
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- The proposed development footprint should be fully demarcated (stakes and danger tape) during the construction phase, and all construction activities must be done within this demarcated area. - Ditches that are dug for the sewage pipelines should be inspected daily for the presence of trapped animals (frogs, snakes, small mammals).		Contractor	Construction phase
Performance Indicator		Trapped animals must be relocated outside of the development footprint.	

OBJECTIVE 4: LIMIT THE DISTURBANCE OF ESTUARINE AND WETLAND HABITAT CAUSED BY CONSTRUCTION ACTIVITIES

<i>Impact Management Objective: To prevent the contamination of ground water through chemical spills or leaching of chemicals during construction</i>		
Potential impact to avoid	• Disturbance and impact on adjacent estuarine habitat.	
Impact Management Outcome	Construction activities are limited to the construction footprint.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase to monitor and report back on compliance with conditions of the environmental authorisation. • Consult weather forecasts daily and weekly. Do not work during rainfall and minimise the storage of mobile materials in low-lying areas. Plan the construction area as if it could be inundated with floodwaters in the event of a significant rainfall event. • Construction access for the pipeline through Zone D (see Figure 5 of this EMPr and Appendix F) should utilise existing access points from Long Street. No new roads should be necessary. • The width of the working area through Zone D (see Figure 5 of this EMPr and Appendix F) must be as narrow as possible and must be clearly demarcated. Estuarine habitat outside of this demarcated area must be considered as No-Go areas.	Contractor	Construction phase

• Revegetation of the pipeline through Zone D (see Figure 5 of this EMPr and Appendix F) must be actively encouraged. The route is currently well covered by indigenous vegetation (e.g. sedges, <i>P. australis</i>, <i>Stenotaphrum secundatum</i> etc.). It is recommended that when trenching, a top layer of vegetation in association with 20-30 cm of soil should be removed and set aside for replanting or covering the filled in trench. • Open trenching for sewer lines should be done in as short a stretch as possible and backfilled with material as soon as possible to reduce the likelihood of material loss in the event of flooding. • Keep a skip on site so that any waste materials can be conveniently discarded and removed. This includes small amounts of dirty water, such as that used for mixing concrete. • Equipment and materials lay-down areas should be located away from estuarine habitat and stormwater channels leading into the estuary. Minimise the storage of loose materials in case of a flood event that could wash them into the estuary. • Post-construction site clean-up must be completed to ensure the entire site footprint and surrounding area has been cleared of litter and any waste materials associated with construction. The ECO should be informed of the construction close-out and complete an inspection to ensure this measure has been implemented. • The pipeline route through Zone D (see Figure 5 of this EMPr and Appendix F) must be routinely inspected for the establishment of alien invasive plant species. This must be done at a high frequency following construction (i.e. monthly) and can be reduced once natural vegetation along the pipeline has recovered. These must be controlled by hand. No aerial application of herbicides is permitted. Herbicides may only be applied to cut-stumps and must be registered for use on the target plant species.		
Performance Indicator	Construction activities are limited to the construction footprint.	

OBJECTIVE 5: JOB CREATION

<i>Impact Management Objective: To create employment opportunities with potential for skills transfer, for members of the local community.</i>			
Potential impact to be promoted	• Temporary jobs opportunities • There may be opportunities to transfer skills from more experienced workers to less experienced workers.		
Impact Management Outcome	The local community benefits from the employment opportunities created during the construction phase.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
• No mitigation required for this positive benefit. However, where practical preference must be given to previously disadvantaged individuals from the local community when appointing contractors/ workers. • Skills transfer between members of the workforce should be encouraged.		Contractor	Construction phase
Performance Indicator	The majority of the construction team is from the local community, with preference given to historically disadvantaged individuals. Skills transfer from experienced to less experienced workers is actively encouraged on site.		

11. Environmental impact management post construction rehabilitation phase

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

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

- rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner

OBJECTIVE 1: SITE CLOSURE & REHABILITATION

Impact Management Objective: To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner.		
Potential impact to avoid	• Failure to remove all construction related waste and materials may result in environmental pollution. • Failure to remove all construction related equipment, machinery and site facilities may pose an impact to the natural environment. • Failure to stabilise disturbed surfaces may result in soil erosion and increased storm water run-off, which may limit successful revegetation of the site.	
Impact Management Outcome	The site is neat and tidy, and all exposed surfaces are suitably covered/ stabilised. There is no construction-related waste or pollution remaining on site.	
IMPACT MANAGEMENT ACTIONS		
Mitigation measure	Responsible party	Time period
• On completion of the construction operations, the site camp area must be cleared of all site camp facilities, ablution facilities, fencing, signage, waste and surplus material. • Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the ECO. • Any contaminated soil must be collected and disposed of as hazardous waste. • All construction waste, litter and rubble are to be removed from the site and re-used elsewhere or recycled/disposed of at an appropriate facility. • Burying or burning of waste or rubble on site is prohibited. • All areas within the working area and site camp that have become devoid of vegetation or where soils have been compacted due to construction activities must be scarified or ripped. • Topsoil removed during the establishment of the site camp and the working area must be spread evenly over the entire site camp area and all other disturbed/ exposed areas after those areas have been ripped, scarified, shaped and contoured (as required). • Where necessary seeding and planting of vegetation can take place after the replacement of the topsoil. Hardy, drought tolerant, non-invasive plant species must be selected. If needed, a layer of mulch can be applied to the newly shaped/ landscaped and topsoiled areas. The mulch will serve to limit erosion and will promote the re-vegetation of the site by retaining moisture in the soil and providing organic material (compost) for new plant growth. Mulched material must be spread to a depth of ± 50mm – a thinner layer is likely to be ineffective in protecting the site, while thicker layers may suppress plant growth.	Contractor	Post-Construction phase

• All exposed soils and recently topsoiled areas are to be re-vegetated or stabilised to the satisfaction of the ECO, to protect these areas from wind and water erosion. No areas are to be left exposed to erosive forces. Erosion protection measures that can be applied include mulching (described above), the placement of geotextile, onion bags filled with wood chips, brush-packing or other similar measures. • Any topsoil, subsoil or other excavated material that cannot be utilised during site rehabilitation must be removed from the site and reused elsewhere on the property or disposed of at an appropriate disposal site. • Where necessary disturbed soils must be revegetated with the local indigenous vegetation such as that which occurs at the site or provided with other suitable cover. • It is recommended that follow-up alien clearing be conducted 6 months after construction is complete.		
Performance Indicator	• All construction-related materials, equipment, facilities, waste and contaminated soils have been removed from the site. • Compacted soils have been scarified/ ripped and stabilised. • All disturbed/exposed surfaces have been provided with a suitable covering and/or stabilised. • No alien vegetation is evident on site.	

12. Environmental impact management operational phase

During the operational lifespan of the upgraded sewerage pipeline, occasional maintenance activities may be required to ensure the system continues to function safely and efficiently. These may include routine inspections, clearing of blockages, repairing minor defects, or responding to unplanned operational issues. While such activities are typically infrequent and of short duration, they may still introduce limited environmental risks—particularly given the pipeline’s location within or adjacent to the estuarine functional zone. To ensure that maintenance works are undertaken responsibly and with minimal environmental disturbance, the following objectives are applicable

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

- To prevent pollution of wetland and estuarine habitat caused by pipe blockages
- To limit disturbance of wetland and estuarine habitat caused by maintenance activities

OBJECTIVE 1: TO PREVENT POLLUTION OF WETLAND AND ESTUARINE HABITAT CAUSED BY PIPE BLOCKAGES

Impact Management Objective: To prevent pollution of wetland and estuarine habitat caused by pipe blockages.			
Potential impact to avoid	Occasional leaks due to damages or blockages resulting in pollution of wetland and estuarine habitats.		
Impact Management Outcome	The risk of polluting the wetland or estuary habitat is reduced.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
- When blockages to sewerage infrastructure within the EFZ occur, the maintenance team should ensure a honey-sucker is on standby to mop up any spills or overflows for removal and disposal at the Wastewater Treatment Works. - Any serious sewage spills that result in large quantities of sewage leaking from a pump station or manhole must be contained in a temporary coffer dam which can be constructed using sandbags for the walls and plastic sheeting as a base. From here, honey-suckers can collect sewage for removal. - Any water-tight seals around manholes, joints or other access points that must be broken for maintenance should be replaced thereafter to ensure the mitigation measures to prevent water ingress or sewage leakage are maintained under flood scenarios. - Keep sewer lines clear of dense vegetation to facilitate access and reduce the risk of roots cracking sewer lines.		Mossel Bay Municipality	Operational Phase

Performance Indicator	Mitigation measures of the specialist are adhered to.
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OBJECTIVE 2: TO LIMIT DISTURBANCE OF WETLAND AND ESTUARINE HABITAT CAUSED BY MAINTENANCE ACTIVITIES

<i>Impact Management Objective: To limit disturbance of wetland and estuarine habitat caused by maintenance activities.</i>			
Potential impact to avoid	Damage or disturbance of nearby wetland and estuarine habitat due to maintenance activities.		
Impact Management Outcome	The risk of disturbing or damaging nearby wetland and estuarine habitat is reduced.		
IMPACT MANAGEMENT ACTIONS			
Mitigation measure		Responsible party	Time period
All of the mitigation measures provided for the construction phase are applicable to maintenance work where applicable.		Mossel Bay Municipality	Operational Phase
Performance Indicator	Mitigation measures of the specialist are adhered to.		

13. Emergency Preparedness

13.1 Emergency response procedures

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

- The construction contractor is responsible for ensuring that the requirements of the Occupational Health & Safety Act (OHSA) are adhered to during the construction phase. The Applicant is responsible for ensuring compliance with the OHSA during the undertaking of construction activities.

13.2 Emergency preparedness

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

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

14. Method statements

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

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

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

- Establishment of site camp and stockpile area.
- Cement/ concrete batching, disposal and emergency contingencies.
- Topsoil and sub-soil storage/ stockpiling.
- Storage of fuels and hazardous chemicals and emergency contingencies.
- Waste management system.
- Storm water management and control.
- Emergency preparedness plan / emergency response procedure (see Chapter 13).

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

15. Roles and Responsibilities

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

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

Duty of Care:

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

15.1 Duties and Responsibilities of the Applicant

The Applicant is ultimately responsible for ensuring that the environmental management measures specified in this EMPr, as well as any other conditions specified by the competent authority, are implemented and adhered to during the construction phase of the proposed development.

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

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

15.2 Duties and Responsibilities of the Contractor

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

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

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

- Identify emergency situations that may arise as a result of construction activities and formulate appropriate emergency response procedures (see Chapter 13).
- Ensure that all construction workers, including sub-consultants and service providers, undergo environmental awareness training prior to commencing work on site, or as soon as possible thereafter (see Chapter 16).
- Compile the required method statements, which must be to the satisfaction of the ECO, before commencing with the activity to be governed by the method statement (Chapter 14).
- Respond to concerns or issues identified by the ECO, as relates to environmental management, and implement the appropriate management or remediation measures, at the Contractor's own expense (unless agreed otherwise)
- Should third parties be called to the site to perform clean up and rehabilitation procedures, the Construction Contractor will be responsible for all associated costs.

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

15.3 Duties and Responsibilities of the ECO

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

Competency of the ECO

The ECO must be independent of the Applicant, Engineer, Construction Contractor and their service providers. The appointed ECO must be suitably qualified and experienced, and must be able to demonstrate that he / she is of sufficient competency to undertake the required task. The ECO should preferably be a resident in close proximity to the development area to ensure quick response if required. The ECO must work in close co-operation with the Construction Contractor, resident engineer or ESO

(where applicable) and all contractors in order to identify potential problems before they occur, and provide suitable guidance as to how the identified problems (environmental impacts) can be avoided.

Duties of the ECO

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

- Conduct a pre-construction site inspection to ascertain the pre-commencement condition of the site (i.e. the status quo) and determine whether faunal search-and-rescue is required;
- Conduct environmental awareness training (see Chapter 16);
- Undertake regular site visits to monitor compliance with all mitigation, monitoring and management measures contained in the EMPr and the Environmental Authorisation, during the pre-construction, construction and rehabilitation phases of the development (see section below regarding frequency of ECO visits).
- Evaluate the achievement of the performance indicators associated with each impact management outcome specified in this EMPr (Chapters 9-12)
- Liaise with site contractors, engineers and other members of the development team with regard to the requirements of the EMPr;
- Provide guidance as and when required regarding the implementation of the environmental management measures contained in the EMPr and EA, so as to assist the Applicant and contractor in remaining compliant with these measures;
- Assist in finding environmentally acceptable solutions to construction problems;
- Ensure that the working area, site camp facilities, access roads and no-go areas are properly demarcated;
- Ensure that proper topsoil management practices are adhered to on site;
- Ensure that proper waste management & pollution prevention strategies are practised on site;
- Examine method statements;
- Email contractors with potential non compliance notices in case of contravention of the EMPr;
- Ensure satisfactory rehabilitation of disturbed areas on site, after construction is complete;
- Keep detailed records of all site activities that may pertain to the environment, and produce compliance-monitoring reports (ECO Reports) for submission to the Applicant, and the Competent Authority at regular intervals during the construction phase;
- Submit a final post-construction inspection report, within 6 months of completion of the construction phase. The audit report must detail the rehabilitation measures undertaken, describe all major incidents or issues of non-compliance and any issues or aspects that require attention or follow-up.
- All ECO Reports and Inspection Reports must be submitted to the Applicant and Competent Authority.

Frequency of ECO visits

The ECO must conduct weekly site visits during the initial bulk earthworks (civils), to check compliance with the conditions of the EA and mitigation measures and recommendations of this EMPr. The ECO has the discretion to undertake additional visits if he / she feels this is justified due to the actions of the contractors, and to make *ad hoc* visits in order to ensure compliance.

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

Once the footprint has been established and the cofferdam is in place, the site visit frequency can be reduced to two visits per month. Once the cofferdam is removed and activities are limited to the mechanical aspects within the building the visits can be reduced to one visit per month.

Authority of the ECO

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

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

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

16. Environmental Awareness Plan

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

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

1. This EMPr must be kept on site at all times.
2. The provisions of this EMPr and the conditions of the Environmental Authorisation must be explained in detail to all staff during Awareness Training.
3. Training booklets will be handed out to all labourers and must be explained to them.
4. Weekly checks to be done by the Applicant's environmental representative (where available) who must be on site at all times.
5. The ECO to do frequent site visits, as recommended in Section 15.3 of the EMPr.
6. Monthly monitoring reports to be compiled by the ECO. These reports will be circulated to all parties involved (including the applicant, contractor and the competent authority).

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

- The demarcated "No-Go" areas;
- General do's and don'ts of the site;
- Making of fires;
- Waste management, use of waste receptacles and littering;
- Use of the toilets provided;
- Use and control of construction materials and equipment etc.;

- Control, maintenance and refuelling of vehicles;
- Methods for cleaning up any spillage;
- Access and road safety;
- Emergency procedures (e.g. in case of fire, spillage etc.)
- General “best practice” principles, with regards to the protection of environmental resources.

Environmental awareness training and education must be ongoing throughout the construction phase and must be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMPr), or as new workers come to site. Translators must be utilised where needed. An Environmental Awareness Guideline has been compiled and is included in Appendix F of the EMPr.

17. Monitoring, Record Keeping and Reporting

17.1 Environmental Auditing

In accordance with the requirements of the Amended Environmental Impact Assessment Regulations of 2014 (GN No. R.327 of 7 April 2017), the holder of the Environmental Authorisation (i.e. the Applicant) must, for the period that the Environmental Authorisation is valid, appoint a suitably qualified independent person to conduct an environmental audit to audit compliance with the conditions of the Environmental Authorisation and the EMPr.

The appointed auditor must undertake environmental audits within 6 months after the completion of the rehabilitation measures. Following each audit the environmental auditor must submit an audit report to the Competent Authority (in this instance the DEA&DP). The Auditor must be independent from the EAP and ECO.

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

17.2 Construction phase monitoring, reporting and record keeping.

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

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

ECO Inspections - Photographic Records

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

ECO Inspections - Written Records

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

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

Construction Phase Record Keeping

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

17.3 Corrective Action Procedure

Correction actions need to be followed in the event where there is non-compliance with a condition of the EA and any recommendation and mitigation measure as stipulated in this EMPr in order to rectify the non-compliance and to prevent reoccurrence.

The ECO will be responsible for reporting non-compliance with any condition of the EA and the recommendations and mitigation measures as included in this EMPr. The ECO will also be responsible for the compilation of non-compliance reports and identifying steps to correct the non-compliance.

The ECO must report all non-compliance issues to the contractor whose responsibility it is to correct. A timeframe for the completion of the corrective actions must be agreed to the ECO. Once the corrective actions have implemented the contractor must notify the ECO. The ECO must review the effectiveness of the corrective actions and if it is found to be inadequate, additional measures must be implemented. Only once the corrective actions have been completed to the satisfaction of the ECO will the matter be considered as closed.

In instances where there are repeated instances where the requirements and conditions of this EMPr and the Environmental Authorisation are contravened or not fully complied with, the Construction Contractor may be liable for financial penalties. Penalties shall be issued by the Engineer, in accordance with the Schedule of Fines contained in the table below. Penalties may be issued at the Engineer's discretion, and/or upon the request/ recommendation of the ECO or Competent Authority.

Depending on the nature of transgression, the Engineer and/or ECO may issue one or more warnings to the Contractor prior to the issuing of a fine. Warnings may be given in writing or orally, but oral warnings must be followed up with written confirmation of the warning within 48 hours of the oral warning. The Engineer has the discretion to issue a fine without first issuing a warning, if the severity of the transgression is judged by the Engineer and/or ECO and/or Competent Authority to warrant such action.

The Engineer must ensure that the levying of fines/penalties forms part of the contract between the Construction Contractor and the Engineer and is subject to the provisions of South African contract law.

The table below specifies the transgressions for which the Construction Contractor may incur financial penalties, and the amount of the fines that may be levied. Levying of fines/ penalties is subject to alignment with South African Contractual Law. For repeat offences of the same/ similar transgression by the same party, the value of the fine shall be doubled for each subsequent repeat offence to a maximum value of **R50 000.00** per offence.

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

#	Finable Transgression	Min Fine	Max Fine
1	Failure to notify the ECO of the commencement of construction or pre-construction activities, prior to the commencement of such activities	R1 000	R2 000
2	Failure to comply with the provisions relating to the demarcation of the working area, site camp and associated facilities, and the maintenance of the demarcated boundaries.	R1 000	R5 000
3	Failure to comply with the provisions relating to the demarcation of all "no-go" areas, and the maintenance of the demarcated boundaries.	R2 000	R5 000

Environmental Management Programme

4	Failure to provide secured ablution facilities (1:30 ratio) on site.	R500	R15 000
5	Failure to comply with the provisions relating to the clearance of vegetation on site.	R2 000	R5 000
6	Clearance of indigenous vegetation (regardless of the density of alien vegetation present) outside of the demarcated boundaries of the working area and site camp.	R2 500	R15 000
7	Damage to indigenous vegetation in the surrounding areas within No-Go areas	R2 000	R10 000
8	Failure to apply herbicide to alien vegetation when required to do so.	R500	R2 000
9	Failure to adhere to designated access routes and/or the driving of vehicles through undeveloped vegetation outside of the demarcated working area or site camp.	R1 000	R5 000
10	Movement of vehicles and/or construction workers in no-go areas;	R1 000	R10 000
11	Empty cement bags found on site or surrounding vegetation. Open cement bags on site with cement blowing from the bag	R2 500	R15 000
12	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, within designated "no-go" areas.	R1 000	R10 000
13	Parking or storage of vehicles, machinery, tools and other materials or equipment related to the Contractors operations, outside of the areas demarcated for such parking/storage.	R500	R5 000
14	Failure to comply with the provisions relating to the management of topsoil and subsoil.	R1 000	R5 000
15	Excessive excavation of material in areas not depicted for such purpose / activity on the approved design plans.	R2 500	R10 000
16	Failure to comply with the provisions relating to waste management on site i.e. recycling of waste	R500	R5 000
17	Failure to comply with the provisions relating to the storage, use and management of hazardous substances and fuels on site and/or the spillage of hydrocarbons or hazardous substances on site.	R1 000	R10 000
18	Mixing cement or concrete on bare ground and/or failure to comply with any other provision regarding cement/ concrete batching	R1 000	R5 000
19	Failure to provide adequate fire-fighting equipment (in working order) on site at all times and/or failure to comply with the provisions relating to fire prevention and/or the occurrence of unattended or out of control fires.	R500	R5 000
20	Refuelling of vehicles, machinery or equipment outside of the designated refuelling area.	R500	R2 000
21	Maintenance of vehicles, machinery or equipment outside of the designated maintenance yard, except in emergencies	R500	R2 000
22	Failure to undertake refuelling or repairs over a drip tray or other impermeable bunded surface to collect spilled hydrocarbons (fuels, lubricants, oils etc.) and other hazardous substances; failure to provide drip trays under fuel burning equipment (including pumps and generators) where there is a risk of hydrocarbon leakage.	R500	R2 000
23	Storing / placing fuel containing equipment (i.e. bowsers and other fuel containers) within a drainage line.	R2 500	R10 000
24	Failure to produce a required method statement/s to the engineer's and ECO's satisfaction prior to undertaking the activity concerned and/or failure to adhere to an approved method statement	R1 000	R5 000
25	Waste found to be buried or burnt on site	R5 000	R15 000

18. CONCLUSION

The recommendations and mitigation measures prescribed in this EMPr have been formulated with the intention of addressing potential pre-construction, construction and operational phase impacts on the environment. It is likely that if the conditions, requirements and recommendations of the above EMPr are implemented as described and the relevant stakeholders adhere to the various mitigation measures, then the project will be completed without unforeseen negative environmental impacts. Familiarity with the contents of this EMPr by the contractors and other individuals involved in the development project will assist in achieving “environmental best-practice”, which ultimately ensures that the project arrives at a sustainable outcome.

APPENDIX A: LOCALITY MAPS

APPENDIX H: FIGURE 1: LOCALITY MAP FOR THE PROPOSED UPGRADING OF THE BULK SEWERAGE LINE FROM AMY SEARLE STREET / GREENHAVEN TO THE CRICKET FIELD SEWERAGE PUMPSTATION



Prepared for:
Mossel Bay Municipality

Date:
November 2025



APPENDIX B: SITE DEVELOPMENT PLANS

APPENDIX C: ENVIRONMENTAL AWARENESS GUIDELINE



GEORGE

TEL: +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953

EMAIL: info@sesc.net **WEBSITE:** www.sesc.net

ADDRESS: 102 Merriman Street, George, 6530

PO BOX: 9087, George, 6530

CAPE TOWN

TEL: +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869

EMAIL: lauren@sesc.net **WEBSITE:** www.sesc.net

ADDRESS: Unit 71, Eden on the Bay, 5 Beach Estate Boulevard
Blouberg, Big Bay, 7441

PO BOX: 443, Milnerton, 7435

ENVIRONMENTAL AWARENESS TRAINING BOOKLET

-
- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
 - Environmental Control & Monitoring • Public Participation • Broad scale Environmental Planning



Environmental Monitor's Foreword

SES is here to ensure that everyone complies with the conditions of "Duty to Care". If these conditions are not complied with the project can be stopped and fines can be issued.

We hope that with your co-operation the project won't be stopped and fines won't be issued, and a successful project can be finished on time.

Notes:

- Workers working on this project must undergo environmental training.
- The information contained in this document should be used during day-to-day activities.

HOW IS THIS PROJECT IMPLEMENTING ENVIRONMENTAL MANAGEMENT?

This project is implementing Environmental Management on an ongoing basis throughout the duration of the project. The following aspects would be implemented to achieve the above stated:

- A dedicated Environmental Manager or Environmental Control Officer appointment to the project to implement and monitor Environmental Management.
- Regular environmental inspection on the site.
- Regular environmental training for workers
- Environmental audits on a regular basis.

WASTE TREATMENT

Refuse:

- Refuse waste includes: waste food, food containers, packaging materials, cans, bottles, newspapers and magazines.
- Day to day household waste should always be disposed of in the containers provided on site by the company.
- No dumping of waste anywhere other than in the bins provided.
- No burning of refuse.
- If there are not enough refuse containers on site, the ECO or supervisor needs to be informed.

Construction Waste:

- Construction waste includes: concrete, steel, cement, rock, pre-coated chips, wood, plastic, empty bags and rubble.
- Construction waste must be discarded in skips located in strategic areas for removal.
- Construction waste must not be discarded in holes or burned on site.

- Small amounts of construction waste should be collected and not discarded into vegetation or down fill slopes.
- Material should only be spoiled if a rehabilitation plan has been designed for the area.

Liquid waste:

- Liquid waste includes: concrete, paint, thinners, diesel, hydraulic fluids, cooking oil, chemicals, other fuel and sewage.
- Use facilities provided for waste.
- The liquid waste should be recycled as far as possible.
- Use chemical toilets and ablution facilities.

INFORM THE ENVIRONMENTAL CONTROL OFFICER (ECO) IMMEDIATELY OF ANY IMMEDIATE OR POTENTIAL ENVIRONMENTAL INCIDENT.

SPECIFIC ENVIRONMENTAL ISSUES
SPESIFIEKE OMGEWINGSKWESSIES
IMIBA ETHILE YEZOBUME BEMEKO YENDALO

The basic Do's and Don'ts towards environmental awareness are as follows:

Die basiese Moets en Moenies van omgewingsbesinning is as volg:

Oondoqo bo mawukwenze no mawungakwenzi kwilinge lezobume be meko yendalo bume ngoluhlobo:

Toilet Facilities:
Toilet Fasiliteite:
Izindlu Zangase:

DO:

USE THE TOILET FACILITIES PROVIDED - REPORT FULL FACILITIES

MOET:

GEBRUIK MAAK VAN TOILET FASILITEITE WAT VOORSIEN WORD – RAPPORTEER AS FASILITEITE VOL IS

OMAWUKWENZE: SEBENZISA IZINDLU ZANGASESE
EZIBONELELWEYO- NIKA INGXELO NGAMALUNGISELELO
AGCWELEYO.

DO NOT:

USE THE BUSH

MOENIE:

DIE BOS GEBRUIK NIE

OMAWUNGAKWENZI: UKUSEBENZISA ITYHOLO.



Vehicles operation and maintenance:
Voertuig werking en onderhoud:
Ulawulo nophatho lezithuthi:

DO:

ENSURE THAT VEHICLES AND MACHINERY DO NOT LEAK FUEL OR OILS. REFUELLING, MAINTENANCE, SERVICING OR WASHING MUST BE DONE WITHIN THE DESIGNATED AREA IN THE CONSTRUCTION CAMP AREA ONLY.

MOET:

VERSEKER DAT VOERTUIG EN MASJINERIE NIE OLIES OF BRANDSTOF LEK NIE. VOLMAAK, ONDERHOUD, DIENS OF SKOONMAAK VAN VOERTUIG MOET SLEGS IN AANGEWYSTE AREAS IN DIE KONSTRUKSIE KAMP GESKIED.

OMAWUKWENZE: QINISEKISA IZITHUTHI NOMATSHINI ABAVUZI MAFUTHA OKANYE I OYILE, UKUGALELA, UKUPHATHA, UKULUNGISA OKANYE UKUHLAMBA KUFUNEKA KWENZIWE KUMMANDLA OTYUNJIWEYO KWINKAMPI YOLWAKHIWO KUPHELA NGOKUKHAWULEZILEYO.

DO:

REPORT ALL FUEL OR OIL SPILLS IMMEDIATELY & STOP THE SPILL CONTINUING.

MOET:

RAPPORTEER ENIGE BRANDSTOF OF OLIE STORTE & VERHOED DAT DIE STORT AANHOU.

OMAWUKWENZE: NIKA INGXELO NGE OLI NAMAFUTHA ACHITHEKILEYO, UZE UNQANDE UCHITHEKO LUNGAQHUBEKI.

DO:

PREVENT CONTAMINATION OR POLLUTION OF STREAMS AND WATER CHANNELS.

MOET:

VERHOED DIE KONTAMINASIE EN BESOEDELING VAN STROME & WATERKANALE.

OMAWUKWENZE : NQANDA USULELEKO OKANYE UNGCOLISEKO LWEMILAMBO NEMISELE YAMANZI.

DO NOT:

ALLOW WASTE, LITTER, OILS OR FOREIGN MATERIALS INTO THE STREAM

MOENIE:

TOELAAT DAT AFVALPRODUKTE, GEMORS, OLIES OF VREEMDE MATERIALE IN STROME BELAND NIE.

OMAWUNGAKWENZI: MUSA UKUVUMELA INCITHO, ULAHLO, IOYILE OKANYE EZINYE IZINTO EMILANJENI.



Fire Control:
Vuur Beheer:
Ulawulo Lemililo:

DO:

DISPOSE OF CIGARETTES AND MATCHES CAREFULLY. (Littering is an offence.)

MOET:

GOOI SIGARETTE & VUURHOUTJIES OP GEPASTE MANIER WEG WEG (rommelstrooi is 'n oortreding)

OMAWUKWENZE: LAHLA ISIGARETE NOOMATSHISI NGONONOPHELO (ukulahla lityala).

DO:

ENSURE A WORKING FIRE EXTINGUISHER IS IMMEDIATELY AT HAND IF ANY "HOT WORK" IS UNDERTAKEN e.g. welding, grinding, gas cutting etc.

MOET:

VERSEKER DAT 'N WERKENDE BRANDBLUSSER BYDERHAND IS INDIEN "WARM WERK" GEDOEN WORD bv. Sweiswerk.

OMAWUKWENZE: QINISEKISA ISICIMA-MLILO ESISEBENZAYO SISESANDLENI UKUBA KUKHO UMSEBENZI "OTSHISAYO" OWENZIWAYO, umz. ukuwelda, ugubo, ukuqhawula ugesi, njl.

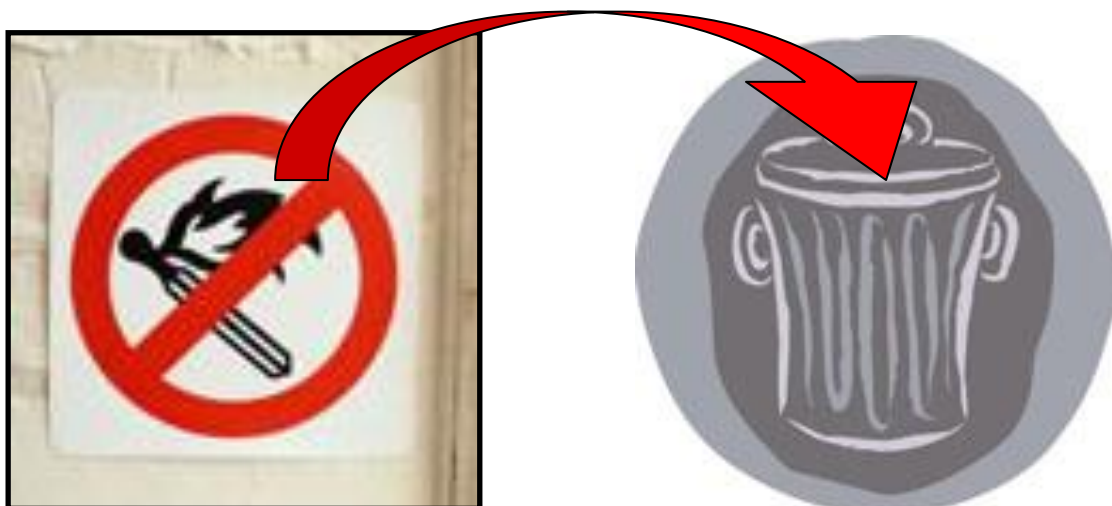
DO NOT:

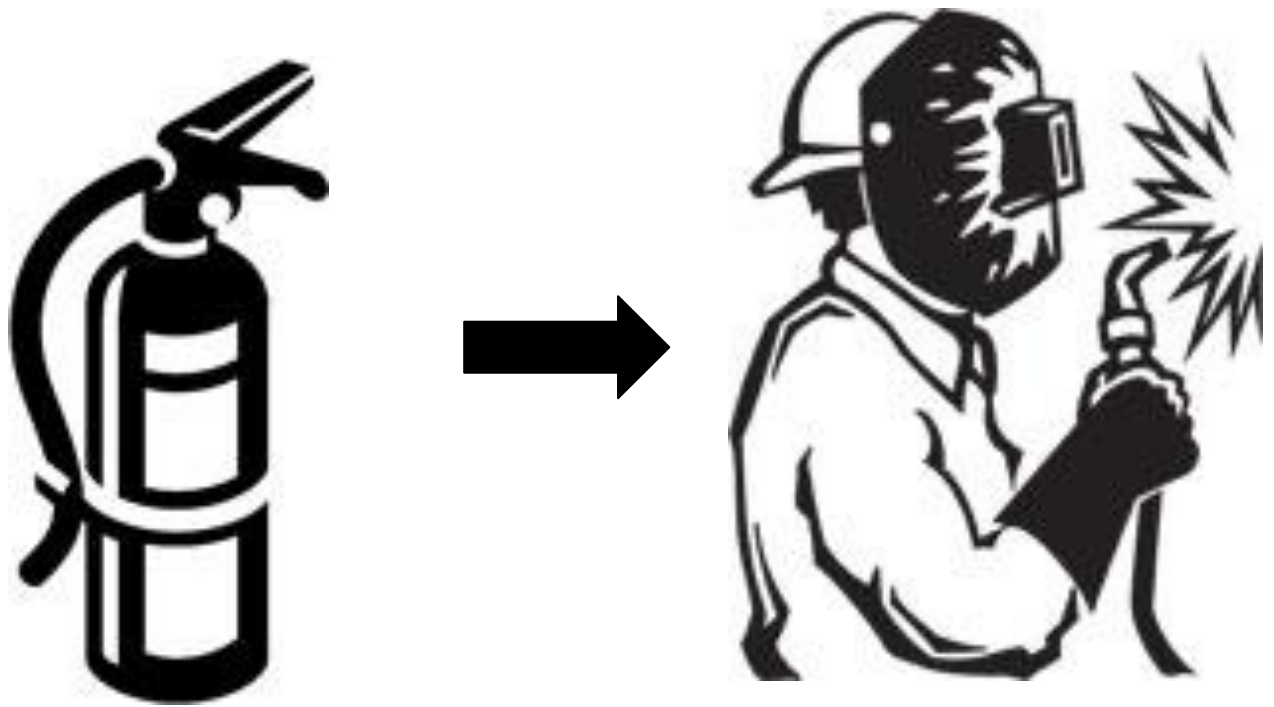
MAKE ANY FIRES

MOENIE:

ENIGE VURE MAAK OF ENIGEIETS VERBRAND NIE

OMAWUNGAKWENZI: UKWENZA IMILILO OKANYE UTSHISE NOKUBA YINTONI.





Fencing and Restricted Areas:
Omheining en Beperkte Areas:
Ubiyelo Nemimandla Engavumelekanga:

DO:

CONFINE WORK AND STORAGE OF EQUIPMENT TO WITHIN THE IMMEDIATE WORK AREA.

MOET:

BEPERK ALLE WERK EN STOOR VAN GEREEDSKAP TOT IN DIE GEGEWE WERKAREA.

OMAWUKWENZE: GCINA UMSEBENZI NEZIXHOBHO ZOKUSEBENZA NGAKUMMANDLA OKUSETYENZELWA KUWO.

DO NOT:

ENTER ANY FENCED OFF OR MARKED AREA. SUCH AREAS HAVE BEEN MARKED WITH “NO-GO AREA” SIGNS AND SHOULD BE ADHERED TO.

MOENIE:

ENIGE OMHEINDE OF GEMERKTE AREAS BINNEGAAN NIE. SULKE AREAS IS MET “NO-GO AREA” TEKENS GEMERK EN MOET GEHOORSAAM WORD.

OMAWUNGAKWENZI: MUSA UKUNGENA KWI NDAWO EBIYIWEYO OKANYE EPHAWULWEYO. IMIMANDLA ENJALO IPHAWULWE NGAMAGAMA ATHI “ **NO-GO AREA**”.



**NO-GO
AREA**

Safety:
Veiligheid:
Ukhuseleko:

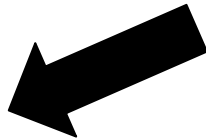
DO:

USE ALL SAFETY EQUIPMENT AND COMPLY WITH ALL SAFETY PROCEDURES.

MOET:

GEBRUIK ALLE VEILIGHEIDSGEREEDSKAP EN VOLDOEN AAN ALLE VEILIGHEIDS PROSEDURES.

OMAWUKWENZE: SEBENZISA ZONKE IZIXHOBO ZOKHUSELEKO, UZE UTHOBELE YONKE IMIGAQO YOKHUSELO.



Driving and Dust:
Bestuur en Stof:
Uqhubo Nothuli:

DO:

DRIVE ON DESIGNATED ROUTES ONLY.

MOET:

NET OP AANGEWYSTE ROETES BESTUUR.

OMAWUKWENZE: QHUBA KWIMIMANDLA EPHAWULWEYO
KUPHELA.

DO NOT:

SPEED OR DRIVE RECKLESSLY

MOENIE:

JAAG OF ROEKELOOS BESTUUR NIE.

OMAWUNGAKWENZI: SUKUQHUBA NGESANTYA ESIPHEZULU
OKANYE NGOKUNGAKHATHALI.

DO NOT:

ALLOW CEMENT TO BLOW AROUND.

MOENIE;

TOELAAT DAT SEMENT WEGWAAI NIE.

OMAWUNGAKWENZI: MUSUKUVUMELA ISAMENTE ISASAZWE.

DO NOT:

CAUSE EXCESSIVE DUST

MOENIE:

OORDREWE STOF VEROORSAAK NIE.



Vegetation protection:
Plantegroei Beskerming:
Ukhuselo Lwezityalo:

DO NOT:

DAMAGE OR REMOVE ANY VEGETATION WITHOUT DIRECT INSTRUCTION.

MOENIE:

ENIGE PLANTEGROEI SONDER DIREKTE INSTRUKSIE BESKADIG OF VERWYDER NIE.

OMAWUNGAKWENZI: MUSA UKUTSHABALALISA OKANYE USUSE NASIPHINA ISITYALO NGAPHANDLE KOMYALELO.



Animals:
Diere:
Izilwanyana:

DO NOT:

INJURE, CAPTURE/SNARE, FEED OR CHASE ANIMALS – this includes birds, frogs, snakes, lizards, tortoises, etc.

MOENIE:

ENIGE DIERE BESEER, VANG, VOER OF JAAG NIE – dit sluit in: voëls, paddas, slange akkedisse, skilpaaie ens.

OMAWUNGAKWENZI: MUSA UKWENZAKALISA, UKUBAMBA, UKONDLA OKANYE UKULEQA IZILWANYANA- okuquka iintaka, amasele, iinyoka, amacilikishe, izikolopati.

DO:

REPORT ANY INJURY OF AN ANIMAL.

MOET:

DIE BESERING VAN 'N DIER RAPPORTEER.

OMAWUKWENZE: XELA NASIPHI ISENZAKALO SESILWANYANA.



**Preventing Pollution:
Voorkoming van Besoedeling:
Ukhuselo Longcoliseko:**

DO:

CLEAR YOUR WORK AREAS OF LITTER AND BUILDING RUBBLE AT THE END OF EACH DAY – use the waste bins provided and ensure that litter will not blow away.

MOET:

RUIM NA ELKE DAG DIE WERK AREA OP EN GOOI ENIGE ROMMEL WEG IN DIE GEGEWE HOUERS – maak seker dat rommel nie kan wegwaai nie.

OMAWUKWENZE: COCA INDAWO OSEBENZA KUYO, IZINTO EZILAHLIWEYO NENKUNKUMA YOKWAKHA QHO EKUPHELENI KWEMINI-sebenzisa imigqomo yenkunkuma uze uqiniseke ukuba inkunkuma ayivuthuzwa ngumoya.

DO NOT:

ALLOW WASTE BINS TO OVERFLOW OR WASTE TO BLOW AROUND.

MOENIE:

TOELAAT DAT ROMMELHOUERS OORVLOEI OF DAT ROMMEL ROND WAAI NIE.

OMAWUNGAKWENZI: MUSA UKUVUMELA IMIGQOMO YENKUNKUMA IGCWALE KAKHULU OKANYE INKUNKUMA ISASAZEKE.

DO NOT:

LITTER OR LEAVE FOOD LAYING AROUND

MOENIE:

ROMMEL OF KOS LAAT RONDLÊ NIE.

OMAWUNGAKWENZI: MUSA UKUNGCOLISA OKANYE USHIYE UKUTYA KULELE INDAWO YONKE.

DO NOT:

BURY ANY LITTER OR WASTE IN THE GROUND.

MOENIE:

ENIGE ROMMEL OF GEMORS IN DIE GROND BEGRAWE NIE.

OMAWUNGAKWENZI: MUSA UKUNGCWABA INKUNKUMA EMHLABENI.



APPENDIX D: CURRICULUM VITAE OF AUTHOR



GEORGE
TEL: +27 (0) 44 873 4923 FAX: +27 (0) 44 874 5953
EMAIL: info@sescs.net WEBSITE: www.sescs.net
ADDRESS: Unit 17 Cathedral Square,
Cathedral Street, George, 6530
PO BOX: 9087, George, 6530

CAPE TOWN
TEL: +27 (0) 21 554 5195 FAX: +27 (0) 86 575 2869
EMAIL: betsy@sescs.net WEBSITE: www.sescs.net
ADDRESS: Tableview, Cape Town, 7441
PO BOX: 443, Milnerton, 7435

CURRICULUM VITAE

MICHAEL JON BENNETT

PERSONAL

Profession: Principle Environmental Assessment Practitioner and Senior Environmental Control Officer, Sharples Environmental Services cc, George

Possion: Director – George

Nationality: South African

Date of Birth: 22 October 1985

Languages: English (read, write and speak) & Afrikaans (read, write and speak)

Marital Status: Single

Drivers License: Code B

Health: Excellent

EAPASA Reg: 2021/3163

IAIASA Membership: 7334

WORK EXPERIENCE

2014 – Present: Sharples Environmental Services cc, George, WC
Environmental Assessment Practitioner

I have gained extensive experience in assessments and monitoring and have worked on a variety of multidisciplinary projects and am proficient in:

- Basic Assessments Reports
- Water Use Authorisation Applications
- Environmental Monitoring and Reporting
- Environmental Management Programmes
- Environmental Control Officer Training
- Conducting Outeniqua Sensitive Coastal Area licensing applications

2016 – 2017: Sharples Environmental Services cc, Cape Town, WC
Intrim Office Manager, Environmental Assessment Practitioner

2011 – 2014: Peninsula Permits & NCC Group, Cape Town, WC
Environmental Control Officer

TERTIARY EDUCATION

2010 University of Cape Town

- I hold a Bachelor of Science Degree specialising in Environmental and Geographic Science & Ocean and Atmospheric Science

PROJECTS

- | | | |
|-------------|---|----------------------------------|
| 2024 | George | George Municipality |
| ▪ | Basic Assessment Report for the proposed upgrade of the Gwaing wastewater treatment works on the remainder of erf 464, George, Western Cape | |
| 2024 | George | 3MP Sales and Education Services |
| ▪ | Basic Assessment Report for the proposed mixed-use development on erf 998 and the remainder of the farm zandhoogte no. 139, Tergniet, Mossel Bay, Western Cape | |
| 2024 | Mossel Bay | Hartland lifestyle estate |
| ▪ | Part II amendment of the appeal environmental authorisation issued on 18 august 2009 (as amended) and the EMPr for the proposed residential development on a portion of the farm vaale valley 219, Mossel Bay - Hartland lifestyle estate | |
| 2024 | George | George Municipality |
| ▪ | Basic Assessment Report for the proposed upgrading of the Herold's Bay pump station and associated rising main as well as the development of new associated infrastructure on erf 116, remainder of erf 95, remainder of farms 236 and 237 and portions 10, 35 and 37 of farm brakfontein no. 236, Herold's Bay, George, Western Cape | |
| 2024 | George | George Municipality |
| ▪ | Part II Amendment of Environmental Authorisation for proposed development of a Photovoltaic Solar Plant on erf 2819, George, Western Cape | |
| 2024 | George | George Municipality |
| ▪ | Basic Assessment Report for the proposed repair and rehabilitation of flood damage along the Camphersdrift River in the Van Riebeeck Park (Project 28(3)), George, Western Cape | |
| 2024 | Plettenberg Bay | The More Family Collection |
| ▪ | Basic Assessment Report for the proposed expansion of the Milkwood Manor and parking on erf 10190, remainder of erf 2066 and the remainder of erf 706, Plettenberg Bay, Western Cape | |

- 2023** George Urban Country Estate (Pty) Ltd
- Basic Assessment Report for the proposed residential development on erf 19374 (remainder erf 6182, erven 6179 and 6156), George, Western Cape
- 2023** George George Municipality
- Basic Assessment Report for the Upgrading of the Eden Pumpstation, George, Western Cape
- 2023** Mossel Bay Paprenax Trading 6 cc
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape
- 2023** George George Municipality
- Basic Assessment Report for proposed upgrade of the Schaapkop Pumpstation rising main on remainder of erf 464 and erf 13486, George, Western Cape
- 2023** George Garden Route Gateway Plaza
- Basic Assessment Report for proposed mixed-use development on portions 278 and 282 of farm Kraaibosch no. 195, George, Western Cape
- 2023** George George Municipality
- Basic Assessment Report for proposed development of a Photovoltaic Solar Plant on erf 2819, George, Western Cape
- 2023** George EARP Construction
- Basic Assessment Report for the proposed commercial development on portion 49 of Farm Hansmoeskraal 202, George, Western Cape
- 2022** George Pieter Koen Development Company
- Basic Assessment Report for the proposed residential development on Portion 21 of the Farm Kraaibosch No. 195 (Pieter Koen), George, Western Cape
- 2022** Mossel Bay Dalmar
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the Proposed Residential Development On A Portion Of The Farm Vaale Valley 219, Mossel Bay (Hartenbos Landgoed II), Western Cape

- 2022** George Dalmar
- Amendment of Environmental Authorisation Proposed Development of Herold's Bay Country Estate on A Portion of Portion 7 of The Farm Buffelsfontein No. 204, Herold's Bay, Western Cape
- 2022** George Pieterkoen Trust
- Basic Assessment Report for the proposed residential development on Portion 21 of the Farm Kraaibosch No. 195 (Pieter Koen), George, Western Cape
- 2022** Still Bay W. Nel & Irma Oosthuizen Trust IT 1596/2008
- Basic Assessment Report for the development of 5 residential units on erven 4139, 4140, 4141, 4142, 4143, 4144, 4145 (Erf 3997), Still Bay West, Western Cape
- 2022** George Octo Trading 377 cc
- Section 24 G Retrospective Environmental Authorisation for the alleged unlawful construction of a road clearance of vegetation to establish a house on remainder of Farm Holle Kloof 91 and Portion 1 of the Farm Plattekleof 131, Waboomskraal, George, Western Cape
- 2022** Knysna CapeNature
- Basic Assessment Report for the Proposed development on Portions 38 and 39 of Farm 205 and Remainder of Farm 211, Goukamma Nature Reserve, Knysna, Western Cape
- 2021** Prince Albert Jurie Klue
- Section 24 G Retrospective Environmental Authorisation for the alleged unlawful clearance of vegetation on Farm Angliers Bosch (Fernkloof), Remainder of Farm 157, Klaarstroom, Prince Albert, Western Cape
- 2021** Mossel Bay Mossel Bay Municipality
- Basic Assessment Report for the proposed Dana Bay Emergency Access Road on Remainder of Portion 7 of the Farm 225, Dana Bay, Mossel Bay, Western Cape
- 2021** Willowmore LEZMIN 2087cc
- Basic Assessment Report for the proposed development of Portion 1 of the Farm Matjiesfontein No. 206, Baviaanskloof, Division Willowmore, Eastern Cape
- 2020** Sedgefield Knysna Municipality
- Basic Assessment Report for the proposed housing development on erven 3861, 3865, 3866, 3917, 3918 and 5010 in Sedgefield, Knysna, Western Cape

- 2020** Mossel Bay Paprenax Trading 6 cc
- Basic Assessment Report for the proposed establishment of a filling station and associated business infrastructure on a portion of erf 13996, Kwanonqaba, Mossel Bay, Western Cape
- 2020** Ladismith Department of Transport and Public Works
- Maintenance Management Plan for the periodic maintenance of Trunk Road 31, section 4, km 30.8 to km 76.06, Barrydale to Ladismith, Western Cape
- 2020** Knysna Knysna Municipality
- Maintenance Management Plan for the Maintenance of the potable water pipeline system on Erven 4197, RE/1352, RE/1351, RE/1146 and 1316 in Knysna, Western Cape
- 2020** Humansdorp Kouga Municipality
- Environmental Control Officer for the Phase 1A of New municipal 66kV double circuit overhead line between the Melkhout substation at Humansdorp and the main intake substation at Jefferys Bay, Eastern Cape
- 2020** Humansdorp Kouga Municipality
- Environmental Control Officer for the Construction of a new 22kv overhead powerline between Melkhout substation and Allison Street, Humansdorp, Eastern Cape
- 2020** Knysna Knysna Municipality
- Environmental Control Officer for the Charlesford raw water pumping scheme: Upgrade and refurbishment of pumpstation: Mechanical and electrical, Knysna, Western Cape
- 2020** Seweweekspoort, Department of Transport & Public Works
- Amendment of Environmental Authorisation (Part 2, Substantive amendment) for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape
- 2019 – 2021** Seweweekspoort, Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to road structures on MR309 in Seweweekspoort, Western Cape
- 2019** George George Municipality
- Environmental Control Officer for the Raising of the Garden Route Dam Spillway on Portion 3/352, Remainder of 536 of Erf 221, Erf 3055 and Erf 3056, George, Western Cape

- 2019** Laingsburg Department of Agriculture
- Environmental Control Officer for the Construction Of Erosion Prevention Structures Within The One In Ten Year Flood Line Of The Buffels River, Laingsburg, Western Cape
- 2019** Williston Williston Municipality
- Environmental Control Officer for the Upgrading of bulk water network in Williston – Phase 3, Williston, Northern Cape
- 2019** George George Municipality
- Environmental Control Officer for the construction of new 66kV overhead line between Ballots Bay and Glanwood substations, George, Western Cape
- 2019** Oudtshoorn Department of Transport & Public Works
- Environmental Control Officer for the Periodic maintenance of Trunk Road 31, Section 6, km 23.3 to km 47.8 Calitzdorp to Oudtshoorn, Western Cape
- 2019** Kleinbrak Mossel Bay Municipality
- Environmental Control Officer for the Upgrading of Beyers Street, Klienbrak River, Western Cape
- 2019** George Outeniqua Eye Clinic Body Corporate
- Environmental Control Officer for the proposed expansion of parking area on erf 5950 and part of remainder erf 464, George, Western Cape
- 2019** Mossel Bay Hey Innovations
- Basic Assessment Report for the proposed establishment of a residential development on Erf 2839, Great Brak River, Western Cape
- 2019** Oudtshoorn Oudtshoorn Municipality
- Environmental Management Programme for the Blossoms Emergency Supply Scheme, Oudtshoorn, Western Cape
- 2019** Humansdorp Clinkscapes Maughan-Brown
- Environmental Management Programme for the proposed construction of a new 22kV overhead powerline between Melkhout Substation and Allison Street, Humansdorp, Eastern Cape
- 2019** George PN&MR Lotter Family Trust
- Addendum to the Environmental Management Programme for the Establishment of a Township (Rivendale) on Portions 5, 15, 16 and 31 of the Farm Hansmoeskraal 202, Western Cape

- 2019** Oudtshoorn Department of Transport and Public Works
- Basic Assessment Report for the Proposed Maintenance Activities of Trunk Road 33/4 between km 4.6 and km 14.4, Meiringspoort, Western Cape
- 2019** George Dynarc Capital
- Substantive amendment of environmental authorisation for the proposed Development of Portion 130, 131 and 132 of the Farm Gwayang 208
- 2019** George Department of Transport & Public Works
- Basic Assessment Report for the proposed Upgrading of Bridge No. 2221 on Trunk Road 2/9 at km 15.1 over the Maalgate River.
- 2018 - 2019** Oudtshoorn Department of Transport and Public Works
- Maintenance Management Plan for the proposed periodic maintenance of Trunk Road 31, section 6, km 23.3 to km 47.8, Western Cape
- 2018 - 2019** Humansdorp Clinkscapes Maughan-Brown
- Applicability of the EIA regulations Checklist for the proposed new 22kV overhead line between Melkhout Substation and Allison Street, Eastern Cape
- 2018 - 2019** Knysna Knysna local Municipality
- Applicability of the EIA regulations Checklist for the proposed Rheenendal infill housing, subdivision and rezoning of portions of erf 42, 36 and 387 as well as erven 535, 536, 553, 54, 393, 406, 672, 673 and 68, Rheenendal, Western Cape
- 2018 - 2019** Knysna Knysna local Municipality
- Applicability of the EIA regulations Checklist for the proposed infill housing and subdivision of erven in Welsyndorp and the rezoning and subdivision of erven in Bosdorp, Karatara, Western Cape.
- 2018** Port Elizabeth ACSA P.E.
- Applicability of the EIA regulations Checklist for the proposed ACSA Port Elizabeth Airport Photovoltaic Plant, Eastern Cape Province
- 2018** Mossel Bay TopUp Prop Inv.
- Applicability of the EIA regulations Checklist for the proposed Farm Stall Centre and filling Station on Portion 65 of the Farm Hartenbosch 217, Hartenbos

- 2018** George Outeniqua Eye Clinic Body Corporate
- Basic Assessment Report for the proposed expansion of parking area on erf 5950 and part of remainder erf 464
- 2018** Beaufort West Beaufort West Municipality
- Environmental Control Officer for the First and Second Environmental Audit for the provision of adequate water supply within the jurisdiction of the Beaufort West municipality
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Management Programme update for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation and the construction of a new 22kV overhead power line between the Midbrak and Kleinbrak Substations.
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Control Officer for the construction of a new 22kV overhead power line between the Midbrak and Kleinbrak Substations
- 2018** Mossel Bay Element Consulting Engineers
- Environmental Control Officer for the Upgrade of Amy Searle Canal – Phase 5, Great Brak River
- 2018** Gouritsmond Hessequa Consulting Engineers
- Environmental Control Officer for the Upgrade and expansion of the Gouritsmond Water Treatment Works on remainder of erf 140, Gouritsmond
- 2018** George Biprops 14
- Environmental Control Officer for the residential development on portion 5 of the farm Kraaibosch No. 195, Groenkloof Woods: Phase C & D
- 2018** Knysna Knysna Municipality
- Environmental Control Officer for upgrading of Knysna bulk water supply scheme: phase 2B
- 2018** Plettenberg Bay Bitou Municipality
- Environmental Control Officer for the upgrade of the Kranshoek Bulk Water Supply Scheme: Construction of Pipelines, reservoirs and associated infrastructure near Plettenberg Bay.
- 2018** Mossel Bay SMEC
- Environmental Control Officer for the Upgrade of Kusweg and associated infrastructure in Rheeboek

- 2017** George EARP Construction
- Invasive Alien Management Plan for the proposed residential development on portions 21, 23, 24 & 48 of Farm Hansmoeskraal 202 near George
- 2017** Mossel Bay Mossel Bay Municipality
- Environmental Control Officer for the development of the new Mossel Bay municipal cemetery on erf 2001/0
- 2017** Knysna Knysna Municipality
- Environmental Control Officer for the remedial work to prevent further settlement of the low-lift pump sump and retaining wall at Gouna River Pump Station
- 2017** Knysna Knysna Municipality
- Environmental Control Officer for upgrading of Knysna bulk water supply scheme: phase 1
- 2017** George Biprops 14 (Pty) Ltd
- Environmental Control Officer for the residential development on portion 5 of the farm Kraaibosch No. 195
- 2017** Still Bay Hessequa Municipality
- Environmental Control Officer for the construction of a reservoir, booster pump station and associated infrastructure in Melkhoutfontein near Still Bay
- 2016 - 2017** Heidelberg Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to structures in the Central Eden District Municipality Region, Heidelberg North
- 2016 - 2017** Riversdale Department of Transport & Public Works
- Environmental Control Officer for the flood damage repairs to structures in the Central Eden District Municipality Region, Riversdale East area
- 2016 - 2017** Still Bay Department of Transport & Public Works
- Environmental Control Officer for the upgrade of main road 332 near Still Bay
- 2016 - 2017** Mossel Bay The South Cape College
- Environmental Control Officer for the extension of the South Cape College: Phase 3, Mossel Bay Campus

- 2016 - 2017** Klein Brak Mossel Bay Municipality
- Environmental Control Officer for the removal of obstructions in the lower floodplain of the Klein Brak River Estuary
- 2016** Prince Albert Milway Trade and Invest 1014cc
- Basic Assessment for the proposed guest lodge on remainder of Farm Rietpoort 13
- 2016** Plettenberg Bay Bitou Municipality
- Basic Assessment for the proposed Qolweni phase 5 development near Plettenberg Bay
- 2016** Mossel Bay Element Consulting Engineers
- Environmental Management Programme for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation
- 2016** George SMEC
- Environmental Policy for the resurfacing of York Street, George
- 2016** Mossel Bay Department of Transport & Public Works
- Maintenance Management Plan for proposed upgrade of Louis Fourie Road.
- 2016** George Oaklands Bridge Country Estate HOA
- Maintenance Management Plan for proposed repair and maintenance of the riverbank at Oaklands Bridge Country Estate in Heather Park
- 2016** Gouritz Department of Transport & Public Works
- Update of the Maintenance Management Plan for proposed repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond
- 2016** George Ivorybell Investment (Pty) Ltd
- Outeniqua Sensitive Coastal Area Environmental Impact Report for the proposed new house on erf 379 in Heralds Bay
- 2016** George George Municipality
- Environmental Assessment Report for the substantive amendment of environmental authorisation of the proposed upgrade and extension of the overhead power lines and associated substations
- 2016** Oudtshoorn SA Army Infantry School
- Environmental Control Officer for the construction of a fighting in built up areas (FIBUA) range on portion 10 of the farm Blaauwtjes Drift 110 in Oudtshoorn

- 2015 - 2016** Gouritz Department of Transport & Public Works
- Environmental Control Officer for the repair and maintenance of the Gouritz River Bridge bank protection along the R325 near Gouritzmond
- 2015 - 2016** Albertinia Garden Route Game Lodge (Pty) Ltd
- Environmental Control Officer for the five new units at the Garden Route Game Lodge
- 2015 - 2016** Mossel Bay Element Consulting Engineers
- Environmental Control Officer for the replacement of 22kV overhead powerline between Power Town and Hartenbos and between Hartenbos and the Hartenbos sewage substation
- 2014 - 2016** Plettenberg Bay Chauke Quantity Surveyers
- Environmental Control Officer for the Qolweni and Kwanokuthula High Density Units and engineering services
- 2016** Plettenberg Bay Bitou Municipality
- Environmental Control Officer for the civil engineering works for Kwanokuthula Phase 4 and the extension of Sishuba Street
- 2014 - 2016** Mossel Bay The South Cape College
- Environmental Control Officer for the extension of the South Cape College, Mossel Bay Campus
- 2016** George SMEC
- Environmental Control Officer for the resurfacing of York Street
- 2014 - 2015** Mossel bay The Muller Murray Trust
- Environmental Control Officer for the construction of gravity pipeline from the Nautilus take-off to the Boggomsbaai Reservoir phase 2
- 2015** Swellendam Casidra SOC Ltd
- Environmental Control Officer for the Grootvaderbos Groynes in the Buffeljags River
- 2015** George Element Consulting Engineers
- Environmental Control Officer for the upgrading and extension of overhead power lines and substations: construction of a new 66kV overhead line between Protea and Ballots Bay substation

- 2014 - 2015** George Department of Transport & Public Works
- Environmental Control Officer for the flood damage repair projects in the George and Knysna local municipal areas
- 2015** George BDE Consulting Engineers (Pty) Ltd
- Environmental Control Officer for the photovoltaic solar plant for the ACSA George Airport
- 2015** Heidelberg Bergstan South Africa
- Environmental Control Officer for the Duiwenhoks River stabilization works: Sites B31, B38 and B39
- 2015** Krakeel Element Consulting Engineers
- Environmental Control Officer for the construction of filling station at SSK Tuinrote Agri on portion 5 of the farm no. 320
- 2014 - 2015** Herbertsdale SMEC
- Environmental Control Officer for the flood damage repairs to structures in the Eden region: Herbertsdale area
- 2014 - 2015** George Department of Transport & Public Works
- Environmental Control Officer for the flood damage repair projects in the George and Knysna local municipal areas
- 2015** George SMEC
- Environmental Control Officer for the improvements to the Pacaltsdorp interchange and new pedestrian bridge
- 2014 - 2015** Still Bay De Villiers & Moore Consulting Engineers
- Environmental Control Officer for the Still Bay 66kV substation and overhead powerline
- 2014** Beaufort West Worley Parsons Consulting Engineers
- Environmental Control Officer for the Nelspoort bulk water supply scheme northeast of Nelspoort



GEORGE
TEL: +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953
EMAIL: info@sesc.net **WEBSITE:** www.sesc.net
ADDRESS: Unit 17 Cathedral Square,
Cathedral Street, George, 6530
PO BOX: 9087, George, 6530

CAPE TOWN
TEL: +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869
EMAIL: betsy@sesc.net **WEBSITE:** www.sesc.net
ADDRESS: Tableview, Cape Town, 7441
PO BOX: 443, Milnerton, 7435

CURRICULUM VITAE

CHRISTIAAN CHARL SMIT

PERSONAL

Profession: Candidate Environmental Assessment Practitioner and Environmental Control Officer
Nationality: South African
Languages: English (read, write and speak) & Afrikaans (read, write and speak)
Drivers License: Code B
EAPASA Registration: 2024/8297 (Candidate EAP)

SUMMARY

Christiaan holds a Masters degree in Environmental Management, a BSc in Biodiversity and Ecology and a PGD in Environmental Management all from Stellenbosch University. He has experience in environmental monitoring and has contributed to numerous projects. Christiaan is registered with EAPASA as a Candidate Environmental Assessment Practitioner (2024/8297)

WORK EXPERIENCE

February 2024 - Present: Sharples Environmental Services cc, George, WC
Candidate Environmental Assessment Practitioner and Environmental Control Officer

- Environmental Monitoring and Reporting
- Environmental Management Programmes
- Rehabilitation Plans
- Applicability Checklists
- Amendments
- Environmental Audit Reports
- Notice of Intent to Develop

January 2024 – February 2024: Oudtshoorn Municipality, Oudtshoorn, WC
Intern under Municipal Environmental Control Officer

- Drafting of notices
- Environmental complaints register
- Site inspections

TERTIARY EDUCATION

- 2020** Stellenbosch University
- Bachelor of Science Degree in Biodiversity and Ecology
- 2021** Stellenbosch University
- Post Graduate Diploma in Environmental Management
- 2024** Stellenbosch University
- Master of Philosophy in Environmental Management

- Environmental Impact Assessments • Basic Assessments • Environmental Management Planning
- Environmental Control & Monitoring • Water Use License Applications • Aquatic Assessments



ACCREDITATION / ASSOCIATION

- EAPASA Registration: 2024/8297 (Candidate EAP)
- Junior Member IAIA South Africa

KEY PROJECTS

- 2025** **George** – George Municipality – Water and Sanitation: Civil Engineering Services
- Assisted with the amendment application for the proposed upgrade of the existing Eden Sewage Pump Station, on Erven RE/5987, 6013 and 6014, George, Western Cape Province.
- 2025** **Mossel Bay** – Hartland Lifestyle Estate (Pty) Ltd 71
- Assisted with the amendment application for the proposed residential development on a portion of the Farm Vaale Valley 219, Mossel Bay – Hartland Lifestyle Estate.
- 2025** **George** – George Municipality – Water and Sanitation: Civil Engineering Services
- Environmental Control Officer for the proposed rehabilitation of a donga and upgrade of the effluent pipe at the Gwaing Waste Water Treatment Works, Remainder Erf 464, George Local Municipality, George, Western Cape.
- 2024-2025** **Mossel Bay** – Hatch Consulting Engineers on Western Cape Provincial Government: Department of Transport and Public Works - Roads
- Environmental Control Officer for the upgrade of Louis Fourie Road in Mossel Bay, WC.
- 2024-2025** **George** – Zutari on behalf of George Municipality
- Environmental Control Officer for the proposed development of a new additional 40 megalitre raw water balancing dam and associated infrastructure at the George Water Treatment Works, George, Western Cape.
- 2024-2025** **Mossel Bay** – Zutari on behalf of Mossel Bay Municipality
- Environmental Control Officer for the Upgrading of Informal Settlements Program (UISP) – Precinct 2, Mossel Bay.
- 2024-2025** **George** – George Municipality – Water and Sanitation: Civil Engineering Services
- Environmental Control Officer for the proposed upgrade of the existing Schaapkop Sewage Pump Station, on Erf 13486, George, Western Cape Province.
- 2024-2025** **Great Brak** – Outeniqua Game Farm: Langdon Johnston
- Environmental Control Officer for the proposed development of a residential development on Erf 2839, Great Brak, Western Cape.
- 2024-2025** **Herolds Bay** – Long Island Trading 44 (Pty) Ltd
- Environmental Control Officer for the proposed development of Herolds Bay Country Estate on a Portion of Portion 7 Farm Buffelsfontein No. 204, Herolds Bay, Western Cape.
- 2024-2025** **George** – SNA Consulting Engineers on behalf of Western Cape Government: Department of Transport and Public Works
- Environmental Control Officer for the upgrade of the bridge No. 2221 on Trunk Road 2/9 at km 15.1 over the Maalgate River, George, Western Cape.
- 2024-2025** **George** – BA Developments (Pty) Ltd

- Environmental Control Officer for the development of Glen Haven Country Estate on Portion 52/195, George, Western Cape.
- 2024-2025 George** – George Municipality – Water and Sanitation: Civil Engineering Services
- Environmental Control Officer for the proposed upgrade of the existing Eden Sewage Pump Station, on Erven RE/5987, 6013 and 6014, George, Western Cape Province.
- 2024-2025 Hartenbos** – SMEC South Africa (Pty) Ltd
- Environmental Control Officer for the periodic maintenance of TR33/2, MR344, DR1582 and OP6811 near Hartenbos, Western Cape.
- 2024-2025 Plettenberg Bay** – Status Homes Property Developers
- Environmental Control Officer for the proposed mixed – use development on Portion 9 of the Farm Kranshoek No. 432, Knysna Road, Plettenberg Bay, Western Cape.
- 2024 Plettenberg Bay** – Sonqua Consulting on behalf of Western Cape Government
- Environmental Control Officer for the New Horizons Mixed – Used Development on Farmhillview No. 437 and associated infrastructure.
- 2024 Mossel Bay** – Confuel (Pty) Ltd
- Environmental Control Officer for the proposed truck stop and associated infrastructure on Erf 56 and 57, Mossdustria, Mossel Bay Local Municipality, Western Cape.
- 2024 George** – CS Hentiq 1044 (Pty) Ltd
- Applicability Checklist for the determination of the applicability of the NEMA EIA Regulations, 2014 (as amended) for the installation of Le Grand external sewer rising main, Hansmoeskraal, George, Western Cape.
- 2024 Mossel Bay** – Mossel Bay Municipality
- Rehabilitation Plan for the piggery site restoration on Erf 1717, Kwanongaba, Mossel Bay, Western Cape.
- 2024 George** – Zutari
- Notice of Intent for the proposed amendment of the Environmental Authorisation for the proposed development of a new additional 40 megalitre raw water balancing dam and associated infrastructure at the George Water Treatment Works on Erf 221, George.
- 2024 Dana Bay** – Private
- Applicability Checklist for the determination of the applicability of the NEMA EIA Regulations, 2014 (as amended) for the proposed subdivision of portions of land on Remainder Droogfontein No. 245 to consolidate with existing business zoned plots, Dana Bay, Western Cape.
- 2024 George** – Zutari
- Notice of Intent for the proposed amendment of the Environmental Authorisation for the proposed development of a new additional 40 megalitre raw water balancing dam and associated infrastructure at the George Water Treatment Works on Erf 221, George.

2024 Oudtshoorn – Buitendag Property Investments (Pty) Ltd

- Applicability Checklist for the determination of the applicability of the NEMA EIA Regulations, 2014 (as amended) for the proposed development of a house on the Farm Kleinsvlakte Nr 288, Oudtshoorn, Western Cape.

2024 Still Bay – Vivren Properties (Pty) Ltd

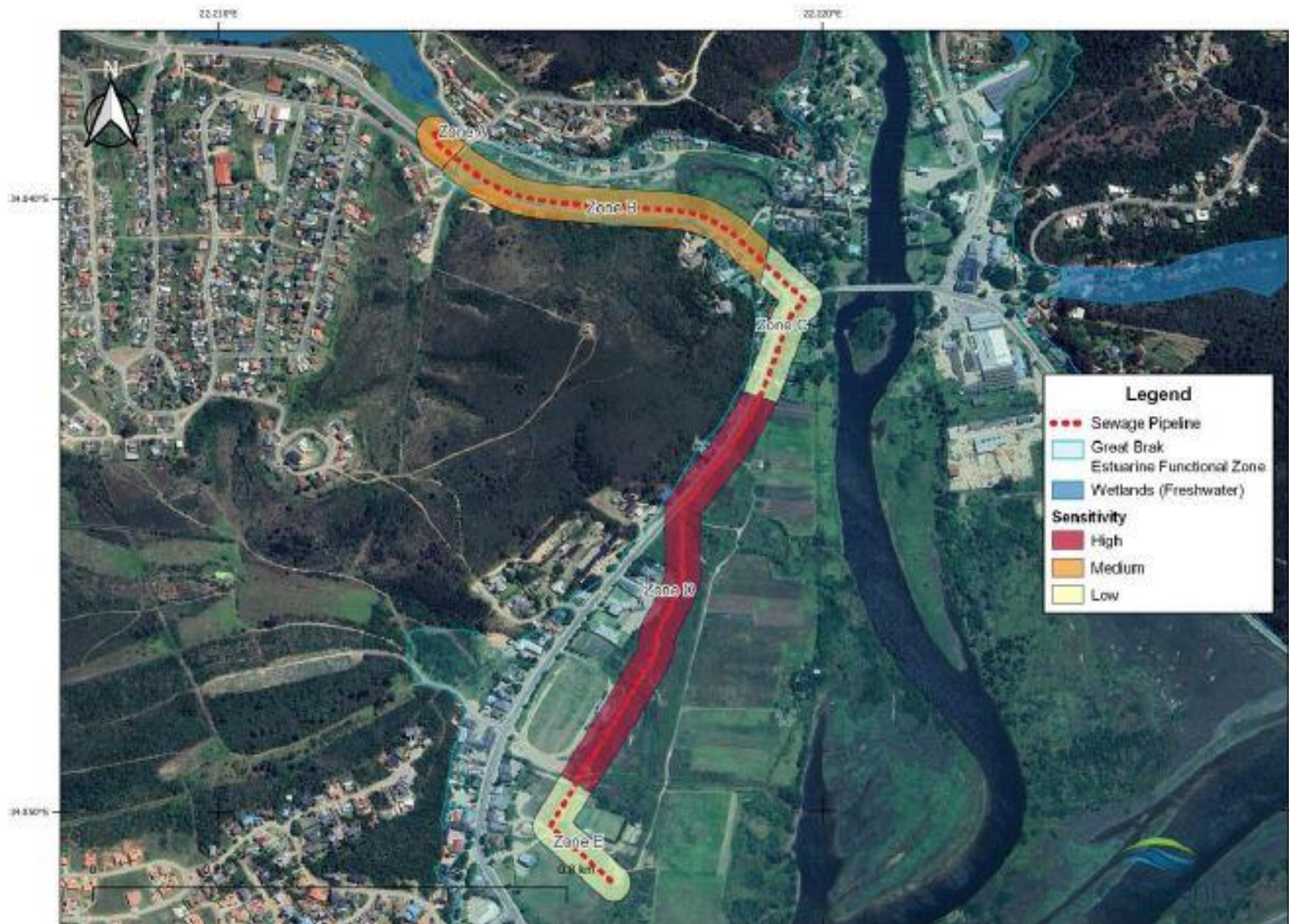
- Environmental Audit Report for the proposed Preekstoel Coastal Development on Erf 1028 and Portion 2 of Erf 599, Still Bay East, Hessequa Municipality, Western Cape.

2024 George – George Municipality

- Environmental Audit Report for the Molen Close River Rehabilitation Remainder of Farm 464, George, Western Cape.

APPENDIX E: SENSITIVITY MAPS

APPENDIX B2: FIGURE 1: ESTUARINE IMPACT ASSESSMENT SENSITIVITY ZONES



CBA's & ESA's



APPENDIX F: ESTUARINE IMPACT ASSESSMENT

Upgrade of Bulk Sewage Pipeline, Great Brak, Western Cape.

Specialist Estuarine Assessment



Prepared For: Sharples Environmental Services
Author: Dr. J.M. Dabrowski (PhD)
Confluent Environmental Pty (Ltd)
7 St. Johns Street,
Dormehls Drift,
George, 6529
SACNASP: Pr. Sci. Nat. (Water Resources – 114084)
Date: 15 September 2025
Version: Draft Final



EXECUTIVE SUMMARY

Confluent Environmental was appointed to conduct an estuarine assessment for the proposed upgrade of a bulk sewage pipeline located within the estuarine functional zone (EFZ) of the Great Brak Estuary. The proposed project entails the installation of a new Ø 300mm pipeline along an existing sewer line alignment. The primary objective of the sewer line upgrade will be to increase the capacity of the pipeline which is crucial to avoiding blockages and leaks associated with increased sewage flows as the town of Great Brak expands. In this respect, the project is aligned to many of the management objectives of the Great Brak Estuarine Management Plan (EMP) – particularly with respect to improving water quality in the estuary.

Existing catchment-scale impacts on the estuary relate primarily to the reduction in base and low flows caused by construction of weirs and small and large dams (most notably the Wolwedans Dam) in the catchment area and abstraction of water for irrigation and domestic water supply. These reduced flows have altered the magnitude of freshwater base flows and the seasonal distribution of flows and flood events into the estuary. This in turn has a significant impact on the dynamics of the estuary mouth, which remains closed for long periods of time due to the lack of regular flooding events. When large flow/flood events do occur, the mouth is artificially breached to prevent flooding of infrastructure and residential areas. Other impacts include alteration of the natural salinity gradient due to impedance of freshwater flows into the estuary and alteration to estuary mouth dynamics, degradation and/or loss of estuarine habitat through development (urban and agricultural) in the EFZ, nutrient inputs from agricultural activities, fishing pressures and human disturbance of birds. The estuary experiences frequent blooms of the nuisance filamentous macro-algae *Cladophora glomerata*, which is indicative of eutrophication caused by prolonged mouth closure that results in a combination of increased residence time of water in the estuary and recycling of nutrients from the benthos (Human et al., 2016). Based on these impacts the Present Ecological State (PES) of the estuary is **C/D**. According to Resource Quality Objectives (RQOs) set for the estuary, the Target Ecological Category (TEC) is **E**, indicating a high tolerance for development and utilisation of estuarine resources.

While the entire pipeline route is mapped within the EFZ, long sections of the route run through urbanised, transformed habitat. Five distinct zones (Zones A to E) have been identified and of these, only Zone D runs through estuarine habitat. A short length of the pipeline (~40 m – Zone A) runs adjacent to, but well outside of the delineated area of an unchannelled valley bottom wetland which is located outside of the EFZ. The majority of the upgrades to the sewage pipeline will occur in transformed sections of the EFZ (Zone B, C and E – total length of ~ 1 050 m) and no estuarine habitat will be directly disturbed in these zones. Where the pipeline does traverse estuarine habitat (Zone D for a length of ~ 725 m), it does so within an existing servitude and there will be no additional disturbance of estuarine habitat outside of this servitude. Upgrades to the pipeline in this zone will however result in disturbance to estuarine vegetation that, whilst maintained, does cover the existing servitude. Impacts to estuarine wetland habitat can be mitigated to a low or negligible significance of impact (for all phases of the project) and it is therefore recommended that authorisation for the upgrade is granted.

Declaration of Specialist Independence

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public;
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant;
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.



Dr. James Dabrowski (Ph.D., Pr.Sci.Nat. Water Resources; SACNASP Reg. No: 114084)

September 2025

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1 INTRODUCTION

1.1 Project Background

Confluent Environmental were appointed to conduct an estuarine assessment for the proposed upgrade of a bulk sewerage line from Amy Searle Street/Greenhaven to the cricket field sewerage pumpstation in Great Brak. The proposed project entails the installation of a new Ø300mm pipeline which will run along the edge of the estuarine functional zone (EFZ) of the Great Brak Estuary (Figure 1). The pipeline route will follow an existing pipeline servitude. The reporting requirements of this assessment are prescribed by the legislative requirements of the National Environmental Management Act (NEMA) and the National Water Act (NWA).

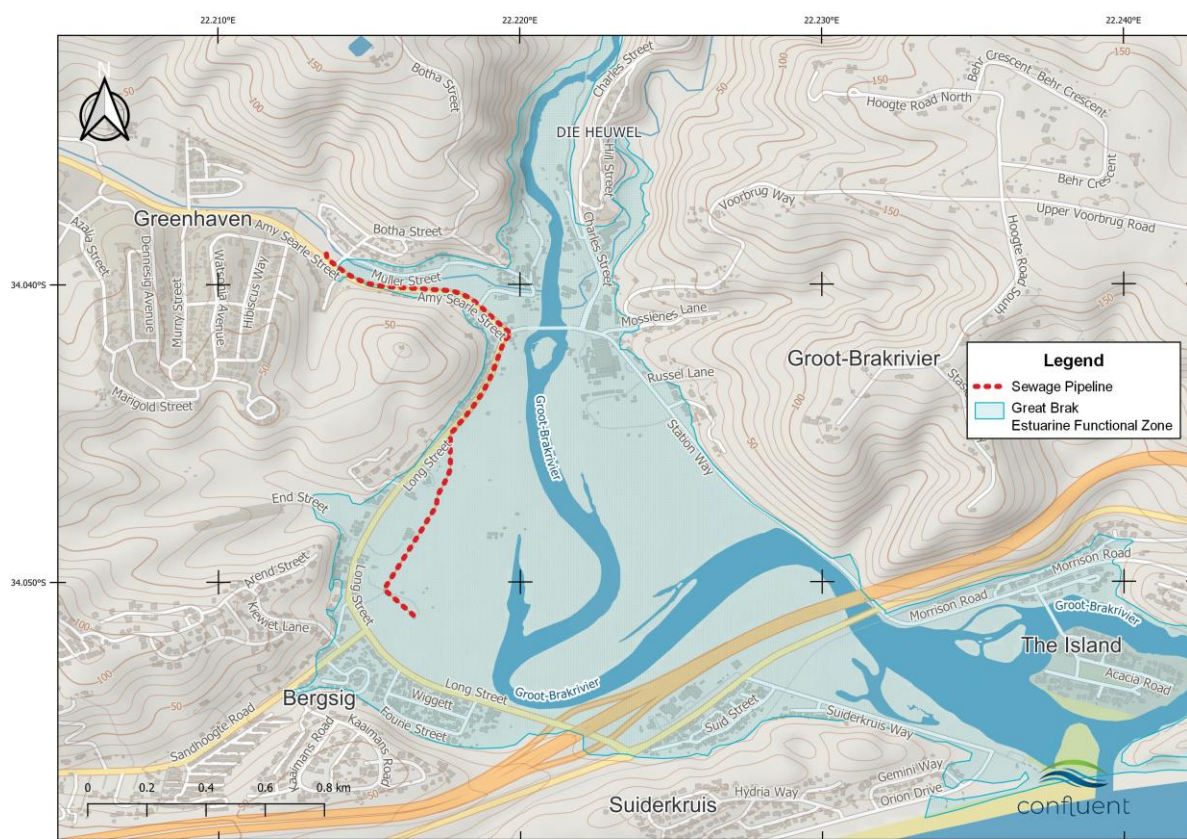


Figure 1: Proposed pipeline route in Great Brak.

1.2 Key Legislative Requirements

1.2.1 National Environmental Management Act (NEMA, 1998)

According to the protocols specified in GN 1540 (Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation), assessment and reporting requirements for aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (screening tool). An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of:

- **Very High** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or

- **Low** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

According to the protocol, prior to commencing with a specialist assessment a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool:

- Where the information gathered from the site sensitivity verification differs from the screening tool designation of **Very High** aquatic biodiversity sensitivity, and it is found to be of a **Low** sensitivity, an Aquatic Biodiversity Compliance Statement must be submitted.
- Similarly, where the information gathered from the site sensitivity verification differs from the screening tool designation of **Low** aquatic biodiversity sensitivity, and it is found to be of a **Very High** sensitivity, an Aquatic Biodiversity Specialist Assessment must be submitted.

The screening tool identified the site as being of **Very High** aquatic biodiversity based on the fact that the pipeline will intersect with the Great Brak Estuary which has also been mapped as an aquatic critical biodiversity area (CBA). A detailed site verification visit was therefore undertaken to confirm the site sensitivity and report accordingly.

1.2.2 National Water Act (NWA, 1998)

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The National Water Act (NWA) (Act No. 36 of 1998) aims to protect water resources, through:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource; and
- The rehabilitation of the water resource.

A watercourse means:

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

According to Section 21 (c) and (i) of the NWA, no activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Estuaries are, however, not defined as watercourses and maintenance or construction activities assessed as part of this report therefore do not require any Section 21 (c) or (i) water use authorisation in terms of the NWA.

1.3 Scope of Work

Based on the key legislative requirements listed above, the scope of work for this report includes the following:

- A desktop review of estuary and provincial and national conservation plans relevant to the site;
- Undertake a site visit to the study area to verify the sensitivity of aquatic biodiversity affected by the proposed development; and
- Develop a plan to guide the timing, extent and execution of maintenance activities.
- Describe and assess the significance of the potential impacts of the proposed development on the estuarine environment;
- Recommend mitigation measures to minimise the potential negative impacts of rehabilitation activities on freshwater ecosystems; and
- Provide a report that meets the requirements of the NEMA as per Section 1.2.1 above.

1.4 Assumptions & Limitations

- Estuaries are highly dynamic systems and the assessment of impacts related to this development relied on a single site visit. While every effort has been made to increase the confidence of the assessment presented in this report, given the dynamic nature of estuaries, it is possible that certain impacts may have been overlooked.

2 METHODS

2.1 Estuarine Assessment

2.1.1 Desktop Assessment

A desktop assessment was conducted to contextualize the affected estuary in terms of its local and regional setting, and conservation planning. An understanding of the biophysical attributes and conservation and water resource management plans of the area assists in the assessment of the importance and sensitivity of the estuary, the setting of management objectives and the assessment of the significance of anticipated impacts. The following data sources and GIS spatial information were consulted to inform the desktop assessment:

- National Freshwater Ecosystem Priority Area (NFEPA) atlas (Nel et al., 2011);
- National Wetland Map 5 and Confidence Map (CSIR, 2018);
- Western Cape Biodiversity Spatial Plan (CapeNature, 2023);
- DWS hydrological spatial layers;
- Resource quality objectives (RQOs) set for the Breede-Gouritz WMA (DWS, 2018);
- The National Biodiversity Assessment (NBA) for estuaries (Van Niekerk et al., 2019);
- The desktop provisional eco-classification of the temperate estuaries of South Africa (Van Niekerk et al., 2014); and
- Great Brak Estuarine Management Plan (EMP) (DEADP, 2018)

2.1.2 Present Ecological State

According to Van Niekerk et al. (2014), the desktop Present Ecological State (PES) of all estuaries in South Africa was derived from several abiotic (hydrology, state of the mouth, salinity, water quality and physical habitat) and biotic (microalgae, macroalgae, invertebrates, fish and birds) indices of estuarine health. Based on the combined score for each of these

indices an overall PES was derived and classified according to the categories defined in Table 1.

Table 1: Estuary health scoring system indicating the relationship between the six Ecological Categories and the loss of ecosystem condition and functionality.

Category	Description
A	Natural: The natural biotic processes should not be modified. The characteristics of the resource should be determined by unmodified natural disturbance regimes. There should be no human induced risks to the abiotic and biotic processes and function.
B	Largely Natural: A small change in natural habitats and biota may have taken place, but the ecosystem functions are essentially unchanged.
C	Moderately Modified: A loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged
D	Largely Modified: A large loss of natural habitat, biota, and basic ecosystem function has occurred.
E	Seriously Modified: The loss of natural habitat, biota and basic ecosystem function is extensive.
F	Critically Modified: Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural abiotic processes and associated biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

2.1.3 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) for all estuaries in South Africa was determined by Turpie and Clarke (2007). The EIS takes size, the rarity of the estuary type within its biographical zone, habitat, biodiversity and functional importance of the estuary into account. Biodiversity importance, in turn is based on the assessment of the importance of the estuary for plants, invertebrates, fish and birds, using rarity indices. These importance scores ideally refer to the system in its Present State. These criteria were each rated (out of a score of 100) and the average of all criteria was used as the final EIS Score (Table 2).

Table 2: Description of EIS Scores for estuaries derived by Van Niekerk et al. (2014).

EIS Score	Description
0 – 60	Average Importance
61 – 80	Important
80 – 100	High Importance

2.2 Wetland Assessment

2.2.1 Present Ecological State

WET-Health 2.0 is designed to assess the PES of a wetland by scoring the perceived deviation from a theoretical reference condition, where the reference condition is defined as the unimpacted condition in which ecosystems show little or no influence of human actions. In thinking about wetland health or PES, it is thus appropriate to consider 'deviation' from the natural or reference condition, with the ecological state of a wetland taken as a measure of the extent to which human impacts have caused the wetland to differ from the natural reference condition. Whilst wetland features vary considerably from one wetland to the next, wetlands are all broadly influenced/ by their climatic and geological setting and by three core

inter-related drivers, namely hydrology, geomorphology and water quality. The biology of the wetland (in which vegetation generally plays a central role) responds to changes in these drivers, and to activities within and around the wetland. The interrelatedness of these four components forms the basis of the modular-based approach adopted in WET-Health Version 2. Desktop and field data were captured in GIS software and used to populate the Level 1 WET-Health tool (Macfarlane et al., 2020) which was used to derive the PES of the wetland HGM units. The magnitude of observed impacts on the hydrological, geomorphological, water quality and vegetation components of the wetland were calculated and combined as per the tool to provide a measure of the overall condition of the wetland on a scale from 1-10. Resultant scores were then used to assign the wetland into one of six PES categories as shown in Table 3 below.

Table 3: Wetland Present Ecological State (PES) categories and impact descriptions.

ECOLOGICAL CATEGORY	DESCRIPTION	IMPACT SCORE*	PES SCORE (%)*
A	Unmodified, natural.	0-0.9	90-100
B	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	80-89
C	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2-3.9	60-79
D	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9	40-59
E	Seriously modified. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	20-39
F	Critically modified. Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10	0-19

2.2.2 Ecological Importance and Sensitivity

The ecological importance of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales (Duthie, 1999). Ecological sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (Duthie, 1999). The Ecological Importance and Sensitivity (EIS) provides a guideline for determination of the Ecological Management Class (EMC). The revised method for the determination of the EIS of a wetland considers the three following ecological aspects (Rountree et al., 2013):

- **Ecological importance and sensitivity**
 - Biodiversity support including rare species and feeding/breeding/migration;
 - Protection status, size and rarity in the landscape context;
 - Sensitivity of the wetland to floods, droughts and water quality fluctuations.
- **Hydro-functional importance**
 - Flood attenuation;
 - Streamflow regulation;
 - Water quality enhance through sediment trapping and nutrient assimilation;
 - Carbon storage
- **Direct human benefits**

- Water for human use and harvestable resources;
- Cultivated foods;
- Cultural heritage;
- Tourism, recreation, education and research.

Each criterion is scored between 0 and 4, and the average of each subset of scores is used to derive a score for each of the three components listed above. The highest score is used to determine the overall Importance and Sensitivity category of the wetland system.

Table 4: Ecological importance and sensitivity categories. Interpretation of average scores for biotic and habitat determinants.

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
<u>Very high:</u> Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these floodplains is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and ≤4	A
<u>High:</u> Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these floodplains may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and ≤3	B
<u>Moderate:</u> Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these floodplains is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and ≤2	C
<u>Low/marginal:</u> Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these floodplains is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	>0 and ≤1	D

2.3 Impact Assessment

A site visit was conducted on the 14th of August 2025, with the primary objective of identifying existing impacts and assessing the impacts of the proposed pipeline upgrade on the estuary. The impact assessment methodology is described in the appendix to this report (Appendix 1). Development and maintenance activities typically impact on the following important drivers of estuaries:

- **Hydrology:** Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes and base flows and modifications to general flow characteristics, including change in the hydrological regime or hydroperiod of the aquatic ecosystem;
- **Geomorphology:** This refers to the alteration of hydrological and geomorphological processes and drivers, and associated impacts to aquatic habitat and ecosystem goods and services primarily driven by changes to the sediment regime of the aquatic ecosystem and its broader catchment;
- **Modification of water quality:** This refers to the alteration or deterioration in the physical, chemical and biological characteristics of water within estuaries, streams, rivers and wetlands, and associated impacts to aquatic habitat and ecosystem goods

and services (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication etc.);

- *Fragmentation*: Loss of lateral and/or longitudinal ecological connectivity due to structures crossing or bordering watercourses (e.g. road or pipeline crossing a wetland or estuary);
- *Modification of estuarine habitat*: This refers to the physical disturbance of in-stream and riparian aquatic and estuarine habitat and associated ecosystem goods and services including the loss or degradation of all or part of any unique or important features associated with or within the ecosystem; and
- *Estuarine biodiversity*: Impacts on community composition (numbers and density of species) and integrity (condition, viability, predator prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site.

Construction and operational activities associated with the jetty were therefore assessed with respect to their impact on these drivers (if applicable).

3 PROPOSED DEVELOPMENT

In South Africa, the Estuarine Functional Zone (EFZ) is defined as the area that not only delineates the boundaries of the estuarine waterbody, but also the supporting physical and biological processes and adjacent habitats necessary for estuarine function and health (Van Niekerk et al., 2019). It includes all dynamic areas influenced by long-term estuarine sedimentary processes, multiple ecotones of floodplain and estuarine vegetation that contribute organic material and provide refuge from strong currents during high flow events. EFZs are currently delineated by the 5 m contour line and therefore include large areas of terrestrial habitat (much of which has been historically developed) that border the actual water body. The EFZ is now commonly used to delineate the spatial extent of the entire estuary.

The pipeline route runs adjacent to Amy Searle and Long streets (Figure 2). The upper, western most section of the pipeline is located adjacent to freshwater wetland habitat (i.e. outside of the EFZ). The majority of the pipeline is located within the EFZ and will be buried immediately adjacent to Amy Searle and Long streets (beneath the sidewalk). The southern most section of the pipeline deviates from Long Street, further in towards the EFZ and closer to open water estuarine habitat.

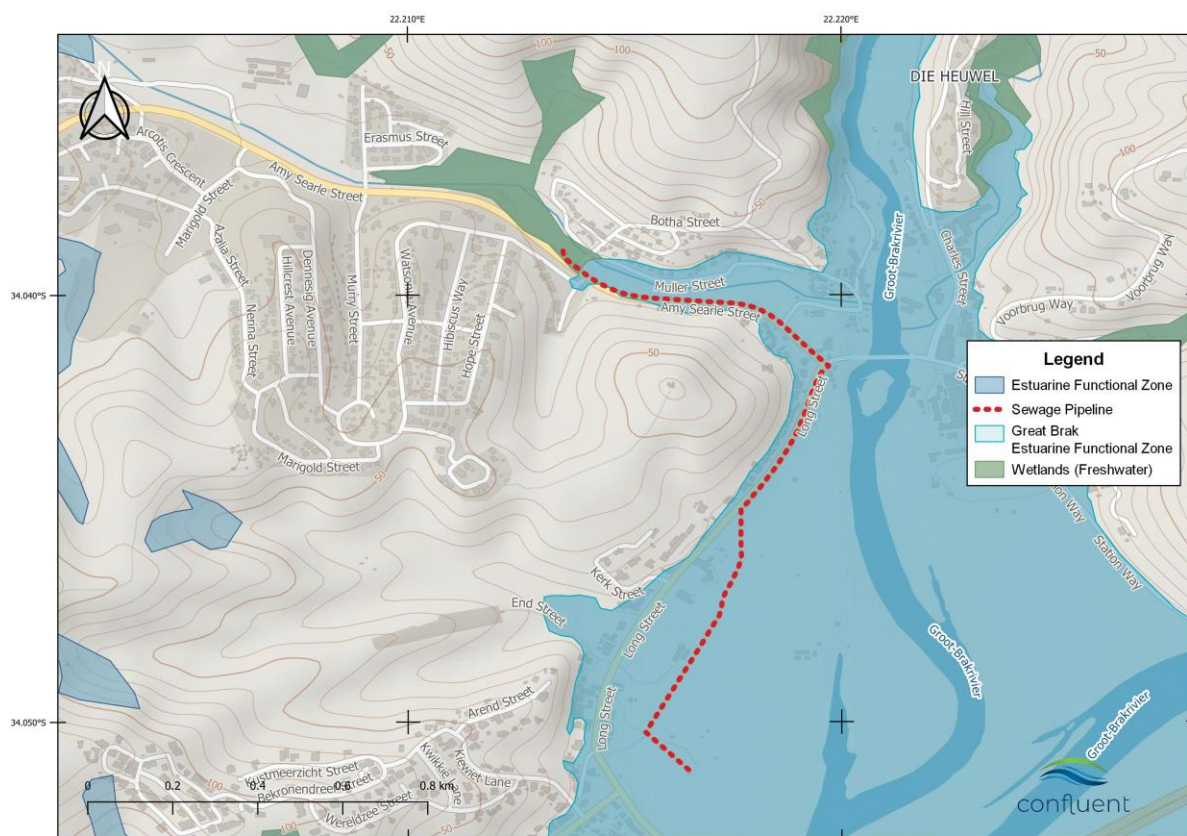


Figure 2: Mapped estuarine and freshwater wetland habitat (CSIR, 2018) relative to the pipeline route.

4 DESKTOP ASSESSMENT

The Great Brak estuary falls in quaternary catchment K20A (Figure 3). The main river flowing through the catchment area is the Groot Brak River. The estuary falls within level 22.02 of the Southern Coastal Belt ecoregion, which is characterised by moderately undulating plains of moderate relief with altitude ranging from 0 to 500 m above mean sea level. Mean annual precipitation for the catchment area is relatively high (between 300 and 700 mm per annum), and occurs year-round, with peaks in late winter and early spring (August to October).

According to Van Niekerk et al. (2019), the estuary is classified as a **warm temperate, large temporarily closed system** with the mouth closed for the majority of the time. The EFZ extends from the coast approximately 6.5 km further upstream, beyond the Searle's Bridge and further up the Great Brak River (Figure 2). The estuary is approximately 6 km long and has a water surface area of 0.6 km² at high tide, and a tidal prism of 0.3×10^6 m³ (DEADP, 2018). The lower reaches of the estuary are mostly shallow (0.5 to 1.2 m deep), comprising of extensive sand banks. Deeper areas are associated with scouring zones near the rocky cliffs and bridges (Human et al., 2016). The middle reaches are also relatively shallow and are characterised by larger intertidal and floodplain salt marsh areas – much of which has been transformed into agricultural land. A summary of the composition of different natural habitat types occurring in the estuary is provided in (Table 5). A large proportion of the area of the EFZ has been transformed from natural habitat to schools and agricultural, commercial and residential properties.

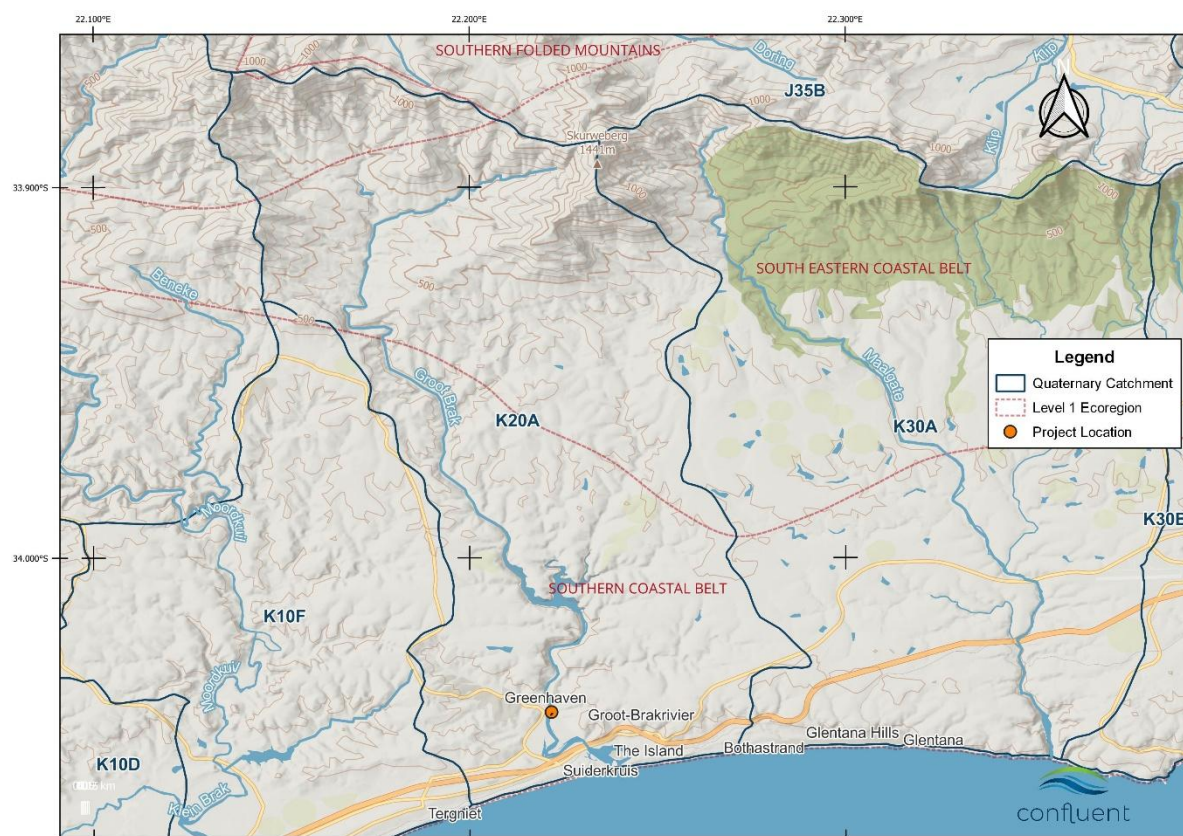


Figure 3: Location of the project area relative to quaternary catchment K20A.

Table 5: Composition of different habitat types in the Great Brak estuary.

Habitat	Area (ha)	Area (%)
Inter-tidal Salt Marsh	13.0	12.3
Supratidal Salt Marsh	26.6	25.3
Submerged Macrophytes	0	0
Reeds & Sedges	2.5	2.4
Mangroves	0	0
Sand/Mud Banks	29.9	28.4
Open Water	33.1	31.5
Rocks	0	0
Swamp Forest	0	0
Macroalgae	0	0
TOTAL	105.1	100

According to the Great Brak EMP (DEADP, 2018) benthic invertebrates of the Great Brak estuary are dominated by the mudprawn (*Upogebia Africana*), the sandprawn (*Callinassa kraussi*) and the bivalve (*Loripes clausus*). Diversity and abundance is considered to be low relative to other closed estuaries in the region. Zooplankton biomass and abundance in the estuary is typical of temporarily closed systems and is dominated by the copepods *Acartia longiptella* (during closed phases) and *Pseudodiaptomus hessei* (during open phases). A total of 33 species of fish from 21 families have been recorded from the Great Brak estuary, which is considered to be high compared to other temporarily open/closed estuaries in the region.

A total of 52 non-passerine waterbird species have been recorded on the Great Brak estuary (excluding vagrants), with 39 of these species being recorded during summer, and 41 in

winter. Numbers of birds on the estuary are relatively low, however. The estuary supports an average of about 240 birds in mid-summer and 153 in mid-winter. The estuary is ranked 135th out of 258 estuaries in terms of its avifauna.

4.1 Freshwater Conservation & Management

4.1.1 National Freshwater Ecosystem Priority Atlas (NFEPA)

The Great Brak estuary is located in sub-quaternary catchment (SQC) 9083 (Figure 4), which, according to the National Freshwater Ecosystem Priority Atlas (NFEPA, Nel et al., 2011), has been classified as a Fish Support Area (FSA). FSAs are SQCs that are not necessarily in a good ecological condition but are still essential for protecting threatened or near-threatened freshwater fish species that are indigenous to South Africa. The management goal of FSAs is to prevent additional fish species from becoming threatened or to prevent threatened or near-threatened species from becoming extinct. In order to achieve these objectives, there should be no further deterioration in river condition. Freshwater fish species that are expected to occur in the Great Brak River are listed in Table 6. Of these species *A. mossambica* and *M. capensis* are likely to also occur within the estuary. Both of these species are catadromous and breed at sea, with juveniles migrating through estuaries and into freshwater systems until they reach maturity (after which they migrate back to the sea). *G. zebratus* and *S. capensis* are endemic to South Africa but are not expected to occur in estuarine environments.

Table 6: List of freshwater fish species that occur in the Great Brak River (DWS, 2014).

Scientific Name	Common Name
<i>Anguilla mossambica</i>	African Longfin Eel
<i>Galaxius zebratus</i>	Cape Galaxius
<i>Myxus capensis</i>	Freshwater Mullet
<i>Sandelia capensis</i>	Cape Kurper

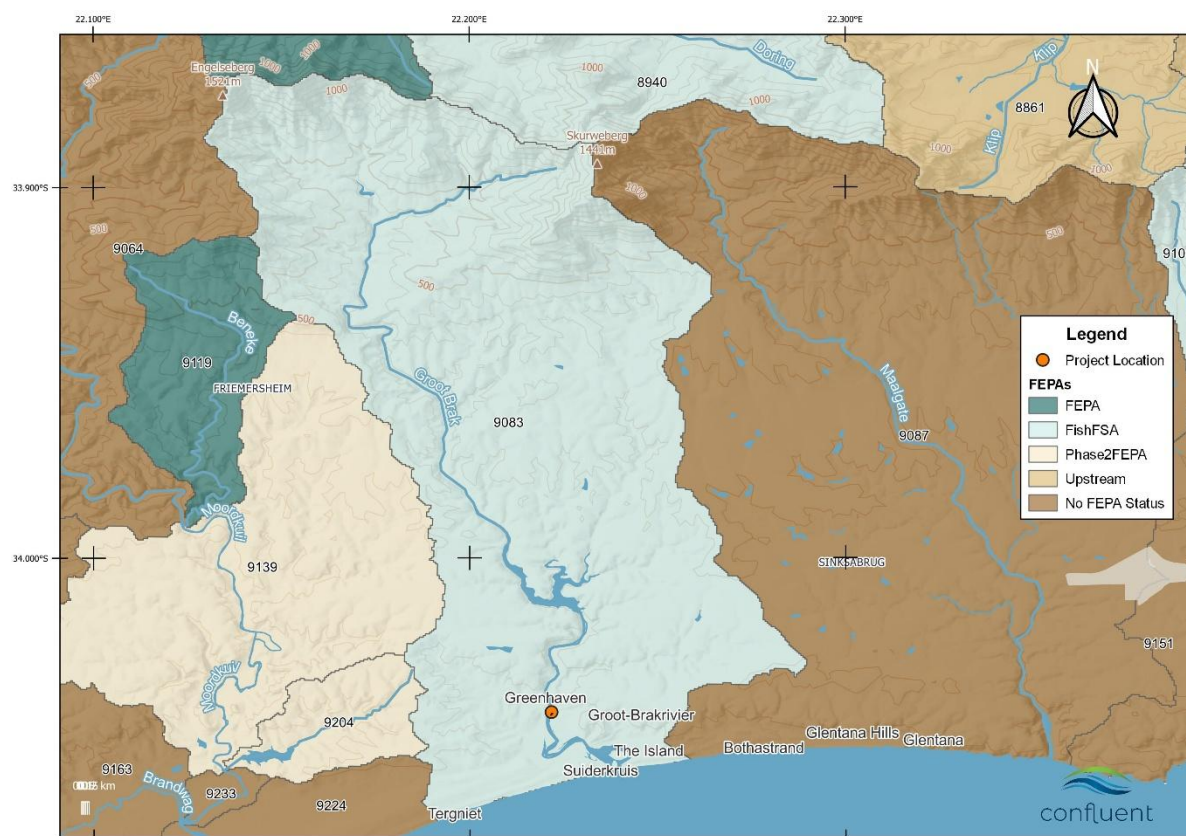


Figure 4: Map indicating the location of the project area in relation to FEPAs.

4.2 Western Cape Biodiversity Spatial Plan

The main purpose of a biodiversity spatial plan is to ensure that the most recent and best quality spatial biodiversity information can be accessed and used to inform land use and development planning, environmental assessments and authorisations, natural resource management and other multi-sectoral planning processes. The WCBSP plan achieves this by providing a map of terrestrial and freshwater areas that are important for conserving biodiversity pattern and ecological processes – these areas are called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). According to the Western Cape Biodiversity Spatial Plan (WCBSP) for Mossel Bay, the lower, southern section of the pipeline traverses natural and modified aquatic CBAs (Figure 5). The northern section runs through modified terrestrial CBAs. Management objectives associated with aquatic CBAs are provided in Table 7.

Table 7: Definitions and management objectives of the Western Cape Biodiversity Spatial Plan.

Category	Definition	Management Objective
CBA1	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
CBA2	Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land-uses are appropriate.

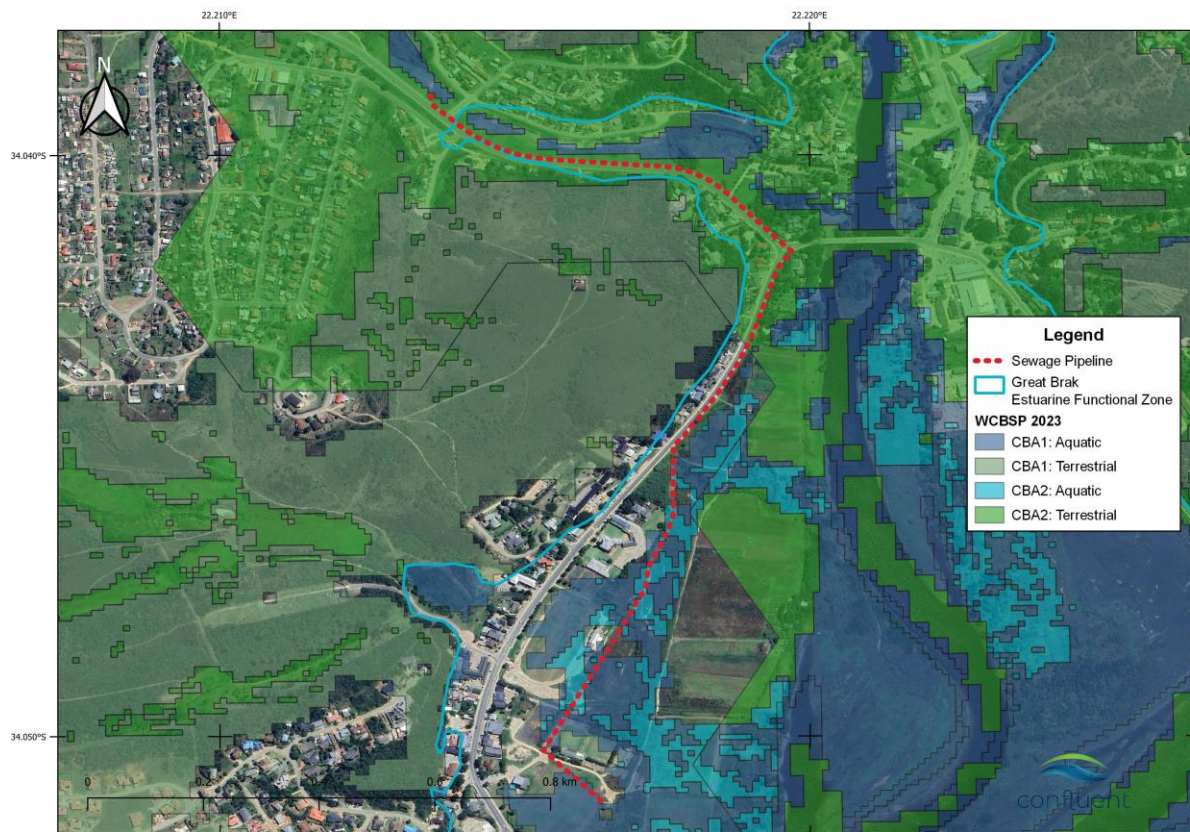


Figure 5: Map of the Western Cape Biodiversity Spatial Plan (WCBSP).

4.3 Great Brak Estuarine Management Plan

Estuaries are recognised as particularly sensitive and dynamic ecosystems and the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008, as amended by Act 36 of 2014) (ICMA), via the prescriptions of the South African National Estuarine Management Protocol (the Protocol), require Estuary Management Plans (EMPs) to be prepared for estuaries in order to create informed platforms for efficient and coordinated estuarine management. To this end, the Great Brak River EMP was compiled in 2018 (DEADP, 2018) and provides a detailed situation assessment of the estuary as well as management objects aimed at achieving an agreed upon vision for the estuary which is as follows:

“The Great Brak River estuary is managed in a transparent, accountable and cooperative manner to ensure an appropriate balance between biodiversity conservation, recreational use, human safety and development, now and in the future.”

Specific management objectives highlighted in the EMP that are relevant to the proposed development include are listed in Table 8. The primary objective of the sewer line upgrade will be to increase the capacity of the pipeline which is crucial to avoiding blockages and leaks associated with increased sewage flows as the town of Great Brak expands. In this respect, the project is aligned to many of the management objectives of the EMP – particularly with respect to improving water quality in the estuary.

Table 8: Management objectives included in the Estuarine Management Plan (EMP) for the Great Brak Estuary (objectives highlighted in bold are relevant to the proposed sewage line upgrade).

Description	Management Objectives
1. Conservation of estuarine biodiversity	- Zonation plan for the estuary approved and implemented. - Great Brak River EMP integrated within local, district and provincial level planning documents (IDPs and SDFs). - Alien vegetation clearing and monitoring operations in place. Future development on the estuary is constrained to ensure that it does not compromise estuary health, ecosystem functioning and/or sensitive species (e.g. no development in the 1:50 year flood line). - Harvesting of living marine resources (fish and bait) on the estuary remains within sustainable limits, resource users do not exceed applicable size and bag limits
2. Restoration of estuary health	- Freshwater environmental reserve for the Great Brak River estuary implemented; revised dam operating rules for the Wolwedans are in force and respected. Quantity and quality of freshwater reaching the estuary adequate to restore and maintain estuary health. Sewage and storm water entering the estuary monitored and controlled
3. Effective and efficient mouth Management	- Mouth Management Plan (MMP) accepted and signed off by all relevant authorities (DWS, - Disaster Management, Weather SA, Eden and Mossel Bay Municipalities). - Beaching protocols are implemented in accordance with the accepted Mouth Management - Plan & approved Maintenance Management Plan (MMP).
4. Water quality management	- Water quality samples collected and analysed in accordance with EMP requirements. - Bacteriological (Faecal coliforms, E. coli and Enterococci) and physico-chemical parameters (nitrate, nitrite, ammonia, phosphorus, silica, suspended sediment, toxic substances) from water quality samples taken in the estuary.
5. Visitor management	- Informative and educational signage erected at key points access points that highlights the conservation importance and value of the Great Brak River estuary. - Visitors are sensitive to and aware of activities affecting health and functioning of the estuary, and management regulations governing use of the estuary. - Quality and quantity of visitor facilities (ablutions, parking, etc.) sufficient to meet visitor expectations and requirements.
6. Development planning	Future development on the estuary is constrained to ensure that it does not compromise the existing sense of place, conservation value and/or cultural heritage resources associated with the Great Brak River estuary
7. Harmonious and effective Governance	- Great Brak River Estuary Advisory Forum convened and meets regularly. - Manager for the Great Brak River estuary appointed and capacitated - Arrangements for co-operative governance of the Great Brak River estuary defined and agreed to by all participating agencies. - Finance required for implementation of the Great Brak River estuary EMP secured and available. - Adequate capacity and resources available for implementation of the EMP amongst participating agencies
8. Enhanced public awareness and appreciation for the Great Brak River estuary	- Functional and effective stakeholder communication, education and awareness programmes are in place. - Informative and educational signage erected at key access points that highlights the conservation importance and value of the Great Brak River estuary - Great Brak River estuary recognised as an important local ecotourism destination.
9. Research and monitoring	Adequate research and monitoring is being conducted that allows for quantification of utilisation patterns, changes in abiotic and biotic health, and benefits accruing to local communities and national economy.

4.4 Resource Quality Objectives

The classification of water resources and development of Resource Quality Objectives (RQOs) for the Breede-Gouritz Catchment Management Area was finalised in 2018 (DWS, 2018). The estuary falls within quaternary catchment K20A, which falls within the G14 Gouritz-Olifants Integrated Unit of Analysis (IUA). The Water Resource Class for this IUA is III, indicating sustainable minimal protection and high utilisation. The estuary falls within G14-E16 priority resource unit, and gazetted RQOs are provided in Table 9 below. While the Present Ecological State (PES) of the estuary is C/D (Moderately to Largely Modified – see section 5.3), the Target Ecological Category (TEC) for the Great Brak Estuary been set as an **E (Seriously Modified)**, which indicates a highly impacted river with a low level of protection for high utilisation for socio-economic development.

Table 9: Resource Quality Objectives (RQOs) for the Great Brak estuary.

IUA Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric													
G14 Groot-Brak	III	K20A	G14-E16	Groot-Brak Estuary	gxi5	E	Quantity	Flow	MMR/MAR (% Nat)	Maintain a flow regime to create the required habitat for birds, fish, macrophytes, microalgae and water quality.	Months												
											MMR/MAR (% Nat)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
							Nutrients	DIN	Inorganic nutrient concentrations not to exceed TPCs for macrophytes and microalgae	River inflow: NOx-N not to exceed 100 µg/t over 2 consecutive months; NH3-N not to exceed 20 µg/t over 2 consecutive months; Estuary (except during upwelling or floods): average NOx-N not to exceed 100 µg/t, no single measurement to exceed 150 µg/t, average NH3-N not to exceed 20 µg/t during survey, no single measurement to exceed 100 µg/t		62.2	67.3	55.3	48.2	43.4	55.7	49.2	54.9	38.3	43.7	63.4	63.8
											DIP	River inflow: PO4-P not to exceed 20 µg/t over 2 consecutive months; Estuary (except during upwelling or floods): average PO4-P not to exceed 20 µg/t during survey, no single measurement to exceed 50 µg/t											
							Quality	Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae			A salinity gradient should always be present in the upper reaches of the estuary (Zone D and F), an REI zone should always be present in the upper reaches of the estuary (Zone D and F), salinity should not exceed 35										
											System variables	Dissolved oxygen		System variables not to exceed TPCs for biota	Entire estuary and river inflow: DO >5 mg/t								
							Pathogens	Enterococci	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation	≤185 Enterococci/100 ml (90 th percentile)													
											Escherichia coli	≤500 E. coli/100 ml (90 th percentile)											
							Habitat	Hydrodynamics	Mouth state	Maintain connectivity with marine environment at a level that ensures water quality and habitat remains suitable for biota typically found in the estuary			Closed mouth state should not increase by >10% from established baseline										
											Sediment	Sediment characteristics, Channel shape/size		Flood regime is sufficient to maintain natural bathymetry and sediment characteristics	Channel shape/size, sediment grain size and organic matter must not change by >30% from established baseline								

IUA Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
							Microalgae	Biomass and community composition of phytoplankton and benthic microalgae community	Maintain the composition and richness of phytoplankton and benthic microalgae groups and medium-low biomass	Maintain low phytoplankton biomass. Maintain microalgal group diversity as measured for the baseline survey; phytoplankton biomass should not increase by more than 20% above baseline concentrations; phytoplankton group diversity to should not change more than 20% from baseline conditions; maintain high subtidal benthic microalgal biomass during the closed mouth phase and low intertidal benthic microalgal biomass during the open phase; Epipellic diatoms indicative of brackish conditions should be found during the closed phase.
						Biota	Macrophytes	Extent, distribution and richness of macrophytes	Maintain extent, distribution and richness of macrophyte groups, limit colonisation/spread of the EFZ by alien species	Maintain distribution of macrophyte habitats as for present (2013): Submerged macrophyte, <i>Ruppia cirrhosa</i> beds: ~5 ha, <i>Zostera capensis</i> present during open mouth conditions, intertidal salt marsh: ~13 ha, supratidal and floodplain salt marsh: ~26.6 ha, Reed (<i>Phragmites australis</i>) and sedge stands in the middle / upper reaches: ~2.5 ha; prevent excessive filamentous macroalgal growth. Area covered should be half that covered by submerged macrophytes and less than 50 % of the open water surface area; maintain the zonation of salt marsh and distribution of different species along an elevation gradient. Ensure the long-term persistence of intertidal salt marsh species such as <i>Triglochin</i> spp. and <i>Cotula coronopifolia</i> ; prevent hypersaline sediment and groundwater conditions in the salt marsh. Sediment electrical conductivity should be approximately 30 mS and similar to groundwater values.
							Invertebrates	Macrofauna community composition, abundance and richness	Maintain composition, richness and abundance of different groups of benthic macrofauna and zooplankton	Density of mudprawns should exceed 100 – 150 burrow counts per m2 in the highest density areas; in the zooplankton, the density of <i>Pseudodiaptomus hessei</i> should exceed levels of about 5000-10000 m3 in the upper estuary in spring. Salinity variation in the estuary is highly variable and the mouth remains closed for extended periods - this may also lead to the temporary absence of some invertebrate species that might be expected to occur here.
IUA Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
							Fish	Fish community composition, abundance and richness	Maintain composition, richness and abundance of different groups of fish, prevent colonisation/increase of alien species	Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise: Estuarine species (40-60%), Estuarine associated marine species (30-50%), Indigenous freshwater fish (1-5%); Category Ia species should contain viable populations of at least two species (e.g. <i>G. aestuaria</i> , & <i>Hyporhamphus capensis</i>); Category IIa obligate dependents should be well represented by at least two large exploited species
							Birds	Avifauna community composition, abundance and richness	Maintain composition, richness and abundance of different avifauna groups	Retain species richness, abundance and density of bird counts of resident and migrant waders, gulls, terns, wading birds and waterfowl within 15 % of present state (2006).

5 ESTUARINE ASSESSMENT

5.1 Historical Impacts

Historical impacts relevant to the proposed pipeline upgrade are summarized as follows:

- 1939: The natural estuarine channel below the wetland ran in close proximity to present day Amy Searle Street (Figure 6).
- 1957: The channel had been straightened – presumably to drain the wetland during high flood events (Figure 6)
- 1989: Loss of wetland habitat associated with development of roads. Estuarine channel was realigned to flow further north of present-day Amy Searle Street (Figure 6).

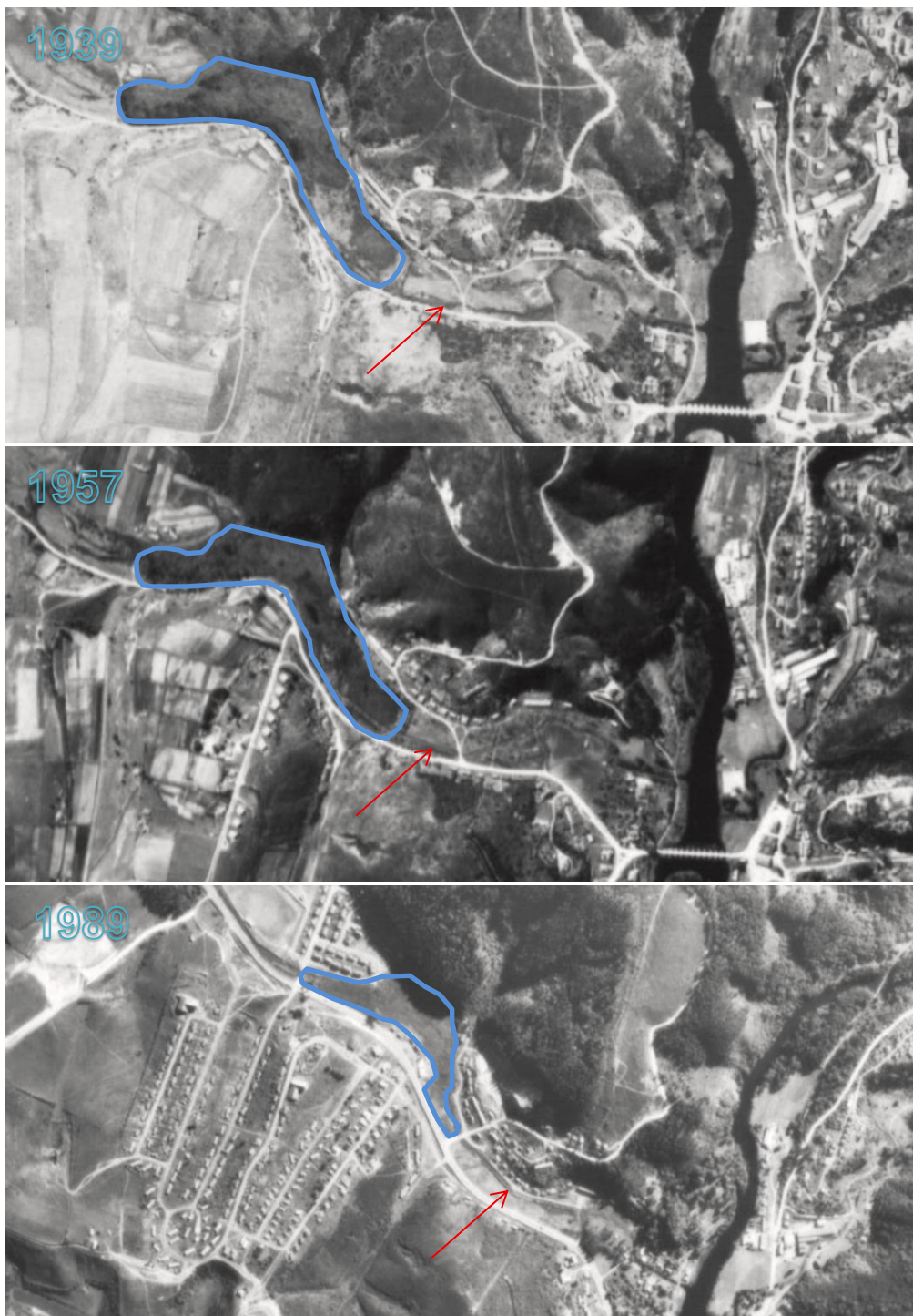


Figure 6: Historical images illustrating modifications to wetland habitat upstream and adjacent to Zone A (blue outline indicates the extent of the wetland and red arrow indicates the positions of the channel).

5.2 Existing Impacts

5.2.1 Catchment Scale Impacts

Broader catchment-scale impacts relate primarily to the reduction in base and low flows caused by construction of weirs and small and large dams (most notably the Wolwedans Dam) in the catchment area and abstraction of water for irrigation and domestic water supply. These reduced flows have altered the magnitude of freshwater base flows and the seasonal distribution of flows and flood events into the estuary. This in turn has a significant impact on

the dynamics of the estuary mouth, which remains closed for long periods of time due to the lack of regular flooding events. When large flow/flood events do occur, the mouth is artificially breached to prevent flooding of infrastructure and residential areas. Other impacts include alteration of the natural salinity gradient due to impedance of freshwater flows into the estuary and alteration to estuary mouth dynamics, degradation and/or loss of estuarine habitat through development (urban and agricultural) in the EFZ, nutrient inputs from agricultural activities, fishing pressures and human disturbance of birds. The estuary experiences frequent blooms of the nuisance filamentous macro-algae *Cladophora glomerata*, which is indicative of eutrophication caused by prolonged mouth closure which results in a combination of increased residence time of water in the estuary and recycling of nutrients from the benthos (Human et al., 2016).

5.2.2 Site Specific Impacts

While the entire pipeline route is mapped within the EFZ, long sections of the route run through urbanised, transformed habitat. Five distinct zones have been identified (Figure 7).

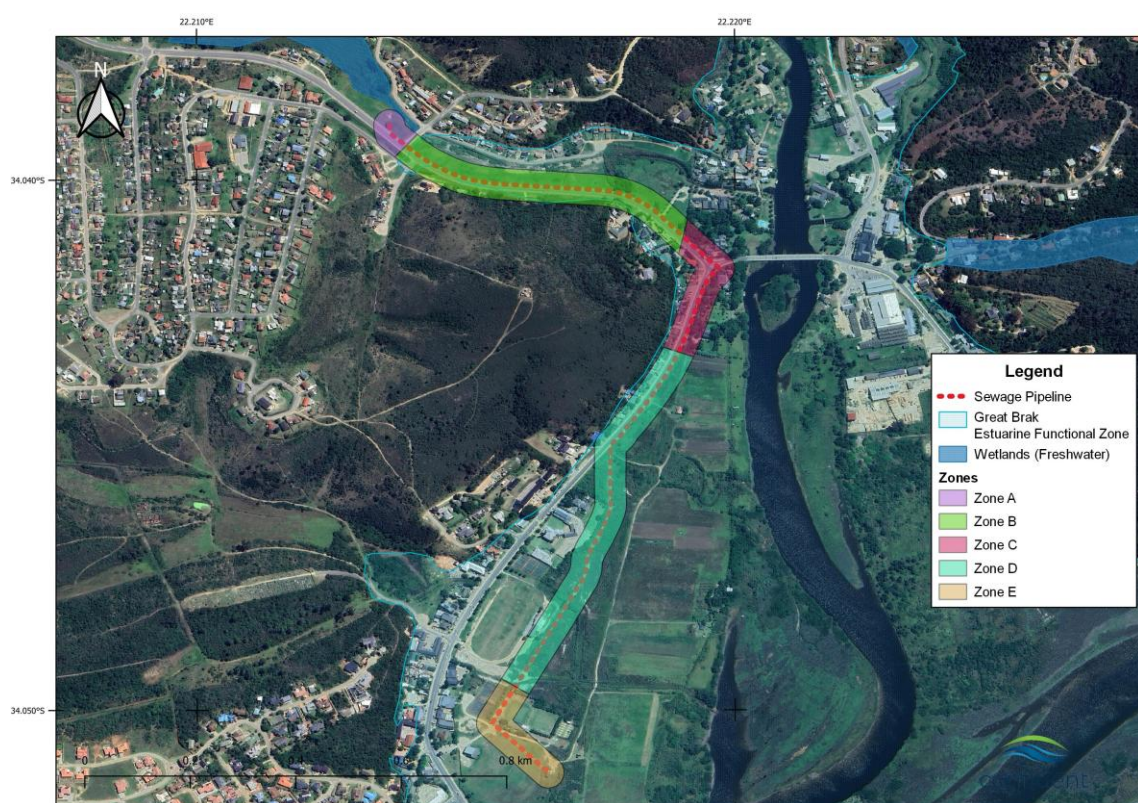


Figure 7: Habitat zones identified along the route of the proposed sewage pipeline upgrade.

Each of the zones is characterised as follows:

- Zone A:** The upper-most manhole linked to the proposed pipeline upgrade is located adjacent to a channel that extends from a large *Phragmites australis* dominated unchannelled valley-bottom wetland (Figure 8). Other prominent species include *Nidorella ivifolia* and *Cyperus textilis*. The channel is narrow and receives stormwater input from the surrounding area. The channel drains water from the wetland and has been diverted from its original course, which used to run closer to Amy Searle Street (see Section 5.1). This wetland falls outside of the EFZ and is considered as freshwater habitat (not estuarine).



Figure 8: Photographs of the wetland (left) and the channel extending from the lower end of the wetland towards the EFZ (right).

- **Zone B:** The upper section of the pipeline (running adjacent to Amy Searle Street) runs through a grassed public open space area (Figure 9). Open water estuarine habitat has been transformed into a concrete-lined canal. The pipeline route along this section runs immediately beneath the sidewalk and does not traverse through any natural estuarine habitat. The closest distance to the canal is approximately 20 m. Several stormwater channels drain stormwater from Amy Searle Street down towards the canal. The canal has undergone many modifications in the past and has been diverted from its natural course (see Section 5.1). There is a patch of estuarine wetland vegetation that extends away from the channel towards Amy Searle Street. This is a remnant of the historical channel that used to run closer to Amy Searle Street (see Section 5.1). The wetland area is dominated by *P. australis* reedbeds but also includes *C. textilis* and *N. ivifolia*. There are clear signs of historical excavation within the wetland as was by vegetated mounds of soil around the perimeter (adjacent to Amy Searle Street). These mounds have been invaded by alien tree species – most notably *Melia azedarach* (Syringa).



Figure 9: Photographs of the grassed area adjacent to the canal (top left), the canal lined with open concrete pavers (top right), a stormwater channel leading from Amy Searle Street down towards the canal (bottom left) and a patch of remnant wetland vegetation in close proximity to Amy Searle Street (bottom right).

- Zone C:** This section of the pipeline follows Long Street and runs immediately adjacent to the road and sidewalk. The pipeline runs through a transformed section of the EFZ and does not run through or adjacent to any natural estuarine habitat.
- Zone D:** The pipeline route passes through natural, estuarine habitat located immediately adjacent to Long Street and eventually deviates from Long Street and passes through estuarine habitat, characterised by stands of *Phragmites australis* and patches of salt marsh vegetation (Figure 10). The habitat is supratidal and lies above the level of the highest high tide. Several stormwater channels that divert stormwater off of Long Street intersect with the pipeline route. While, the pipeline passes along an existing, disturbed servitude, the habitat immediately adjacent to the servitude is considered to be sensitive. This zone largely coincides with mapped aquatic CBA1 and CBA2 habitat (Figure 5).



*Figure 10: Examples of estuarine habitat located immediately adjacent to the sewer line servitude, including *Juncus kraussii* sedge beds (top left), *P. australis* reed beds (top right), salt marsh (bottom left) and vegetated stormwater channels extending from Long Street further into the interior of the EFZ (bottom right).*

- **Zone E:** The final section of the pipeline passes through the Great Brak municipal sport grounds complex where any former natural estuarine habitat has once again been transformed (roads, parking areas and sports fields) - Figure 11.



Figure 11: Paved roads and sports fields in Zone E (left and right).

5.3 Present Ecological State (PES) and Ecological Importance & Sensitivity (EIS)

5.3.1 Great Brak Estuary

The rapid level assessment for the Great Brak estuary confirmed the Present Ecological State as **C/D – Moderately to Largely Modified** (Van Niekerk et al., 2014) indicating that while loss and/or change of natural habitat and biota has occurred, the basic ecosystem functions and processes remain predominantly unchanged. In this respect alterations to water quality and the hydrodynamics of the estuary (e.g. prolonged mouth closure) are considered the most important variable with respect to impacts on habitat (Table 10). This in turn has notably influenced the majority of biotic indicators, with macrophytes, fish and birds most heavily affected. The Recommended Ecological Category (REC) is also set at **D**. The EIS of the estuary is presented in Table 11 and is rated as **Important**.

Table 10: Present Ecological State (PES) of the Groot Brak Estuary as determined by Van Niekerk et al. (2015).

Variable	Weight
Hydrology	C
Hydrodynamics and Mouth Condition	C/D
Water Quality	D
Physical Habitat Alteration	B
Habitat Health Score	C
Microalgae	C/D
Macrophytes	D/E
Invertebrates	D
Fish	D/E
Birds	C
Biotic Health Score	D
PES	C/D

Table 11: Estuarine Importance Scores (EIS) of the Groot Brak Estuary (Turpie and Clark, 2007)

Criteria	Weight	Score
Estuary Size	15	90
Zonal Rarity Type	10	80
Habitat Diversity	25	10
Biodiversity Importance	25	80
Functional Importance	25	77
Weighted Estuary Importance Score		63.25

5.3.2 Unchannelled Valley Bottom Wetland

As described in Section 5.1, the extent of the wetland has decreased over time and has also been artificially drained, presumably to accommodate development within the adjacent areas and to control flooding. The short length of channel upstream of Botha Street, was originally part of this broader wetland area. Despite these modifications the wetland is relatively large, provides good habitat for aquatic biota and its hydro-functional attributes remain largely unchanged and the PES is C – Moderately Modified (Table 12).

Table 12: Present ecological state (PES) of the unchannelled valley bottom wetland.

Final (adjusted) Scores				
PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	4.8	1.2	3.0	3.0
PES Score (%)	52%	88%	70%	70%
Ecological Category	D	B	C	C
Confidence (revised results)	Not rated	Not rated	Not rated	Not rated
Combined Impact Score	3.2			
Combined PES Score (%)	68%			
Combined Ecological Category	C			

The ecological importance and sensitivity of and the ecosystem services provided by the wetland are summarised as follows:

- The ecological importance and sensitivity of the wetland is **Moderate**. The wetland is relatively large and provides permanent reed-bed habitat which is likely to provide habitat for red-data bird species. The wetland is sensitive to changes in water quality and flow and (Table 13);
- The hydro-functional importance and sensitivity of the wetland is **Moderate**. The wetland does provide moderately important supporting and regulating ecosystem services, including flood attenuation, streamflow regulation and pollutant assimilation capabilities (Table 14);
- Provisioning (e.g. water for abstraction, harvestable materials, cultivated and livestock foods) and cultural (e.g. recreation, tourism, education and research) services provided by the wetland are **Low** (Table 15).
- The overall importance and sensitivity of the wetland is **Moderate**.

Table 13. Ecological Importance and Sensitivity criteria for the wetland.

Ecological Importance and Sensitivity	Score
Biodiversity Support	
Presence of Red Data species	2- Rare or endangered avifauna likely to utilise the wetland.
Populations of unique species	1 – Relatively low probability of unique species
Migration/feeding/breeding sites	1 – Low importance
Average	1.66
Landscape Space	
Protection status of wetland	1 – Public area
Protection status of vegetation type	0 – Vegetation has been transformed
Regional context of the ecological integrity	2 – Moderate (PES C)
Size and rarity of the wetland types present	2 – Moderate, relatively large, unchannelled valley bottom wetland
Diversity of habitat types	1 – Low diversity – dominated by <i>P. australis</i> reedbeds
Average	1.2
Sensitivity of Wetland	
Sensitivity to changes in floods	2 – Moderate sensitivity
Sensitivity to changes in low flows	3 – High sensitivity
Sensitivity to changes in water quality	1 – Low sensitivity
Average	2
ECOLOGICAL IMPORTANCE AND SENSITIVITY	2 (Moderate)

Table 14: Hydro-functional importance of the wetland.

Hydro-functional Importance			Score
Regulating & supporting benefits	Flood attenuation		2
	Streamflow regulation		2
	Water quality enhancement	Sediment trapping	2
		Phosphate assimilation	2
		Nitrate assimilation	2
		Toxicant assimilation	2
		Erosion control	1
	Carbon storage		2
HYDRO-FUNCTIONAL IMPORTANCE		1.5 (Moderate)	

Table 15: Direct human benefit importance of the wetland.

Direct Human Benefits		Score
Subsistence benefits	Water for human use	0 – No formal abstraction occurring
	Harvestable resources/cultivated foods	1 – Reedbeds provide harvestable resources but unlikely to be heavily utilised
Cultural benefits	Cultural heritage	0
	Tourism and recreation Education and research	1 – Potential bird-watching opportunities
DIRECT HUMAN BENEFITS		0.4 (Low)

5.4 Sensitivity

Habitat zones (as described in Section 5.2.2) were assigned sensitivity ratings based on the proximity of the pipeline to estuarine habitat (Figure 12):

- Low sensitivity (Zone C and E): These zones are located outside of natural estuarine habitat and are unlikely to have any impact on aquatic biodiversity.
- Medium sensitivity (Zone A and B): These zones are located outside of natural freshwater and estuarine habitat but are in close enough proximity to warrant precautions that prevent impacts – particularly during the construction phase.
- High Sensitivity (Zone D): This zone traverses through or runs in very close proximity to natural estuarine habitat. Precautions must be taken to minimise impacts to natural estuarine habitat during the construction and operational phase.

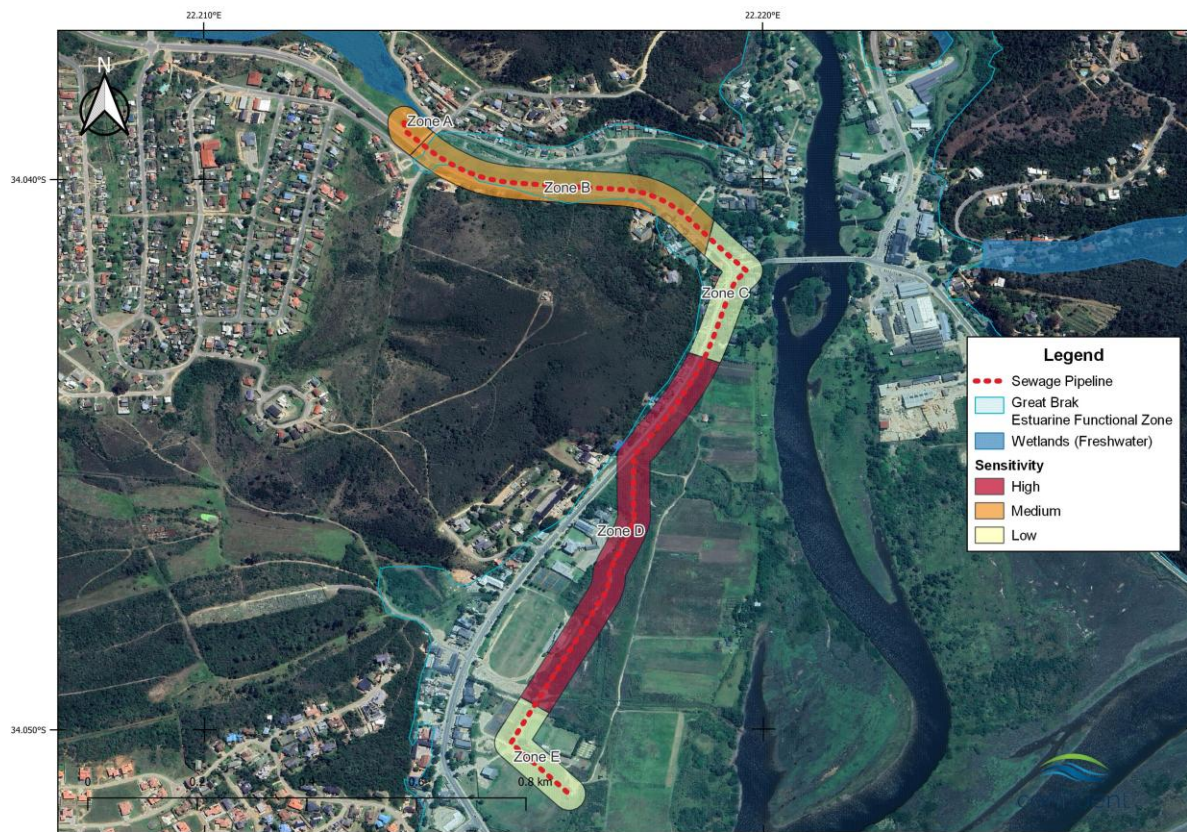


Figure 12: Sensitivity of zones.

6 IMPACT ASSESSMENT

The impact assessment follows the principals of the mitigation hierarchy which states that the next step along the hierarchy should only be followed once the previous step is no longer viable, and with valid reason (Figure 13). The impact assessment methodology is provided in the Appendix to this report.

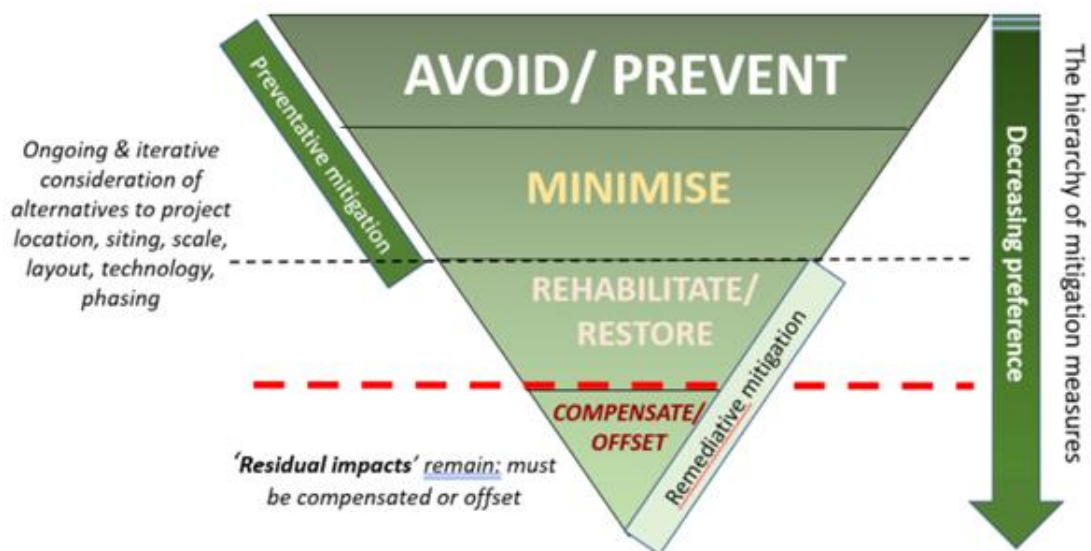


Figure 13: The mitigation hierarchy as presented in (Brownlie et al., 2023). The lower steps in the diagram should only be considered once the steps above have been duly considered.

6.1 Layout and Design Phase

Impact 1: Sewer line design in the flood line (applicable to all zones)

The entire pipeline route is located within the 1:50 and 1:100 year floodline. The primary concern around development of sewerage infrastructure in flood prone areas is prevention of the leakage of sewage during flood events which could pollute the wetland and estuary.

	Without Mitigation	With Mitigation
Intensity	High	High
Duration	Brief	Brief
Extent	Local	Local
Probability	Likely	Probably
Significance	-50: Minor	-40: Minor
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High

Mitigation:

- Air valves along sewer lines must be elevated above the 1:100-year flood line
- Sewer manhole covers should not be made of metal because of the risk of theft.
- Manholes must be designed to be watertight to prevent environmental contamination from leaking sewage and to avoid ingress of surface water during rainfall and flood events. Watertight manholes achieve this seal using components like gaskets on the manhole cover, proper joint sealing between sections, and leak-resistant pipe-to-manhole connections, which are essential for system integrity and cost efficiency.

6.2 Construction Phase

Impact 2: Disturbance of estuarine and wetland habitat caused by construction activities.

Construction activities in Zone A, B and D will take place in, or adjacent to natural freshwater and estuarine habitat. These activities include clearing of vegetation, excavation of trenches, stockpiling of materials and mixing of cement (e.g. for construction of manholes). Care must therefore be taken to minimise disturbance and impact on adjacent habitat.

	Without Mitigation	With Mitigation
Intensity	High	Moderate
Duration	Short term	Short term
Extent	Limited	Very limited
Probability	Almost certain	Unlikely
Significance	-60: Minor	-24: Negligible
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High

Mitigation:

- An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase to monitor and report back on compliance with conditions of the environmental authorisation.

- Consult weather forecasts daily and weekly. Do not work during rainfall and minimise the storage of mobile materials in low-lying areas. Plan the construction area as if it could be inundated with floodwaters in the event of a significant rainfall event.
- Construction access for the pipeline through Zone D should utilise existing access points from Long Street. No new roads should be necessary.
- The width of the working area through Zone D must be as narrow as possible and must be clearly demarcated. Estuarine habitat outside of this demarcated area must be considered as No-Go areas.
- Revegetation of the pipeline through Zone D must be actively encouraged. The route is currently well covered by indigenous vegetation (e.g. sedges, *P. australis*, *Stenotaphrum secundatum* etc.). It is recommended that when trenching, a top layer of vegetation in association with 20-30 cm of soil should be removed and set aside for replanting or covering the filled in trench.
- Open trenching for sewer lines should be done in as short a stretch as possible and backfilled with material as soon as possible to reduce the likelihood of material loss in the event of flooding
- Keep a skip on site so that any waste materials can be conveniently discarded and removed. This includes small amounts of dirty water, such as that used for mixing concrete.
- Equipment and materials lay-down areas should be located away from estuarine habitat and stormwater channels leading into the estuary. Minimise the storage of loose materials in case of a flood event that could wash them into the estuary.
- Post-construction site clean-up must be completed to ensure the entire site footprint and surrounding area has been cleared of litter and any waste materials associated with construction. The ECO should be informed of the construction close-out and complete an inspection to ensure this measure has been implemented.
- The pipeline route through Zone D must be routinely inspected for the establishment of alien invasive plant species. This must be done at a high frequency following construction (i.e. monthly) and can be reduced once natural vegetation along the pipeline has recovered. These must be controlled by hand. No aerial application of herbicides is permitted. Herbicides may only be applied to cut-stumps and must be registered for use on the target plant species.

6.3 Operational Phase

Impact 3: Pollution of wetland and estuarine habitat caused by pipeline blockages.

There is a high likelihood that occasional leaks will occur due to blockages or damaged sections of the pipeline. Standard operating procedures must be developed and implemented in order to detect, respond to and contain leaks when these do occur. The objective is to reduce the risk of pollution entering the estuary.

	Without Mitigation	With Mitigation
Intensity	High	Moderate
Duration	Brief	Brief
Extent	Local	Local
Probability	Almost certain	Almost certain
Significance	-60: Minor	-54: Minor
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High
Mitigation:		

- When blockages to sewerage infrastructure within the EFZ occur, the maintenance team should ensure a honey-sucker is on standby to mop up any spills or overflows for removal and disposal at the Wastewater Treatment Works.
- Any serious sewage spills that result in large quantities of sewage leaking from a pump station or manhole must be contained in a temporary coffer dam which can be constructed using sandbags for the walls and plastic sheeting as a base. From here, honey-suckers can collect sewage for removal.
- Any water-tight seals around manholes, joints or other access points that must be broken for maintenance should be replaced thereafter to ensure the mitigation measures to prevent water ingress or sewage leakage are maintained under flood scenarios.
- Keep sewer lines clear of dense vegetation to facilitate access and reduce the risk of roots cracking sewer lines.

Impact 4: Disturbance of wetland and estuarine habitat caused by maintenance on pipelines (Zone A, B and Zone D).

The operational phase primarily relates to maintenance and repairs required for the sewer lines within the EFZ. The proximity of the pipeline to estuarine habitat increases the risk that contractors appointed for maintenance could inadvertently create impacts to the estuary. Mitigation measures aim to reduce the risk of damage or disturbance to nearby estuarine or wetland habitat.

	Without Mitigation	With Mitigation
Intensity	High	Moderate
Duration	Short term	Short term
Extent	Limited	Very limited
Probability	Almost certain	Unlikely
Significance	-60: Minor	-24: Negligible
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High

Mitigation:

- All of the mitigation measures provided for the construction phase are applicable to maintenance work where applicable.

7 DWS RISK ASSESSMENT

Risks of activities associated with the phases of sewage pipeline upgrade to the unchannelled valley-bottom wetland were determined according the risk assessment matrix developed as part of GN 4167 of 2023 (Section 21 (c) and (i) water use Risk Assessment Protocol). The first stage of the risk assessment is the identification of environmental activities, aspects and impacts and essentially mirror those that were identified in the impact assessment (see Section 6). The intensity of impact to receptors and resources (i.e. hydrology, water quality, geomorphology, biota and vegetation) is rated (from 0 to 5, representing negligible and very high impact, respectively), which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. Risks were then quantified based on the anticipated spatial scale, duration and likelihood of occurrence and assumed the full implementation of recommended mitigation measures described in Section 6. A short section of the pipeline lies adjacent to a modified, artificially channelised section of the wetland. Impacts that will be affect

the wetland (and measures that must be implemented in order to mitigate these impacts) are described in detail in Section 6 and are summarised as follows:

Design Phase

- Leaking manholes caused by stormwater ingress.

Construction Phase

- Erosion and sedimentation of the wetland due to clearance of vegetation and stockpiling of soil during the trench excavation.
- Contamination of watercourses by solid waste and chemical pollutants caused by construction activities.
- Physical disturbance of aquatic habitat caused by construction activities (including excavation of trenches, operation of vehicles, stockpiling of materials, management of waste).

Operational Phase

- Leaking manholes caused by blockages in the pipeline.
- Future maintenance of the pipeline.

Table 16: DWS risk assessment of the proposed Great Brak sewage pipeline upgrade on wetland habitat.

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating (with mitigation)	Confidence level						
			Name/s	PES	EIS	Abiotic Habitat (Drivers)			Biota																	
						Hydrology	Water Quality	Geomorph	Vegetation	Fauna																
LAYOUT	Periodic flooding	Leaking manholes caused by stormwater ingress	Unchannelled VB Wetland	C	High		1	2	1	1	2		4	1	1		6	4		24		60%		14.4	L	High
CONSTRUCTION	Operation of machinery and construction vehicles	Spills and leaks of fuel and oil	Unchannelled VB Wetland	C	High		0	1	0	1	1		2	1	1		4	4		16		20%		3.2	L	High
		Disturbance of wetland habitat and water quality	Unchannelled VB Wetland	C	High		0	1	0	1	1		2	1	1		4	4		16		20%		3.2	L	High
	Construction workers working adjacent to delineated area of wetland	Disturbance of wetland habitat and water quality	Unchannelled VB Wetland	C	High		0	1	0	1	1		2	1	1		4	4		16		40%		6.4	L	High
	Excavation of trench to lay new pipeline	Erosion and sedimentation caused by clearing of vegetation and excavation of trench	Unchannelled VB Wetland	C	High		0	1	1	1	1		2	1	1		4	4		16		40%		6.4	L	High
	Construction of manhole	Pollution caused by mixing of cement	Unchannelled VB Wetland	C	High		0	1	0	1	1		2	1	1		4	4		16		20%		3.2	L	High
	Stockpiles and laydown areas	Sedimentation and pollution caused by erosion of stockpiles	Unchannelled VB Wetland	C	High		0	1	1	1	1		2	1	1		4	4		16		40%		6.4	L	High
		Disturbance of wetland habitat caused by placement of laydown areas and stockpiles	Unchannelled VB Wetland	C	High		1	0	1	1	1		2	1	1		4	4		16		20%		3.2	L	High
OPERATIONAL	Operation of Sewage Pipeline	Leaking manholes caused by blocked pipelines	Unchannelled VB Wetland	C	High		1	2	1	1	2		4	1	1		6	4		24		100%		24	L	High

8 CONCLUSION

The majority of the upgrades to the sewage pipeline will occur in transformed sections of the EFZ (Zone A, B, C and E) and no estuarine habitat will be directly disturbed in these zones. Where the pipeline does traverse estuarine habitat (Zone D), it does so within an existing servitude. Impacts to estuarine wetland habitat can however be mitigated to a low or negligible significance of impact and it is recommended that authorisation for the upgrade is granted.

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APPENDIX 1: IMPACT ASSESSMENT METHODOLOGY

Individual impacts for the construction and operational phase were identified and rated according to criteria which include their intensity, duration and extent. The ratings were then used to calculate the consequence of the impact which can be either negative or positive as follows:

$$\text{Consequence} = \text{type} \times (\text{intensity} + \text{duration} + \text{extent})$$

Where type is either negative (i.e. -1) or positive (i.e. 1). The significance of the impact was then calculated by applying the probability of occurrence to the consequence as follows:

$$\text{Significance} = \text{consequence} \times \text{probability}$$

The criteria and their associated ratings are shown in Table 17.

Table 17: Categorical descriptions for impacts and their associated ratings

Rating	Intensity	Duration	Extent	Probability
1	Negligible	Immediate	Very limited	Highly unlikely
2	Very low	Brief	Limited	Rare
3	Low	Short term	Local	Unlikely
4	Moderate	Medium term	Municipal area	Probably
5	High	Long term	Regional	Likely
6	Very high	Ongoing	National	Almost certain
7	Extremely high	Permanent	International	Certain

Categories assigned to the calculated significance ratings are presented in Table 18.

Table 18: Value ranges for significance ratings, where (-) indicates a negative impact and (+) indicates a positive impact

Significance Rating	Range	
Major (-)	-147	-109
Moderate (-)	-108	-73
Minor (-)	-72	-36
Negligible (-)	-35	-1
Neutral	0	0
Negligible (+)	1	35
Minor (+)	36	72
Moderate (+)	73	108
Major (+)	109	147

Each impact was considered from the perspective of whether losses or gains would be irreversible or result in the irreplaceable loss of biodiversity of ecosystem services. The level of confidence was also determined and rated as low, medium or high (Table 19).

Table 19: Definition of reversibility, irreplaceability and confidence ratings.

Rating	Reversibility	Irreplaceability	Confidence
Low	Permanent modification, no recovery possible.	No irreparable damage and the resource isn't scarce.	Judgement based on intuition.
Medium	Recovery possible with significant intervention.	Irreparable damage but is represented elsewhere.	Based on common sense and general knowledge
High	Recovery likely.	Irreparable damage and is not represented elsewhere.	Substantial data supports the assessment

APPENDIX G: TERRESTRIAL BIODIVERSITY SITE VERIFICATION AND COMPLIANCE STATEMENT REPORT

SITE VERIFICATION AND COMPLIANCE STATEMENT REPORT FOR THE PROPOSED UPGRADE OF A SEWERAGE PIPELINE IN GREAT BRAK, WESTERN CAPE

Terrestrial Biodiversity



Date:	17 August 2025
Version:	Draft
Author:	JA van der Walt (Pr. Sci.Nat: 116549)
EAP:	Sharples Environmental Services
Applicant:	Mossel Bay Municipality



EXECUTIVE SUMMARY

VEGETATION UNITS	National: Groot Brak Dune Strandveld (CR) Vlok Veg Map: Brandwag Fynbos Renosterveld Thicket and Groot Brak River Saltmarsh. The original vegetation has been almost fully transformed into roads, pavements, and lawns. The remaining natural vegetation is dominated by non-native species, with no intact plant communities remaining.
DEVELOPMENT FOOTPRINT SIZE AND LEVEL OF TRANSFORMATION	No intact communities of natural vegetation remain in the proposed development footprint, which is approximately 2,100 m long and 5 m wide.
LANDUSE PLANNING	Smaller sections of the proposed development footprint fall within a CBA wetland and estuary, but these areas are transformed/degraded and mostly dominated by non-native plant species.
CONNECTIVITY	Portions of the proposed development footprint can be regarded as a buffer for the Groot Brak estuary.
PLANT SPECIES OF CONSERVATION CONCERN	No plant species of conservation concern were recorded in the proposed development footprint
ANIMAL SPECIES OF CONSERVATION CONCERN	No animal species of conservation concern were recorded in the proposed development footprint
WATER COURSES AND WETLANDS	The proposed pipeline crosses artificial drainage ditches created to direct stormwater into low-lying areas between the Groot Brak estuary and the urban development along Lang Street.
MAIN CONCLUSIONS	The site has been assessed as having low sensitivity from a terrestrial biodiversity perspective, contrary to the very high rating assigned in the Environmental Screening Tool. This determination is supported by the absence of intact natural and threatened vegetation due to urban transformation. The CBAs in the proposed development footprint will not be significantly impacted and should return to their current state within two years.

DECLARATION OF INDEPENDENCE IN TERMS OF CHAPTER 5 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT (NEMA), ACT 107 OF 1998:

I, Johannes Adriaan van der Walt, ID: 6706225172085, declare that:

- I act as the independent environmental specialist in this report;
- I will perform the work relating to the report objectively, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments and specialist reports, including knowledge of the Act, Regulations, and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations, and all other applicable legislation;
- I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations

ENVIRONMENTAL SPECIALIST:

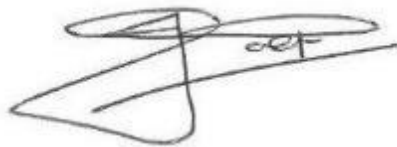
Johannes Adriaan van der Walt

Tel: +27 (82) 305 8945

Email: admin@aecorp.co.za

Signature

Date: 17 August 2025

A handwritten signature in black ink, appearing to be 'J. A. van der Walt', written over a light blue horizontal line.

Abridged Curriculum Vitae – Johannes Adriaan van der Walt

PROFESSIONAL REGISTRATION

Professional Natural Scientist:
South African Council for
Natural Science Professionals
(SACNASP) nr116549

QUALIFICATIONS

MTech Nature Conservation
(cum laude) 2014, CPUT

BTech Nature Conservation
(cum laude) 2012, CPUT

NDip Nature Conservation
(cum laude) 1994, CPUT

LANGUAGES

English – fluent
Afrikaans – fluent

EXPERIENCE

37 years of biodiversity
conservation and botanical
experience in the Fynbos and
Succulent Karoo Biomes

EMPLOYMENT

1988 – 2006 CapeNature

2007 – 2010 Botanical Insight
cc

2010 - 2017 CapeNature

2017 – present: Director at
Advanced Environmental
Corporation (Pty) Ltd and
Fynbos Fish Trust trustee

BOTANICAL, ANIMAL, AND BIODIVERSITY EXPERTISE WAS GAINED THROUGH:

- Employment as a nature conservationist with CapeNature for 25 years;
- biodiversity assessments (including botanical, animal species, and biodiversity) since 1994;
- participating as a SANBI-CREW volunteer for botanical assessments for threatened plants;
- participating in the Protea Atlas project as a volunteer;
- contributing as a Red-list assessor for a selection of Fynbos species;
- conservation initiatives for threatened flora with CapeNature;
- compliance monitoring of wildflower shows (Clanwilliam, Leipoldtville, Porterville, Tulbagh, and Darling) between 1994 and 2006;
- compilation of species lists for protected areas;
- compilation of specialist botanical assessments for DEA&DP and private landowners since 2017;
- discovering five new plant species in the CFR since 2019;
- keeping up to date with new plant descriptions and taxonomic revisions in the CFR and
- keeping an extensive private collection of applicable literature, including field guides and other botanical reference books.

PUBLICATIONS:

- Author and co-author of 14 biodiversity conservation and botanical scientific papers

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1. INTRODUCTION

1.1 Background

The Mossel Bay Municipality is in the process of upgrading its sewage system in Groot Brakrivier, and one of these upgrades includes the installation of a new Ø300mm pipeline from Amy Searle Street/Greenhaven, past the cricket field sewerage pump station to Lang Street. The Environmental Assessment Practitioner (EAP) appointed by the municipality is Sharples Environmental Services. The proposed activities trigger environmental regulations promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (“NEMA”) and require environmental authorization.

1.2 Environmental Screening Tool Report

Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations requires an applicant for an Environmental Authorisation to submit a report generated by the Environmental Screening Tool as part of their application. This tool, developed by the Department of Forestry, Fisheries, and the Environment (DFFE), became operational on July 5, 2019, as announced in the Government Gazette. The screening tool report will identify the environmental sensitivities that intersect with the proposed development footprint as defined by the applicant, as well as the relevant protocols that the applicant would need to follow. The screening tool is accessible at <https://screening.environment.gov.za>.

An environmental screening tool report for the proposed development was completed on the 25th of July 2025. A **“Very High”** environmental sensitivity rating was indicated for the Terrestrial Biodiversity theme. As per the procedures for the assessment and minimum criteria for reporting on identified environmental themes (Terrestrial Biodiversity) in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation (October 2020), *“An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of **“very high sensitivity”** for terrestrial biodiversity, must submit either a Terrestrial biodiversity Specialist Assessment Report or a Terrestrial Biodiversity Compliance Statement, depending on the outcome of a site inspection/site sensitivity verification undertaken”*.

The site sensitivity verification was conducted on 19 and 20 July 2025, and the outcome, as reported in **Section 7** of this report, indicated a **low sensitivity** towards terrestrial biodiversity and therefore a terrestrial biodiversity compliance statement was compiled and included in this report.

2. TERMS OF REFERENCE

2.1 Site verification

-The assessment must contextualize the study area to provide a baseline description of the ecological system; the terrestrial plant biodiversity and any significant terrestrial features must be provided.

-The assessment must identify the following:

- Terrestrial critical biodiversity areas (CBAs)
- Terrestrial ecological support areas (ESAs)
- Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004
- Priority areas for protected area expansion
- Indigenous forests

-Undertake a site visit and ground-truth biodiversity information. Where required, undertake baseline surveys and/or studies to supplement the information base and inform the assessment.

-Estimate the trajectory of change in the context of the 'No-Go' Alternative due to existing impacts.

-Assessment criteria to be aligned with the promulgated Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (October 2020).

Following the site verification visit, in which the Specialist confirms the presence, likely presence or confirmed absence of a SCC identified within the site identified as "medium" sensitivity by the screening tool, the Specialist is to confirm the need for a Compliance Statement or a Terrestrial Plant Species Assessment and undertake this report/statement following the Gazetted Protocol (October 2020).

2.2 Compliance statement

The compliance statement must:

- be applicable within the study area;
- confirm that the study area is of "low" sensitivity for terrestrial biodiversity; and
- indicate whether the proposed development will have any impact on the biodiversity feature.

Minimum Requirements Include:

- contact details, relevant experience, and the SACNASP registration number of the specialist preparing the compliance statement, including a curriculum vitae.
- a signed statement of independence by the specialist;

- a statement on the duration, date, and season of the site inspection and the relevance of the season to the outcome of the assessment;
- a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;
- in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;
- where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;
- a description of the assumptions made and any uncertainties or gaps in knowledge or data;
- the mean density of observations/ number of sample sites per unit area; and
- any conditions to which the compliance statement is subjected.

A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

2.3. Legal requirements applicable to the specialists conducting assessments

The Environmental Impact Assessment Regulations that were published on 4 December 2014 and amended on 7 April 2017, state that:

(1) an EAP and a specialist, appointed in terms of regulation 12(1) or 12(2), must-

(a) be independent;

(b) have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these Regulations, and any guidelines that have relevance to the proposed activity;

(c) ensure compliance with these Regulations;

(d) perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the application;

(e) take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan, or document relating to the application; and

(f) disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing-

(i) any decision to be taken concerning the application by the competent authority in terms of these Regulations; or

(ii) the objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; unless access to that information is protected by law, in which case it

must be indicated that such protected information exists and is only provided to the competent authority.

(2) In the event where the EAP or specialist does not comply with sub-regulation (1)(a), the proponent or applicant must, before conducting public participation as contemplated in chapter 5 of these Regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicant's cost.

(3) An EAP or specialist appointed to externally review the work of an EAP or specialist as contemplated in sub-regulation (2) must comply with sub-regulation (1).

2.4 Report Content Requirements

The following legislation and guideline documents are applicable and were adhered to in compiling this report:

2.4.1 Guidelines documents

- a) Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process (Brownlie 2005).
- b) Ecosystem Guidelines for Environmental Assessments in the Western Cape (Cadman 2016).
- c) The Western Cape Biodiversity Spatial Plan Handbook (Pool-Stanvliet *et al.* 2017)
- d) South African National Biodiversity Institute (SANBI), 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.

2.4.2 Legal documents

- a) Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), when applying for Environmental Authorisation" ("the Protocols") (GN No. 320 as published in Government Gazette No. 43110 on 20 March 2020) came into effect on 09 May 2020 the Protocol.
- b) Appendix 6 of the 2014 EIA Regulations (National Environmental Management Act, 1998 (Act No. 107 of 1998)

3. LIMITATIONS AND ASSUMPTIONS

The field surveys for this report were conducted on July 19 and 20, 2025. The findings from this specialist assessment are based on a two-day site visit, which means some species might not have been recorded. However, the proposed development footprint was highly altered, reducing the likelihood that species were missed. Confidence in the findings is high. It is unlikely that a full terrestrial biodiversity assessment would reveal additional findings that would significantly impact the outcome.

4. STUDY AREA

4.1 Location

Groot Brakrivier is situated on the southern coast of the Western Cape Province, South Africa, as illustrated in **Figure A**. The town is located on both sides of the Groot Brakrivier estuary.

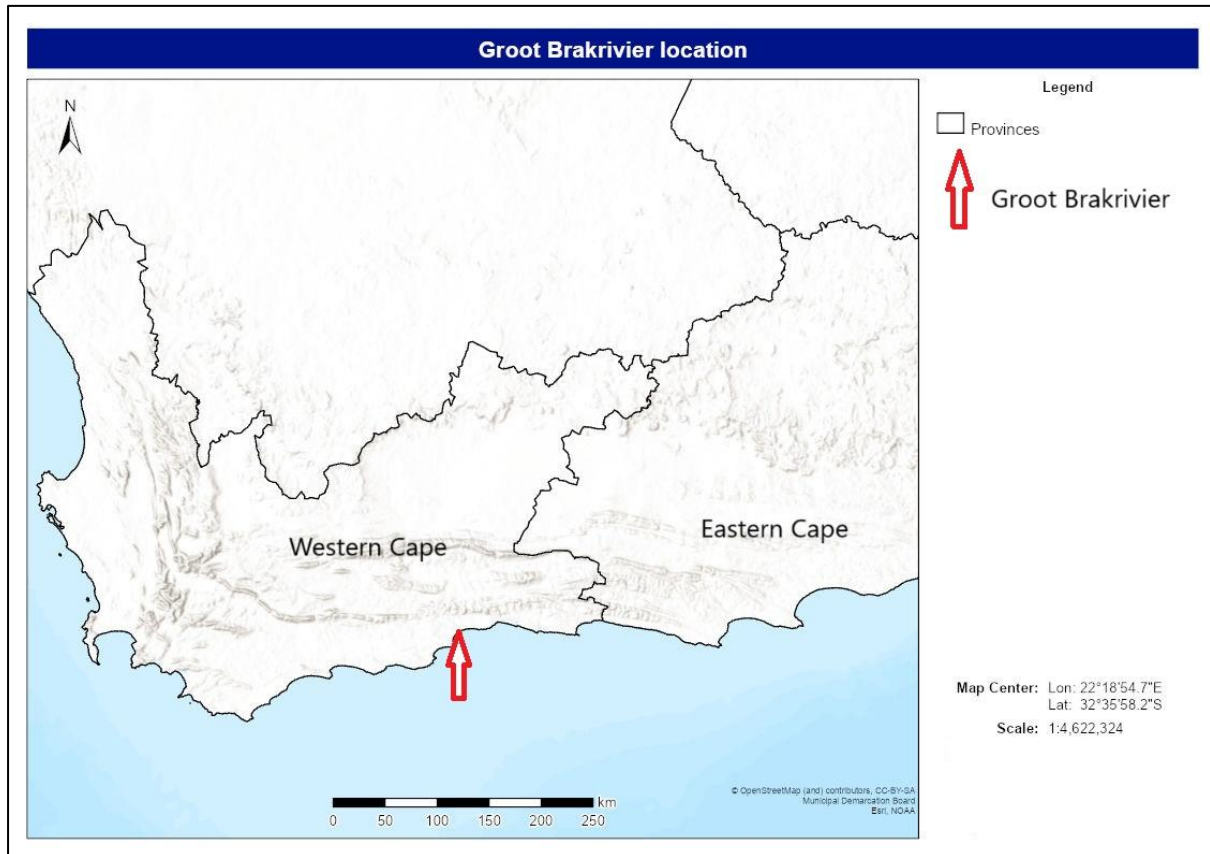


Figure A. Map showing the location of Groot Brakrivier.

4.2 Proposed Development Footprint (PDI) and Project Area of Influence (PAOI)

The proposed development footprint is indicated as a purple polygon in **Figure B**. This purple polygon is the route of the old sewage pipeline that is due for an upgrade. The development footprint will be approximately 2,1 km in length, with a construction footprint of 5 m in width for installation during the construction phase. The anticipated impacts will mostly occur during the construction phase of the project when the municipality will dig a trench along the proposed development footprint for the replacement of the sewage pipeline. These impacts are not expected to extend beyond the demarcated footprint. The PAOI is therefore treated here as the development footprint within which direct impacts will occur.

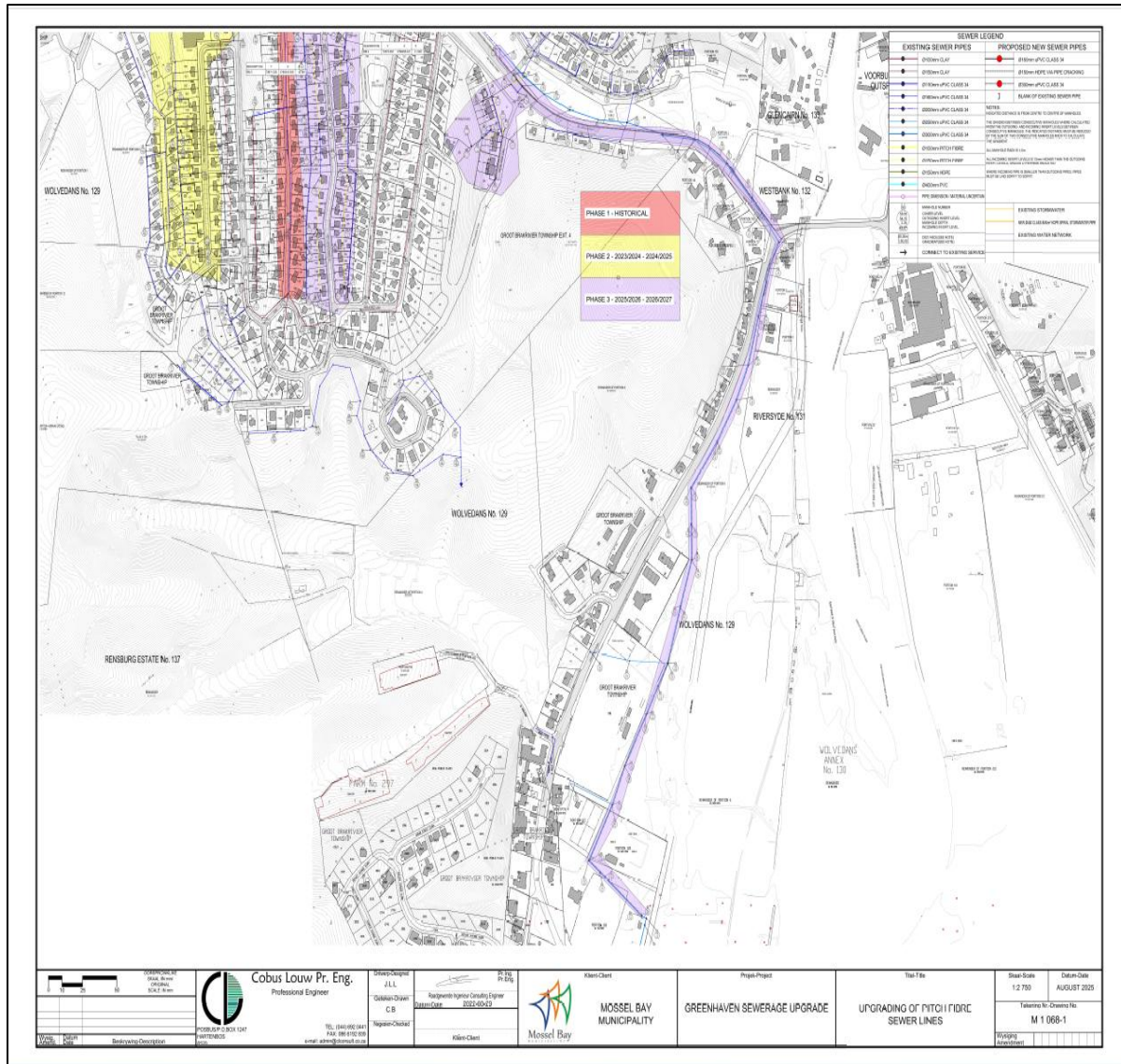


Figure B: The route of the proposed sewage pipeline upgrade is indicated with a purple polygon

5. METHODOLOGY

5.1 Desktop assessment

The specialist used various sources of information to assess the sensitivity of the terrestrial biodiversity within the proposed development footprint.

5.1.1 The Environmental Screening Tool Report: The environmental screening tool report indicates the sensitivity of the terrestrial biodiversity theme across the proposed development and lists sensitivity features that could potentially be impacted by the proposed development.

5.1.2 CapeFarmMapper 3: The following spatial data were obtained from CapeFarmMapper 3 (CFM 3). CMF 3 is GIS software provided by the Western Cape Department of Agriculture, available at <https://gis.elsenburg.com/apps/cfm/>.

- Vegetation units
- Vegetation unit threat status
- Spatial planning data: Critical Biodiversity Areas, Ecological Support Areas.

5.1.3 iNaturalist: iNaturalist is a crowdsourced species identification system and an organism occurrence recording tool. Sightings are graded, and only research-grade sighting is used in specialist assessments.

5.1.4 Google Earth: Google Earth is a web and computer program created by Google that renders a 3D representation of Earth based primarily on satellite imagery but also on street-level views. This imagery is useful when historical aerial imagery is needed of a proposed development footprint. It also gives a good perspective of the level of transformation before a field assessment is undertaken.

5.1.5 Other sources of data: Additional data were collected from a range of pertinent sources, including Mucina & Rutherford (2006), the National Vegetation Map (2018), and relevant biodiversity plans (Pool-Stanvliet 2017, SANBI 2021).

5.2 Field assessment

The field assessment was conducted over two days (19 and 20 July 2023). The specialist walked the proposed development footprint from west while collecting data. All plant and tree species were noted, photographed, and identified on-site if possible. Plants and trees that could not be identified during the field survey were later identified using available literature and taxonomic experts. The specialist also took drone imagery to give a better view of the proposed development footprint.

6. RESULTS: DESKTOP ASSESSMENT

6.1 Climate

The Mean Annual Precipitation (MAP) for Groot Brakrivier is approximately 459 mm, with approximately 40% of the rain falling in summer (October–March) and 60% in winter (April–September). Mean daily maximum and minimum temperatures are 26.8°C and 7.7°C for February and July, respectively (Mucina & Rutherford 2006).

6.2 Topography, geology, and soils

The proposed development footprint is located on a relatively flat area with a very slight gradient from west to east. The highest elevation on the proposed pipeline upgrade is at 10 metres above sea level (MASL), while the lowest point is at 1 MASL. The area is mostly underlain by the clastic sedimentary rocks of the Kirkwood Formation (Mesozoic Uitenhage Group). In the east, quartzite, schist, and phyllite of the Kaaimans Group (Namibian Erathem) and Cape Granite (edges of high coastal cliffs) are also present. In parts along the coast, these rocks are covered by the unconsolidated dune sand of the Strandveld. See **Figure C** for a map of the soil types present at the proposed development footprint (Mucina & Rutherford 2006).

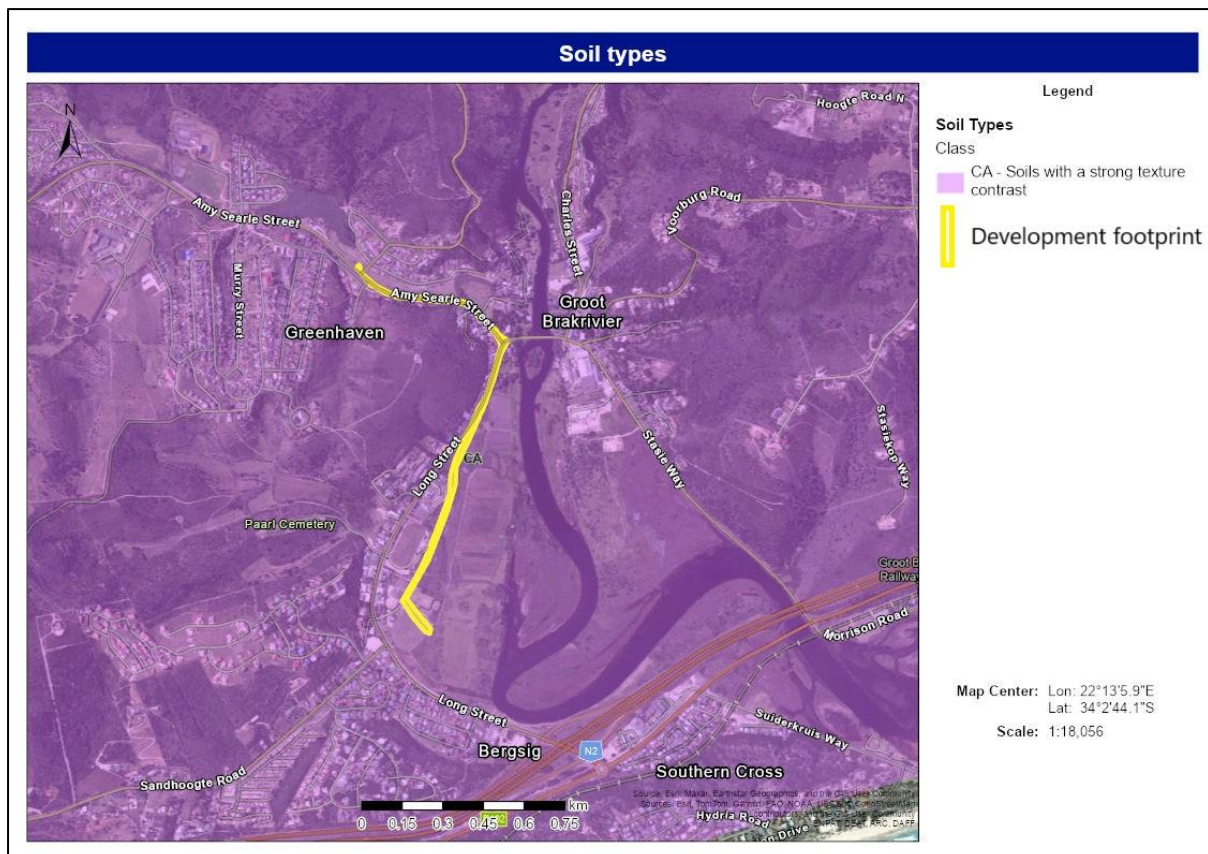


Figure C: Map indicating the different soil types on and near the proposed development footprint

6.3 VEGETATION

6.3.1 General Context

Groot Brakrivier town, where the proposed development is situated, is part of the Cape Floristic Region (CFR). The CFR is renowned for its botanical diversity, containing over 9,000 vascular plant species, 69% of which are endemic (Goldblatt & Manning 2000). The CFR encompasses most of the Cape Fold Mountains and coastal lowlands stretching from Nieuwoudtville to Gqeberha. The Fynbos Biome consists of three primary vegetation complexes: Fynbos, Renosterveld, and Western Strandveld. The Fynbos complex is the most extensive, covering 67% of the Fynbos Biome, while Western Strandveld covers the smallest area within the Fynbos Biome. The proposed development site is located within this Western Strandveld complex. The Western Strandveld complex is subdivided into nine different vegetation units, of which one, Groot Brak Dune Strandveld, is the mapped vegetation unit across the proposed development footprint.

6.3.2 Local vegetation context

Groot Brak Dune Strandveld (**Figure D**) is listed as Critically Endangered (CR), with a Target of 36%. None of it is protected in statutory conservation areas, and only about 1% is safeguarded in private reserves (George, Kanon, Blydskap, Kwelanga). Nearly half of the region has been transformed for agriculture, through road construction or coastal settlement development. Erosion levels vary, ranging from moderate to high, with some areas classified as low. In 1990, 53% of the original extent of this vegetation was still present, and in 2018, this had declined to 45%, placing the ecosystem type at risk of collapse.

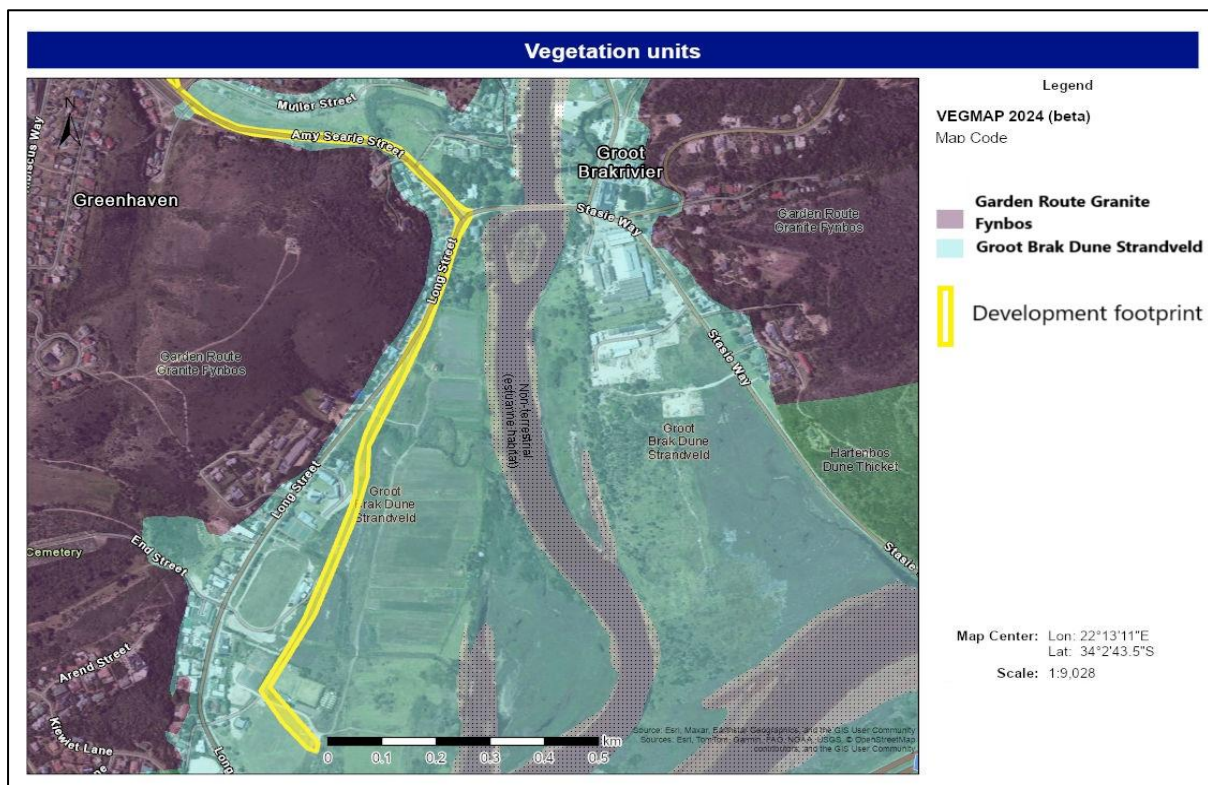


Figure D: Vegetation unit map for the proposed development footprint

6.3.3 Vlok Vegmap

The Vlok Vegmap composite vegetation map of the Riversdale, Little Karoo, Swartberg, and Garden Route regions of the Southern Cape, as classified by Jan Vlok, was mapped at a scale of 1:50,000 for various projects and combined into one continuous layer. The Vlok Vegmap mapped the vegetation unit along Amy Searle Street as Brandwag Fynbos Renosterveld Thicket and the section along Lang Street as Groot Brak River Saltmarsh, as displayed in **Figure E**. There is no conservation statuses linked to the vegetation units as mapped by the Vlok Vegmap.

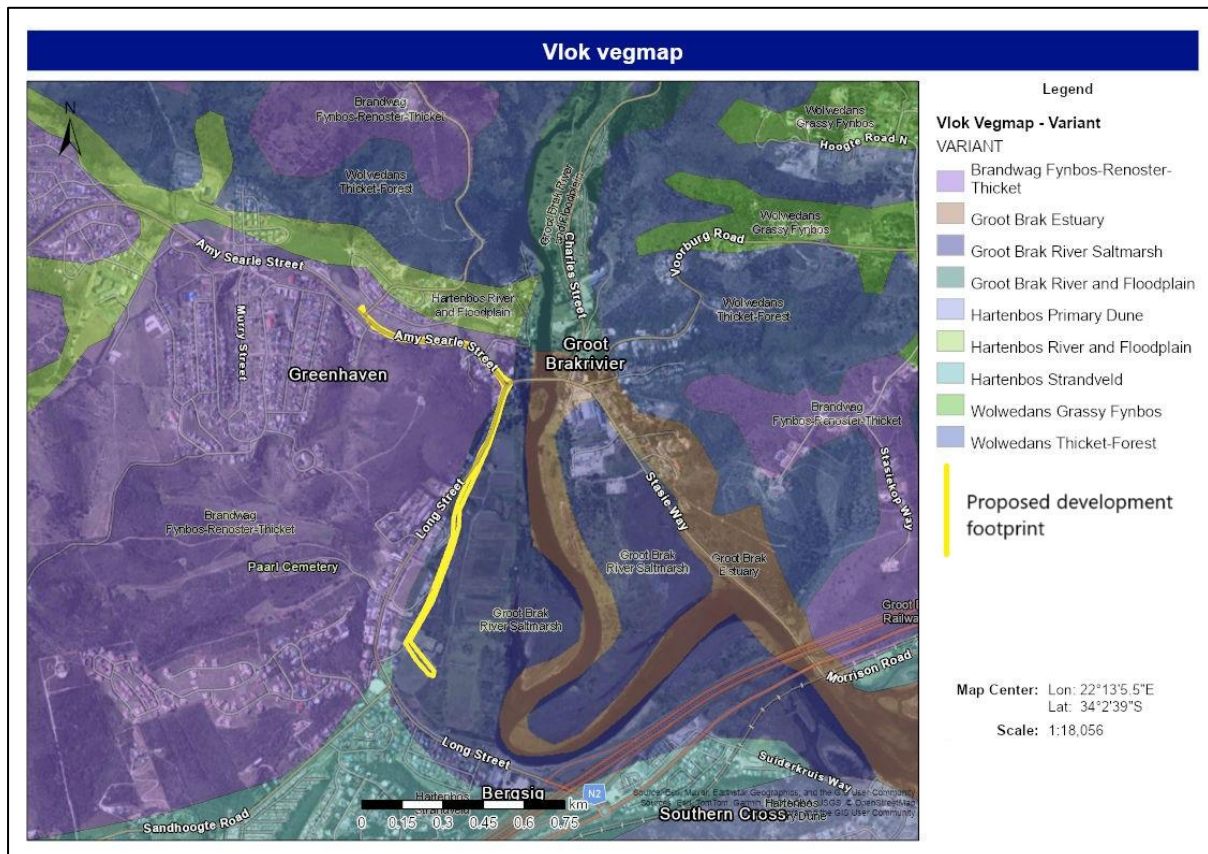


Figure E: The Vlok Vegmap for the proposed development footprint

6.4 Plant species

According to Mucina & Rutherford (2006), important taxa in Groot Brak Dune Strandveld include:

Important Taxa Small Trees: *Chionanthus foveolatus*, *Clausena anisata*. Tall Shrubs: *Azima tetraacantha*, *Cussonia thyrsiflora*, *Diospyros dichrophylla*, *Euclea racemosa* subsp. *racemosa*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Maytenus procumbens*, *Metalasia muricata*, *Morella cordifolia*, *Myrsine africana*, *Mystroxydon aethiopicum*, *Olea exasperata*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Rhus crenata*, *R. glauca*, *R. longispina*, *R. lucida*, *Schotia afra* var. *afra*, *Sideroxylon inerme*, *Tarchonanthus littoralis*. Low Shrubs: *Asparagus suaveolens*, *Ballota africana*, *Carissa bispinosa* subsp. *bispinosa*, *Chironia baccifera*, *Clutia daphnoides*, *Eriocephalus africanus* var. *africanus*, *Helichrysum teretifolium*, *Lauridia tetragona*, *Phyllica axillaris*, *Polygala myrtifolia*. Succulent Shrubs: *Aloe arborescens* (d), *Cotyledon orbiculata* var. *dactyloopsis*, *Crassula perforata*, *C. pubescens* subsp. *pubescens*, *Euphorbia burmannii*, *E. mauritanica*, *Tetragonia fruticosa*, *Zygophyllum morgsana*. **Biogeographically Important Taxa**

(both South Coast endemics) Herb: *Indigofera tomentosa*. Geophytic Herb: *Freesia alba* (Mucina & Rutherford 2006).

6.5 Environmental Screening Tool results

Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations requires an applicant for an Environmental Authorisation to submit a report generated by the Environmental Screening Tool as part of their application. This tool became operational on 5 July 2019, as announced in the Government Gazette. The screening tool report will identify the environmental sensitivities that intersect with the proposed development footprint, as defined by the applicant, as well as the relevant protocols that the applicant must follow. The screening tool is accessible at <https://screening.environment.gov.za>. The Environmental Screening Tool Report rated the terrestrial biodiversity theme as very high sensitivity for the proposed pipeline upgrade. The image from the Environmental Screening Tool Report is displayed in **Figure E**.

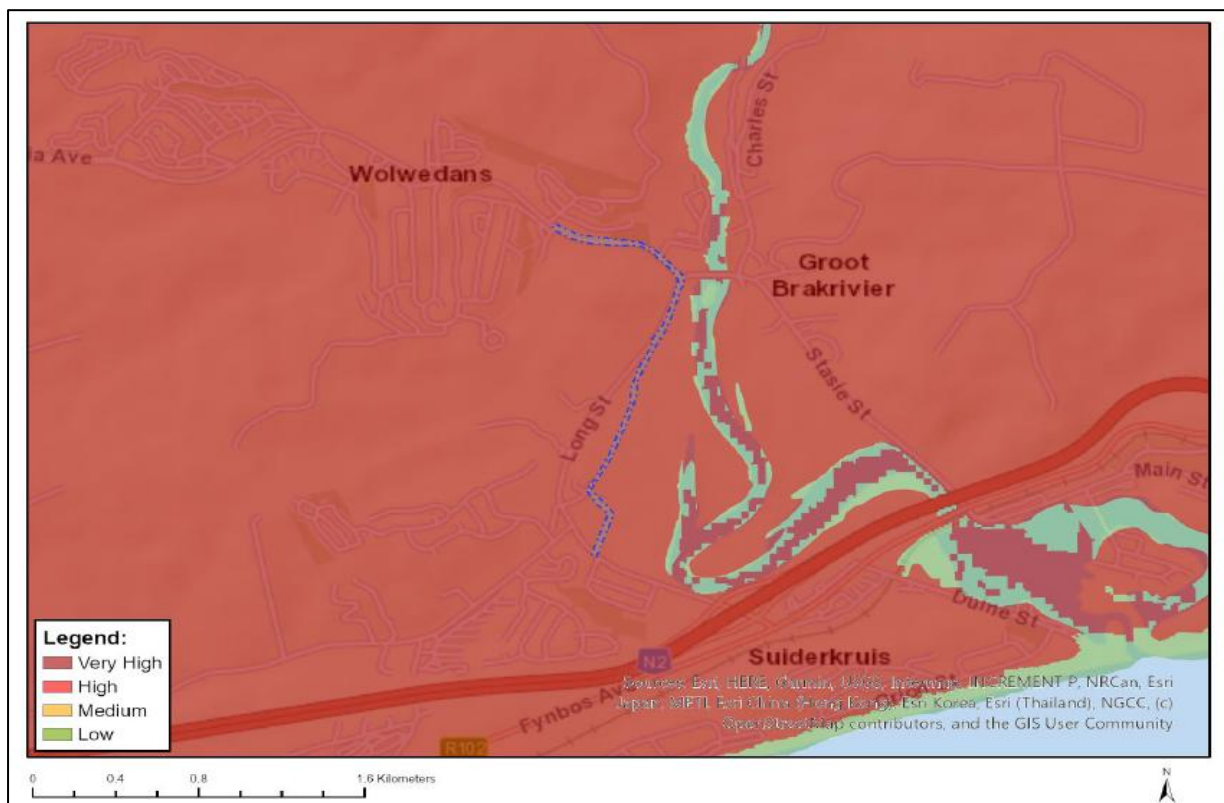


Figure E: Map indicating the terrestrial biodiversity theme sensitivity rating for the proposed development footprint and surrounding areas.

The environmental screening tool also lists the individual features that are responsible for the very high rating of the terrestrial biodiversity theme. These features are listed in **Table 1**.

Table 1: Sensitivity rating of the terrestrial biodiversity features as listed in the environmental screening tool report for the proposed development footprint

Sensitivity rating	Feature	Conservation status
Very High	CBA2: Terrestrial	NA
Very High	Garden Route Granite Fynbos	Critically Endangered
Very High	Groot Brak Dune Strandveld	Critically Endangered

6.6 Spatial Planning

6.6.1 Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas (CBAs) are areas that must be safeguarded in their natural or near-natural state because they are essential for conserving biodiversity and maintaining ecosystem functioning. The spatial planning map for Groot Brakrivier (**Figure F**) indicates that the proposed development footprint does not cross over any terrestrial CBA. The footprint does intersect with CBA Wetland and CBA Estuary near Lang Street. **Figure G** provides a zoomed-in version of **Figure F** to show more detail on the CBA Wetland demarcation. No Ecological Support Areas (ESAs) are mapped near the proposed development footprint. ESAs that are not essential for meeting biodiversity targets but play an important role in supporting the functioning of protected areas or critical biodiversity areas are often vital for delivering ecosystem services. The 2023 Western Cape Biodiversity Spatial Plan (WC BSP) was formally adopted into law on the 13th of December 2024 (Gazette Extraordinary 9017) in alignment with the Western Cape Biodiversity Act (No. 6 of 2021). This marks the replacement of the 2017 WC BSP with the 2023 WC BSP.

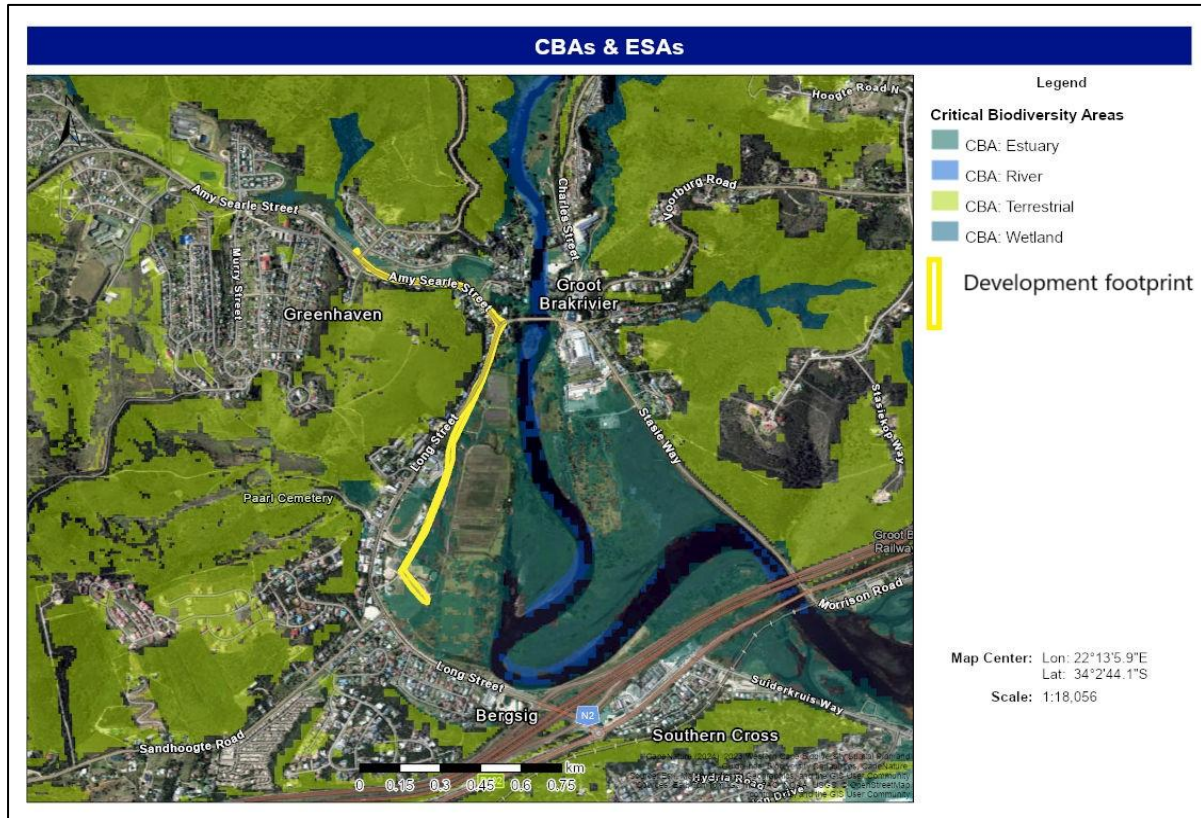


Figure F: Spatial planning map for Groot Brakrivier.

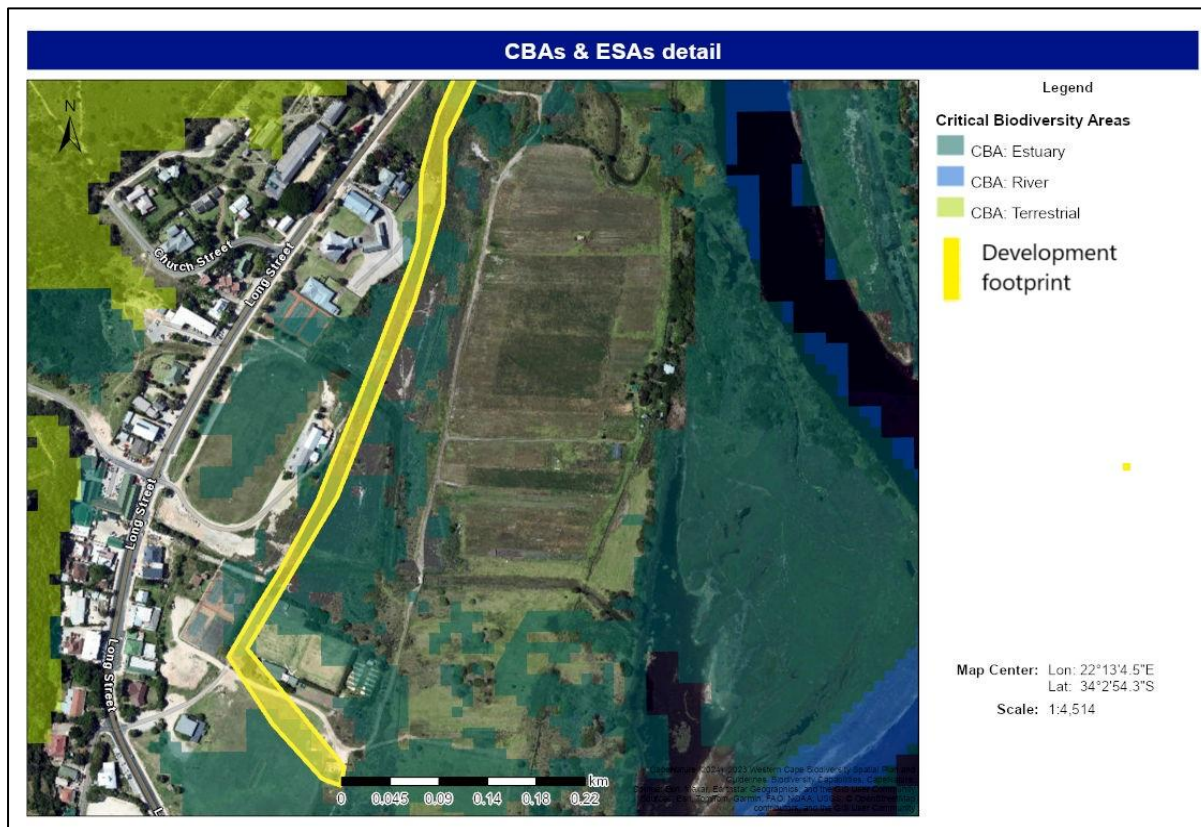


Figure G: Spatial planning map for the southern section of the proposed development footprint

6.6.2 Reasons for CBA status

The Biodiversity Spatial Plan (2017) for the Western Cape provides reasons for the inclusion of areas into CBAs. These reasons for the CBAs at the proposed development footprint are summarized in **Table 3**.

Table 3: Reasons for the inclusion of CBAs at the proposed development footprint

Summary 1:	Climate adaptation corridor (14.28), Ecological processes (8.82), Estuary (14.29), River Type (3.21), SA Vegetation Type (2.32), Threatened SA Vegetation Type (8.13), Threatened Vertebrate (11.4), Water resource protection (7.69)
Feature 1:	Bontebok Extended Distribution Range
Feature 2:	Cape Coastal Lagoons (LT)
Feature 3:	Climate adaptation corridor
Feature 4:	FEPA River Corridor
Feature 5:	Groot Brak Dune Strandveld (EN)
Feature 6:	Groot Brak Estuary
Feature 7:	Southern Coastal Belt Permanent Lowland River
Feature 8:	Watercourse protection- Southern Coastal Belt

6.6.3 Special Habitats, Indigenous Forest, Connectivity, and Corridors

The proposed southern section of the proposed development footprint is close to the Groot Brak estuary. The proposed development footprint is not within the estuary boundaries but part of a buffer zone between the estuary and urban development.

6.6.4 Protected Areas

There are no formally protected areas near the proposed development footprint. Groot Brakrivier does fall in the domain of the Gouritz Cluster Biosphere Reserve as indicated in **Figure H**. The proposed development footprint is also not in an area that forms part of a protected area expansion strategy.

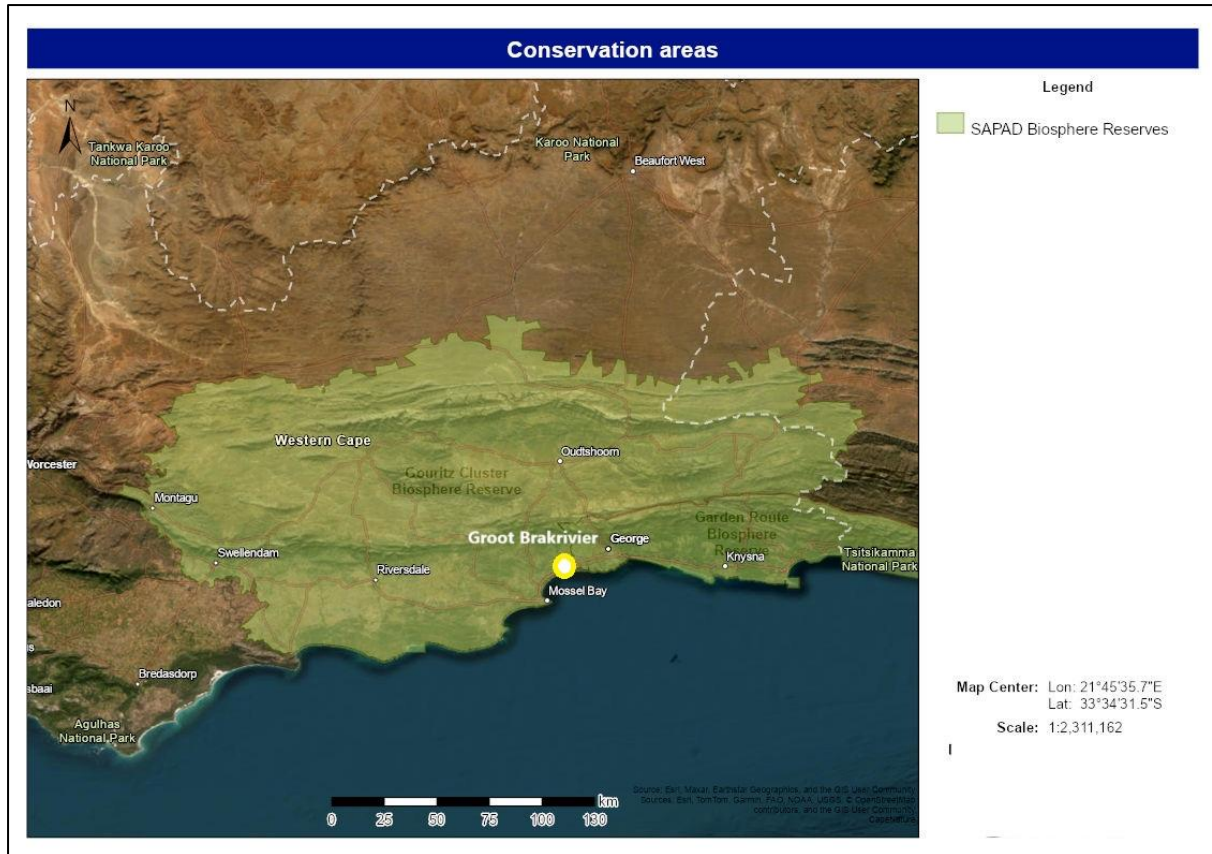


Figure H: Protected areas map for the area that includes Groot Brakrivier

7. RESULTS: FIELD ASSESSMENT

7.1 Vegetation units

The natural vegetation (Groot Brak Dune Strandveld) has been historically transformed for urban development across most of the proposed development footprint. The range of photos and maps covers the proposed development footprint from north to south and is displayed in **Figures 1 to 17**. The yellow shaded area in the maps indicates the area visible in the adjoining photograph. There are small sections that retain elements of the original vegetation, but more than 75% of the area is fully transformed. Large sections are maintained as lawns, and sidewalks that are either paved or tarred. No visible natural plant communities are still intact.





Figure 3

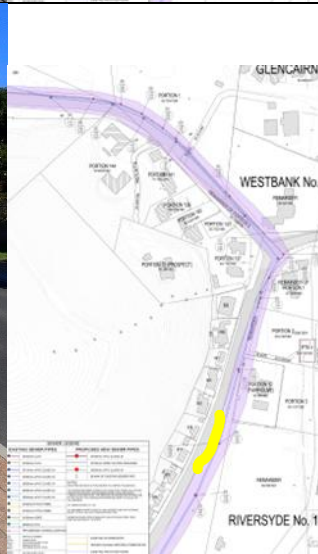


Figure 4



Figure 5











7.2 Critical Biodiversity areas reason verification

Reasons for the CBA status within the proposed development footprint	Comment on the reason
Bontebok Extended Distribution Range	There are no Bontebok habitat within the proposed development footprint.
Cape Coastal Lagoons (LT)	The proposed development will have no impact.
Climate adaptation corridor	The linear activity will temporarily alter the already transformed environment, but the area should return to its current state within two years.
FEPA River Corridor	The linear activity will temporarily alter the already transformed environment, but the area should return to its current state within two years.
Groot Brak Dune Strandveld (EN)	Only a few elements of this vegetation unit exist, as most have been almost completely transformed
Groot Brak Estuary	The activity will not impact the Groot Brak Estuary.
Southern Coastal Belt Permanent Lowland River	The activity will not impact the Groot Brak River.
Watercourse protection- Southern Coastal Belt	The activity will temporarily impact the artificial drainage lines that cross the proposed development footprint.

7.3 Plant species

No plant species of conservation concern were located within the proposed development footprint. More details are contained in the Plant Species Compliance statement.

7.4 Animal species

No animal species of conservation concern were located within the proposed development footprint. More details are contained in the Animal Species Compliance statement.

8. CONCLUSIONS

The site sensitivity is verified to be **Low** from a terrestrial biodiversity perspective and not Very High as rated in the Environmental Screening Tool. This finding is based on:

- No functional plant communities of the original vegetation unit (Groot Brak Dune Strandveld) remain in the proposed development footprint. The other vegetation unit listed in the environmental screening tool report, Garden Route Granite Fynbos, is not present in the proposed development footprint.
- The Critical Biodiversity Areas that are located within the proposed linear development footprint area are mostly transformed and would also return to their current state within two years.

The specialist therefore recommends that the development proceed as planned from a terrestrial biodiversity perspective if the mitigation measures in **Section 9** are captured in the Environmental Management Plan Report.

9. PROPOSED IMPACT MANAGEMENT OUTCOMES OR ANY MONITORING REQUIREMENTS FOR INCLUSION IN THE ENVIRONMENTAL MANAGEMENT PROGRAM.

- The proposed development footprint should be fully demarcated (stakes and danger tape) during the construction phase, and all construction activities must be done within this demarcated area.
- In the areas as displayed in Figures 11 to 14, the topsoil that is removed during construction must be kept separate from the lower soil and replaced accordingly.
- Alien invasive trees (*Acacia* spp.) within the proposed development footprint in the section, as displayed in Figures 11 to 14, should be removed.

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APPENDIX H: PLANT SPECIES SITE VERIFICATION AND COMPLIANCE STATEMENT REPORT

SITE VERIFICATION AND COMPLIANCE STATEMENT REPORT FOR THE PROPOSED UPGRADE OF A SEWERAGE PIPELINE IN GREAT BRAK, WESTERN CAPE

Plant species



Date:	17 August 2025
Version:	Draft
Author:	JA van der Walt (Pr. Sci.Nat: 116549)
EAP:	Sharples Environmental Services
Applicant:	Mossel Bay Municipality



EXECUTIVE SUMMARY

VEGETATION UNITS	Groot Brak Dune Strandveld: The original vegetation has been almost fully transformed into roads, pavements, and lawns. The remaining natural vegetation is dominated by non-native species, with no intact plant communities remaining.
VEGETATION SIZE	Limited intact natural vegetation remains within the proposed development footprint, which is approximately 2,100 meters long and 5 meters wide.
LANDUSE PLANNING	Smaller sections of the proposed development footprint fall within a CBA Estuary and CBA Wetland, but these areas are transformed and mostly dominated by non-native plant species.
CONNECTIVITY	Portions of the proposed development footprint can be regarded as a buffer for the Groot Brak estuary.
PLANT SPECIES OF CONSERVATION CONCERN	No plant species of conservation concern were recorded in the proposed development footprint
WATER COURSES AND WETLANDS	The proposed pipeline crosses artificial drainage ditches created to direct stormwater into low-lying areas between the Groot Brak estuary and the urban development along Lang Street.
MAIN CONCLUSIONS	The site has been assessed as having low sensitivity from a plant species perspective, contrary to the medium rating assigned in the Environmental Screening Tool. This determination is supported by the absence of plant species of conservation concern within the proposed development footprint, the significant degree of transformation observed in the area, and the predominance of alien vegetation within the site.

DECLARATION OF INDEPENDENCE IN TERMS OF CHAPTER 5 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT (NEMA), ACT 107 OF 1998:

I, Johannes Adriaan van der Walt, ID: 6706225172085, declare that:

- I act as the independent environmental specialist in this report;
- I will perform the work relating to the report objectively, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments and specialist reports, including knowledge of the Act, Regulations, and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations, and all other applicable legislation;
- I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations

ENVIRONMENTAL SPECIALIST:

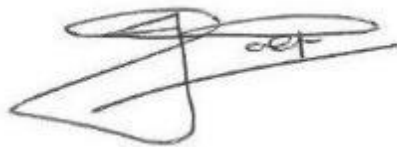
Johannes Adriaan van der Walt

Tel: +27 (82) 305 8945

Email: admin@aecorp.co.za

Signature

Date: 17 August 2025

A handwritten signature in black ink, appearing to be 'J. van der Walt', written over a light blue horizontal line.

Abridged Curriculum Vitae – Johannes Adriaan van der Walt

PROFESSIONAL REGISTRATION

Professional Natural
Scientist: South African
Council for Natural Science
Professionals (SACNASP)
nr116549

QUALIFICATIONS

MTech Nature Conservation
(cum laude) 2014, CPUT

BTech Nature Conservation
(cum laude) 2012, CPUT

NDip Nature Conservation
(cum laude) 1994, CPUT

LANGUAGES

English – fluent
Afrikaans – fluent

EXPERIENCE

37 years of biodiversity
conservation and botanical
experience in the Fynbos and
Succulent Karoo Biomes

EMPLOYMENT

1988 – 2006 CapeNature

2007 – 2010 Botanical Insight
cc

2010 - 2017 CapeNature

2017 – present: Director at
Advanced Environmental
Corporation (Pty) Ltd and
Fynbos Fish Trust Trustee

BOTANICAL, ANIMAL, AND BIODIVERSITY EXPERTISE WAS GAINED THROUGH:

- Employment as a nature conservationist with CapeNature for 25 years;
- biodiversity assessments (including botanical, animal species, and biodiversity) since 1994;
- participating as a SANBI-CREW volunteer for botanical assessments for threatened plants;
- participating in the Protea Atlas project as a volunteer;
- contributing as a Red-list assessor for a selection of Fynbos species;
- conservation initiatives for threatened flora with CapeNature;
- compliance monitoring of wildflower shows (Clanwilliam, Leipoldtville, Porterville, Tulbagh, and Darling) between 1994 and 2006;
- compilation of species lists for protected areas;
- compilation of specialist botanical assessments for DEA&DP and private landowners since 2017;
- discovering five new plant species in the CFR since 2019;
- keeping up to date with new plant descriptions and taxonomic revisions in the CFR and
- keeping an extensive private collection of applicable literature, including field guides and other botanical reference books.

PUBLICATIONS:

- Author and co-author of 14 biodiversity conservation and botanical scientific papers

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1. INTRODUCTION

1.1 Background

The Mossel Bay Municipality is in the process of upgrading its sewage system in Groot Brakrivier, and one of these upgrades includes the installation of a new Ø300mm pipeline from Amy Searle Street/Greenhaven to the cricket field sewerage pump station near Lang Street. The Environmental Assessment Practitioner (EAP) appointed by the municipality is Sharples Environmental Services. The proposed activities trigger environmental regulations promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (“NEMA”) and require environmental authorization.

1.2 Environmental Screening Tool Report

Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations requires an applicant for an Environmental Authorisation to submit a report generated by the Environmental Screening Tool as part of their application. This tool, developed by the Department of Forestry, Fisheries, and the Environment (DFFE), became operational on July 5, 2019, as announced in the Government Gazette. The screening tool report will identify the environmental sensitivities that intersect with the proposed development footprint as defined by the applicant, as well as the relevant protocols that the applicant would need to follow. The screening tool is accessible at <https://screening.environment.gov.za>.

An environmental screening tool report for the proposed development was completed on the 25th of July 2025. A **“Medium”** environmental sensitivity rating was indicated for the Plant Species theme. As per the procedures for the assessment and minimum criteria for reporting on identified environmental themes (Terrestrial Plant Species) in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation (October 2020), *“An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of **“medium sensitivity”** for terrestrial plant species, must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection/site sensitivity verification undertaken”*.

The site sensitivity verification was conducted on 19 and 20 July 2025, and the outcome, as reported in **Section 7** of this report, indicated a **low sensitivity** towards terrestrial plant species and therefore a terrestrial plant species compliance statement was compiled and included in this report.

2. TERMS OF REFERENCE

2.1 Site verification

-The assessment must contextualize the study area to provide a baseline description of the ecological system; the terrestrial plant biodiversity and any significant terrestrial features must be provided.

-The assessment must identify the following:

- Terrestrial critical biodiversity areas (CBAs)
- Terrestrial ecological support areas (ESAs)
- Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004
- Priority areas for protected area expansion
- Indigenous forests

-Undertake a site visit and ground-truth biodiversity information. Where required, undertake baseline surveys and/or studies to supplement the information base and inform the assessment.

-Estimate the trajectory of change in the context of the 'No-Go' Alternative due to existing impacts.

-Assessment criteria to be aligned with the promulgated Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (October 2020).

Following the site verification visit, in which the Specialist confirms the presence, likely presence or confirmed absence of a SCC identified within the site identified as "medium" sensitivity by the screening tool, the Specialist is to confirm the need for a Compliance Statement or a Terrestrial Plant Species Assessment and undertake this report/statement following the Gazetted Protocol (October 2020).

2.2 Compliance statement

The compliance statement must:

- be applicable within the study area;
- confirm that the study area is of "low" sensitivity for terrestrial plant species; and
- indicate whether or not the proposed development will have any impact on SCC.

Minimum Requirements Include:

- contact details, relevant experience, and the SACNASP registration number of the specialist preparing the compliance statement, including a curriculum vitae.
- a signed statement of independence by the specialist;

- a statement on the duration, date, and season of the site inspection and the relevance of the season to the outcome of the assessment;
- a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;
- where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;
- a description of the assumptions made and any uncertainties or gaps in knowledge or data;
- the mean density of observations/ number of sample sites per unit area; and
- any conditions to which the compliance statement is subjected.

2.3. Legal requirements applicable to the specialists conducting assessments

The Environmental Impact Assessment Regulations that were published on 4 December 2014 and amended on 7 April 2017, state that:

(1) an EAP and a specialist, appointed in terms of regulation 12(1) or 12(2), must-

(a) be independent;

(b) have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these Regulations, and any guidelines that have relevance to the proposed activity;

(c) ensure compliance with these Regulations;

(d) perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the application;

(e) take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan, or document relating to the application; and

(f) disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing-

(i) any decision to be taken concerning the application by the competent authority in terms of these Regulations; or

(ii) the objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; unless access to that information is protected by law, in which case it must be indicated that such protected information exists and is only provided to the competent authority.

(2) In the event where the EAP or specialist does not comply with sub-regulation (1)(a), the proponent or applicant must, before conducting public participation as contemplated in chapter 5 of these Regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicant's cost.

(3) An EAP or specialist appointed to externally review the work of an EAP or specialist as contemplated in sub-regulation (2) must comply with sub-regulation (1).

2.4 Report Content Requirements

The following legislation and guideline documents are applicable and were adhered to in compiling this report:

2.4.1 Guidelines documents

a) Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process (Brownlie 2005).

b) Ecosystem Guidelines for Environmental Assessments in the Western Cape (Cadman 2016).

c) The Western Cape Biodiversity Spatial Plan Handbook (Pool-Stanvliet *et al.* 2017)

d) South African National Biodiversity Institute (SANBI), 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.

2.4.2 Legal documents

a) Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), when applying for Environmental Authorisation" ("the Protocols") (GN No. 320 as published in Government Gazette No. 43110 on 20 March 2020) came into effect on 09 May 2020 the Protocol.

b) Appendix 6 of the 2014 EIA Regulations (National Environmental Management Act, 1998 (Act No. 107 of 1998)

3. LIMITATIONS AND ASSUMPTIONS

The field surveys for this report were conducted on July 19 and 20, 2025. These surveys took place during the optimal period for botanical assessments (June to September). The findings from this specialist assessment are based on a two-day site visit, which means some plant species might not have been recorded. However, the proposed development footprint was highly altered, reducing the likelihood that species were missed. Confidence in the findings is high. It is unlikely that a full botanical assessment would reveal additional findings that would significantly impact the outcome.

4. STUDY AREA

4.1 Location

Groot Brakrivier is situated on the southern coast of the Western Cape Province, South Africa, as illustrated in **Figure A**. The town is located on both sides of the Groot Brakrivier estuary.

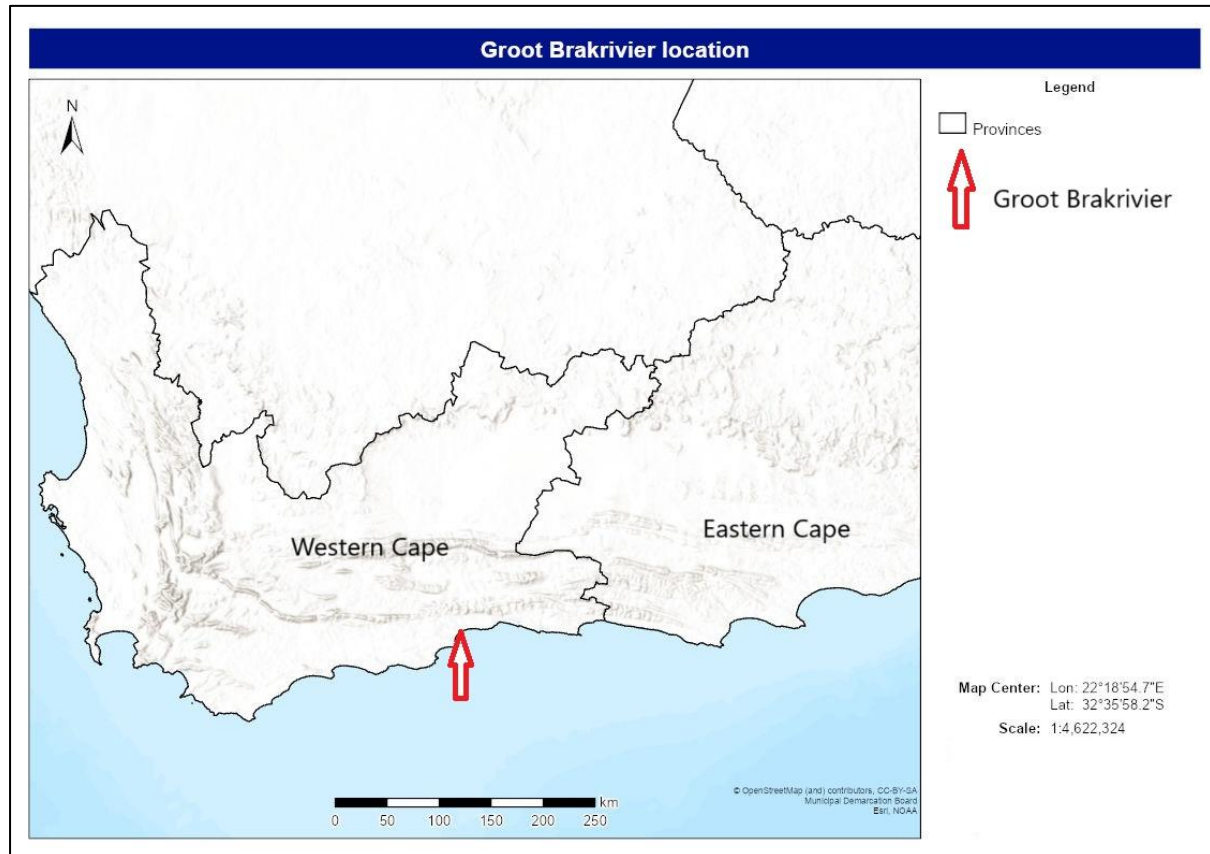


Figure A. Map showing the location of Groot Brakrivier

4.2 Proposed Development Footprint (PDI) and Project Area of Influence (PAOI)

The proposed development footprint is indicated as a purple polygon in **Figure B**. This purple polygon is the route of the old sewage pipeline that is due for an upgrade. The development footprint will be approximately 2,1 km in length, with a construction footprint of 5 m in width for installation during the construction phase. The anticipated impacts will mostly occur during the construction phase of the project when the municipality will dig a trench along the proposed development footprint for the replacement of the sewage pipeline. These impacts are not expected to extend beyond the demarcated footprint. The PAOI is therefore treated here as the development footprint within which direct impacts will occur.

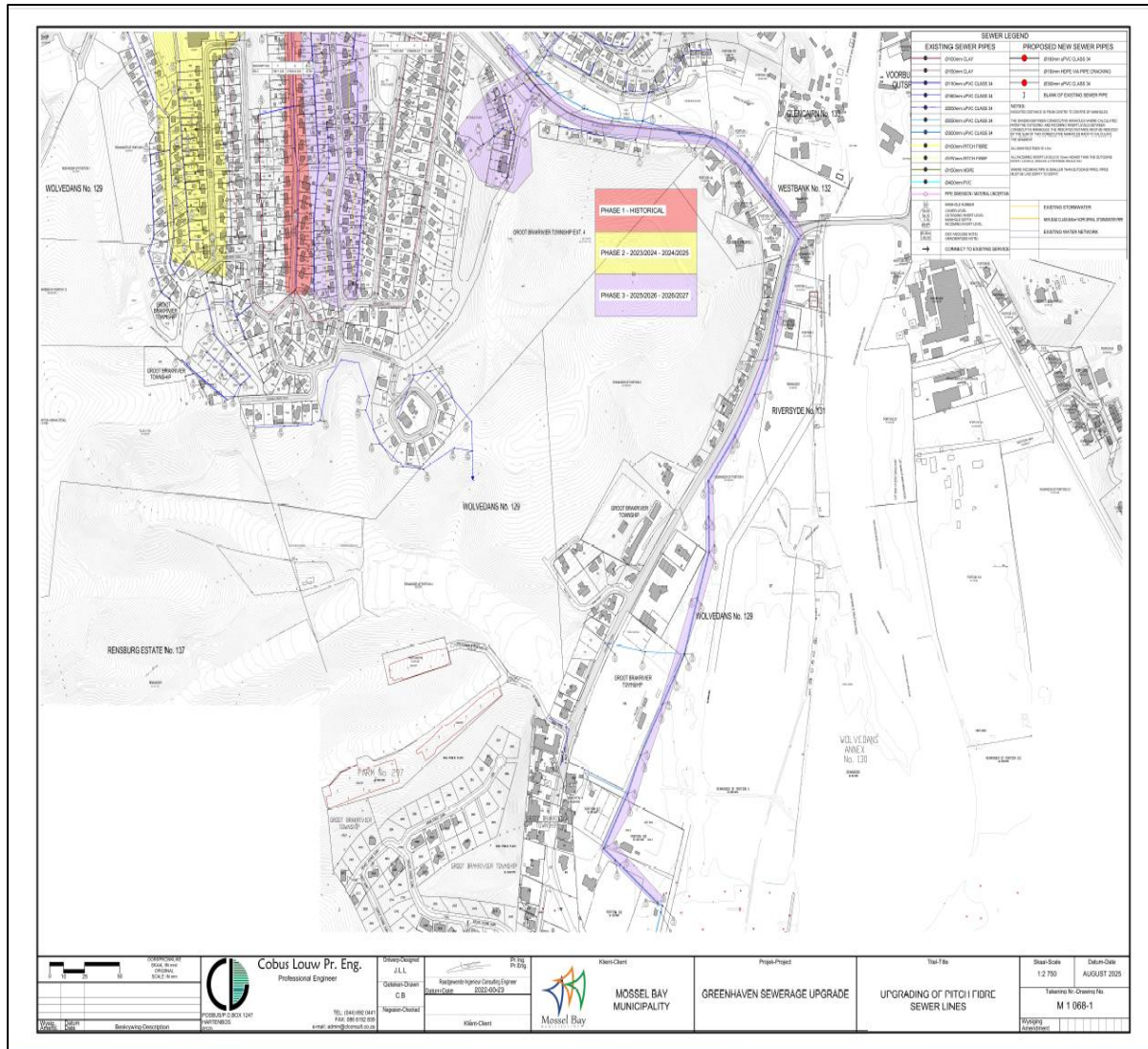


Figure B: The route of the proposed sewage pipeline upgrade is indicated with a purple polygon

5. METHODOLOGY

5.1 Desktop assessment

The specialist used various sources of information to assess the sensitivity of the vegetation and plant species within the proposed development footprint.

5.1.1 The Environmental Screening Tool Report: The environmental screening tool report indicates the sensitivity of the plant theme across the proposed development and lists threatened and sensitive plant species that could potentially occur within or near the proposed development footprint.

5.1.2 CapeFarmMapper 3: The following spatial data were obtained from CapeFarmMapper 3 (CFM 3). CMF 3 is GIS software provided by the Western Cape Department of Agriculture, available at <https://gis.elsenburg.com/apps/cfm/>.

- Vegetation units
- Vegetation unit threat status
- Spatial planning data: Critical Biodiversity Areas, Ecological Support Areas.

5.1.3 iNaturalist: iNaturalist is a crowdsourced species identification system and an organism occurrence recording tool. Sightings are graded, and only research-grade sighting is used in specialist assessments.

5.1.4 Google Earth: Google Earth is a web and computer program created by Google that renders a 3D representation of Earth based primarily on satellite imagery but also on street-level view. This imagery is useful when historical aerial imagery is needed of a proposed development footprint. It also gives a good perspective of the level of transformation before a field assessment is undertaken.

5.1.5 Other sources of data: Additional data were collected from a range of pertinent sources, including Mucina & Rutherford (2006), the National Vegetation Map (2018), and relevant biodiversity plans (Pool-Stanvliet 2017, SANBI 2021).

5.2 Field assessment

The field assessment was conducted over two days (19 and 20 July 2023). The specialist walked the proposed development footprint from west while collecting data. All plant and tree species were noted, photographed, and identified on-site if possible. Plants and trees that could not be identified during the field survey were later identified using available literature and taxonomic experts. The specialist also took drone imagery to give a better view of the proposed development footprint.

6. RESULTS: DESKTOP ASSESSMENT

6.1 Climate

The Mean Annual Precipitation (MAP) for Groot Brakrivier is approximately 459 mm, with approximately 40% of the rain falling in summer (October–March) and 60% in winter (April–September). Mean daily maximum and minimum temperatures are 26.8°C and 7.7°C for February and July, respectively (Mucina & Rutherford 2006).

6.2 Topography, geology, and soils

The proposed development footprint is located on a relatively flat area with a very slight gradient from west to east. The highest elevation on the proposed pipeline upgrade is at 10 metres above sea level (MASL), while the lowest point is at 1 MASL. The area is mostly underlain by the clastic sedimentary rocks of the Kirkwood Formation (Mesozoic Uitenhage Group). In the east, quartzite, schist, and phyllite of the Kaaimans Group (Namibian Erathem) and Cape Granite (edges of high coastal cliffs) are also present. In parts along the coast, these rocks are covered by the unconsolidated dune sand of the Strandveld. See **Figure C** for a map of the soil types present at the proposed development footprint (Mucina & Rutherford 2006).

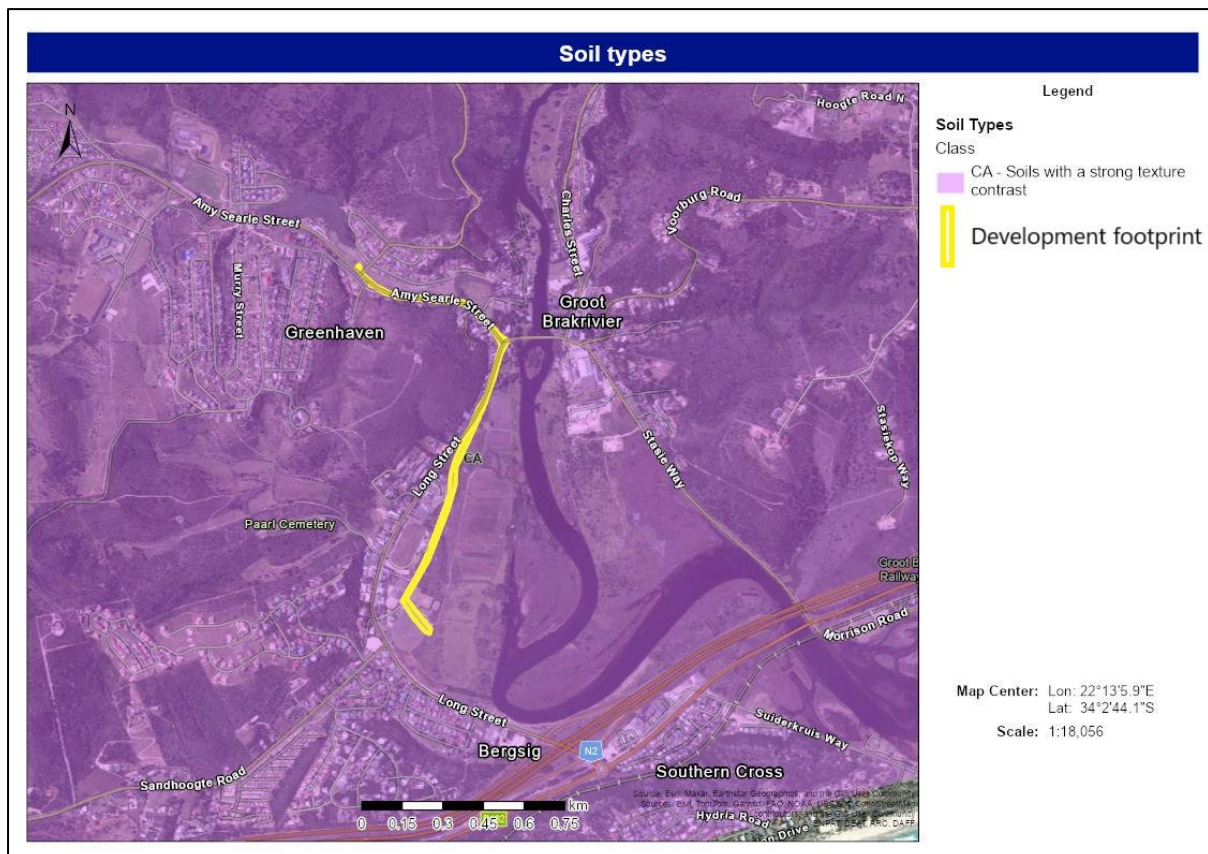


Figure C: Map indicating the different soil types on and near the proposed development footprint

6.3.3 Plant species

According to Mucina & Rutherford (2006), important taxa in Groot Brak Dune Strandveld include: **Important Taxa** Small Trees: *Chionanthus foveolatus*, *Clausena anisata*. Tall Shrubs: *Azima tetracantha*, *Cussonia thyrsiflora*, *Diospyros dichrophylla*, *Euclea racemosa* subsp. *racemosa*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Maytenus procumbens*, *Metalasia muricata*, *Morella cordifolia*, *Myrsine africana*, *Mystroxydon aethiopicum*, *Olea exasperata*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Rhus crenata*, *R. glauca*, *R. longispina*, *R. lucida*, *Schotia afra* var. *afra*, *Sideroxylon inerme*, *Tarchonanthus littoralis*. Low Shrubs: *Asparagus suaveolens*, *Ballota africana*, *Carissa bispinosa* subsp. *bispinosa*, *Chironia baccifera*, *Clutia daphnoides*, *Eriocephalus africanus* var. *africanus*, *Helichrysum teretifolium*, *Lauridia tetragona*, *Phylla axillaris*, *Polygala myrtifolia*. Succulent Shrubs: *Aloe arborescens* (d), *Cotyledon orbiculata* var. *dactylopsis*, *Crassula perforata*, *C. pubescens* subsp. *pubescens*, *Euphorbia burmannii*, *E. mauritanica*, *Tetragonia fruticosa*, *Zygophyllum morskana*. **Biogeographically Important Taxa** (both South Coast endemics) Herb: *Indigofera tomentosa*. Geophytic Herb: *Freesia alba* (Mucina & Rutherford 2006).

Environmental Screening Tool results

Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations requires an applicant for an Environmental Authorisation to submit a report generated by the Environmental Screening Tool as part of their application. This tool became operational on 5 July 2019, as announced in the Government Gazette. The screening tool report will identify the environmental sensitivities that intersect with the proposed development footprint, as defined by the applicant, as well as the relevant protocols that the applicant must follow. The screening tool is accessible at <https://screening.environment.gov.za>. The Environmental Screening Tool Report rated the relative plant species theme as medium sensitivity for the proposed pipeline upgrade. The image from the Environmental Screening Tool Report is displayed in **Figure E**.

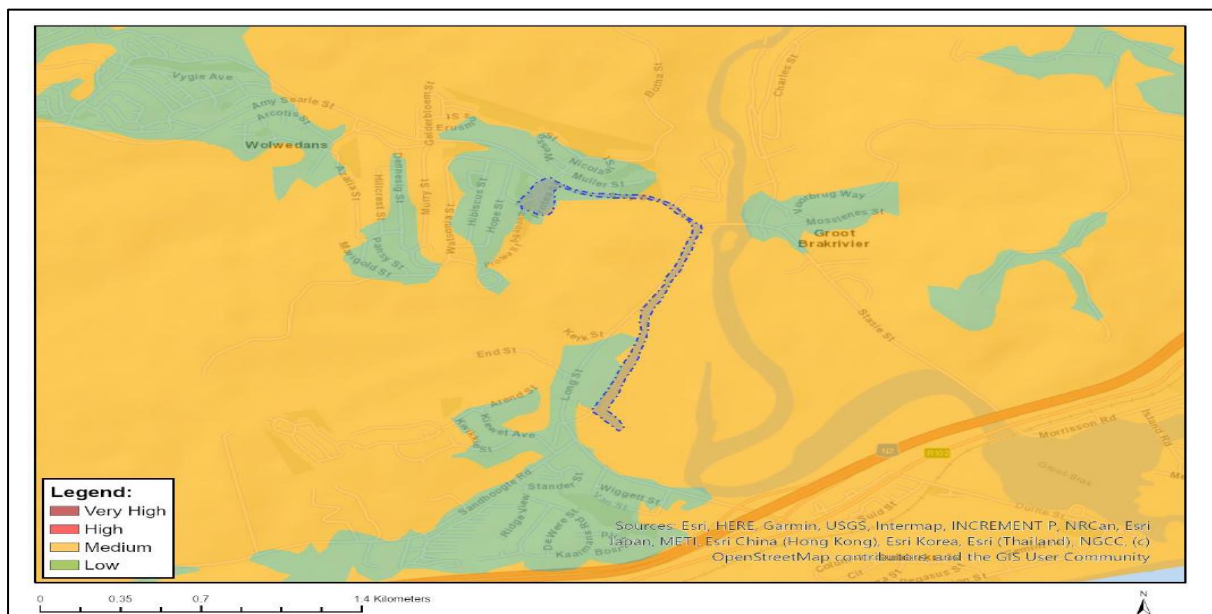


Figure E: Map indicating the relative plant theme sensitivity rating for the proposed development footprint and surrounding areas.

The Environmental Screening Tool report also lists threatened and sensitive species that could potentially occur at or near the proposed development footprint. These species are listed in **Table 1** below, and the table also indicates the SANBI Red List status of the species. The specialist also included a column that indicates the natural distribution of the species. The names of the sensitive species listed in the environmental screening tool report may not be displayed in this report, as this report will be available in the public domain. Sensitive species are targeted by collectors and/or illegal harvesting.

Table 1: Threatened and sensitive species listed for the proposed development footprint (CR Critically Endangered, EN Endangered, VU Vulnerable)

Species	SANBI Red List status	Distribution
<i>Lampranthus pauciflorus</i>	EN	Cape Infanta to Plettenberg Bay
<i>Lebeckia gracilis</i>	EN	Agulhas to Gqeberha
<i>Erica unicolor subsp. mutica</i>	EN	Herbertsdale to George
<i>Erica glandulosa subsp. fourcadei</i>	VU	Mossel Bay to Cape St Francis.
<i>Hermannia lavandulifolia</i>	VU	Worcester to Plettenberg Bay
<i>Sensitive species 633</i>	CR	Groot Brak but not in Strandveld
<i>Sensitive species 268</i>	EN	Herbertsdale to Groot Brak (Renosterveld)
<i>Sensitive species 1024</i>	EN	Riversdale to Knysna (not in Strandveld)
<i>Cotula myriophylloides</i>	CR	Cape Peninsula, Bredasdorp, Plettenberg Bay
<i>Euchaetis albertiniana</i>	EN	Albertinia
<i>Sensitive species 516</i>	EN	Herbertsdale to Mossel Bay
<i>Sensitive species 800</i>	VU	Cape Peninsula to Knysna
<i>Sensitive species 500</i>	VU	Cape Flats to Gqeberha
<i>Diosma passerinoides</i>	VU	Caledon to Baviaanskloof
<i>Agathosma microcarpa</i>	VU	Potberg to Mossel Bay

iNaturalist

There were seven research-grade iNaturalist plant sightings within or very near to the proposed development footprint. The low number of iNaturalist sightings is an indication that the proposed development footprint has been transformed.

Table 2: Research grade observations from iNaturalist within or very near to the proposed development footprint.

Family	Species	Common name	Red List status
ASTERACEAE	<i>Osteospermum moniliferum</i>	Bitou	LC
CONVOLVULACEAE	<i>Falkia repens</i>	Pink Ear	LC
ERICACEAE	<i>Erica afra</i>	heath	LC
IRADACEAE	<i>Gladiolus tristis</i>	Marsh Afrikaner	LC

OXALIDACEAE	<i>Oxalis pes-caprae</i>	Sorrel	LC
POACEAE	<i>Cenchrus clandestinus</i>	Kikuyu Grass	ALIEN
RUTACEAE	<i>Calodendrum capense</i>	Cape-Chestnut	LC

6.4 Spatial Planning

6.4.1 Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas (CBAs) are areas that must be safeguarded in their natural or near-natural state because they are essential for conserving biodiversity and maintaining ecosystem functioning. The spatial planning map for Groot Brakrivier (**Figure F**) indicates that the proposed development footprint does not cross over any terrestrial CBA. The footprint does intersect with CBA Wetland and CBA Estuary near Lang Street. **Figure G** provides a zoomed-in version of **Figure F** to show more detail on the CBA Wetland demarcation. No Ecological Support Areas (ESAs) are mapped near the proposed development footprint. ESAs that are not essential for meeting biodiversity targets but play an important role in supporting the functioning of protected areas or critical biodiversity areas are often vital for delivering ecosystem services. The 2023 Western Cape Biodiversity Spatial Plan (WC BSP) was formally adopted into law on the 13th of December 2024 (Gazette Extraordinary 9017) in alignment with the Western Cape Biodiversity Act (No. 6 of 2021). This marks the replacement of the 2017 WC BSP with the 2023 WC BSP.

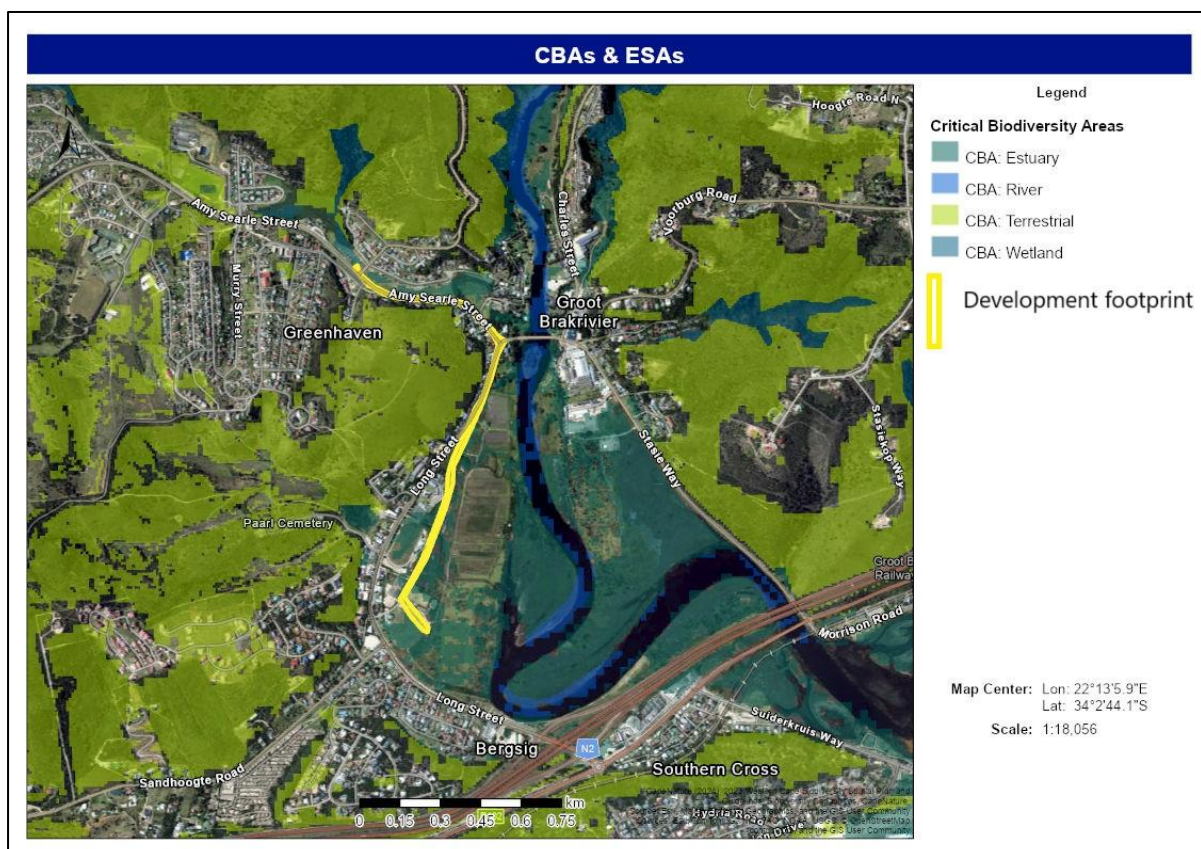


Figure F: Spatial planning map for Groot Brakrivier.**Figure G:** Spatial planning map for the southern section of the proposed development footprint

6.4.2 Reasons for CBA status

The Biodiversity Spatial Plan (2017) for the Western Cape provides reasons for the inclusion of areas into CBAs. These reasons for the CBAs at the proposed development footprint are summarized in **Table 3**.

Table 3: Reasons for the inclusion of CBAs at the proposed development footprint

Summary 1:	Climate adaptation corridor (14.28), Ecological processes (8.82), Estuary (14.29), River Type (3.21), SA Vegetation Type (2.32), Threatened SA Vegetation Type (8.13), Threatened Vertebrate (11.4), Water resource protection (7.69)
Feature 1:	Bontebok Extended Distribution Range
Feature 2:	Cape Coastal Lagoons (LT)
Feature 3:	Climate adaptation corridor
Feature 4:	FEPA River Corridor
Feature 5:	Groot Brak Dune Strandveld (EN)
Feature 6:	Groot Brak Estuary
Feature 7:	Southern Coastal Belt Permanent Lowland River
Feature 8:	Watercourse protection- Southern Coastal Belt

6.4.3 Special Habitats, Indigenous Forest, Connectivity, and Corridors

The proposed southern section of the proposed development footprint is close to the Groot Brak estuary. The proposed development footprint is not within the estuary boundaries but part of a buffer zone between the estuary and urban development.

6.4.4 Protected Areas

There are no formally protected areas near the proposed development footprint. Groot Brakrivier does fall in the domain of the Gouritz Cluster Biosphere Reserve as indicated in **Figure H**.

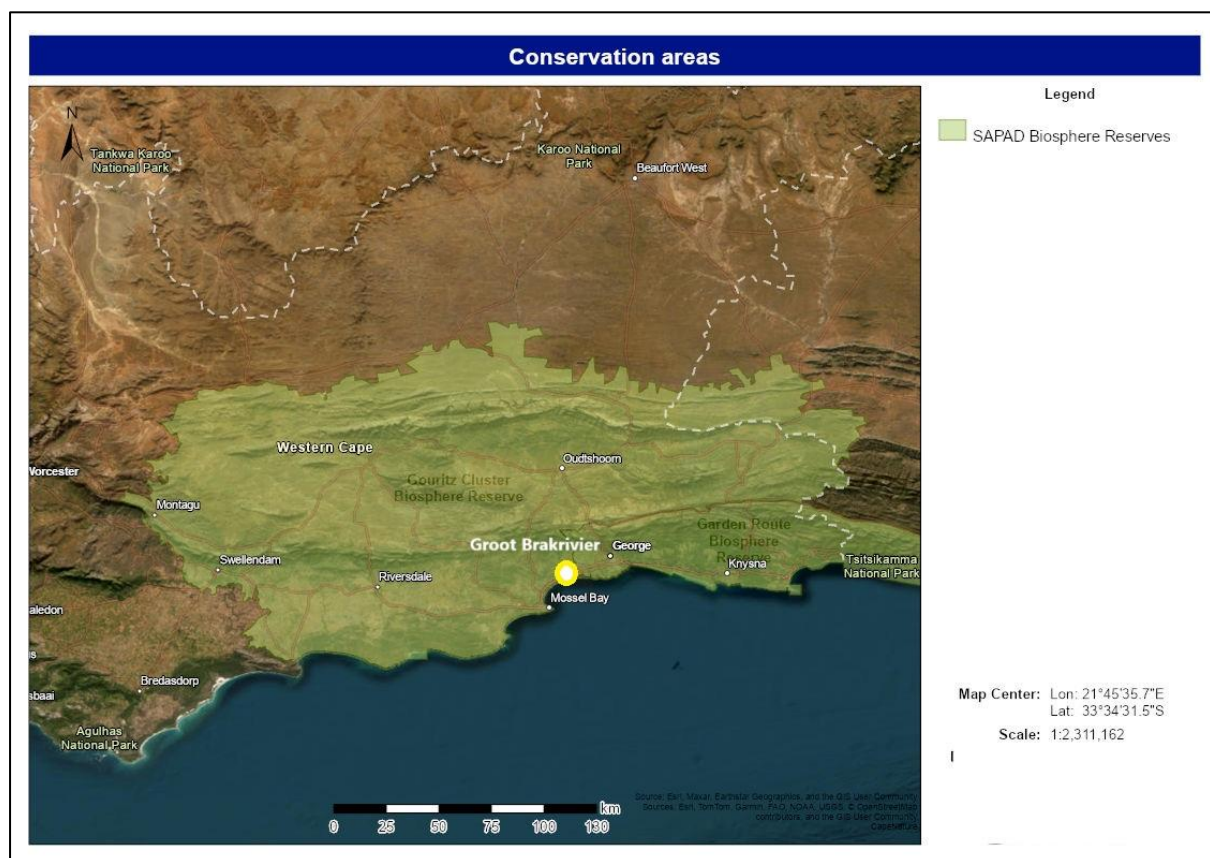


Figure H: Protected areas map for the area that includes Groot Brakrivier

The proposed development footprint is also not part of an area earmarked for protected area expansion, as it is located within an urban environment. The CBA status of sections of the footprint will protect further expansion of urban development.

7. RESULTS: FIELD ASSESSMENT

7.1 Vegetation

The natural vegetation (Groot Brak Dune Strandveld) has been historically transformed for urban development across most of the proposed development footprint. The range of photos and maps covers the proposed development footprint from north to south and is displayed in **Figures 1 to 17**. The yellow shaded area in the maps indicates the area visible in the adjoining photograph. There are small sections that retain elements of the original vegetation, but more than 75% of the area is fully transformed. Large sections are maintained as lawns and sidewalks that are either paved or tarred. No visible natural plant communities are still intact.





Figure 3



Figure 4



Figure 5











7.2 Plant species

The specialist identified 43 plant species from 27 families during a two-day survey of the proposed development site (**Table 4**). Due to prior transformation, overall species diversity was low as anticipated.

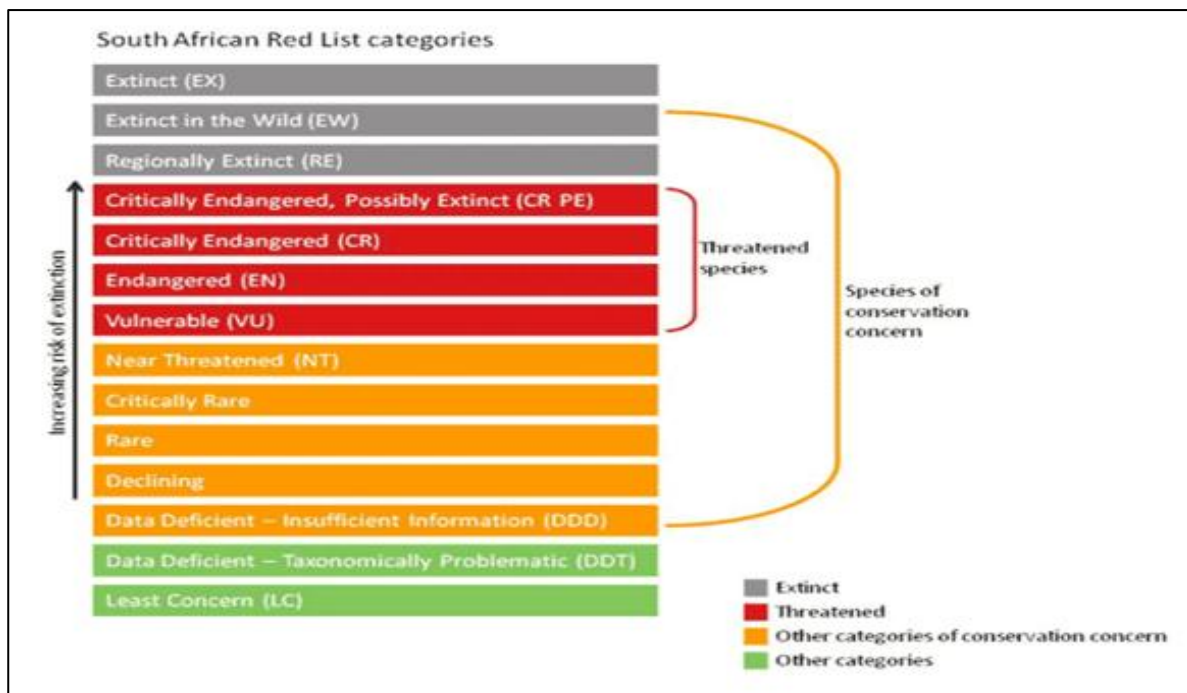
No threatened plant species were recorded within the proposed development footprint. None of the 15 threatened and sensitive plant species listed in the Environmental Screening Tool Report was recorded within the proposed development footprint. The conservation status of the plants is also presented in **Table 4**, and the various categories of conservation status are listed in **Table 5**.

Table 4: Plant species recorded during the field survey on 19 and 20 July 2025

FAMILY	SPECIES	COMMON NAME	SANBI Red List status
AIZOACEAE	<i>Carpobrotus edulis</i>	Common Sourfig	LC
AIZOACEAE	<i>Carpobrotus deliciosus</i>	Delicious Sourfig	LC
AIZOACEAE	<i>Disphyma crassifolium</i>	Purple Dewplant	LC
AMARANTHACEAE	<i>Salicornia decumbens</i>	Dense Glasswort	LC
ANACARDIACEAE	<i>Searsia lucida</i>	Glossy Currantrhus	LC
ANACARDIACEAE	<i>Schinus terebinthifolia</i>	Brazilian pepper	alien
APOCYNACEAE	<i>Gomphocarpus physocarpus</i>	Balloonplant	LC
ARACEAE	<i>Zantedeschia aethiopica</i>	Arum Lily	LC
ASPARAGACEAE	<i>Agave attenuata</i>	Foxtail agave	LC
ASTERACEAE	<i>Arctotheca prostrata</i>	Prostrate Capeweed	LC
ASTERACEAE	<i>Helichrysum cymosum</i>	Fume Everlasting	LC
ASTERACEAE	<i>Helminthotheca echioides</i>	Bristly oxtongue	alien
ASTERACEAE	<i>Metalasia acuta</i>	Pointy Blombush	LC
ASTERACEAE	<i>Nidorella ivifolia</i>	Ovenbush	LC
ASTERACEAE	<i>Oedera pungens</i>	Perdekaroos	LC
ASTERACEAE	<i>Osteospermum moniliferum</i>	Bitou	LC
ASTERACEAE	<i>Senecio inaequidens</i>	Ragwort	LC
ASTERACEAE	<i>Taraxacum officinale</i>	Common dandelion	alien
BASELLACEAE	<i>Anredera cordifolia</i>	Mignonette vine	alien
BIGONIACEAE	<i>Tecomaria capensis</i>	Cape honeysuckle	LC
CASUARINACEAE	<i>Casuarina cunninghamiana</i>	Beefwood	alien
COMMELINACEAE	<i>Commelina africana</i>	Yellow Dayflower	LC
CONVOLVULACEAE	<i>Falkia repens</i>	Pink Ear	LC
CYPERACEAE	<i>Cyperus albobstriatus</i>	Dwarf striped sedge	LC
CYPERACEAE	<i>Cyperus textilis</i>	Mat Sedge	LC
EBENACEAE	<i>Diospyros dichrophylla</i>	Poison Starapple	LC
FABACEAE	<i>Acacia mearnsii</i>	Black Wattle	alien
FABACEAE	<i>Acacia cyclops</i>	Rooikrans	alien
GERANIACEAE	<i>Pelargonium capitatum</i>	fleshy-stalk pelargonium	LC
GERANIACEAE	<i>Pelargonium zonale</i>	Zonal Storkbill	LC

HYPOXIDACEAE	<i>Hypoxis setosa</i>	Stargrasses	LC
IRADACEAE	<i>Bobartia robusta</i>	Giant Rushiris	LC
JUNCACEAE	<i>Juncus acutus</i>	Spiny rush	LC
JUNCACEAE	<i>Juncus effusus</i>	Common rush	LC
JUNCAGINACEAE	<i>Triglochin maritima</i>	Common arrow-grass	LC
MAVACEAE	<i>Hermannia flammea</i>	Flaming dollsrose	LC
OXALIDACEAE	<i>Oxalis pes-caprae</i>	klawersuring	LC
POACEAE	<i>Stenotaphrum secundatum</i>	Buffalo grass	LC
RUTACEAE	<i>Calodendrum capense</i>	Cape-Chestnut	LC
SCROPHULARIACEAE	<i>Myoporum laetum</i>	Myoporum	alien
TYPHACEAE	<i>Typha capensis</i>	Cape bulrush	LC
VERBENIACEAE	<i>Verbena bonariensis</i>	Purple top	alien
VISCACEAE	<i>Viscum capense</i>	Voëlent	LC

Table 5: South African Red List categories as prescribed by the International Union for Conservation of Nature (IUCN)



7.3 Alien plant species present

Alien species were dominant in certain sections of the proposed development footprint. The alien species is listed in **Table 4** above.

8. CONCLUSIONS

The site sensitivity is verified to be **Low** from a plant species perspective and not Medium as rated in the Environmental Screening Tool. This finding is based on:

- No plant species of conservation concern is located within the proposed development footprint.
- The severe state of transformation of the proposed development footprint.
- The high percentage of alien vegetation located within the proposed development footprint.

The specialist therefore recommends that the development proceed as planned from a plant species perspective if the mitigation measures in **Section 9** are captured in the Environmental Management Program.

9. PROPOSED IMPACT MANAGEMENT OUTCOMES OR ANY MONITORING REQUIREMENTS FOR INCLUSION IN THE ENVIRONMENTAL MANAGEMENT PROGRAM.

- The proposed development footprint should be fully demarcated (stakes and danger tape) during the construction phase, and all construction activities must be done within this demarcated area.
- In the areas as displayed in Figures 11 to 14, the topsoil that is removed during construction must be kept separate from the lower soil and replaced accordingly.
- Alien invasive trees (*Acacia* spp.) within the proposed development footprint in the section, as displayed in Figures 11 to 14, should be removed.

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APPENDIX I: FOSSIL FINDS PROCEDURE

HWC PROCEDURE: CHANCE FINDS OF PALAEOLOGICAL MATERIAL

June 2016

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO.

It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent.

Procedure to follow if it is likely that the material identified is a fossil:

- i. The ECO or site agent must ensure that all **work ceases** immediately in the vicinity of the area where the fossil or fossils have been found;
- ii. The ECO or site agent must **inform HWC of the find immediately**. This information must include photographs of the findings and GPS co-ordinates;
- iii. The ECO or site agent must compile a **Preliminary Report and fill in the Fossil Discoveries: HWC Preliminary Record Form** within 24 hours without removing the fossil from its original position. The **Preliminary Report** records basic information about the find including:
 - The date
 - A description of the discovery
 - A description of the fossil and its context (e.g. position and depth of find)
 - Where and how the find has been stored
 - Photographs to accompany the preliminary report (the more the better):
 - A scale must be used
 - Photos of location from several angles
 - Photos of vertical section should be provided
 - Digital images of hole showing vertical section (side);
 - Digital images of fossil or fossils.

Upon receipt of this **Preliminary Report**, HWC will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.

- v. **Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags.** This protection should allow for the later excavation of the finds with due scientific care and diligence. HWC can advise on the most appropriate method for stabilisation.
- vi. If the find cannot be stabilised, **the fossil may be collect with extreme care** by the ECO or the site agent and put aside and protected until HWC advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until HWC has indicated, in writing, that it is appropriate to proceed.

FOSSIL DISCOVERIES: HWC PRELIMINARY RECORDING FORM

Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	Lat:	Long:
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	Digital image of vertical section (side)	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil	Name: Contact:	
Recorder	Name: Contact:	
Photographer	Name: Contact:	



iLifa leMveli leNtshona Koloni
Erfenis Wes-Kaap
Heritage Western Cape