Compliance Statement for the Proposed Upgrades and New Installation of Sewerage Infrastructure in Great Brak, Western Cape.

Specialist Plant Species and Terrestrial Biodiversity Report

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ABBREVIATIONS

BPA	Biodiversity Priority Area
BSP	Biodiversity Spatial Plan
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMPr	Ecological Management Programme
ESA	Ecological Support Area
NEM:BA	National Environmental Management: Biodiversity Act
PAOI	Project Area of Influence
POSA	Plants of Southern Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern

DECLARATION OF SPECIALIST INDEPENDENCE

The consulting services comprise an assessment of the potential sensitivity of the ecosystems and flora that fall within the development footprint for the site. The following declaration is given by the appointed specialist:

- 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 field assessment and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this report has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this site was done in an objective manner. Even if this 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.

Signed: 20 November 2024

BIANKE FOUCHÉ ABRIDGED CV

Qualifications

- B.Sc. Environmental Sciences (Nelson Mandela University),
- B.Sc. Honours in Botany (Nelson Mandela University),
- M.Sc. Conservation Biology (University of Cape Town)

SACNASP Registration No: 141757 (Professional Botanical; Candidate Ecological)

Skills and Core Competencies

- My MSc research will add to our understanding of plant community niche construction and Alternative Stable State (ASS) theory. The knowledge gained will be used to advise landscape stewardship practices, especially regarding reforestation initiatives in the Overstrand.
- I have worked closely with the conservation team of the Grootbos Foundation, where I assisted with vegetation surveys, mounting voucher specimens in the Grootbos herbarium, and taken part in controlled fynbos fires in the Overberg.
- Postgraduate studies of mine included assessing the allelopathic effects of *Eucalyptus* leaves on garden peas and leeks and assessing the accuracy of the climate leaf analysis multivariate programme (CLAMP) in predicting the climate of fynbos vegetation.
- In Cape Town I regularly took part in alien clearing activities and helped to identify relevant listed invasive plants.
- I am currently a member of SACNASP, the International Association for Impact Assessment (IAIA) in South Africa, Botanical Society of South Africa, and the custodians for rare and endangered wildflowers (CREW-Outramps) in George.

References

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1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by the Applicant on the recommendation of Cape EAPrac to undertake an assessment for botanical and terrestrial sensitivity of the proposed upgrade of sewerage infrastructure in Grest Brak. Upgrades involve the replacement of existing sewerage infrastructure that link to the Great Brak Wastewater Treatment Works (WWTW), construction of a new pump station in Bergsig suburb, and upgrade of the pump station on the cricket field in Great Brak.

1.2 Screening Tool Report

According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, the SSVR is required because the terrestrial plant species theme has been highlighted as having a **Medium and Low** sensitivity over different areas of the site, and the terrestrial biodiversity has an overall **Very High** sensitivity (Fig. 1).

Figure 1: The screening sensitivity maps provided by the Screening Tool report for terrestrial biodiversity (left) and terrestrial plant species (right) themes.

The following definitions are given in the Species Environmental Assessment Guideline (Verburgt et al., 2020) for the High and Medium plant species theme sensitivities respectively:

Terrestrial plant species theme High sensitivity

"Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat."

Terrestrial plant species theme Medium sensitivity

"Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level."

The species flagged for the Plant Species Theme are discussed and listed later in this report. A Very High sensitivity rating for terrestrial biodiversity according to the screening tool is triggered for all Biodiversity Priority Areas (BPAs) and other sensitive features (Stewart et al., 2021). BPAs triggered here include the various management layers of the Western Cape Biodiversity Spatial Plan (WC BSP), as well as the other sensitive features listed in Table 1 below.

Table 1: BPAs flagged for the Great Brak Sewerline in the Screening Tool Report.

Sensitivity layer	Data included and source
Critical Biodiversity Areas (CBAs)	Most recent terrestrial CBA spatial footprint for metros, provinces, or bioregional plans, combined to create a national data set. Both CBA 1 and 2 areas were flagged for Terrestrial and Forests.
Ecological Support Areas (ESAs)	Most recent ESA spatial footprint for metros, provinces, or bioregional plans, combined to create a national data set. Areas of ESA 2 were triggered, which means restore from other land use.
Red Listed Ecosystems	Any ecosystem that is listed as Vulnerable, Endangered, or Critically Endangered according to the "Revised National List of Ecosystems that are Threatened and in Need of Protection (NEM:BA Act no.10 of 2004, as amended in November 2022). Three ecosystems were triggered here, namely Hartenbos Dune Thicket, Garden Route Granite Fynbos, and Groot / Great Brak Dune Strandveld.

1.3 General Site Location

The Sewerage infrastructure upgrades are planned in Great Brak, as indicated in Fig. 2 below. The legend of the map indicates that some sections of the existing infrastructure will be decommissioned. The map also indicates the locations of prominent estuaries, wetlands, rivers, and streams in the surrounding landscape. The Great Brak River is the closest River to the proposed upgrades areas, and it flows into the Great Brak Estuary, which is located adjacent to the easternmost section of areas requiring upgrades.

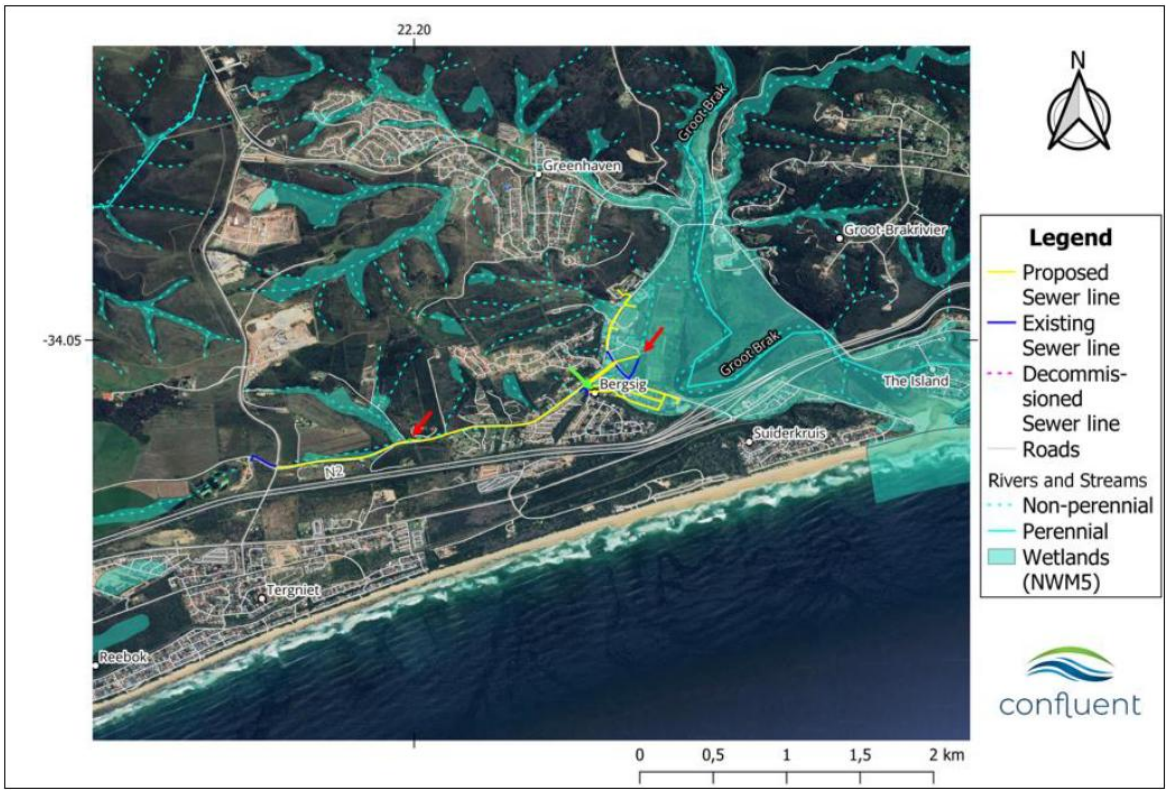

Figure 2: The approximate location of sewerage infrastructure in Great Brak. The red arrows indicate two pumpstations that must be upgraded, and a new pumpstation is indicated by a light green arrow.

1.4 Proposed Infrastructure

The Mossel Bay Municipality (MBM) propose upgrading the main sewerage infrastructure between the Waste Water Treatment Works (WWTW) and Bergsig suburb, along with construction of one new, and another upgraded pump station. New sewerage infrastructure are also proposed within Bergsig, including new sewerage infrastructure and one new pump station. The proposed sewerage infrastructure will be approximately 4,8 km in length with a construction footprint of 6m in width for installation during the construction phase. Three alternative layouts are being proposed for assessment.

1.5 Development Alternatives

Sky High Engineers propose three alternative development options along Sandhoogte Road (Figure 3). Sections of the proposed upgrades to the sewer lines that are the same between all three layouts proposed are :

1. Sewer system upgrades along Sandhoogte Road.
    a. New Ø355mm gravity sewer pipeline along Sandhoogte Road.
    b. Upgrading of the Sandhoogte pumpstation (only internal upgrades, no expansion).
2. Sewer System Upgrades within residential neighbourhood (Bergsig).
    a. New Ø160mm sewer pipeline to connect un-serviced erven to the sewer network.

b. The pipeline will be installed along Stander Street, Ebenezer Avenue, Wigget Street, Fourie Street, Van Rensburg Street, Long Street and Kerk Street.

3. All decommissioning infrastructure / pipelines will remain *in situ* and will not be removed.
4. Upgrade of the existing main sewer line from a Ø200mm pipeline to a Ø355mm pipeline between Groot Brak WWTW and Bergsig suburb which extends roughly 2.4 km predominantly along Sandhoogte Road. At the time of writing, it had not been confirmed which side of the road the sewer line would run. Part of the scope of work was to recommend a preferred alignment of the sewer line during the assessment.
5. Internal upgrading of the existing Sandhoogte pump station to a flow rate of 120L/s. The footprint won't change.
6. Upgrading of the cricket field pump station involving a) the internal reconfiguration of sumps, and b) upgrading of existing pumps to a flow rate of 120L/s each. This will increase the footprint by approximately 100 m^2 of disturbed area (Error! Reference source not found.).
7. Proposal to develop a new sewer network and pump station in Bergsig suburb. The pump station footprint will be 50 m^2 (on Erf 111).

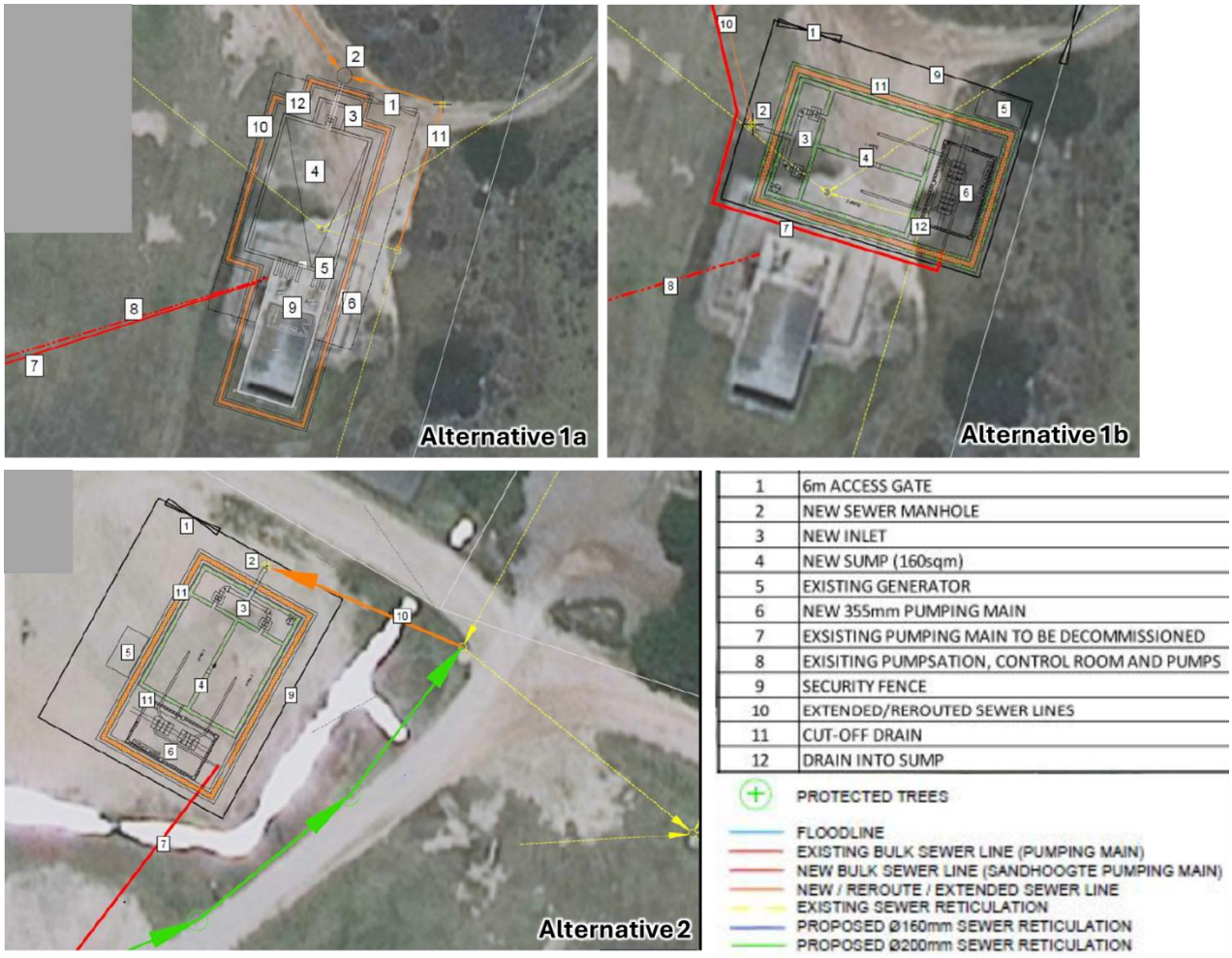

Figure 3: Differences between the proposed layouts illustrated.

In addition to these plans, the differences between the layouts presented in Fig. 3 is summarised per alternative layout below. The three options summarised below all have similar impacts on the terrestrial biodiversity & terrestrial plant species. The assessment in this report remains the same regardless of the final option that is chosen, unless the wider disturbance footprint of Alternative 2 affects sensitive thicket habitat. Should sensitive habitat be affected by the upgrades, an impact assessment may be required.

1.5.1 Alternative 1a (Fig. 3):

1. Renovation of the existing cricket field pumpstation and expansion of the existing sump (34° 3'4.43"S, 22°12'59.41"E; Figure 3).
2. Construction of a new pumpstation next to Fourie street in Bergsig.

1.5.2 Alternative 1b (Fig. 3):

8. New pumpstation next to the existing cricket field pumpstation.
9. Decommissioning of the existing cricket field pumpstation.

1.5.3 Alternative 2 (Fig. 3):

1. New pumpstation next to the tennis courts. (34° 3'1.09"S, 22°12'54.13"E).
2. Decommissioning of the existing cricket field pumpstation.

1.6 Project Area of Influence

The proposed upgrade of sewerage infrastructure will have some impact on the surrounding vegetation, and this is perhaps most pronounced around pump stations included in the project. The area that will be affected by the upgrades that affects the natural vegetation is defined as the project area of influence (PAOI). In this case the PAOI is defined as

1. The road reserve on the side of the road where the upgraded pipelines will be installed.
2. A maximum disturbance envelope of 2m around the proposed infrastructure where structures fall outside of the road reserve.
3. The PAOI excludes protected trees and their associated habitat, as effort should be made during the construction phase to demarcate all these areas as no-go sensitive areas where impacts must be avoided. E.g., the “Milkwood wall” (see Fig. 8 in Section 5) south of Fourie Street should be entirely excluded from the PAOI.
4. The natural vegetation on either side of Sandhoogte Road must also be actively excluded from the PAOI, with care taken during construction to minimise impacts that result in the loss of vegetation and habitat beyond the road reserve.

2. TERMS OF REFERENCE

This screening tool sensitivity verification report provides information on Terrestrial and Botanical diversity and sensitivity of the habitats along the proposed infrastructure routes to the sewerage upgrades. The results presented are based on a desktop and field assessment, which includes a consideration of historical photographic records of the site. The assessment presented in this report follows the Protocol for the Specialist Assessment and Minimum

Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, and Terrestrial Plant Species themes.

This site sensitivity assessment follows the requirements of:

- The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), which includes:
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species (28 July 2023).
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity (20 March 2020).
- Additional guidelines for the terrestrial biodiversity theme:
    - Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers et al., 2016).
    - The Western Cape Biodiversity Spatial Plan Handbook and summary booklet (CapeNature, 2017; Pool-Sandvliet et al., 2017).
    - The Subtropical Thicket Ecosystem Programme Handbook: Integrating the natural environment into land-use decisions at the municipal level: towards sustainable development (Pierce & Mader, 2006). This guideline provides more information about Goukamma Dune Thicket.
- Additional guidelines for the terrestrial plant species theme:
    - Species Environmental Assessment Guideline: Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (Verburgt et al., 2020).

The assessment was undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with relevant expertise in the field of Botanical and/or Ecological science.

3. METHODOLOGY

3.1 Desktop Assessment

The desktop assessment was performed using Cape Farm Mapper and QGIS version 3.28.3 “Firenze”. Plant species data was sourced from the following sources:

- The DFFE screening tool listed SCC.
- Information on plant occurrence prior to the site visit was sourced from SANBIs Biodiversity Advisor, Plant Red List website, and the Botanical Research and Herbarium Management System (BRAHMS) for the Plants of Southern Africa (POSA) database.
- iNaturalist observations of the property and surrounding areas.

Ecosystem/ vegetation type data was sourced from:

- The 2024 updated Beta South African National Vegetation Map from SANBI.
- The National Biodiversity Assessment report of 2018 (Skowno et al., 2018).
- Shapefiles for the Western Cape Biodiversity Spatial Plan (WC-BSP) i.e., information on PAs, CBAs, ESAs, and ONAs were downloaded from BGIS database (CapeNature, 2017; Pool-Sandvliet et al., 2017).
- Cape Farm Mapper for additional spatial information required for the site.
- Chief Directorate: National Geo-spatial Information (CD: NGI) Geospatial Portal and Google Earth for the acquisition of historical aerial imagery of the site.
- The conservation status of ecosystems was found in the Revised National List of Ecosystems that are Threatened and in need of protection, published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004, as revised in Nov. 2022), and also using the Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006).

3.2 Field Assessment

Field work on the property was undertaken on the 04th of July 2024. The method for identifying species was similar to a BioBlitz, also described as a “timed meander”, where the specialist especially keeps an eye out for rare and threatened species, as well as other dominant species or species that play an important ecological role on the site. Some Red Listed Plant species are also more easily detected during a site survey than other species. This timed meander survey method is an attempt to account for the short and single survey period, where detection probability of some seasonal, rare and threatened species (e.g., geophytes, small succulents, small perennials etc.) are low (Garrard et al., 2008; Wintle et al., 2012). Observations of individual species and environmental characteristics were documented using an android app “Spot Lens”.

3.3 Assumptions & Limitations

This assessment is subject to a few assumptions, uncertainties, and limitations, as listed below:

- Only one survey took place during spring on the 04th of July 2024. The season of the assessment and survey timing always play a role in limiting the findings of a terrestrial habitat and plant species specialist report.
- Some rare and threatened plant species are difficult to locate and easily overlooked in the field (e.g., geophytes, small succulents, small shrubs, and cryptic spp.).
- Many plant species flower seasonally and are therefore difficult to identify outside of their flowering season.
- Environmental factors such as the prevailing fire regime and level of alien invasion influence the successional stage of the vegetation present at the site, and therefore the species visible at the time of assessment (Cowling et al., 2010; Privett et al., 2001).

- Denser vegetation always makes it hard to gain access to some sections of the site. It is possible that the impenetrable nature of some vegetation in some places caused an SCC/ several SCC to be missed on the site.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate

Great Brak falls within a Mediterranean climate, which is characterised by summers that are typically warmer and slightly drier compared to the rest of the year. Winters are usually wetter; however, temperatures rarely reach sub-zero. Winters are therefore more mild compared to other South African towns. Annual rainfall in the region varies considerably due to proximity to the coast and differences in elevation, which directly affect vegetation and soil moisture levels. The area's soils range from sandy to loamy, with varying levels of fertility. Coastal areas are predominantly sandy, with lower nutrient content, whereas more fertile loamy soils are found further inland. This variation in soil types, combined with the region's climate, supports a diverse range of fynbos and other native vegetation. However, sandy soils are particularly vulnerable to erosion when disturbed, presenting significant challenges for construction activities.

The local geology mostly consists of sedimentary rocks, such as sandstone and shale. These are common in the Cape Supergroup, and while these geological formations are typically stable, they could potentially complicate excavation and trenching efforts (i.e., where hard rocks are encountered). The geology also plays a crucial role in determining groundwater levels and flow, which are critical considerations for the design and installation of sewerage infrastructure to prevent seepage or contamination. This is especially relevant in the eastern section of the proposed upgrade, where construction will occur in close proximity to the Great Brak Estuary.

4.1.2 Vegetation type(s)

The vegetation types according to the new 2024 Beta version of the National Vegetation Map (NVM) is the same as the Screening Tool (Fig. 4). The NVM vegetation types here are Garden Route Granite Fynbos (FFg 5: Critically Endangered) in the north, Hartenbos Dune Thicket (AT40: Endangered) in the south, and Great Brak Dune Strandveld (FS 9: Critically Endangered) closer to the Estuary in the East. Despite the mapped vegetation types (which does not take habitat fragmentation into account, as it is not a land use and land cover data layer), Great Brak is mostly transformed and does not represent natural vegetation any longer. This will be discussed in more detail later in the report.

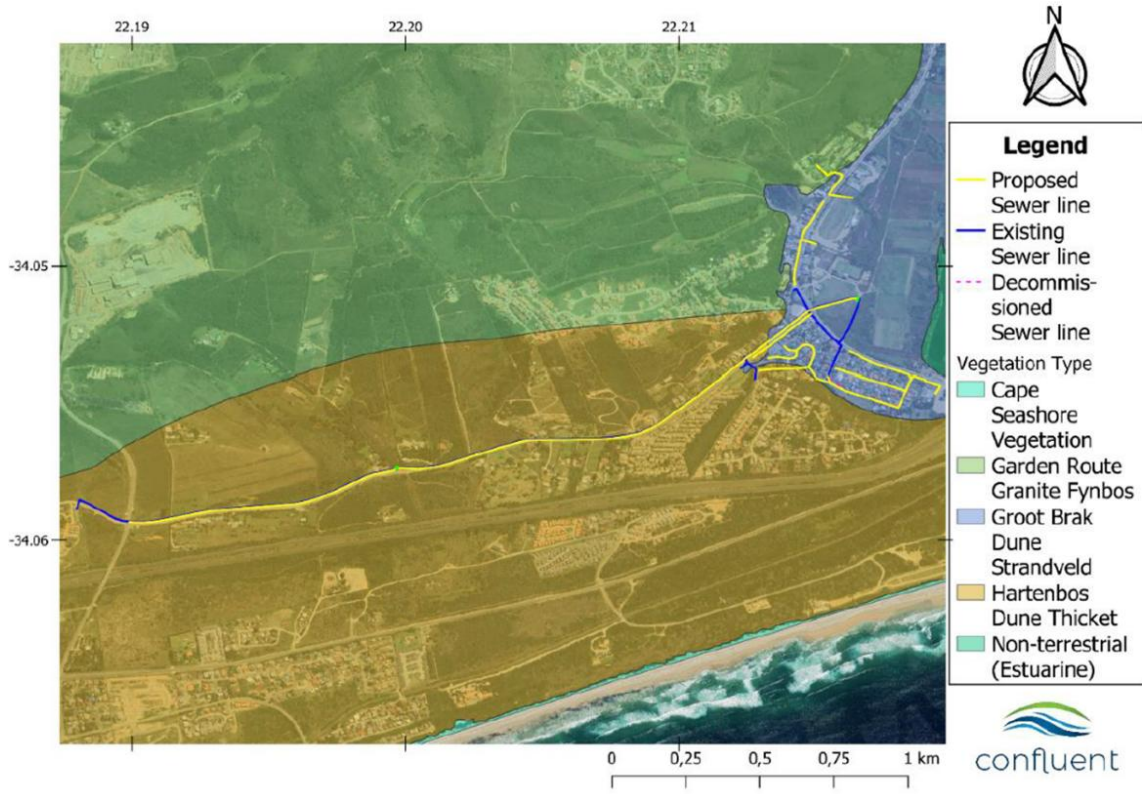

Figure 4: A) The mapped vegetation types according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006). These mapped polygons are also consistent with the new Beta version of the 2024 National Vegetation Map.

4.1.3 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) contains several conservation planning layers that are used to set priority areas for conserving biodiversity (Fig. 5). The definition and objectives of the WC BSP layer mapped for the extent of the Great Brak Sewerline is given in BOX 1. Appendix 9.1 illustrates the recommended land-uses associated with the various BSP layers. The Western Cape Biodiversity Spatial Plan (WCBSP; 2017) indicated the following biodiversity priority areas adjacent to the sewerage infrastructure and surrounding areas;

- An aquatic and terrestrial Critical Biodiversity Area 1 (CBA1),
- An aquatic Ecological Support Area 1 (ESA1),
- An Ecological Support Area 2 (ESA2).

The reasons that inform these BSP areas include:

- Coastal resource protection- Eden
- Great Brak Dune Strandveld (EN)
- South Strandveld Western Strandveld Channelled Valley Bottom Wetland
- South Strandveld Western Strandveld Seep Wetland
- Water source protection- Great-Brak
- Watercourse protection- Southern Coastal Belt.

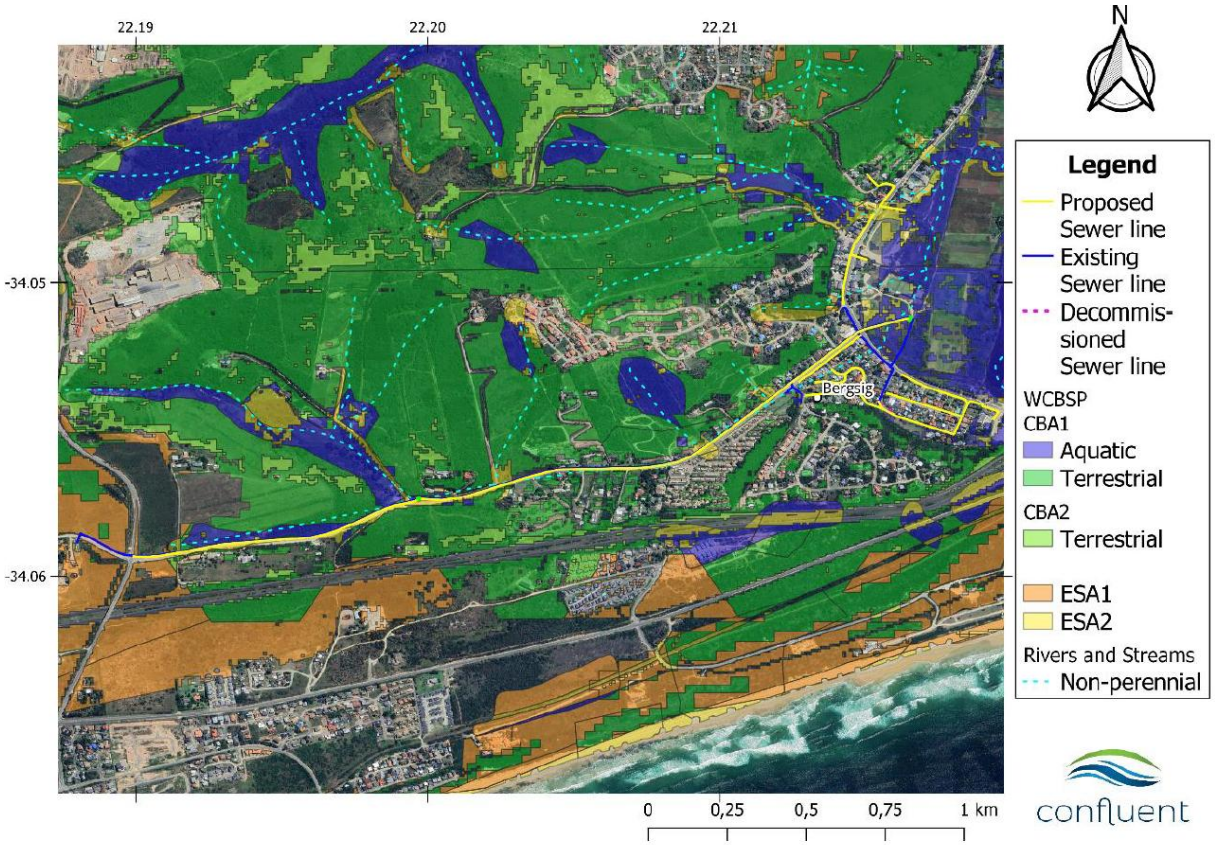

Figure 5: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories for the Great Brak area.

BOX 1: The Biodiversity Spatial Plan

Critical Biodiversity Area 1

Definition: Areas in a natural condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: 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.

Critical Biodiversity Area 2

Definition: Areas in a degraded or secondary condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: Maintain in a functional, 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.

Ecological Support Area 2

Definition: Not essential for meeting biodiversity targets. Important in supporting functioning of PAs or CBAs. Often vital for ecosystem services.

Objective: Restore/minimise impact on ecological infrastructure functioning, especially soil and water-related services.

4.1.4 Historical Aerial Imagery

Historical imagery was sourced from Google Earth. Over the past 20 years, the environment surrounding the proposed sewerage infrastructure and pump stations has undergone significant disturbance, primarily due to urban development and related infrastructure projects. The most notable changes in the area adjacent to the proposed sewerage infrastructure, observed between 2004 and 2022, include the development of higher-density residential areas and estates toward Great Brak, as well as the increasing fragmentation of vegetation in the catchment areas along Sandhoogte Road (Figure 6). Note, for example, the large area of vegetation cleared (presumably for agricultural purposes) along the western extent of Sandhoogte Road between 2014 and 2022.The existing sewerage infrastructure runs along Sandhoogte Road, which has been present in this location for many decades, as indicated by the historical imagery. The new upgrade will be located adjacent to the old infrasturcture.

Figure 6: A series of historical imagery sourced from the CD: NGI geospatial portal (top row) and Google Earth (bottom row). The yellow polygons highlight the position of Portion 76/216.

4.2 Plant Species

The plant species theme sensitivity of Medium is dependent on the presence, or likely presence, of several plant species of conservation concern (SCC).

4.2.1 Species of Conservation Concern (SCC) Listed in the Screening Tool

Several SCC have been flagged by the screening tool. The SCC listed in the screening tool report are illustrated in Fig. 7 below. While more SCC have been observed nearby on iNaturalist, these species are highly unlikely to occur within the footprint and area of influence of the sewerage infrastructure upgrade and are therefore this assessment does not include species in addition to those listed by the screening tool. The Red List criteria for species is briefly explained in Appendix 9.2

Lampranthus fergusoniae	Sensitive species 268
Lampranthus pauciflorus	Duvalia immaculata
Lebeckia gracilis	Sensitive species 1024
Leucospermum praecox	Cotula myriophylloides
Wahlenbergia polyantha	Agathosma eriantha
Selago villicaulis	Agathosma muirii
Freesia fergusoniae	Euchaetis albertiniana
Erica unicolor subsp. mutica	Muraltia knysnaensis
Erica glandulosa subsp. fourcadei	Sensitive species 516
Hermannia lavandulifolia	Sensitive species 800
Sensitive species 153	Sensitive species 500
Sensitive species 633	Sensitive species 654
	Diosma passerinoides
	Agathosma microcarpa
	Zostera capensis

Figure 7: The listed SCC as triggered by the Screening Tool Report.

5. RESULTS: FIELD ASSESSMENT

5.1 Vegetation and plant species observed

The vegetation observed along the roads in the Great Brak area, is predominantly transformed and consists largely of planted graminoid species (The track walked during the site assessment is illustrated in Appendix 9.3). Notable grasses include *Cenchrus clandestinus* (an invasive species in South Africa), *Stenotaphrum secundatum*, and *Cynodon dactylon*. However, certain sections beyond the road reserve remain more pristine, supporting thicket or fynbos vegetation with a higher potential to support species of conservation concern (SCC). These areas also have a high density of protected tree species, particularly Milkwood (*Sideroxylon inerme inerme*, protected tree number 579) and Cheesewood (*Pittosporum viridiflorum*, protected tree number 139).

In addition to these naturally occurring species, two yellowwood species were observed adjacent to roads (namely along Lang Str., Van Rensburg Str., Fourie Str., Stander Str., and Sandhoogte Str.), though they appear to be planted or cultivated

rather than naturally occurring. These species are the Outeniqua yellowwood (*Afrocarpus falcatus*, protected tree number 16) and Henkel's yellowwood (*Podocarpus henkelii*, protected tree number 17). While all four of these protected tree species—Milkwood, Cheesewood, Outeniqua yellowwood, and Henkel's yellowwood—are listed as Least Concern on the SANBI version of the South African Red List of plant species, they are not classified as species of conservation concern (SCC). Nonetheless, their protected status under the National Forests Act mandates careful consideration during the planning and execution of the sewerage infrastructure upgrade. A map of all surveyed and observed trees is illustrated in Fig. 8.

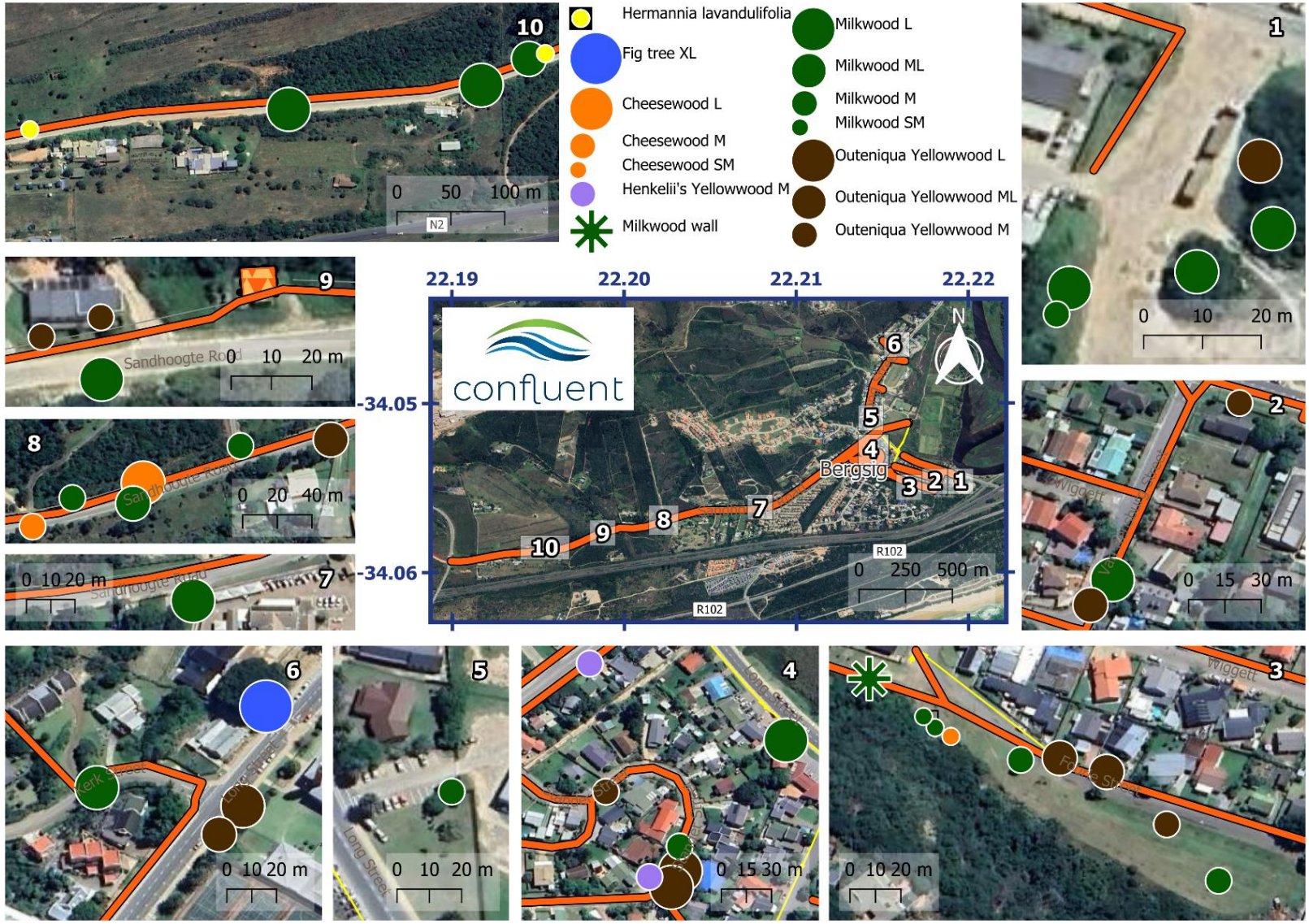

Figure 8: The location of Protected trees and SCC along the sides of the roads where the sewerage infrastructure upgrade is proposed. One very large Fig tree is also included in the map even though it is not a protected tree nor an SCC. The “milkwood wall” indicates the slope to the south full of Milkwood trees.

A plant species list for the Great Brak Sewerage infrastructure is provided below (Table 2). Box 2 indicates the meaning of the various NEMBA categories for invasive plant species. The provided species list indicates which species are threatened and the criteria for why they are threatened (on our Red List, this is only *Hermannia lavandulifolia*), invasive species according to the National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, and the Conservation of Agricultural Resources Act (CARA), No. 43 of 1983, and protected trees.

Table 2: Plant species list. This table is split into two different lists, namely cultivated species, and wild growing species that don't seem to have been planted.

Family	Species	Common name	Information
PLANTS GROWING WILD			
Liliopsida (Monocotyledons)			
Asparagaceae	*Agave americana*	American century plant	Invasive. NEMBA 3, from Mexico
Asphodelaceae	*Aloe ferox*	Cape Aloe	
Cyperaceae	*Cyperaceae*	sedges	
Juncaceae	*Juncus acutus*	spiny rush	Aquatic
Juncaceae	*Juncus effusus*		Aquatic
Juncaginaceae	*Triglochin maritima*	common arrowgrass	Estuarine
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	Invasive. NEMBA 1b, CARA 1, from East Africa
Poaceae	*Phragmites australis*	common reed	Aquatic
Poaceae	*Stenotaphrum secundatum*	Saint Augustine grass	
Magnoliopsida (Dicotyledons)			
Aizoaceae	*Carpobrotus deliciosus*	Delicious Sourfig	
Aizoaceae	*Disphyma crassifolium*	Purple Dewplant	
Amaranthaceae	*Salicornia decumbens*	Dense Glasswort	Estuarine
Anacardiaceae	*Harpephyllum caffrum*	African plum	
Anacardiaceae	*Searsia glauca*	Blue Kunibush	
Apiaceae	*Berula thunbergii*	cutleaf waterparsnip	Aquatic
Araliaceae	*Cussonia thyrsiflora*	Cape Coast Cabbagetree	
Araliaceae	*Hedera canariensis*	Canary Islands Ivy	Invasive. NEMBA 3, from the Canary Islands
Asteraceae	*Bidens pilosa*	Hairy Beggarticks	Naturalised exotic from South America
Asteraceae	*Dicerothamnus rhinocerotis*	Renosterbush	
Asteraceae	*Helichrysum cymosum*	Fume Everlasting	
Asteraceae	*Helminthotheca echioides*	bristly oxtongue	Naturalised exotic North Africa & the Mediterranean
Asteraceae	*Nidorella ivifolia*	Ivy Vleiweed	
Asteraceae	*Osteospermum moniliferum*	Bietou	
Asteraceae	*Senecio angulatus*	creeping groundsel	
Asteraceae	*Senecio pterophorus*	Shoddy Ragwort	
Asteraceae	*Taraxacum officinale*	common dandelion	Naturalised exotic from Eurasia

Family	Species	Common name	Information
Asteraceae	*Ursinia scariosa*	Paper Paraseed	
Basellaceae	*Anredera cordifolia*	Mignonette vine	Invasive. NEMBA 1b, CARA 1, from South America
Boraginaceae	*Echium plantagineum*	purple viper's-bugloss	Invasive. NEMBA 1b, CARA 1, from Eurasia & North Africa
Cactaceae	*Opuntia canterae*		Invasive. NEMBA 1b, CARA 1, from Mexico
Cactaceae	*Opuntia ficus-indica*	Indian fig opuntia	Invasive. NEMBA 1b, CARA 1, from Mexico
Cactaceae	*Opuntia monacantha*	Drooping Pricklypear	Invasive. NEMBA 1b, CARA 1, from Central America
Crassulaceae	*Kalanchoe beharensis*	Velvet-leaf	Naturalised exotic from Madagascar
Crassulaceae	*Kalanchoe delagoensis*	Mother of Thousands	Naturalised exotic from Madagascar
Ebenaceae	*Diospyros dichrophylla*	Poison Starapple	
Fabaceae	*Acacia cyclops*	western coastal wattle	Invasive. NEMBA 1b, CARA 2, from Australia
Fabaceae	*Schotia afra*	Karoo Boerbean	
Geraniaceae	*Pelargonium capitatum*	rose-scented geranium	
Lamiaceae	*Coleus (Plectranthus) barbatus*	Woolly Plectranthus	Naturalised exotic from tropical Africa
Malvaceae	*Hermannia holosericea*	Kwaaiman Dollsrose	
Malvaceae	*Hermannia lavandulifolia*	Lavender Dollsrose	Vulnerable A2c
Oleaceae	*Olea europaea*	Olive	
Oxalidaceae	*Oxalis pes-caprae*	Bermuda buttercup	Opportunistic species
Phytolaccaceae	*Phytolacca octandra*	Inkweed	Invasive. NEMBA 1b, from Americas
Pittosporaceae	*Pittosporum viridiflorum*	Cape Cheesewood	Protected Tree no. 139
Polygonaceae	*Rumex crispus*	curled dock	Naturalised exotic from Eurasia
Rosaceae	*Rubus rigidus*	White Bramble	Opportunistic species
Salvadoraceae	*Azima tetracantha*	Needle Bush	
Sapotaceae	*Sideroxylon inerme inerme*	Southern White Milkwood	Protected Tree no. 579
Scrophulariaceae	*Buddleja saligna*	False Olive	
Scrophulariaceae	*Selago corymbosa*	Stiff Bitterbush	
Solanaceae	*Datura stramonium*	jimsonweed	Invasive. NEMBA 1b, CARA 1, from Central America
Solanaceae	*Lycium ferocissimum*	African boxthorn	
Solanaceae	*Physalis peruviana*	Cape gooseberry	Naturalised exotic from South America
Thymelaeaceae	*Gnidia squarrosa*	saffron bush	
Thymelaeaceae	*Struthiola sp.*	Stringbarks	
Tropaeolaceae	*Tropaeolum majus*	garden nasturtium	Invasive. NEMBA 3 from Central & South America

Family	Species	Common name	Information
Verbenaceae	*Lantana camara*	common lantana	Invasive. NEMBA 1b, CARA 1, from Central & South America
Verbenaceae	*Verbena bonariensis*	purpletop vervain	Invasive. NEMBA 1b, from South America
Pinopsida			
Podocarpaceae	*Afrocarpus falcatus*	Outeniqua Yellowwood	Protected Tree no. 16
CULTIVATED PLANTS			
Cycadopsida (Cycads)			
Cycadaceae	*Cycas revoluta*	Sago cycad	Cultivated
Liliopsida (Monocots)			
Arecaceae	*Washingtonia robusta*	Mexican Fan Palm	Exotic cultivated.
Arecaceae	*Washingtonia sp.*	Fan Palms	Exotic cultivated.
Asphodelaceae	*Aloidendron barberae*	Eastern Tree Aloe	Cultivated
Magnoliopsida (Dicots)			
Anacardiaceae	*Harpephyllum caffrum*	African plum	Cultivated
Anacardiaceae	*Schinus terebinthifolia*	Brazilian pepper	Invasive. NEMBA 3 (1b elsewhere in the country), CARA 3 (1 in KwaZulu-Natal), from South America
Anacardiaceae	*Searsia lancea*	african sumac	Cultivated
Anacardiaceae	*Searsia sp.*	Karees	Cultivated
Bignoniaceae	*Tecoma stans*	yellow trumpet flower	Invasive. NEMBA 1b, CARA 1, from Central America
Bignoniaceae	*Tecomaria capensis*	Cape Honeysuckle	Cultivated
Convolvulaceae	*Ipomoea cairica*	Mile-a-minute vine	Invasive. NEMBA 1b, CARA 1, from the Tropics
Crassulaceae	*Aeonium arboreum*	Tree Aeonium	Exotic cultivated.
Fabaceae	*Erythrina afra*	Coral trees	Cultivated
Fabaceae	*Virgilia divaricata*	Gardenroute Keurboom	Cultivated
Malvaceae	*Hibiscus sp.*	hibiscuses	Exotic cultivated.
Moraceae	*Ficus burkei*	Common Wild Fig	Cultivated
Moraceae	*Ficus rubiginosa*	Port Jackson fig	Cultivated
Myrtaceae	*Metrosideros excelsa*	PÅ• hutukawa	Invasive. NEMBA 1a in the Overstrand, and not listed elsewhere. CARA 3, from New Zealand
Myrtaceae	*Psidium guajava*	Common guava	Invasive. NEMBA not listed in the Western Cape, but listed elsewhere in the coutry. CARA 2, from Central & South America
Myrtaceae	*Syzygium cordatum*	Water Berry	Cultivated. Other species of the same genus are listed as invasive.
Nyctaginaceae	*Bougainvillea sp.*	bougainvilleas	Exotic cultivated.
Rutaceae	*Citrus × aurantium*	Bitter Orange	Exotic cultivated.

Family	Species	Common name	Information
Sapotaceae	*Sideroxylon inerme inerme*	Southern White Milkwood	Protected Tree no. 579
Scrophulariaceae	*Myoporum laetum*	Ngaio	Invasive. NEMBA 3, CARA 3, from Auatralia
Stilbaceae	*Nuxia floribunda*	Forest Elder	Cultivated
Pinopsida			
Araucariaceae	*Araucaria heterophylla*	Norfolk Island Pine	Exotic cultivated.
Cupressaceae	*Hesperocyparis macrocarpa*	Monterey Cypress	Exotic cultivated.
Podocarpaceae	*Afrocarpus falcatus*	Outeniqua Yellowwood	Protected Tree no. 16
Podocarpaceae	*Podocarpus henkelii*	Henkel's yellowwood	Protected Tree no. 17

BOX 2: NEMBA categories for listed invasive alien plants.

Category 1b

- Species which must be controlled.
- Property owners and organs of state must control the listed invasive species within their properties.
- If an Invasive Species Management Programme has been developed, a person must control the listed invasive species in accordance with such programme.
- Authorised officials must be permitted to enter properties to monitor, assist with or implement the control of listed species.
- Any Category 2 listed species (where permits are applicable) which fall outside of containment and control, revert to Category 1b and must be controlled.
- Any Category 3 listed species which occur within a Protected Area or Riparian (wetland) revert to Category 1b and must be controlled.
- The Minister may require any person to develop a Category 1b Control Plan for one or more Category 1b species occurring on a property.

Category 2

Requires a permit issued by the Department of Forestry, Fisheries and the Environment (DFFE) to carry out a restricted activity (See Permit Applications.)

- A person in control of a Category 2 listed species must take all necessary measures to ensure that specimens of the species do not spread outside of the land or area, such as an aviary) specified in the permit.
- A permit is required to carry out any restricted activity.
- No person may carry out a restricted activity in respect of a Category 2 listed invasive species without a permit.
- A person in control of a Category 2 listed species must take all necessary measures to ensure that specimens of the species do not spread outside of the land or area, such as an aviary) specified in the permit.

5.2 Additional SCC that may be found

All SCC that may be present on the site have been identified using the screening tool report for the site, iNaturalist nearby observations, and the POSA database. *Hermannia*

lavandulifolia (VU) is the only confirmed SCC along Sandhoogte Road. This SCC is often found in disturbed landscapes, including the disturbed areas associated with road reserves. None of the other SCC flagged in the Screening Tool, not any nearby observed SCC on iNaturalist are likely to occur within the proposed sewerage infrastructure upgrade area. *Zostera capensis* (EN) was also flagged by the Screening Tool, and this is a species that is only likely to occur within the intertidal zone of the estuary. Therefore, if the sewerage infrastructure upgrades are managed in a way to ensure no negative impacts accidentally occur in the nearby estuary, then this aquatic species is not a concern for the proposed upgrades.

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

The sensitivity of the Terrestrial Biodiversity Theme for the site is confirmed as **Low** within the footprint of the proposed sewerage infrastructure upgrade area. BSP layers of CBA1, CBA2, and ESA2 do not apply within the road reserved where all the upgrades will be taking place. The vegetation along the extent of the proposed upgrade area in Great Brak is also transformed and does not represent natural thicket nor fynbos vegetation.

6.2 Botanical Diversity

The site sensitivity in terms of the Terrestrial Plant Species Theme is confirmed as **Low**. While *Hermannia lavandulifolia* (VU) was found in the nearby the road on Sandhoogte Road, this species is often associated with more disturbed areas, and the proposed upgrades will have a negligible effect on the persistence of this species in the environments surrounding the road. Four protected tree species were observed at various locations along the sides of the roads where the upgrades will be taking place, however all the yellowwood trees (2 species) are cultivated, and all the Milkwood (*Sideroxylon inerme inerme*) and Cheesewood (*Pittosporum viridiflorum*) trees can be avoided by the proposed upgrades. If there is any reason why some of these trees might be impacted by the sewerage infrastructure upgrades, an appropriate licence must be applied for from the Department of Forestry, Fisheries and the Environment (DFFE).

7. CONCLUSION AND RECOMMENDATIONS

The proposed sewerage infrastructure upgrade in Great Brak is located within transformed areas with planted grasses and sidewalks. These areas do not represent threatened ecosystems, CBAs, not ESAs. In some areas, sensitive vegetation does occur beyond the road reserve, however these patches of sensitive vegetation fall outside of the project area of influence (PAOI), as described earlier in this report. To mitigate potential negative impacts on these sensitive habitats, it is essential to implement measures that prevent erosion, dumping, and other disturbances.

- Given the presence of protected tree species such as Milkwood (*Sideroxylon inerme inerme*), Cheesewood (*Pittosporum viridiflorum*), and two yellowwood species (*Afrocarpus falcatus* and *Podocarpus henkelii*, however most of these have been planted) careful planning and adherence to the National Forests Act (No. 84 of 1998) are crucial. This includes obtaining the necessary permits for any activities affecting these protected species and integrating effective erosion control and waste management strategies.

- Buffer areas around sensitive habitat and the estuary to prevent runoff and pollution must be demarcated clearly prior to the commencement of construction.
- Installing erosion control blankets during construction can help manage soil movement in areas identified as prone to erosion and sediment runoff.
- Regular monitoring of the construction area and its surroundings, with the aid of an Environmental Control Officer (ECO) will help detect any emerging issues early, allowing for prompt mitigation and prevention of unforeseen impacts.

Additional mitigation measures should focus on safeguarding the adjacent estuary and minimizing unforeseen impacts beyond the PAOI. Additional comments and measures have been discussed in the aquatic specialist report by Dr. Jackie Dabrowski. Some of these comments included:

- Clearly demarcating the work area.
- Implementing silt control by using sandbags.
- The proposed sewer line and pump station upgrades within the Estuarine Functional Zone (EFZ) will be confined to existing disturbance footprints, which results in a minimization of direct impacts on the estuary. Indirect impacts can be mitigated with simple but effective methods during the construction phase.
- The aquatic report also states that watercourses have been almost completely transformed from their natural condition through channelling, straightening etc. The sewerage infrastructure will therefore not impact any natural watercourses or mapped aquatic CBA 1 areas.

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9. APPENDIX

9.1 Land use recommendations according to the WC BSP

Recommended acceptable land-uses for each BSP layer is outlined and summarised in Table 3 below.

Table 3: The land-use planning proposed by the Western Cape Biodiversity Spatial Plan

LAND USE CATEGORIES		Conservation		Agriculture		Tourism and Recreational Facilities		Rural Accomodation		Urban			Business & Industrial				Infrastructure Installations			
LAND USE SUB-CATEGORIES (Refer to table 4.7 for descriptions)		Proclaimed Protected Areas	Other Nature Areas	Intensive Agriculture	Extensive Agriculture	Low Impact Facilities	High Impact Facilities	Agri-worker Accommodation	Small holdings	Urban Development & Expansion	Community Facilities & Institutions	New Settlements	Rural Business	Non-place-bound Industry (low-moderate impact)	Non-place-bound Industry (high impact)	Extractive Industry (incl. Prospecting)	Linear - roads & rail	Linear - pipelines & canals	Linear - powerlines	Other Utilities
MAP CATEGORY	DESIRED MANAGEMENT OBJECTIVE	Y = Yes: Permissible land uses that are not likely to compromise the biodiversity objective						R = Restricted: Land uses that may compromise the biodiversity objective are only permissible under certain conditions (refer to Table 4.7 for conditions)					N = No: Land uses that will compromise the biodiversity objective and are not permissible							
Protected Area	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity.	Land use within proclaimed protected areas are subject to management plan drawn up for that specific protected area.																		
Critical Biodiversity Area 1	Keep natural, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Y	Y	N	R	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N
Critical Biodiversity Area 2	Keep natural, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Y	Y	N	R	R	N	N	N	N	N	N	N	N	N	N	R	R	R	N
Ecological Support Area 1: Terrestrial	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	Y	Y	N	R	R	N	N	N	N	N	N	R	R	N	N	R	R	R	R
Ecological Support Area 1: Aquatic	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	Y	Y	N	R	R	N	N	N	N	N	N	N	N	N	N	R	R	R	N
Ecological Support Area 2	Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.	Y	Y	N	R	R	N	N	R	N	N	N	N	N	N	N	R	R	R	R
ONA: Natural to Near-Natural	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high impact land uses.	Y	Y	R	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
ONA: Degraded	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high impact land uses.	R	R	R	Y	Y	R	R	Y	R	R	R	R	R	R	R	Y	Y	Y	Y
No Natural Remaining	These areas are suitable for development but may still provide limited biodiversity and ecological infrastructure functions and should be managed in a way that minimises impacts on biodiversity and ecological infrastructure.	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

9.2 The IUCN Species Red List Criteria Summary

This section contains an extra summary explaining the very basics of the five Red List criteria used when assessing the Red List status of species. Note that this summary sheet does not provide detail on the "Near Threatened" category (sometimes also called an "Orange List" category) which comes before the "Vulnerable" category. These are the criteria that are used by the IUCN to assign the extinction threat status for individual plant species. In South Africa there are additional criteria (not shown on Fig. 9) for Rare and Critically Rare plant species.

SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).[1]

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.
A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.
A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.
A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) **(i)** Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) **(ii)** % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

1 Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.

Figure 9: The IUCN summary for the five assessment criteria used during the species Red Listing process.

9.3 Site Assessment Track

The site assessment track walked during July is illustrated in Fig. 10.

Figure 10: An image illustrating the track walked (dotted white line) over the proposed upgrade areas (orange lines).