

Specialist Site Sensitivity Verification and Scoping Report Gwayang Industrial Park, located to the East of the Gwaing River in George, for the Botanical and Terrestrial Biodiversity Themes.




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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 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.
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- All the particulars furnished by me in this document are true and correct.



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March 2024

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Qualifications

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- 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.

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ABBREVIATIONS

LSDF	Local Spatial Development Framework
SUDS	Sustainable Urban Drainage System
DFFE	Department of Forestry, Fisheries, and the Environment
WWTW	Wate Water Treatment Works
BSP	Biodiversity Spatial Plan
NBA	National Biodiversity Assessment
SWSA-sw	Strategic Water Source Areas for surface water
CBA	Critical Biodiversity Area
ESA	Ecological Support Area
ONA	Other Natural Areas
FEPA	Freshwater Ecosystem Priority Areas
CD:NGI	Chief Directorate: National Geo-spatial Information
SANBI	South African National Biodiversity Institute
PAOI	Project Area of Influence
SCC	Species of Conservation Concern
NEMBA	National Environmental Management: Biodiversity Act
EIA	Environmental Impact Assessment
SEI	Site Ecological Importance
SDP	Site Development Plan
EPO	Envrionmental Protection Overlay
Integrity	

1. INTRODUCTION

Confluent Environmental has been appointed to undertake a Terrestrial Biodiversity and Plant Species site sensitivity verification and scoping assessment of the proposed Gwayang industrial mixed development area. The location of the proposed development site is illustrated in Fig. 1. The George Municipality have proposed this project on Erf RE/464, where the development area is ca. 185 ha. The site is south of the R102 road. The western boundary of the proposed development area is adjacent to the George landfill and Wastewater Treatment Works (WWTW).

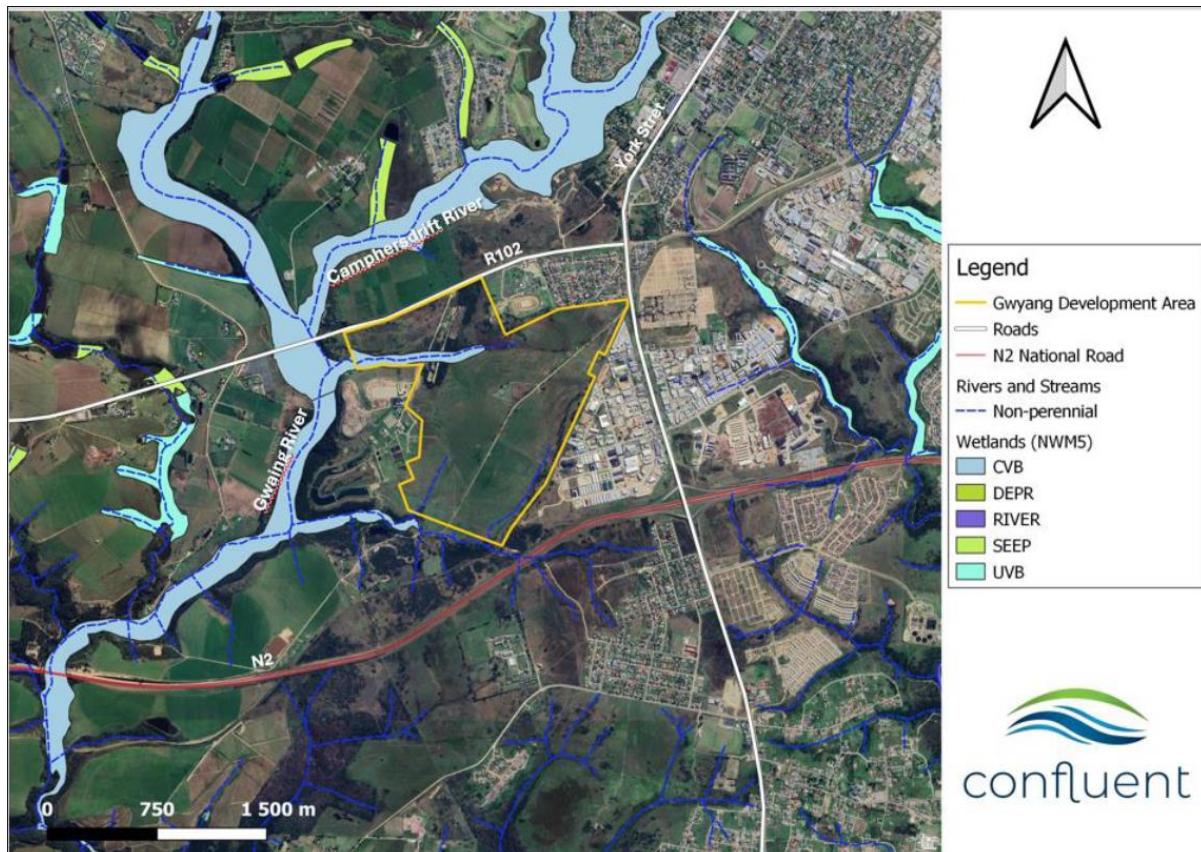


Figure 1: The location of the proposed development area, with the outline of Erf RE/464 visible in yellow. The map also includes mapped watercourses and roads. Map by Dr. Jackie Dabrowski.

This report will address the terrestrial biodiversity and botanical environmental sensitivity themes of the site. The George Municipality is planning to register multiple erven that will be integrated for a mixed-use development in the Gwayang Development Area. The Gwayang Local Spatial Development Framework (LSDF), which includes the erven for the proposed development, is illustrated below in Fig. 2.

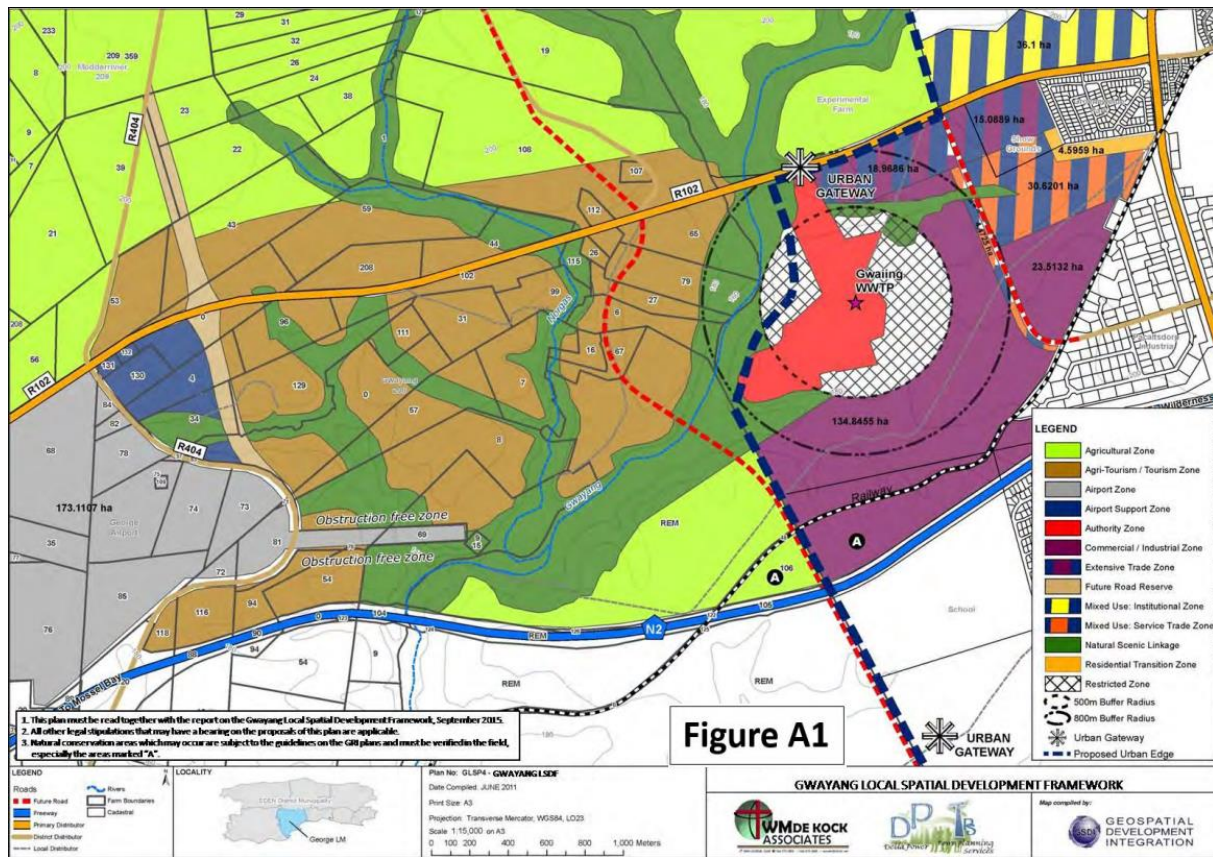


Figure 2: The composite Gwayang LSDF of 2017, as sourced from the George Municipality Terms of Reference (ToR) report for the Gwayang Industrial proposed development.

1.1 The proposed development

The proposed development is planned on municipal land which includes part of the remainder of Erf 464 of George. The objective includes the subdivision of RE/464 into registerable erven that will be released as part of an integrated mixed-use Gwayang Development Area. An initial terrestrial biodiversity and botanical screening report was compiled at the end of 2022 to inform the proposed development plan. Currently the project is also planned over eight separate development phases (Fig. 3).

Following specialist screening reports, the site development plan (SDP) was revised and updated. Currently two alternative development layouts have been presented following the screening reports, namely

1. the first revised and updated layout following recommendations from the initial screening process (preferred layout plan), and
2. the latest revised plan following further engagement with specialists during the scoping phase (the alternative layout plan).



Figure 3: The proposed development phases provided together with the preferred SDP. These phases of development are likely to be similar for both the preferred and alternative development options for the Gwayang mixed-use Development Area.

The current layouts both aim to include the development of residential areas in the form of apartments and group housing. In addition to the residential areas, some industrial areas are also planned here, which would include light and heavy industry. Specific industrial developments are not known at this stage, as these are dependent on the future owners of the erven proposed in the Gwayang development. The relative areas of each land use under the preferred SDP is summarised in Table 1 and the proposed layout is shown in Fig. 4.

Table 1: The proposed zonation for the preferred layout of the Gwayang mixed development area, as illustrated in the SDP from March 2024.

Land Use Description	Zoning - George Integrated Zoning Scheme By-Law	Units	Stands	Area (ha)	% Ha
Group Housing	General Residential Zone II Group Housing	137	4	3.9	1.17%
Apartment Housing	General Residential Zone IV Flats/Apartments	1850	7	9.3	2.79%
Light Industrial	Industrial Zone I	-	32	17.8	5.34%
Heavy Industrial	Industrial Zone II & III	-	16	36.5	10.95%
Mixed Use / Business / Retail	Business Zone I	-	8	15.1	4.53%
Public facilities (Creche's & religious centre)	Community Zone I & II	-	4	0.3	0.09%
Public Squares	Open Space Zone I	-	4	0.7	0.21%
Municipal Land Fill Site & WWTW	Utility Zone	-	2	57.9	17.37%
Municipal Solar Farm	Utility Zone	-	1	24.5	7.35%
Open / conservation areas etc.	Open Space Zone I	-	9	134	40.20%
Planned roads	Transport Zone II	-	TBC	33.4	10.02%
Total number of units/stands		1988	87	333.3	100%

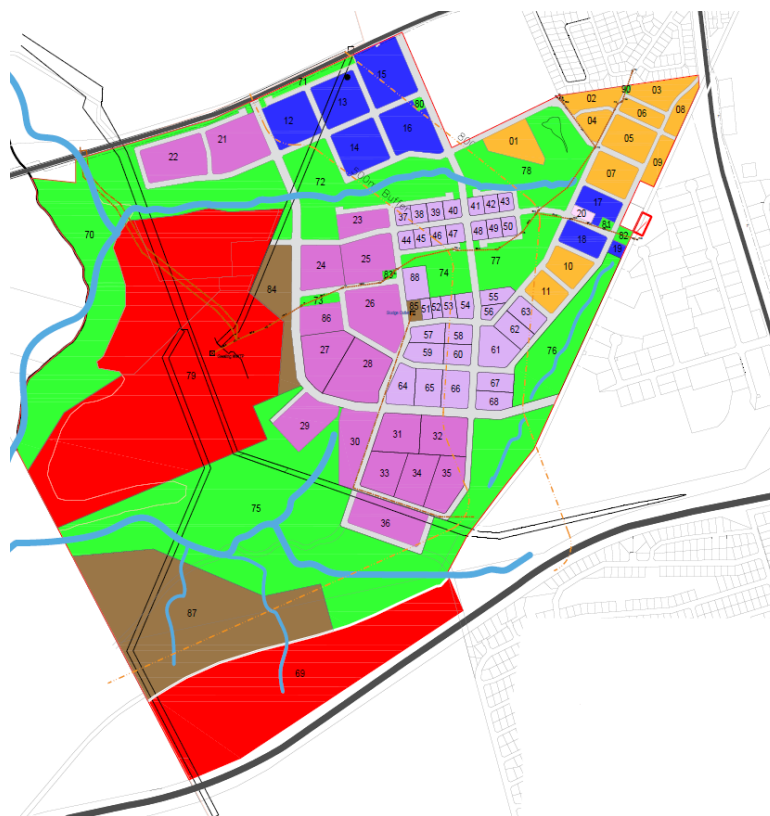


Figure 4: The proposed SDP for the preferred layout of the Gwayang mixed development, (as presented during March 2024).

Following engagement between the biodiversity / environmental specialists with various project engineer, managers, designers, and other stakeholders, an alternative site development plan was developed, as presented in Table 2 and Fig. 5 below. The benefits of the alternative layout plan is that it will cross fewer watercourses, and result in a reduced amount of habitat fragmentation in sensitive remaining fynbos habitat where fynbos golden mole presence has also been established.

Table 2: The proposed zonation for the alternative layout of the Gwayang mixed development area, as illustrated in the alternative SDP from May 2024.

Gwayang Development - George										
Projected Land Use										
Land Use Description	Zoning - George Integrated Zoning Scheme By-Law	Units	Stands	Density	stand size (average)	Area (ha)	FAR	GLA (m2)	% of total area	% of units
Group Housing	General Residential Zone II Group Housing	145	4	35	285	4.1	na	na	4.1%	7.6%
Apartment Housing	General Residential Zone IV Flats/Apartments	1762	7	200	1.3	8.8	1.0	88081	8.8%	92.4%
Light Industrial	Industrial Zone I	na	32	na	0.6	20.7	1.5	310637	11.4%	na
Heavy Industrial	Industrial Zone II & III	na	17	na	2.2	38.1	1.5	570926	21.0%	na
Mixed Use / Business / Retail	Business Zone I	na	8	na	2	15.0	3.0	450525	6.3%	na
Public facilities (Creche's & religious centre)	Community Zone I & II	na	4	na	0.07	0.3	1.0	2607	0.1%	na
Open / conservation areas etc.	Undetermine Use Zone	na	na	na	na	0.3	na	na	0.1%	na
Open / conservation areas etc.	Open Space Zone I	na	4	na	1.0	55.9	na	na	30.8%	na
Planned roads	Transport Zone II	na	10d	na	na	38.2	na	na	21.1%	na
Total number of units/stands		1907	75			181.3			100%	100%

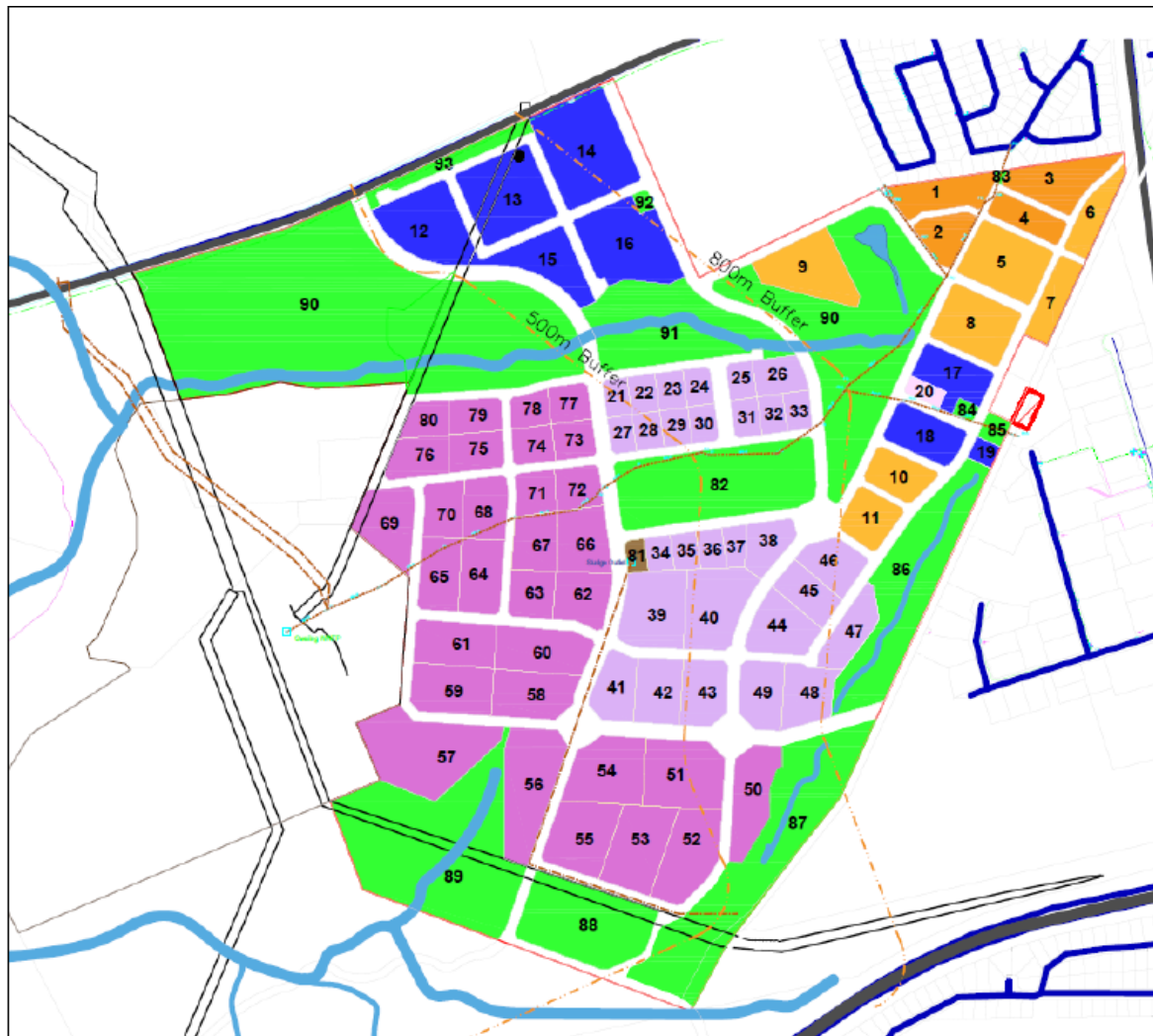


Figure 5: The proposed SDP for the alternative layout of the Gwayang mixed development, (as presented during May 2024).

2. TERMS OF REFERENCE

This screening tool report provides information on Terrestrial and Botanical diversity and sensitivity of the proposed development. 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).
- 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).

2.1 Online Screening Tool

The Department of Forestry, Fisheries, and the Environment (DFFE) Online Screening Tool was used to create an initial screening report for the site. The report was created in the category of “Transformation of land”, with a sub-category “From open space or conservation”. The terrestrial sensitivity rating was given as **Very High**, and the plant species theme as **Low and Medium** (Fig. 6). Species identified under the plant theme of the screening tool may be present at the site, however presence / absence data need to be verified in a site assessment. The species identified are listed later in this report.

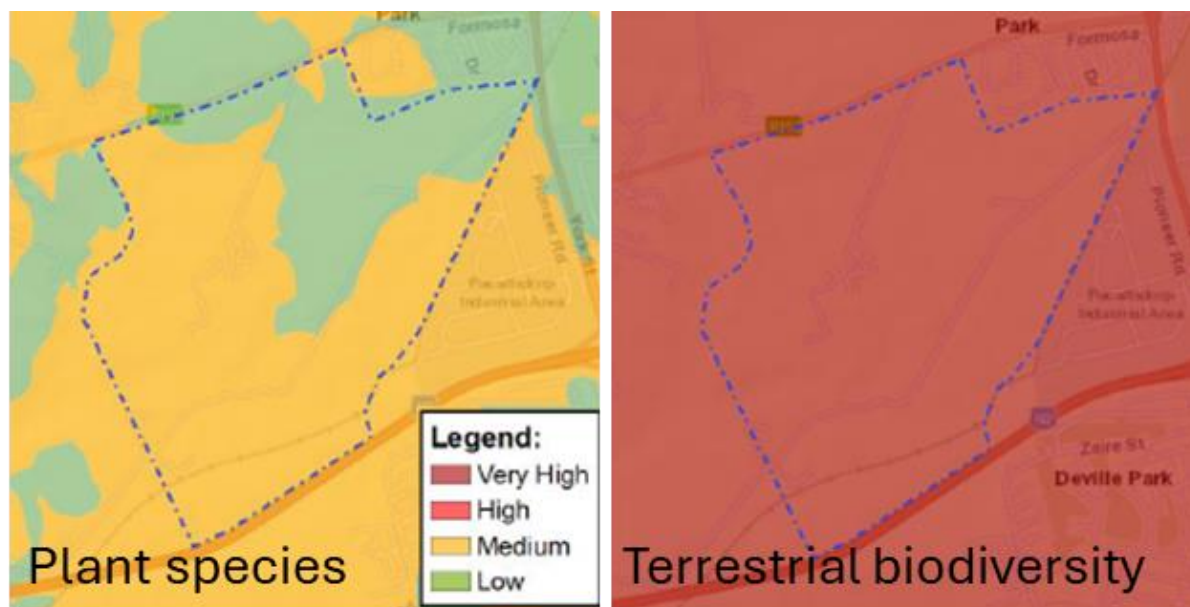


Figure 6: The Screening tool generated sensitivities for the plant species and terrestrial biodiversity themes within the proposed Gwayang development area.

3. METHODOLOGY

3.1 Desktop Assessment

The desktop assessment was performed using Cape Farm Mapper and QGIS version 3.26.3 “Buenos Aires.” Vegetation data was sourced from the following:

- The 2018 updated South African National Vegetation Map from SANBI's Biodiversity GIS (BGIS) database.
- A composite vegetation map of the Riversdale and Garden Route regions of the Southern Cape as classified by Jan Vlok and mapped at a scale of 1:50 000 for various projects.
- Information on plant occurrence prior to the site visit was sourced from SANBI's Botanical Research And Herbarium Management System (BRAHMS) for the Plants of Southern Africa (POSA) database.
- iNaturalist observations of the Farm and surrounding areas, including Custodians of Rare and Endangered Wildflowers (CREW) observations.

Ecosystem data was sourced from:

- Shapefiles for the Western Cape Biodiversity Spatial Plan, i.e., information on PAs, CBAs, ESAs, and ONAs were downloaded from BGIS database.
- The Western Cape Biodiversity Spatial Plan (WC-BSP) of 2017 provides information on CBA and ESAs.
- Cape Farm Mapper layers on the geology, soil, and SWSAs.
- 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 National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the

National Environmental Management: Biodiversity Act (Act No. 10, 2004), and also using Mucina & Rutherford (2006) *The Vegetation of South Africa, Lesotho, and Swaziland*.

3.2 Field Assessment

Field work for the initial screening report was undertaken on the 29th of September 2022 and an additional site assessment during the scoping phase was undertaken on the 22nd of February 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 rarer and threatened species (see Appendix 2 for information of the original 2022 site assessment). Some Red Listed Plant species are found more easily during a site survey than other species. This survey method is an attempt to account for the short and single survey period. Observations of individual species and environmental characteristics were documented using a Nikon Coolpix camera.

3.3 Assumptions & Limitations

This assessment is subject to a few assumptions, uncertainties, and limitations. These are listed below:

- Only one survey (between 10h00 and 15h30) took place during the springtime on 29 September 2022. Even though this is a good time for most flowering species, not all plants flower during this time. Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report.
- Rare and threatened plant species are difficult to locate and easily overlooked in the field.
- The species list for the area is limited to the findings of the one field assessment day, as well as past records on iNaturalist and POSA for the proposed development site and its surrounding areas.
- Effort was made to identify no-go areas and possible impacts for the layout and design phase of the project, but it is always possible that some impacts were missed or neglected. The exclusion of important impacts does not mean that they do not exist, and the development always has a duty of care to mitigate negative impacts to the environment.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

The critically endangered (CR) ecosystem identified by the screening tool is **Garden Route Granite Fynbos (FFg5)**, which is part of the Fynbos Biome. The Garden Route Granite Fynbos historically covered an approximate area of 43 000 ha, according to the NEMBA Act 10 of 2004 (as amended in 2011) schedule on Threatened Terrestrial Ecosystems in South Africa. Today less than 30% of this area remains in three local municipalities (George, Mossel Bay, and Knysna), with only 1% of the original area protected. Most of the remaining portions of this vegetation type is dominated by the Proteaceae, and at least four Red Listed plant species occur in this vegetation type. Sensitive Terrestrial Biodiversity features according to the screening tool are presented in Table 3, and these features form the basis of the desktop investigation for the terrestrial biodiversity theme for the site .

Table 3: Terrestrial landscape level sensitivity provided by the screening tool of the DFFE.

Sensitivity	Features
Very High	Critical biodiversity area 1
Very High	Critical biodiversity area 2
Very High	Ecological support area 2
Very High	Strategic Water Source Areas
Very High	Critically endangered ecosystem

4.1.1 Geology & Soil

The geology under the site is part of the Cape Granite Suite (CGS), which is composed of granites from the late Precambrian. The Maalgaten Granite, considered the main part of the George Pluton (i.e., a body of intrusive igneous rock), is likely present at the site and stretches from Wilderness in the East to the Klein Brak River in the West (Browning & Macey 2015) as shown in Fig. 7. It is thought that this granite covers an approximate area of 248 km².

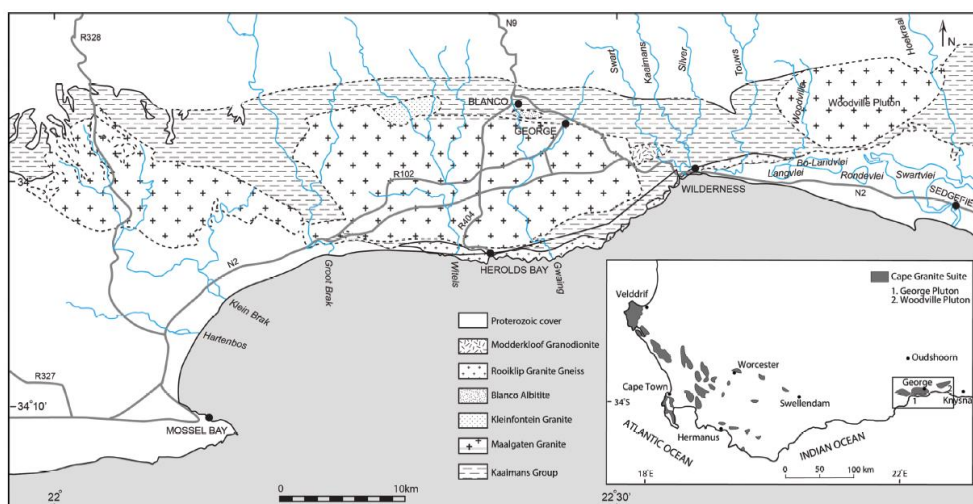


Figure 7: A map taken from the Browning & Macey (2015) paper showing the distribution of the George and Woodville Pluton granitoids. The inset illustrates additional areas where outcrops of the Cape Granite Suite occur.

Soil in the area of the proposed development is categorised as highly erodible (having a high soil k-factor), as described in Cape Farm Mapper. Mottled soils were present near and within wetlands of the site. Mottled soil indicates a fluctuating water table, and therefore is a characteristic of wetlands. The left image in Fig. 8 below illustrates greyish-brown mottled topsoil in a larger wetland, where mottling is present within the top 15cm of the soil. The image on the right was taken on the edge of a small wetland, where soil mottling started appearing at ~30 to 45 cm into the soil profile (i.e., three auger lengths).



Figure 8: Images showing mottling in soils present at the site.

An exposed soil profile was photographed (with an auger for scale) in Fig. 9. The soil horizons included a O horizon, which contains hummus, and other partially broken-down organic material. The A horizon is the topsoil, with the light coloured, eluviated E horizon just below it. Below the E horizon is the B horizon, or subsoil, which is mineral rich, and which showed mottling (like in the right photo of Fig. 9) along wetland boundaries present on the site. However, inside of the wetlands, mottling occurred in the topsoil too (Fig. 9).



Figure 9: A exposed soil profile, with an auger for scale, seen on Erf RE/464. This profile is not fresh, masking some nuance in the profile.

4.1.2 Climate

The proposed development is in the West of George in the Western Cape. The warmest months of the year are January and February, and the coldest month is August. Rainfall in this area does not follow a clear seasonal pattern, though minor peaks occur in the winter months and springtime. There is also far more annual variation in rainfall patterns compared to the more predictable annual temperature patterns. All graphs in Fig. 10 were provided by worldweatheronline.com.



Figure 10: Climate charts for George in the Western Cape showing a) temperature ranges from 2010 to 2022, b) precipitation trends over the period 2010 to 2022, c) monthly minimum and maximum temperatures, and d) monthly average rainfall (mm) and days of rain.

4.1.3 Western Cape Biodiversity Spatial Plan

Critical Biodiversity Areas (CBAs) are areas that are required to meet the biodiversity targets for ecosystems. Species composition and ecosystem services are both included in these targets. The Western Cape Biodiversity Spatial Plan (BSP) contains two categories of identified CBAs. CBA 1 and CBA 2 (see **BOX 1**) both occur on the site for the planned industrial park as illustrated in Fig. 11.

BOX 1: Terrestrial Critical Biodiversity Areas

CBA 1 definition: Areas in natural condition that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

CBA 1 objective: To 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.

CBA 2 definition: Areas in a degraded or secondary condition. These areas are also required to meet the biodiversity targets for species, ecosystems, or ecological processes and infrastructure.

CBA 2 objective: To 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 Areas are not part of the criteria to meet biodiversity targets, however they play a key role in supporting ecological functions. In the Western Cape BSP, there are also two categories of ESAs, namely ESA 1 and ESA 2 (see **BOX 2**). Only ESA 2 is found on the site (Fig. 11).

BOX 2: Terrestrial Ecological Support Areas

ESA 1 definition: Not essential for meeting biodiversity targets. An important role in supporting the functioning of PAs or CBAs. Often vital for ecosystem services.

ESA 1 objective: Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided underlying biodiversity objectives/ecological functioning are not compromised.

ESA 2 definition: Not essential for meeting biodiversity targets. Important in supporting functioning of PAs or CBAs. Often vital for ecosystem services.

ESA 2 objective: Restore/minimise impact on ecological infrastructure functioning, especially soil and water-related services.

There are no protected areas (PAs) that directly flank the development site, neither are there any other natural areas (ONAs), as also defined by the BSP. The reasons given by the BSP for the designation of CBA 1, CBA 2, and ESA 2 areas on the site are as follows (Please see Appendix 3 for more detail):

1. Garden Route Granite Fynbos (CR). The Vlok vegmap version is Wolwedans Grassy Fynbos.
2. Extended distribution range of bontebok, a threatened vertebrate species.
3. Cape Lowland Alluvial Vegetation (CR).
4. South/western Strandveld Channelled Valley Bottom Wetland.
5. Southern Coastal Belt Permanent and Ephemeral Upper Foothill Rivers.
6. Watercourse protection for the Southern Coastal Belt.
7. Water source protection for the Gwaing River.
8. Eastern Fynbos Floodplain Wetland.
9. FEPA River Corridors

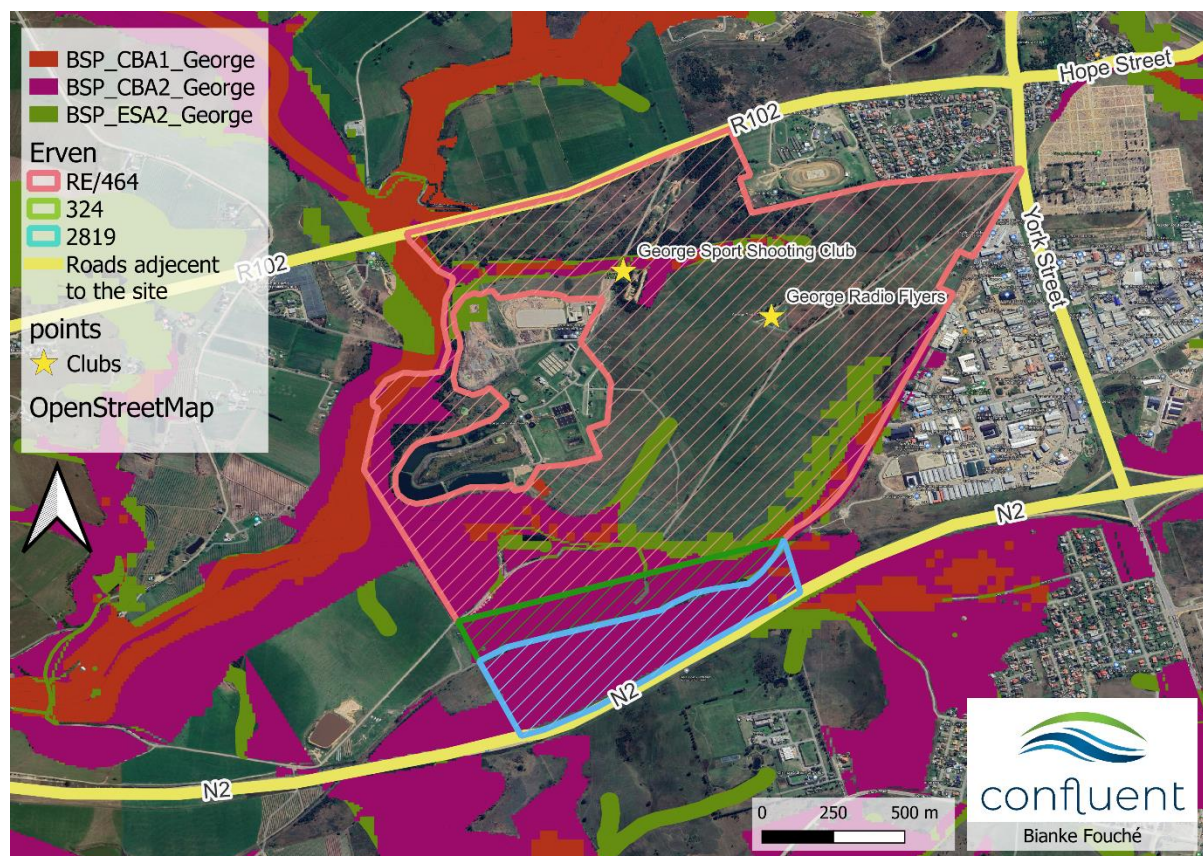


Figure 11: The CBA and ESA areas for the site and immediate surroundings are illustrated.

4.1.4 Outeniqua SWSA-sw

The proposed development site falls into an area designated as the Outeniqua Strategic Water Source Area for surface water (SWSA-sw). The whole of George forms part of the Outeniqua Strategic Water Source Area (SWSA) for surface water. SWSAs for surface water are defined as areas that, for their size, supply a relatively large proportion of mean annual surface water. Water source areas play an essential role in the production of runoff that sustain landscapes downstream. This specific SWSA-sw covers 292 480 ha, and supplies George, Oudshoorn, and the Garden Route area with water. The main Rivers flowing from this SWSA are the Groot Brak and Olifants Rivers. Only 30% of this SWSA is protected, which includes the Garden Route National Park, Goukamma Nature Reserve, two mountain catchments, three forest protected areas, four provincial nature reserves, and three local nature reserves.

About 77% of the river ecosystems of this SWSA is in natural condition, but 18% are critically endangered, and a further 5% is vulnerable. About 46% of the wetland ecosystems in this SWSA are critically endangered, with a further 25% endangered. That leaves only 29% of the wetlands here in a least threatened condition. For more information on this SWSA visit [Outeniqua Water \(cer.org.za\)](http://Outeniqua Water (cer.org.za)).

4.1.5 Mapped Vegetation Types

The 2018 Vegmap of South Africa identifies the proposed development site mostly as Garden Route Granite Fynbos (Fig. 12). In the west, the Gwaing River flows, and Cape Lowland Alluvial Vegetation is present in the area around the river. The Vegmap made by Jan Vlok is also illustrated in Fig. 12. The equivalent of Garden Route Granite Fynbos is Wolwedans

Grassy Fynbos in the Vlok vegetation map version. The Vlok version also changes the name Cape Lowland Alluvial Vegetation to Moordkuils Perennial Stream, which extends a bit further than the Vegmap version of this vegetation type. The Dam identified during the site visit is adjacent to the perennial stream vegetation identified by the Vlok Vegmap.

Wolwedans Grassy Fynbos is often associated with forest patches that occur in water drainage lines. This fynbos often contains ericoid shrubs that are dominant in the matrix, e.g., *Erica sparsa* (Vlok & de Villiers 2007). *Passerina falcifolia* is often prominent on north facing slopes. Most of the remaining extent of Wolwedans Grassy Fynbos has been transformed to pastures (Vlok & de Villiers 2007). Although this vegetation type is not particularly species rich, it does contain some interesting geophytes, e.g., *Gladiolus emiliae* (Vlok & de Villiers 2007). A few *Erica* species can be found here, as well as streambeds that are often dominated by *Pronium* (Vlok & de Villiers 2007).

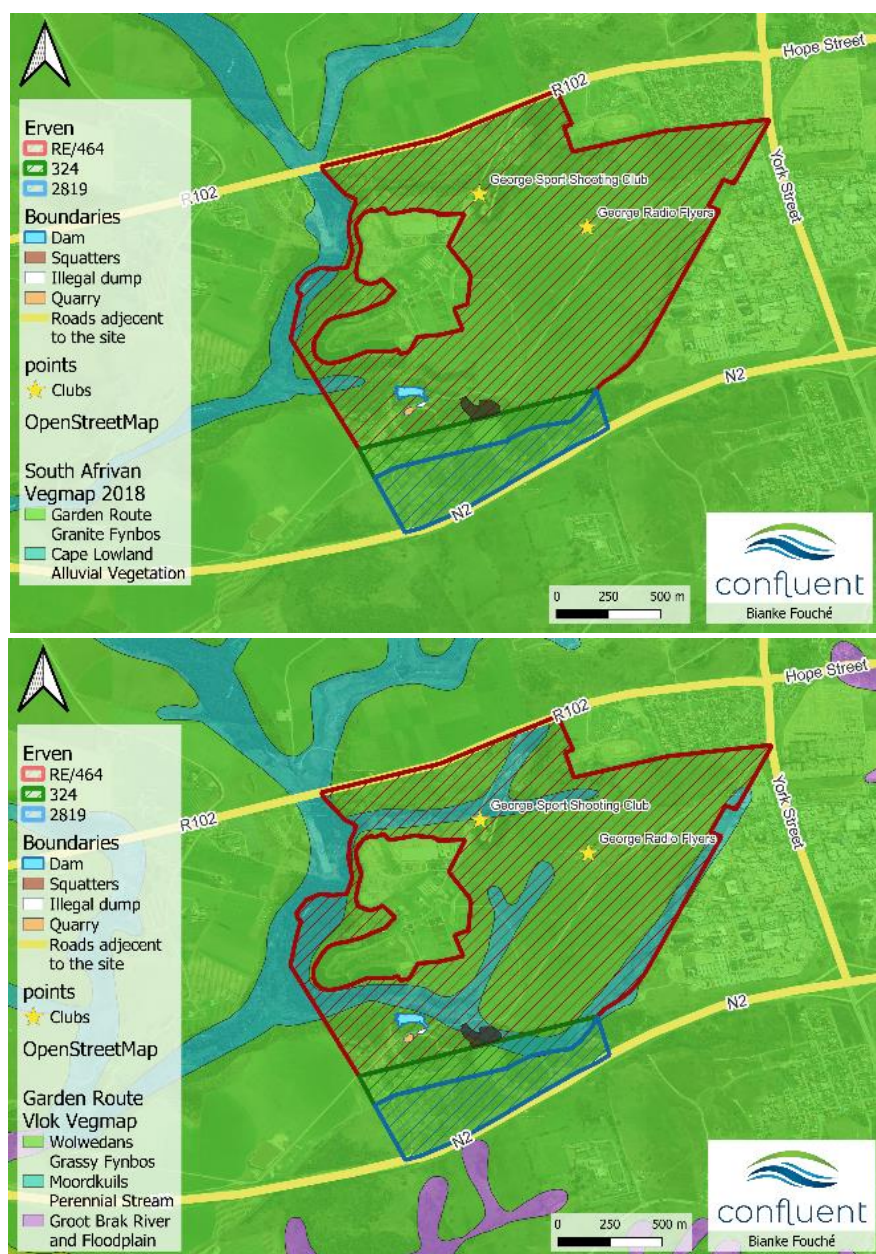


Figure 12: The top map illustrates the national Vegmap, and the bottom map represents the Vlok Garden Route vegetation communities.

4.1.6 *Historical photographs*

Historical imagery available from the Chief Directorate: National Geo-spatial Information (CD: NGI) Geospatial Portal dates back to 1936 for the proposed development site. Four images sourced from the CD: NGI are illustrated in Fig. 13.

- The site seems to have had agricultural influence since before 1936. Past disturbance of this site is considerable.
- The road running north to south in the eastern section of the site, as well as the railway in the south, was present in 1936.
- Between 1957 and 1974, fields had been established across most of the site.
- The N2, along the south of the site, appears in the 1989 image in Fig. 13
- Black wattles expanded into an and in the north of the site between 1957 and 1974 (red circles in Fig. 13). The exact decade when black wattles first started invading the wetlands and ephemeral streams of the proposed development site is uncertain.
- In the 80s and 90s, large excavations in the same abandoned agricultural field described above were made just north of the N2 (indicated as a red circle in the images below).
- Developments to the north and east of the part mostly started after 1974.
- Between 1974 and 1989, the WWTW was built, and in the 90's the rubbish dump in the north-western portion of the site (South of the R102) was established. The use of the old dumping site has stopped after 2003. After this, a new dumping site was started just north of the WWTW.
- The WWTW ponds appear in the historical images in 1989, with continual development of the WWTW area to the present time.
- From 1989, the radio flyer club runway is visible, as well as the start of the Pecaltsdorp Industrial Area to the east of the site.
- Evidence of Squatter camps goes back to ~2016.

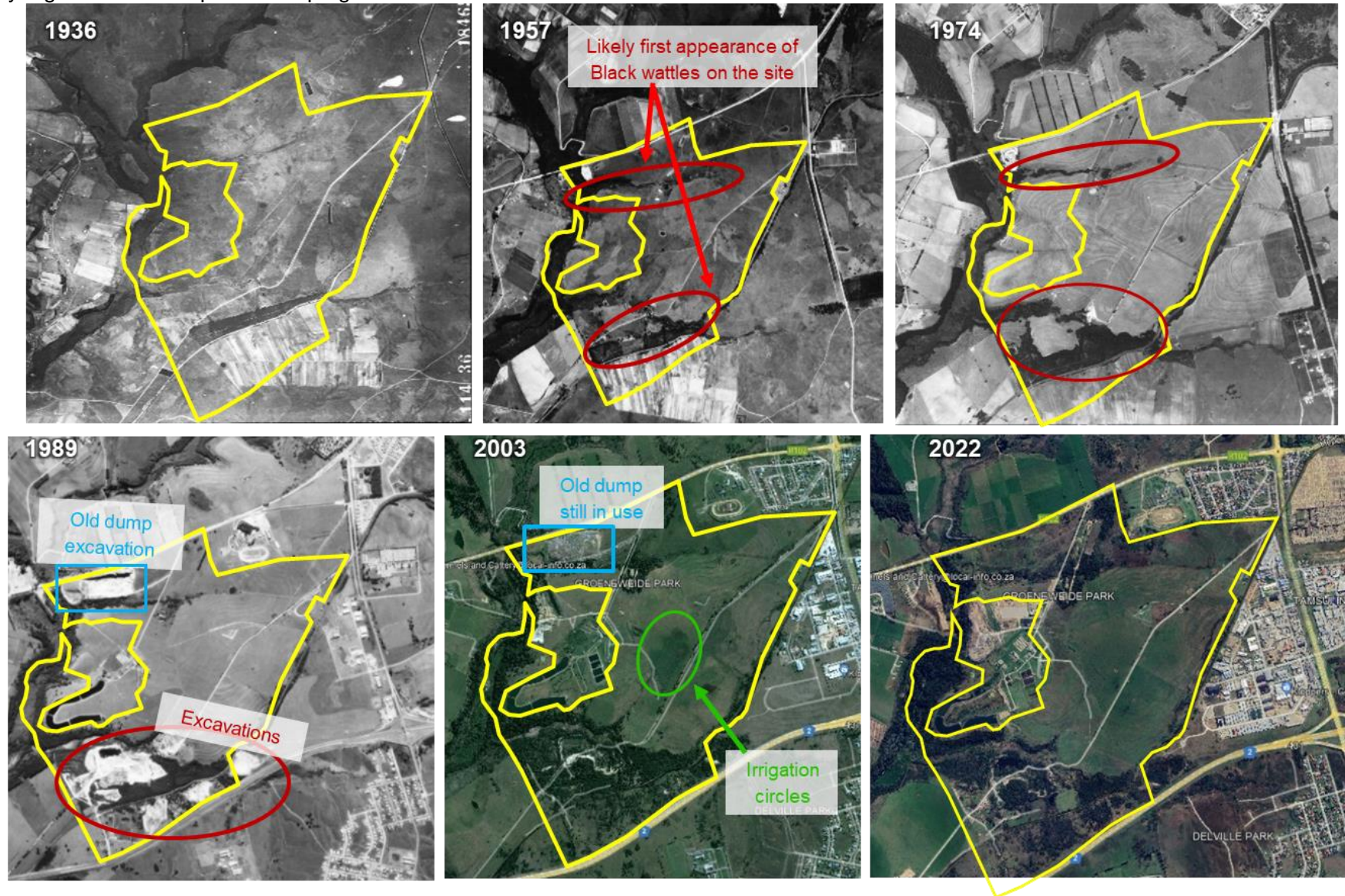


Figure 13: A timeseries of historical photographs showing changed in the proposed development site since 1936. The red circle indicates the establishment of trees, likely black wattle, in an old agricultural field between 1957 and 1974.

A present-day image of the site has been overlaid with areas of historical and present modifications and large-scale disturbances, save for agricultural fields (Fig. 14). Fields are currently utilised for grazing cattle and were historically irrigated with moveable sprinklers using water from the WWTW. Kikuyu grass was sown on some of the fields for the purpose of commercial supply of instant lawn. This operation has ceased along with the irrigation.

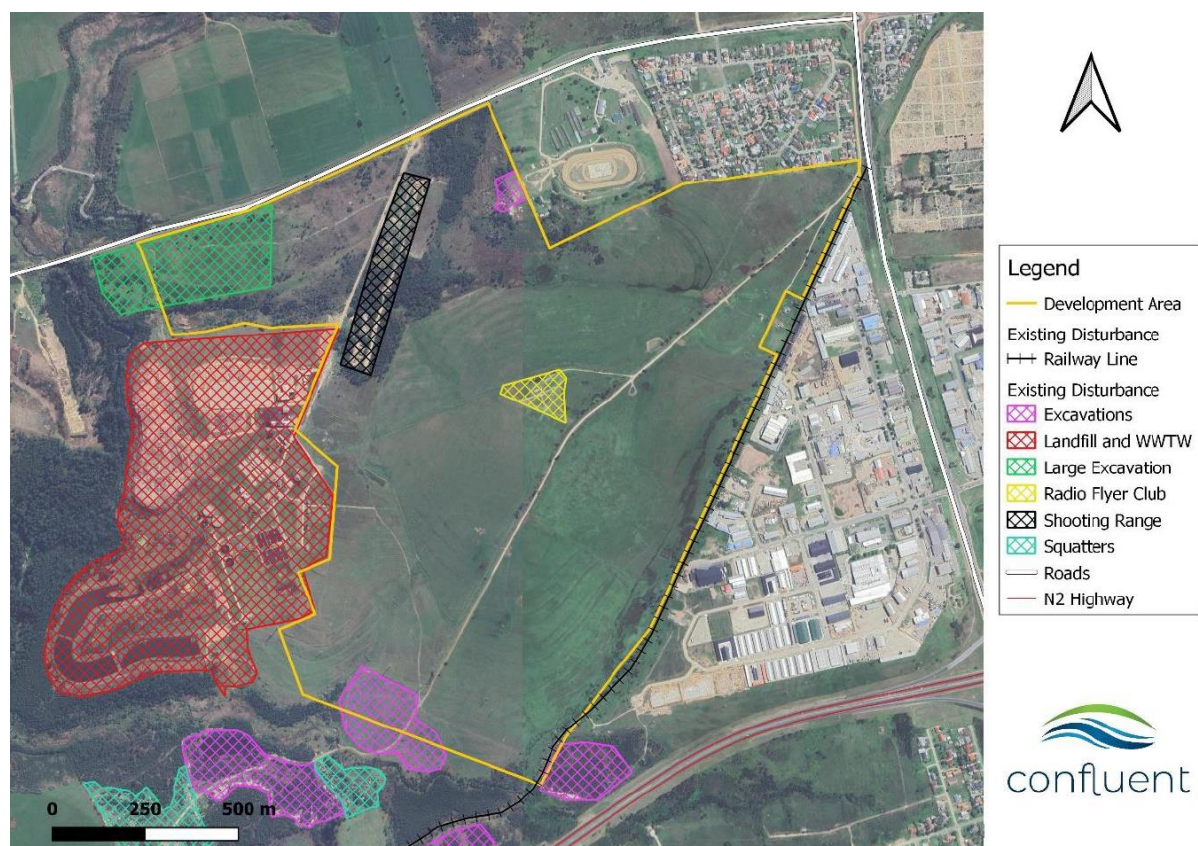


Figure 14: The past & current impacts on the proposed mixed development site.

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). The Red List categories are discussed later in the report.

4.2.1 Species of Conservation concern (SCC) to consider in this report.

The SCC flagged for the site were identified by the screening tool report as well as other sources and specialist input for the area. These species are listed in Table 4 below, with the screening tool listed species highlighted in the table.

Table 4: The plant species of conservation concern flagged for the site, with species in the screening tool report highlighted in grey. The right column is for species that may not be named in the report due to their sensitive nature (the numbers for these species are given by SANBI).

Species of conservation concern	Sensitive species
<i>Afrocarpus falcatus</i>	500
<i>Bartholina etheliae</i>	516
<i>Clivia gardenii</i>	800
<i>Curtisia dentata</i>	1024
<i>Cyrtanthus carneus</i>	1032
<i>Dioscorea sylvatica</i>	1081
<i>Diosma passerinoides</i>	
<i>Disa arida</i>	
<i>Disa schlechteriana</i>	
<i>Disa spathulata</i>	
<i>Erica glandulosa</i> subsp. <i>fourcadei</i>	
<i>Erica unicolor</i> subsp. <i>georgensis</i>	
<i>Erica unicolor</i> subsp. <i>mutica</i>	
<i>Euchaetis albertiniana</i>	
<i>Eulophia barbata</i>	
<i>Faurea macnaughtonii</i>	
<i>Geissorhiza outeniquensis</i>	
<i>Gladiolus geardii</i>	
<i>Gladiolus semipervirens</i>	
<i>Haworthia outeniquensis</i>	
<i>Lampranthus pauciflorus</i>	
<i>Leucospermum glabrum</i>	
<i>Leucospermum praecox</i>	
<i>Nemesia elata</i>	
<i>Ocotea bullata</i>	
<i>Prunus africana</i>	
<i>Podocarpus latifolius</i>	

5. FIELD ASSESSMENT RESULTS

This section serves as a description of vegetation patterns and taxa that were found on the site, as were determined in the field survey of the site. The results from the field assessment are combined with a desktop mapping of historical aerial imagery. The information presented aims to establish any patterns of disturbance for the site, and to identify sensitive areas.

Most of the site's vegetation is of a very poor quality, with heavy invasions by Invasive Alien Plants (IAPs), most notably, *Acacia mearnsii* (black wattle). In large portions of the site, the vegetation was dominated by a mixture of IAPs, exotic and indigenous weeds, and graminoids. No SCC were found during the site visit. In total, over 100 plant species were recorded on the site. Over a quarter of all species recorded are not indigenous, including at least 11 NEMBA listed IAPs.

5.1 General observations

The site includes the WWTW and a dumping site for George. These areas are excluded from this mixed development application. Illegal dumping of household waste was observed in various locations on the site. Most notably, an illegal dump was found in the south, adjacent to squatters on the site, as illustrated in the photo on the right in Fig. 15. Dumps like these can cause harm to local flora and wider environment. Although the squatter area and associated illegal dump is not within the mixed development footprint, it is an important feature to be aware of in the landscape.



Figure 15: Some of the illegal dumping of household waste seen on Erf RE/464.

Right next to the dump adjacent to the squatters, a quarry and dam was observed (Figure 16), which are two areas that may merit further investigation. Both the quarry and dam are surrounded by a vast black wattle (*Acacia mearnsii*) forest. The Gwaing River flows to the north of the dam.



Figure 16: The quarry and dam seen nearby the squatters in the southwestern section of Erf RE/464.

The majority of the Erf/464 section in question is currently used as livestock grazing grounds by people living on the premises (Fig. 17). Some cows were also observed grazing along the edge of a residential area in the northern section of the site (near the George show grounds), with scattered household waste. There is some evidence that fields on the site are periodically irrigated.

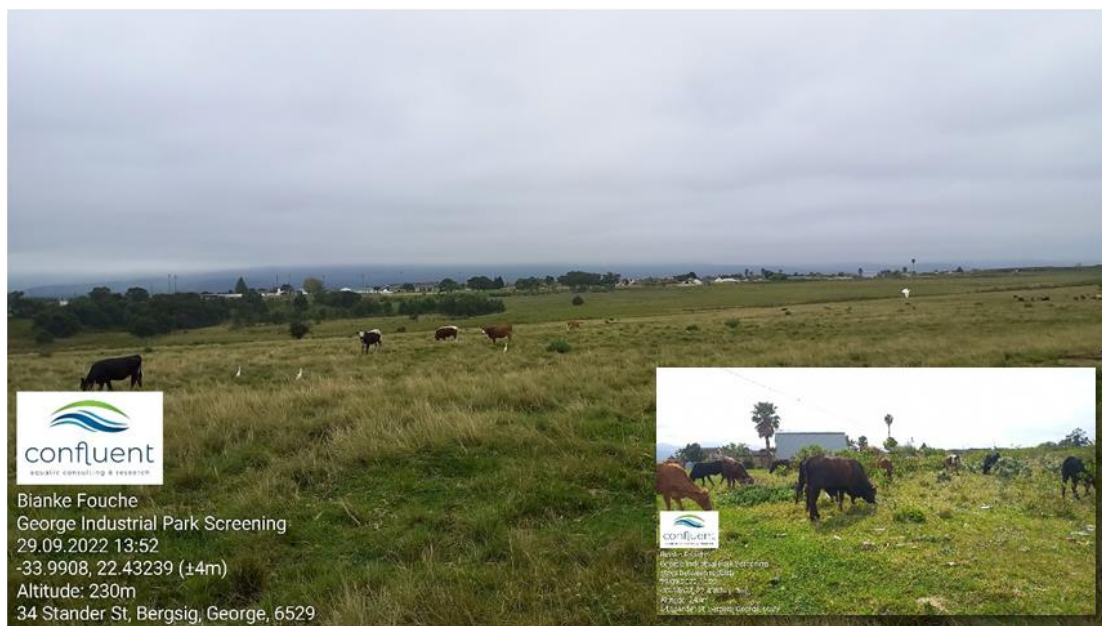


Figure 17: Images showing cows grazing on Erf RE/464. The smaller image is adjacent to the residential area near Groeneweid park.

George Radio Flyers are also found near the centre of Erf RE/464, and the George Sport Shooting Club is located in the north, next to the road that turns off from the R102 to the dump site and WWTP. Fig. 18 (produced in 2022) below illustrates the locations of these two clubs, as well as the location of the quarry, squatters, and dam as described in the previous section.

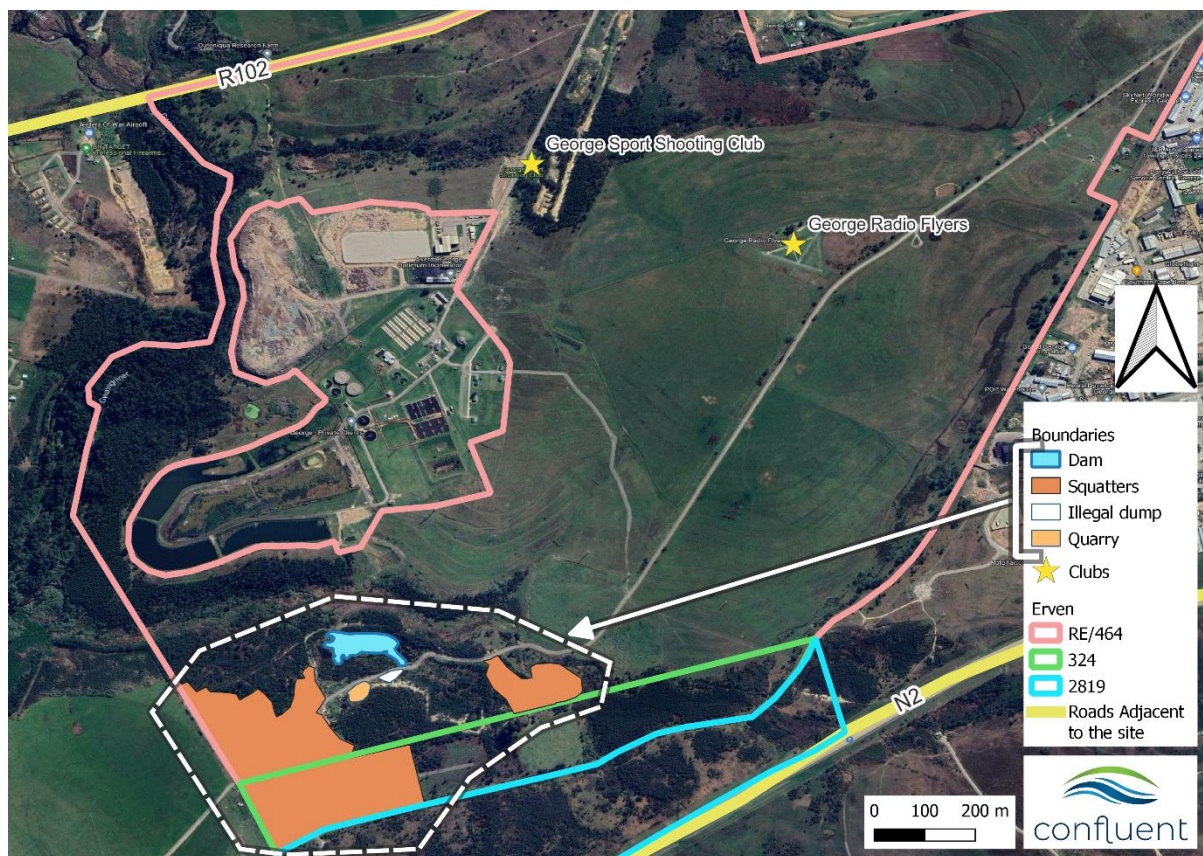


Figure 18: The George Radio Flyers and Sport Shooting Club, as well as location in the south of squatters, an illegal dump, quarry, and dam on Erf RE/464.

5.2 Vegetation identified.

The majority of the site is consistent with agricultural fields that are utilised mainly for grazing of livestock. The project area is illustrated in Fig. 19 as a black line around the defined vegetation on the site. The vegetation on the site is also split onto six broad groups, for the purposes of the discussion in this report. Note that not all the vegetation belonging to a group necessarily has the same ecological importance, consult the site ecological importance section of the report for more information.

- The first group are areas that are primarily invaded by black wattles (*Acacia mearnsii*).
- Group two is represented by fields utilised primarily for grazing livestock. Group two makes up the majority of the area on the site.
- Group three is a mixture of various kinds of disturbed, modified, and transformed vegetation on the site that can't be classified as grazing fields.
- Group four represents all the dams that have been identified.
- Group five represents the relatively small patch of Garden Route Granite Fynbos that is still present north of the George dump.
- Group six is represented by all drainage lines and wetland vegetation.

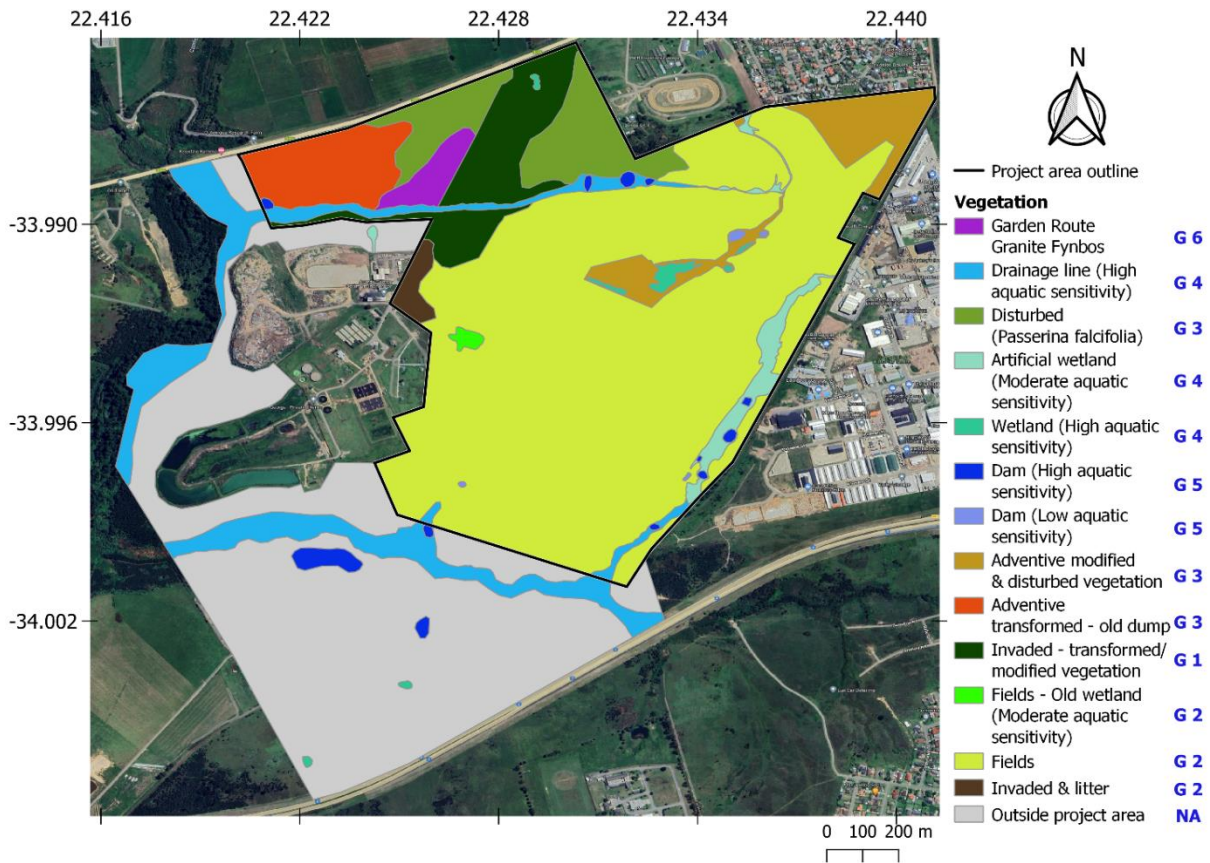


Figure 19: The refined vegetation map made following the specialist site visits. The blue G numbers represent the vegetation group a mapped legend entry belongs to.

5.2.1 Invasive Black Wattle Forests

Areas that are covered in stands of invasive *Acacia mearnsii* (black wattles) forests, as shown in Fig. 20, have very low plant species diversity. Only six species were noted for these forest stands, of which five are not indigenous (Table 5). *Solanum mauritianum* (bugweed) is also problematic on the site (Fig. 20), with stands of very tall plants in some areas. It is very unlikely that any SCC occur in the areas infested with IAPs.

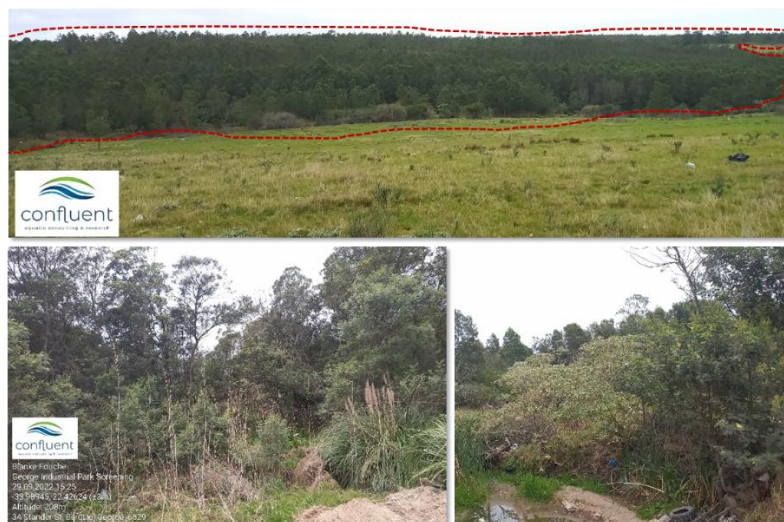


Figure 20: An alien forest (top image) dominated by black wattle, as well as IAPs like pampas grass, and bugweed.

Table 5: Species found within Zone 1, the invasive black wattle forests on the site. A grey status refers to non-indigenous species, orange to IAPs, and green to least concern (LC) species.

Species	Common name	Family	Status	Area*
<i>Bidens pilosa</i> L.	Hairy Beggarticks	Asteraceae	Not Indigenous, Naturalised (POSA)	1
<i>Acacia mearnsii</i> De Wild.	black wattle	Fabaceae	NEMBA Category 2	1, 2, 3, 4, 5,6
<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn.	Pampas Grass	Poaceae	NEMBA 1b	1, 3, 4, 5, 6
<i>Ehrharta erecta</i> Lam.	panic veldtgrass	Poaceae	LC	1, 3
<i>Solanum mauritianum</i> Scop.	bugweed	Solanaceae	NEMBA Category 1b	1, 2, 3, 4, 5
<i>Solanum nigrum</i> L.	black nightshade	Solanaceae	Not Indigenous, Naturalised (POSA)	1
<i>Halleria lucida</i>	African honeysuckle	Stilbaceae	LC	1, 3, 6

5.2.2 Fields for Grazing Livestock

In total, 38 species were recorded within fields and grazing areas on the proposed development site. Seven of these species are NEMBA listed IAPs, and eight are non-indigenous species. Some of the dominant species included grasses (Poaceae) like *Cenchrus clandestinus*, *Cynodon dactylon*, *Eragrostis capensis*, etc. (see Fig. 21). The most diverse family recorded for this zone was the Asteraceae, with eight plant species recorded. No SCC were found in these areas, and it seems very unlikely that an SCC would be found in grazing fields that are subject to frequent disturbance. A species list is illustrated in 6.



Figure 21: Two images showing a) livestock feeding troughs and b) the landfill incinerator (red circle) on the horizon from one of the fields on the site. Graminoids dominate these grazing field landscapes.

Table 6: Plant species recorded in Zone 2, i.e., the fields currently used to graze livestock. A grey status refers to non-indigenous species, yellow to invasive species not NEMBA listed, orange to IAPs, blue to unknown species, and green to least concern (LC) species.

Species	Common name	Family	Status	Area
<i>Arctotheca prostrata</i> (Salisb.) Britten	Prostrate Capeweed	Asteraceae	LC	2, 3
<i>Cirsium vulgare</i> (Savi) Ten.	Bull Thistle, Spear thistle, Scotch thistle	Asteraceae	NEMBA 1b	2, 5
<i>Helichrysum cymosum</i>	Fume everlasting	Asteraceae	LC	2, 3, 4, 5, 6
<i>Helichrysum foetidum</i> (L.) Moench	Stinking Everlasting	Asteraceae	LC	2, 3, 6
<i>Helminthotheca echioides</i> (L.) Holub	bristly oxtongue	Asteraceae	POSA invasive, not NEMBA listed	2, 3, 5
<i>Metalasia acuta</i> P.O.Karis	Pointy Blombush	Asteraceae	LC	2
<i>Nidorella ivifolia</i> (L.) J.C.Manning & Goldblatt	Ivy Vleiweed	Asteraceae	LC	2, 3, 5
<i>Senecio burchellii</i> DC.	Kill Ragwort	Asteraceae	LC	2
<i>Senecio ilicifolius</i> L.	Kowanna Ragwort	Asteraceae	LC	2, 3
<i>Raphanus raphanistrum</i> L.	Jointed Charlock	Brassicaceae	POSA invasive, not NEMBA listed	2
<i>Opuntia</i> sp.	Prickly Pears	Cactaceae	NEMBA 1b (most likely)	2
<i>Lobelia</i> sp.	Lobelias	Campanulaceae	LC	2, 3
<i>Wahlenbergia procumbens</i> (Thunb.) A.DC.	Creeping Capebell	Campanulaceae	LC	2, 3
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	Common Spikethorn	Celastraceae	LC	2
<i>Baeometra uniflora</i> (Jacq.) G.J.Lewis	Beetle Lily	Colchicaceae	LC	2, 5
<i>Cyperus thunbergii</i> Vahl	Giant Sedge	Cyperaceae	LC	2, 5
<i>Ficinia bulbosa</i> (L.) Nees	Bulbous Sedge	Cyperaceae	LC	2, 3, 5
<i>Trifolium repens</i> L.	white clover	Fabaceae	Not NEMBA Indigenous, Naturalised (POSA)	2
<i>Morella humilis</i> (Cham. & Schtdl.) Killick	Shy Waxberry	Myricaceae	LC	2, 3
<i>Fumaria muralis</i> Sond. ex W.D.J.Koch	common ramping-fumitory	Papaveraceae	POSA invasive, not NEMBA listed	2
<i>Plantago lanceolata</i> L.	ribwort plantain	Plantaginaceae	LC	2, 3
<i>Cenchrus clandestinus</i> (Hochst. Ex Chiov.) Morrone	Kikuyu Grass	Poaceae	NEMBA 1b in Protected Areas and wetlands in which it does not already occur. Not listed elsewhere.	2, 3, 5
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Poaceae	LC	2, 3
<i>Eragrostis capensis</i> (Thunb.) Trin.	Cape Love Grass	Poaceae	LC	2, 3
<i>Eragrostis</i> sp.	Lovegrasses	Poaceae	LC	2, 3
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	African bristlegrass	Poaceae	LC	2, 5
<i>Ranunculus multifidus</i> Forssk.	African buttercup	Ranunculaceae	LC	2
<i>Restio triteceus</i>	Wheat capereed	Restionaceae	LC	2, 3, 6
<i>Rubus</i> cf. <i>fruticosus</i> L. agg.	brambles	Rosaceae	NEMBA 2, The fruit of the European	2, 3

			blackberry is not NEMBA listed if used for human consumption.	
<i>Rubus rigidus</i> Sm.	White Bramble	Rosaceae	LC	2, 5
<i>Solanum linnaeanum</i> Hepper & Jaeger	devil's-apple	Solanaceae	LC	2
<i>Vicia tetrasperma</i> Moench	Smooth tare	Fabaceae	POSA invasive, not NEMBA listed	2, 5
<i>Oxalis corniculata</i> L.	Creeping Woodsorrel	Oxalidaceae	POSA invasive, not NEMBA listed	2, 5
<i>Rumex crispus</i> L.	curled dock	Polygonaceae	POSA invasive, not NEMBA listed	2, 5
<i>Datura stramonium</i> L.	jimsonweed	Solanaceae	NEMBA 1b	2, 3
<i>Urtica urens</i> L.	Dwarf Nettle	Urticaceae	POSA invasive, not NEMBA listed	2, 3

5.2.3 Disturbed, modified, or transformed vegetation

The disturbed areas included some fynbos elements, as well as species often associated with disturbed landscapes (e.g., *Pelargonium capitatum*, *Helichrysum spp*, *Nidorella ivifolia*, etc.). Fig. 22 below illustrates the two sub-types of disturbed vegetation on the site, namely low-growing disturbed fields, and densely covered areas of mostly *Passerina falcifolia*.



Figure 22: Disturbed vegetation on the development site. The left image depicts low-growing *Helichrysum* shrubbery, with grasses, *Arctotheca prostrata*, and *Senecio ilicifolius*. The image on the right shows other areas dominated by dense stands of *Passerina falcifolia*.

Across all the disturbed sites (as defined in Fig. 19), a total of 64 plant species were recorded. 42 species of the 64 are additional to the species already presented for zones one and two and are presented in Table 7 below. 36 species in Table 7 were only in disturbed areas on the Gwayang site. 13 non-indigenous species were recorded, of which 8 are NEMBA listed IAP species. The IAPs found in the disturbed areas were black wattles (*Acacia mearnsii*), pampas grass (*Cortaderia selloana*), kikuyu grass (*Cenchrus clandestinus*), bugweed (*Solanum mauritanicum*), brambles (*Rubus fruticosus*), jimsonweed (*Datura stramonium*), *Pinus pinaster*, and fishbone ferns (*Nephrolepis cordifolia*). No SCC were found in the disturbed areas.

Table 7: A plant species list for additional species recorded in the disturbed areas that were absent in zones 1 (black wattle forests) and 2 (grazing fields).

Species	Common name	Family	Status	Area
<i>Centella asiatica</i> (L.) Urb.	Gotu Cola	Apiaceae	LC	3
<i>Gomphocarpus physocarpus</i> E.Mey	balloonplant	Apocynaceae	LC	3
<i>Zantedeschia aethiopica</i> (L.) Spreng.	calla lily	Araceae	LC	3, 4, 5, 6
<i>Aloiampelos tenuior</i> (Haw.) Klopper & Gideon F.Sm.	Fence Aloe	Asphodelaceae	LC	3
<i>Bulbine frutescens</i> (L.) Willd.	Wild Kopieva, Rankkopieva	Asphodelaceae	LC	3
<i>Helichrysum odoratissimum</i> (L.) Sweet	Kooigoed Everlasting	Asteraceae	LC	3
<i>Helichrysum petiolare</i> Hilliard & B.L.Burt	Licorice plant	Asteraceae	LC	3
<i>Osteospermum moniliferum</i> L. subsp. <i>moniliferum</i>	Bietou	Asteraceae	LC	3
<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & B.L.Burt	Jersey Cudweed	Asteraceae	LC	3
<i>Monopsis simplex</i> (L.) E.Wimm.	Simple Oneye	Campanulaceae	LC	3
<i>Cerastium capense</i> Sond.	Cape Mouse-ear Chickweed	Caryophyllaceae	LC	3
<i>Falkia repens</i> Thunb.	Pink Ear	Convolvulaceae	LC	3
<i>Cyperus polystachyos</i> (Rottb.) P.Beauv. var. <i>polystachyos</i>	Bunchy flat-sedge	Cyperaceae	LC	3, 6
<i>Ficinia fascicularis</i> Nees		Cyperaceae	LC	3, 5
<i>Drosera cistiflora</i> L.	Poppy flowered dewplant	Droseraceae	LC	3
<i>Erica quadrangularis</i> Salisb.	Smoke Heath	Ericaceae	LC	3
<i>Lotus subbiflorus</i> Lag. subsp. <i>subbiflorus</i>	Hairy Bird's-foot-trefoil	Fabaceae	LC	3
<i>Otholobium stachyerum</i> (Eckl. & Zeyh.) C.H.Stirt.	Spike Dottypea	Fabaceae	LC	3
<i>Podalyria myrtillifolia</i> (Retz.) Willd.	Myrtle Capesweetpea	Fabaceae	LC	3
<i>Tephrosia capensis</i>	Cape hoarypea	Fabaceae	LC	3, 6
<i>Vicia sativa</i> L.	Common Vetch	Fabaceae	Not Indigenous, Naturalised (POSA)	3
<i>Pelargonium capitatum</i> (L.) L'Hér.	rose-scented geranium	Geraniaceae	LC	3
<i>Pelargonium x hybridum</i>	Hybrid geranium	Geraniaceae	LC	3
<i>Hypoxis hemerocallidea</i> L.f.	African Stargrass	Hypoxidaceae	LC	3, 6
<i>Aristea pusilla</i> (Thunb.) Ker Gawl.		Iridaceae	LC	3
<i>Ixia orientalis</i> L.Bolus	Eastern Kalossie	Iridaceae	LC	3
<i>Moraea lewisiae</i> (Goldblatt) Goldblatt subsp. <i>Lewisiae</i> cf. <i>secunda</i> (Goldblatt) Goldblatt	Ostrich Threadstar	Iridaceae	LC	3, 5
<i>Romulea flava</i> (Lam.) M.P.de Vos	Greenbract Froetang	Iridaceae	LC	3, 5
<i>Abutilon sonneratianum</i> (Cav.) Sweet	Butter and cheese	Malvaceae	LC	3
<i>Hibiscus trionum</i> L.	flower-of-an-hour	Malvaceae	Not Indigenous, Naturalised (POSA)	3

<i>Nephrolepis cordifolia</i> (L.) C. Prel	Fishbone Fern	Nephrolepidaceae	NEMBA 1b in Eastern Cape, KwaZulu-Natal, Mpumalanga, Limpopo and Western Cape.	3
<i>Oxalis purpurea</i> L.	Purple woodsorrels	Oxalidaceae	LC	3
<i>Pinus pinaster</i> Aiton	maritime pine	Pinaceae	NEMBA 1b (in this case)	3
<i>Panicum maximum</i> Jacq.	guinea grass	Poaceae	LC	3
<i>Rumex acetosella</i> (Murb.) Murb	Sheep's sorrel	Polygonaceae	Not listed (in this case)	3
<i>Lysimachia arvensis</i> (L.) U.Manns & Anderb. var. <i>caerulea</i> (L.) Turland & Bergmeier	Blue Scarlet Pimpernel	Primulaceae	POSA invasive, not NEMBA listed	3,5
<i>Cheilanthes viridis</i> (Forssk.) Sw	Green Cliff Brake	Pteridaceae	LC	3, 6
<i>Selago corymbosa</i> L.	Stiff Bitterbush	Scrophulariaceae	LC	3,6
<i>Passerina falcifolia</i> (Meisn.) C.H.Wright	Weeping Gonna	Thymelaeaceae	LC	3

*Carnivorous plant

5.2.4 Dam Areas and Wetlands



Figure 23: Images of wetlands within the proposed Gwayang development area. Top left: A wetland dominated by *Juncus kraussii*, and also including *Ficinia* spp., *Carex glomerabilis*, *Eleocharis limosa*, etc. Top right: A wetland dominated by *Typha capensis*. Bottom left: A smaller wetland on the site. Bottom right: a wetland with the invasive plant *Nasturtium officinale* in the foreground.

Eight additional species were recorded only in wetland and dam areas, as described in Fig. 23 and Table 8. The dominant species in all the wetlands on the site was *Juncus kraussii*, which made up over 90% of the plant cover for the wetlands. In total, 28 species were recorded in wetland areas, of which five are NEMBA listed IAPs, namely black wattles, pampas grass, bugweed, kikuyu grass, bull thistles (*Cirsium vulgare*), and watercress (*Nasturtium officinale*). Invasive species along watercourses and wetlands on the site are often mature plants that occurred at medium to high densities. The IAPs in wetland and dam areas requires a lot of mitigative attention on this site.

Table 8: A plant species list for additional species recorded in wetland and dam areas that were absent in the zones described above.

Species	Common name	Family	Status	Area
<i>Nasturtium officinale</i> R.Br.	watercress	Brassicaceae	NEMBA 2	4, 5
<i>Carex glomerabilis</i> Krecz.		Cyperaceae	LC	4, 5
<i>Eleocharis limosa</i> (Schrad.) Schult.	Finger Rush	Cyperaceae	LC	4, 5
<i>Isolepis prolifera</i> (Rottb.) R.Br.	Budding Club-Rush	Cyperaceae	LC	4, 5
<i>Juncus kraussii</i> Hochst.	Matting Rush	Juncaceae	LC	4, 5
<i>Restio tetragonus</i> Thunb.	Tetragonal Reed	Restionaceae	LC	4, 5, 6
<i>Cliffortia strobilifera</i> L.	Cone River Caperose	Rosaceae	LC	4, 5
<i>Typha capensis</i> (Rohrb.) N.E.Br.	Cape Bulrush	Typhaceae	LC	4, 5

5.2.5 Secondary Garden Route Granite Fynbos.



Figure 24: Relatively intact patch of Garden Route Granite Fynbos. The middle image is *Watsonia knysnana*. and on the right is *Erica gracilis*.

The screening report of 2022 revealed eight additional species were recorded only in the relatively intact Garden Route Granite Fynbos section (Fig. 19), just north of the landfill site (Table 9). The scoping site assessment of 2024 resulted in an additional 13 species was added to the original eight during the scoping assessment in March 2024. Fig. 24 above illustrates two of the species that were only seen in this area of Erf RE/464. Although no SCC were recorded during the field assessments, this is the most likely areas to have SCC of the whole site.

Table 9: A plant species list for additional species recorded in the relatively intact Garden Route Granite Fynbos. Species in this table were not recorded for the groups described above.

Species	Common name	Family	Status	Area
<i>Anthospermum aethiopicum</i>	Tall flowerseed		LC	
<i>Aspalathus angustifolia</i>	Spearleaf capegorse		LC	6
<i>Aspalathus opaca</i>			LC	
<i>Bobartia aphylla</i>	Garden Route rushiris		LC	6
<i>Dierama pendulum</i>	Fairy wand		LC	6
<i>Erica peltata</i>	Shield heath		LC	6
<i>Psoralea stachyera</i>			LC	
<i>Seriphium plumosum</i>	Bankrupt bush		LC	6
<i>Watsonia pillansii</i>	Orange watsonia		LC	6
<i>Foeniculum vulgare</i>	Fennel	Apiaceae	Naturalised exotic	6
<i>Athanasia dentata</i> (L.) L.	Tooth Kanniedood	Asteraceae	LC	6
<i>Erica cerinthroides</i>	Fire heath	Ericaceae	LC	6
<i>Erica gracilis</i> J.C.Wendl.	Graceful Heath	Ericaceae	LC	6
<i>Dietes grandiflora</i> N.E.Br.	Large Fortnight Lily	Iridaceae	LC	6
<i>Hesperantha falcata</i> (L.f.) Ker Gawl.	Sickle Eveninglily	Iridaceae	LC	6
<i>Watsonia knysnana</i> (L.Bolus) L.Bolus	Pink Gardenroute Watsonia	Iridaceae	LC	6
<i>Hermannia flammea</i> Jacq.	Dollroses	Malvaceae	LC	6
<i>Themeda triandra</i>	Kangaroo grass	Poaceae	LC	6
<i>Leucadendron salignum</i> P.J.Bergius	Common Sunshine Conebush	Proteaceae	LC	6
<i>Solanum laciniatum</i>	Kangaroo apple	Solanaceae	Naturalised exotic	6

5.3 Probability of SCC occurrence

All SCC that may be present on the site have been identified using the screening tool report for the site, iNaturalist nearby observations, the POSA database, and specialist inclusions (Table 10). No plant SCC were confirmed anywhere on the proposed mixed development site. None of the flagged SCC are likely to occur on the site. There is a slightly higher chance that one or two of the listed SCC might still persist north of the dump in the remaining Garden Route Granite Fynbos patch there.

Table 10: A list of all the SCC that have been highlighted on the site and their individual probability of occurrence interpretation within the specific context of the proposed project area.

Family	Species of conservation concern	Common name	Growth form	Status	Likelihood of occurrence
AIZOACEAE	<i>Lampranthus pauciflorus</i>	Beach brightfig	Succulent	Endangered B1ab(ii,iii,iv,v)	Low There is a very slight possibility this species might occur in the fynbos patch that remains north of the George dump.
ERICACEAE	<i>Erica unicolor</i> subsp. <i>georgensis</i>	George two-onecolour heath	Shrub	Rare	Low Past & ongoing disturbance and incorrect habitat.
IRIDACEAE	<i>Gladiolus sempervirens</i>		Geophyte	Rare	Low Past & ongoing disturbance and incorrect habitat.
NA	Sensitive species 1081	NA	NA	Endangered B1ab(i,ii,iii,iv,v)	Low Past & ongoing disturbance. The only place this species might conceivably occur is in the small fynbos patch north of the dump, but this is not likely.
NA	Sensitive species 800	NA	NA	Vulnerable B1ab(iii)	Low Past & ongoing disturbance. The only place this species might conceivably occur is in the small fynbos patch north of the dump, but this is not likely.
PODOCARPACEAE	<i>Afrocarpus falcatus</i>	Outeniqua yellowwood	Tree	Protected tree no. 16	Low The site is too invaded and there are no planted trees of this species
PODOCARPACEAE	<i>Podocarpus latifolius</i>	True yellowwood	Tree	Protected tree no. 17	Low The site is too invaded and there are no planted trees of this species.

PROTEACEAE	<i>Leucospermum glabrum</i>	Outeniqua pincushion	Shrub	Endangered B1ab(iii,v)c(iv)+ 2ab(iii,v)c(iv); C2a(i)	Low No members of the Proteaceae survive on the site, apart from the small fynbos section north of the dump. There is a very slight possibility it might occur in the fynbos patch that remains north of the George dump.
AMARYLLIDACEAE	<i>Clivia gardenii</i>	Boslelie	Geophyte	Vulnerable A2abcd; B1ab(ii,iv,v)	Very low Habitat incorrect
AMARYLLIDACEAE	<i>Cyrtanthus carneus</i>	Droopy firelily	Geophyte	Vulnerable A2c; B1ab(iii,v); C1	Very low No habitat
ASPHODELACEAE	<i>Haworthia outeniquensis</i>	Outeniqua haworthia	Succulent	Vulnerable B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)	Very low Habitat incorrect.
CURTISIACEAE	<i>Curtisia dentata</i>	Assegai tree	Tree	Protected tree 570; Near Threatened A2d	Very low The site is too invaded, and this species is not commonly planted
DIOSCORACEAE	<i>Dioscorea sylvatica</i>	Forest elephantsfoot	Geophyte	Vulnerable A2cd	Very low No habitat
ERICACEAE	<i>Erica glandulosa</i> subsp. <i>fourcadei</i>	Ridges glandular heath	Shrub	Vulnerable B1ab(ii,iii,iv,v)	Very low Habitat incorrect
ERICACEAE	<i>Erica stylaris</i>	Heaths	Shrub	Vulnerable B1ab(iii)+2ab(iii)	Very low Habitat incorrect
ERICACEAE	<i>Erica unicolor</i> subsp. <i>mutica</i>	Two-onecolour heath	Shrub	Endangered B1ab(ii,iii,v)	Very low Habitat incorrect.
IRIDACEAE	<i>Geissorhiza outeniquensis</i>	Eastern satin	Geophyte	Near Threatened D2	Very Low Habitat incorrect.
IRIDACEAE	<i>Gladiolus geardii</i>	Gladiolus species	Geophyte	Near Threatened B1ab(iii)+2ab(iii)	Very low Habitat incorrect.
LAURACEAE	<i>Ocotea bullata</i>	Stinkwood	Tree	Protected tree 118; Endangered A2bd	Very low The site is too invaded, and this species is not commonly planted.
NA	Sensitive species 1024	NA	NA	Endangered B1ab(iii,v)+ 2ab(iii,v); C2a(ii)	Very Low Past & ongoing disturbance and incorrect habitat.
NA	Sensitive species 1032	NA	NA	Vulnerable C2a(i)	Very Low Past & ongoing disturbance and incorrect habitat.
NA	Sensitive species 500	NA	Na	Endangered C2a(i)	Very Low Past & ongoing disturbance and incorrect habitat.

NA	Sensitive species 516	NA	Na	Endangered A2cd+4cd; B1ab(i,ii,iii,iv,v)+ 2ab(i,ii,iii,iv,v)	Very Low Incorrect habitat
OCHIDACEAE	<i>Bartholina etheliae</i>	Club spider orchid	Geophyte	Global IUCN: Vulnerable D2; SANBI regional listing: LC	Very low Past & ongoing disturbance and incorrect habitat.
ORCHIDACEAE	<i>Acrolophia lunata</i>	Pale Cinderella Orchid	Geophyte	Endangered B1ab(ii,iii,v); D	Very low Habitat incorrect.
ORCHIDACEAE	<i>Disa arida</i>	Kleinkaroo disa	Geophyte	Endangered C2a(i)	Very low Habitat incorrect
ORCHIDACEAE	<i>Disa schlechteriana</i>	Spur disa	Geophyte	Vulnerable D2	Very low Habitat incorrect
ORCHIDACEAE	<i>Disa spathulata</i>	Begging hand orchid	Geophyte	Endangered C1+2a(i)	Very low Habitat incorrect
PROTEACEAE	<i>Faurea macnaughtonii</i>	Beukeboom	Tree	Rare	Very Low The site is too invaded and this species is not commonly planted.
PROTEACEAE	<i>Leucospermum praecox</i>	Mossel Bay pincushion	Shrub	Vulnerable A2c+3c+4c	Very Low Habitat incorrect.
ROSACEAE	<i>Prunus africana</i>	Red stinkwood	Tree	Protected tree 147; Vulnerable A4acd; C1+2a(i)	Very low The site is too invaded and this species is not commonly planted.
RUTACEAE	<i>Diosma passerinoides</i>	Silcrete bitterbuchu	Shub	Vulnerable A2c; C2a(i)	Very low Habitat incorrect
RUTACEAE	<i>Euchaetis albertiniana</i>	Albertinia beardbuchu	Shrub	Endangered A2c	Very low Habitat incorrect.
SCROPHULARIACEAE	<i>Nemesia elata</i>	Lionfaces	Herbaceous perennial	Vulnerable B1ab(iii,v)+ 2ab(iii,v)	Very Low Habitat incorrect

6. SITE ECOLOGICAL IMPORTANCE (SEI)

6.1 SEI assessment

The Gwayang development area is located in the southwest of George, and covers sections of CBA1, CBA2 and ESA 2. There is a small patch of relatively intact Garden Route Granite Fynbos in the northwest of the site (Fig. 19) Only a small section of relatively intact and graminoid dominated Garden Route Granite Fynbos remains just north of the WWTW. Most of the vegetation on the site is no longer in a natural state. No SCC or rare species were recorded on the site, but several IAPs were recorded throughout all habitat land cover “zones” identified on the site during the field assessment. Mitigation measures for the SEI of different habitats on the site (Table 11) are provided in Table 12. Methods for determining SEI are presented in Appendix 1.

Table 11: The evaluation of Site Ecological Importance (SEI) for various vegetation habitats present on the site (Erven RE/464, 324, and 2819). BI = biodiversity importance, and RR = receptor resilience.

Habitat	Conservation Importance	Functional Integrity	Receptor Resilience	Site Ecological Importance
Fields (including the old wetland area)	Very Low No natural habitat remaining, and highly unlikely populations of SCC or range-restricted species.	Low Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.	High Species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring. Most species will remain even if irrigation is removed.	Very Low BI = Very Low RR = High
Adventive modified & disturbed vegetation; Adventive transformed – old dump; Invaded – transformed / modified vegetation; Dam (low)	Low Limited potential to support SCC or range restricted species, with no confirmed populations from the site visit.	Low Almost no habitat connectivity, with cows frequently grazing in these patches but migrations still possible across some modified or degraded natural habitat. Several minor and major ecological impacts.	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality. Species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Low BI = Low RR = Medium
Artificial wetland (Moderate) Dam (High) Disturbed (<i>Passerina falcifolia</i>) Wetland (High)	Medium Conceivable future potential to support SCC or range restricted, with no confirmed populations from the site assessments.	Medium Only narrow corridors of good habitat connectivity	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality. Species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Medium BI = Medium FI = Medium
Garden Route Granite Fynbos	Very High CR ecosystem type (Cape Lowland Alluvial Vegetation)	Low Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.	Low Species that have a low likelihood of remaining at a site when a disturbance or impact is occurring, and species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High BI = Medium RR = Low

An alternative development footprint to the previous draft layout needs to be identified according to the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (Government Gazette 43110 20 March 2020). This footprint should have a “low” sensitivity, as identified by the screening tool, and verified through the site assessment.

Table 12: Mitigation guidelines for interpreting the SEI in the context of botanical and terrestrial themes for the proposed development activities.

Site Ecological Importance	Recommended mitigation measures
High	Avoidance mitigation wherever possible. Minimisation mitigation, so that changes to the project design are made to limit the amount of habitat impacted. Limited, low impact development activities acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation, where development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation, where development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation, where development activities of medium to high impact acceptable and restoration activities may not be required.

Most of the area for the site is classified as **Very Low or Low SEI** (Zones 1,2 and 3), with some vegetation of the Gwaing River, wetlands, and dams (Zones 4 & 5) having a **Medium SEI** (Fig. 25). The remaining patch of Garden Route Granite Fynbos (Zone 6) has a **High SEI**. Developments must not destroy the remaining patch of Garden Route Granite Fynbos on the site, and this area should be avoided if possible.

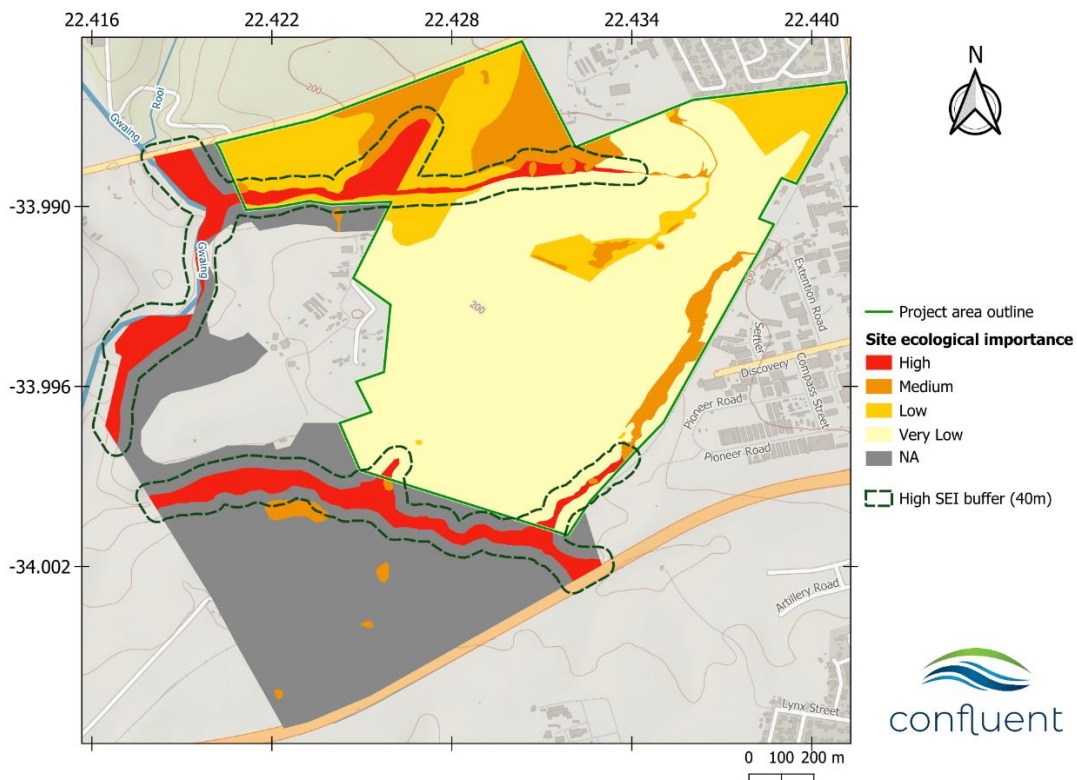


Figure 25: Site Ecological Importance (SEI) for the proposed Gwayang development area.

7. SENSITIVITY VERIFICATION

The screening tool identified medium plant sensitivity for portions of the site and identified the terrestrial sensitivity for the whole site as having a very high sensitivity.

7.1 Terrestrial Biodiversity

Taking the BSP priority areas (CBAs and ESAs), and SEI into consideration, the terrestrial theme **sensitivity is low for most of the site**, apart from the graminoid dominated patch of Garden Route Granite Fynbos, and other areas with a Medium and High SEI rating which all have a **very high terrestrial biodiversity sensitivity**. The Gwaing River alluvial vegetation is currently under major threat from IAPs, especially black wattles, even though most of these habitats on the site are part of CBA 1 and 2 categories. It is imperative that IAPs be removed and that a long-term IAP monitoring plan be in place for the areas that are to remain as open space on the site.

7.2 Botanical diversity

The botanical theme sensitivity is confirmed to be **Low** for the site apart from the section of remaining Garden Route Granite Fynbos which has a **High** plant species theme sensitivity. Although no SCC were recorded on the site during the field survey, many SCC have been recorded nearby, and the small section of Garden Route Granite Fynbos may be a future habitat for SCC.

8. COMBINED ENVIRONMENTAL SENSITIVITY / SEI AND CONFLICT AREAS

The animal species theme report for the Gwayang development included an animal theme SEI map, and the aquatic report included an aquatic sensitivity map. These maps were combined with the SEI map presented in Fig. 25 to produce the combined sensitivity and SEI map for the proposed Gwayang development (Fig. 26). This combined map was then used to highlight the most sensitive areas within the proposed development area, and the layers contained within formed the basis for discussions that led to the latest alternative site layout plan that had been produced after the preferred layout plan.

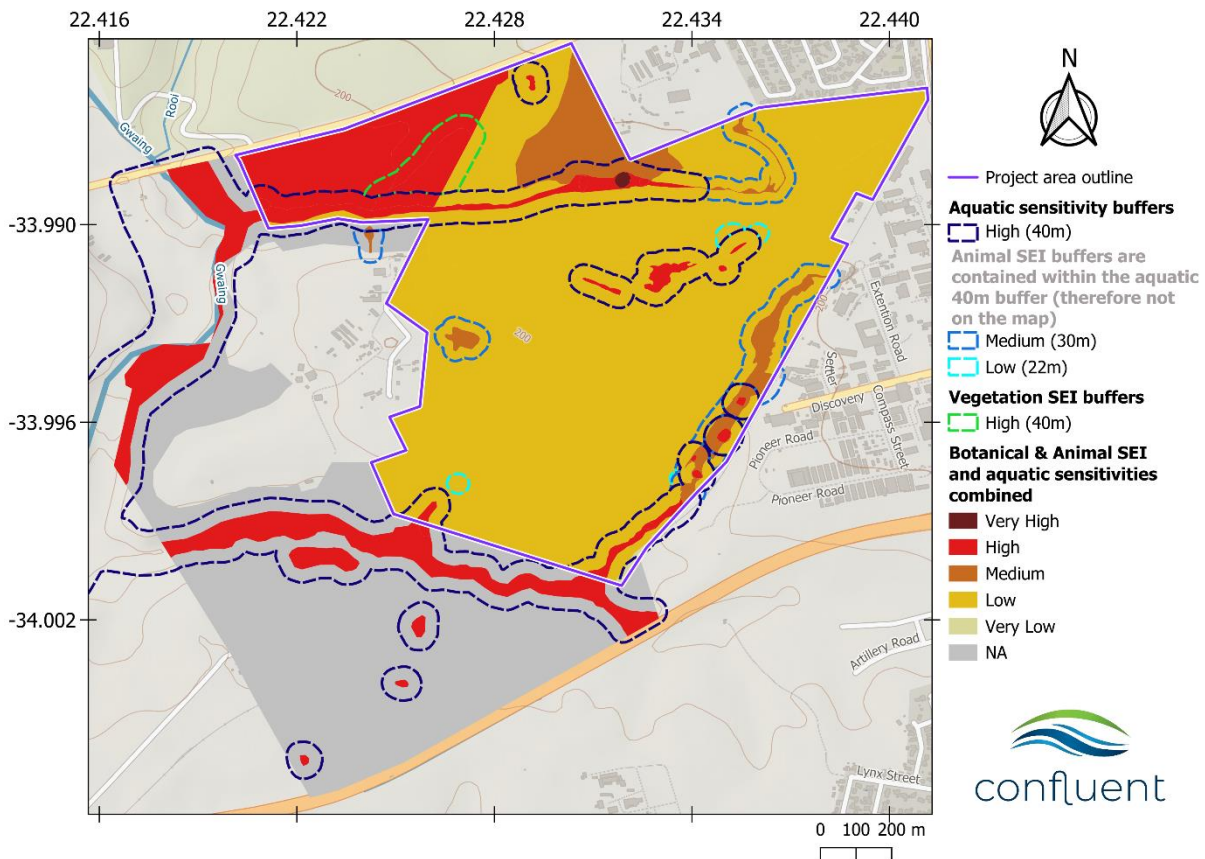


Figure 26: Combined SEI and sensitivity map for the terrestrial biodiversity, plant species, animal species, and aquatic themes for the proposed Gwayang development area. The combined map presents the highest SEI and sensitivity category assigned for different areas of the site across all the themes that have been incorporated.

9. INDENTIFICATION OF POTENTIAL IMPACTS & RECOMMENDATIONS

9.1 Existing impacts & disturbances

9.1.1 *Habitat loss and degradation due to IAP monocultures*

The IAP forests on the site, as well as heavy infestations in wetland areas is cause for concern on the site. IAP stands reduce the biodiversity of the site and are a safety risk to anyone who visits the site. The majority of the black wattle tree stands occur within CBA 1, 2 and ESA 2 areas as defined by the BSP.

- ✓ Effort to properly cut down and eradicate the numerous invasive species present on the site must be undertaken in areas that are earmarked for the open space 1 development zone.
- ✓ In all cleared areas, species endemic to the area needs to be planted to reduce bare soil exposed on the site.
- ✓ Stacks of cleared woody IAP material must be piled away from the natural open space and burned.

9.1.2 *Grazing & mowing disturbances*

Cows grazing and the maintenance of pasture fields on the site negatively affects the floral diversity of the site and allows for the introduction and thriving of numerous IAPs, such as kikuyu grass. Fields currently used for grazing seem to have been disturbed since at least the 1950s.

9.1.3 *Existing roads, infrastructure, squatters, and dumps*

Roads on the site are dirt roads. Negative edge effects are always associated with road edges. The power lines on the site (Fig. 27) need to be taken into consideration when the new development plan is set up, to reduce the development impact on them. Squatters, dumps, and the quarry on the site reduce the amount of habitat and can result in pollution in the form of harmful chemicals, nutrients, and increased siltation. Fence wires, an open drain, and various safety hazards were also found on the site (Fig. 27). All of these hazards present a negative impact for animals and humans alike.

- ✓ The relocation of squatters to new housing facilities must be considered and taken seriously to safeguard the proposed open space network of the proposed development.
- ✓ All illegal activities relating to waste dumps, and the quarry need to be identified, stopped, and mitigated as soon as possible.
- ✓ Waste on the site needs to be cleared and properly disposed of.



Figure 27: Left - an image of the power lines on the site, and the disturbed habitat below. Right – a hazardous open drain on the site

9.1.4 Soil erosion & poor water quality

Erosion of channels along the eastern boundary of the site was observed (Fig. 28). Mitigation measures for this impact is outlined in the Aquatic screening report. Steep and eroded channel sides reduce the quality of habitats.



Figure 28: Left – Erosion around a cement weir. Right – steep eroded channel sides, with a black wattle tree standing on the bank.

9.2 Layout and design phase

The layout and design of the Gwayang development has been guided by the screening and scoping process that has been undertaken by various environmental specialists. Conflict areas based on the sensitive area identified were mostly restricted to some of the linear activities proposed for the Gwayang development where they cross sensitive habitat and watercourses (Fig. 29, as taken from the aquatic specialist report by Dr. Jackie Dabrowski). The reasons for the seven conflict areas depicted in Fig. 29 is presented in the aquatic specialist scoping and sensitivity verification report by Dr. Jackie Dabrowski. Under the preferred SDP, conflict areas one to seven will result in negative terrestrial and botanical ecological impacts on the site, however under the alternative SDP, only conflict areas one and seven will still result in some unavoidable impacts (top vs. bottom maps in Fig. 29).

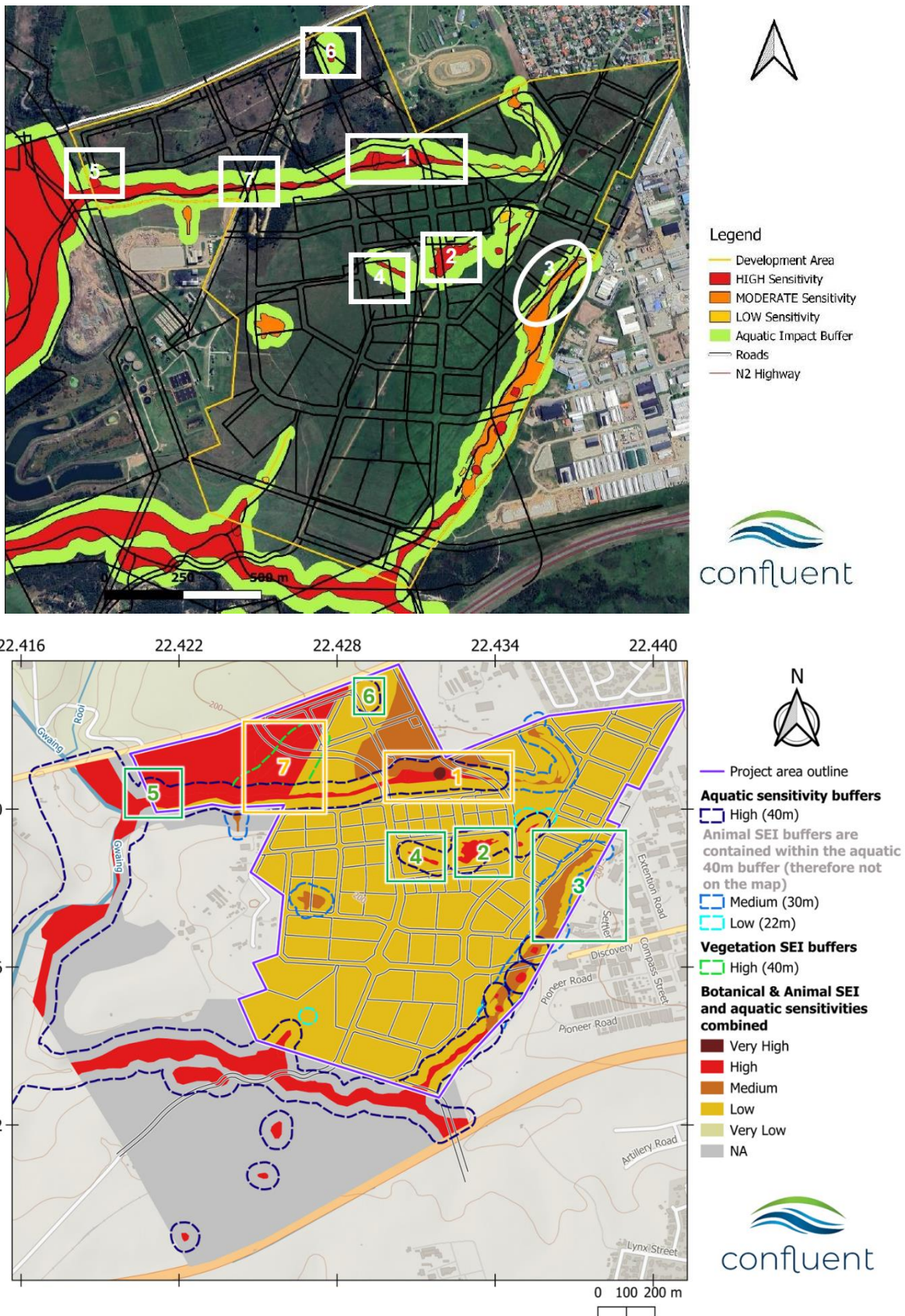


Figure 29: Maps indicating seven conflict areas identified within the preferred SDP (top map). Only aquatic sensitivities are illustrated in the top map, while the bottom map with the alternative SDP overlaid on the combined SEI map, with the conflict areas highlighted in green (impact largely avoided) and yellow (some impacts anticipated).

Some mitigation measures proposed for conflict areas one and seven under the alternative SDP, and all conflict areas under the proposed SDP are:

1. Where possible, divert roads away from conflict areas that intersect sensitive areas. This mitigation measure has been considered in the alternative SDP, which was produced after the preferred SDP. Only in conflict areas one and seven could road impacts not be entirely avoided in the alternative SDP.
2. Remove or reshape erven that cover large areas of sensitive features and their associated buffers. This mitigation measure has been considered in the alternative SDP, which was produced after the preferred SDP.
3. Development above the landfill site (where conflict area seven is located) in the fynbos vegetation identified must be kept minimal and avoided due to the sensitivity of the habitat there. The alternative SDP addressed this concern by minimizing habitat loss in this area, which would mostly be transformed within the preferred SDP.

9.3 Construction phase

The construction phase of the Gwayang mixed-use development will require an impact assessment for some of the flora and ecosystems that still persist on the site. A Construction Phase Environmental Management Programme (CEMP) must be compiled, and its implementation enforced during the construction phase. Some key impact categories associated with the construction phase that will need to be assessed in the Environmental Impacts Assessment (EIA) report include:

- An assessment of the effect of vegetation clearance required for the proposed development, especially within areas identified as High and Medium SEI. The rehabilitation of vegetation in disturbance envelopes must be included in the mitigation measures in the impact assessment report.
- An assessment of impacts associated with soil erosion, dust and compaction on the site that affect the habitats, resilience, and restorability of the site.
- An impact assessment section for the control and prevention of introduction of invasive plant species will need to be included. The project will require an Alien management and eradication plan that includes instruction for the construction phase.
- Buffer areas identified in this project can be used as green buffer zones around the construction site to minimise impacts on surrounding plant communities, especially in areas with a higher SEI value.

9.4 Operational phase

The operational phase of the Gwayang mixed-use development will result in long-term impacts that will affect the flora and biodiversity of the Gwayang area and open space network incorporated in the preferred and alternative SDPs. Depending on the extent to which mitigation will be implemented, including long term implementation, negative operational phase impacts would likely result in low to moderate significance. The associated impact assessment for the operational phase of the project should take the following potential impacts into consideration:

- The effect of landscaping and maintenance of constructed spaces within the proposed development area. The assessment will focus on the use of native plant species to

enhance local biodiversity and reduce water consumption. Maintenance practices, such as pruning, fertilization, and pest control, will be evaluated for their potential impacts on plant health and surrounding ecosystems.

- Water management, although typically an aquatic impact, is also an important botanical impact that needs to be considered. Sustainable drainage systems (SuDS) measures, as outlined on the aquatic specialist report by Dr. Jackei Dabrowski, need to be implemented during the construction & operational phase in order to promote sustainable water management and ecosystem health.
- Invasive alien plant control must be assessed in the operational phase, and again, the site will require an Alien management and eradication plan that includes specific actions and management guidelines for the operational phase.

9.5 Cumulative impacts

Urban expansion is a large impact in George and surrounding towns in the Garden Route. Continued development expansion will continue to fragment Red Listed ecosystems and flora where ecosystems and populations are already under strain and at risk of collapse. Remaining vegetation on the Gwayang development site have all been subject to past disturbance and transformation, and the vegetation on the site is already quite fragmented, and development here should not significantly increase cumulative negative impacts on Garden Route Granite Fynbos or nearby SCC. The effective implementation of the mitigation hierarchy, including impact mitigation measures will result in minimal to negligible terrestrial biodiversity and botanical cumulative impacts.

9.6 No-go areas

All areas identified as areas with a high ecological importance are not to be included in the development plan, and where development cannot be avoided (some linear activities), minimisation and mitigation measures must be applied. Each of the proposed development zones will also come with a unique set of impacts and challenges, depending on the businesses and industry that will be included. For the industrial zone three, at least a 40 m buffer away from any no-go area needs to be implemented to preserve the ecosystem processes and species that occur there. For less impactful activities, a buffer of a minimum distance of 22m needs to be implemented between the development and the no-go area. Buffer areas have been provided in the SEI map, and these are based on the sensitivity of the vegetation and habitats that have been identified there in the aquatic report and this assessment.

10. CONCLUSIONS

The development plan for the Gwayang industrial development is currently under review and has been updated since screening feedback provided in 2022 and again during the scoping phase in 2024. The revised SDP should consider the effect of habitat fragmentation on open spaces proposed, especially where the SDP bisects sensitive areas with main roads.

10.1 Requirements for the Environmental Impact Assessment (EIA) phase

An alien management and eradication plan needs to be in place for the areas designated as the open space 1 zone. The small remaining section of graminoid dominated Garden Route Granite Fynbos is a sensitive habitat that needs to be preserved in order to avoid possible offset requirements during the lifetime of the project. In the impact assessment of the EIA, the details of equipment and structures proposed must be provided, as all mitigation measures must be achievable and relevant for the area where they will be implemented. The extent to which the mitigation measures will reduce impacts must also be included in the discussion.

10.2 Ecological need and desirability

Mixed-use developments in George are increasingly necessary to support the rapid growth and sustainability of the town. George is known for its scenic beauty in the Garden Route, and currently is attracting significant numbers of people that exacerbate the town's need for urban development, especially since there is currently a short supply of commercial / industrial zones. Mixed-use developments, like the proposed Gwayang development, are useful tools to somewhat reduce the effects of urban sprawl and integrate residential, commercial, and recreational spaces if implemented well with conscious effort to improve the environment and maintain and uphold mitigation measures over the long-term.

11. REFERENCES

- Browning C, Macey RH. 2015 Lithostratigraphy of the George pluton units (Cape Granite Suite), South Africa. *South African J. Geol.* 118, 323–330. (doi:10.2113/gssajg.118.3.323)
- Brownlie, S. (2005). Guideline for involving biodiversity specialists in EIA processes. In *Solutions*.
- CapeNature. (2017). An overview of the Western Cape Biodiversity Spatial Plan. https://www.capenature.co.za/wp-content/uploads/2019/10/A-Summary-Overview-of-the-Biodiversity-Spatial-Plan_web.pdf
- CapeNature. 2017 An overview of the Western Cape Biodiversity Spatial Plan</i>. https://www.capenature.co.za/wp-content/uploads/2019/10/A-Summary-Overview-of-the-Biodiversity-Spatial-Plan_web.pdf</div>
- Claassen DPE. 2004 Provincial Zoning Scheme Model By-Law Prepared By: Planning Partners in Association With Du Plessis and Hofmeyr Attorneys.
- Drews, B.K. 1980b. Report on conservation worthy areas of fynbos in the George guide-plan area. Report, Botanical Research Institute, Pretoria.
- Groenewald L, Planner SS, Municipality G, Report OS, Gelderbloem D. 2022 ToR Gwayang Industrial: Layout Review, Outline Services Report and TIA.
- Hoare, D.B., Victor, J.E., Lubke, R.A. & Mucina, L. 2000. Vegetation of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 87-96.
- Kleynhans C. 2021 George Airport North Eastern Precinct Transport Study.
- Mucina L, Rutherford MC. 2006 The vegetation of South Africa, Lesotho, and Swaziland.
- Mucina, L. And Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho, and Swaziland: an illustrated guide. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria. Online, <http://bgis.sanbi.org/SpatialDataset/Detail/18>, Version 2018
- National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria
- National Environmental Management Act, 1998 (Act No. 107 of 1998): Procedures for assessment and minimum criteria for reporting on identified environmental themes when applying for environmental authorisation, Government Gazette of South Africa (2020).
- National Environmental Management: Biodiversity Act (10 of 2004): National list or ecosystems that are threatened and in need of protection, (2011).
- NEMA: Alien and Invasive Species Lists, (2020).
- NEMA: Alien and Invasive Species Regulations, (2020). www.gpwonline.co.za
- Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, (2020).

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria.

Skowno AL et al. 2019 National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries.

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.

Summary of listed ecosystems by province. (n.d.).

Victor JE, Hoare DB, Lubke RA. 2000 Checklist of plant species of the coastal fynbos and rocky headlands, south of George, South Africa. *Bothalia*. 30, 97–101. (doi:10.4102/abc.v30i1.544)

Vlok, J.H.J. & de Villiers, M.E. 2007. Vegetation map for the Riversdale domain. Unpublished 1:50 000 maps and report supported by CAPE FSP task team and CapeNature.

Western Cape Governemnt. (n.d.). Invasive Species Programme | SANBI. <http://www.sanbi.org/biodiversity-science/state-biodiversity/biodiversity-monitoring-assessment/invasive-aliens-early-det>

APPENDIX 1: SITE ECOLOGICAL IMPORTANCE (SEI) METHODS

The site ecological importance (SEI) assessment is a function of biodiversity importance (BI) and receptor resilience (RR), which is defined as:

“The intrinsic capacity of the receptor (i.e., habitat type in question) to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.”

The function is as follows: $SEI = BI + RR$. BI is a function of conservation importance (CI) and habitat functional integrity (FI), so that $BI = CI + FI$. The definition of CI given by the Species Environmental Assessment Guideline of 2022 is:

“The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.”

Most features included in CI are provided by the screening tool but needs to be evaluated at a finer scale from the field work assessment. FI is defined as:

“A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.”

The criteria for defining RR, CI and FI are provided in the Species Environmental Assessment Guidelines of 2022. BI can be derived from a simple matrix of CI and FI, as illustrated in Table 13.

Table 13: The matrix that defines the biodiversity importance (BI) of a given habitat type, as identified from a desktop and field assessment.

Biodiversity Importance		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

SEI can then be derived from a second matrix, as depicted in Table 14. SEI is specific to the proposed development and can therefore only be compared between alternative layouts for the same proposed development, but not between developments.

Table 14: The matrix that defines the site ecological importance (SEI) of a given habitat type, as identified from a desktop and field assessment.

Site Ecological Importance		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very High	Very High	Very High	High	Medium	Low
	High	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	Low	High	Medium	Low	Very Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

APPENDIX 2: SITE VISIT

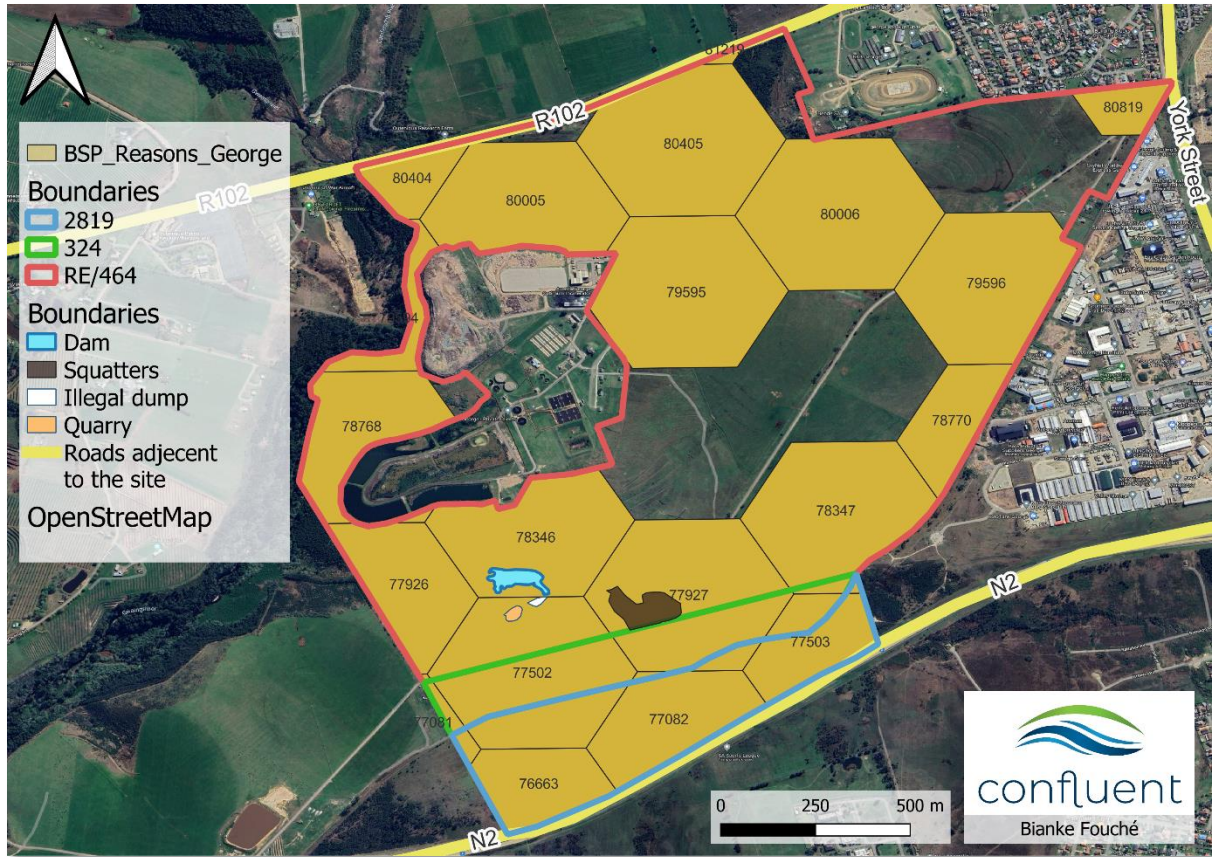
The screening site visit took place on the 29th of September 2022. During this visit photographs were taken of important landscape features and of the botanical diversity observed. The images taken on the site represent the path that was walked, as photograph points are colour coded by time in Fig. 30. Photos that were taken early in the day are colour coded as dark dots, while later photos are lighter dots in



Figure 30: A map indicating the geotagged location of all photographs taken on the planned Gwayang Industrial Park in the west of George. Geotagged and timestamped image locations are shown within the delineated park boundary. The images here also indicate roughly where the specialist track was during the site assessments.

APPENDIX 3: BIODIVERSITY SPATIAL PLAN: REASONS

The terrestrial BSP reasons for assigning CBA, ESA, ONAs, etc. are outlined in Fig. 31 for the proposed Gwayang development site.



Hexagon ID	77081, 76663	77082, 77502, 77503, 77926, 77927, 78347	79595, 79596	78770, 80005, 80006, 80405
Feature_1	Bontebok Extended Distribution Range	Bontebok Extended Distribution Range	Bontebok Expanded Distribution Range	Bontebok Expanded Distribution Range
Feature_2		Watercourse protection- Southern Coastal Belt	Water source protection- Gwaing	Watercourse protection- Southern Coastal Belt
Feature_3				Water source protection- Gwaing

	78346	78768	79594
Feature 1	Bontebok Extended Distribution Range	Bontebok Extended Distribution Range	Bontebok Extended Distribution Range
Feature 2	Garden Route Granite Fynbos (CR)	Cape Lowland Alluvial Vegetation (CR)	Cape Lowland Alluvial Vegetation (CR)
Feature 3	Watercourse protection- Southern Coastal Belt	Garden Route Granite Fynbos (CR)	South Strandveld Western Strandveld Channelled Valley Bottom Wetland
Feature 4	Wolwedans Grassy Fynbos (Vlok variant- CR)	South Strandveld Western Strandveld Channelled Valley Bottom Wetland	Southern Coastal Belt Permanent Upper Foothill River
Feature 5		Water source protection- Gwaing	Water source protection- Gwaing
Feature 6		Watercourse protection- Southern Coastal Belt	Watercourse protection- Southern Coastal Belt
Feature 7		Southern Coastal Belt Permanent Upper Foothill River	

	80404	80819	81219
Feature 1	Bontebok Extended Distribution Range	Water source protection- Kaaimans	Bontebok Extended Distribution Range
Feature 2	Cape Lowland Alluvial Vegetation (CR)		Cape Lowland Alluvial Vegetation (CR)
Feature 3	Eastern Fynbos Renosterveld Granite Fynbos Floodplain Wetland		Eastern Fynbos Renosterveld Granite Fynbos Floodplain Wetland
Feature 4	FEPA River Corridor		FEPA River Corridor
Feature 5	Garden Route Granite Fynbos (CR)		Garden Route Granite Fynbos (CR)
Feature 6	South Eastern Coastal Belt Ephemeral Upper Foothill River		South Eastern Coastal Belt Ephemeral Upper Foothill River
Feature 7	South Strandveld Western Strandveld Channelled Valley Bottom Wetland		South Strandveld Western Strandveld Channelled Valley Bottom Wetland
Feature 8	Water source protection- Gwaing		Water source protection- Gwaing
Feature 9	Watercourse protection- Southern Coastal Belt		Watercourse protection- Southern Coastal Belt
Feature 10	Wolwedans Grassy Fynbos (Vlok variant- CR)		Wolwedans Grassy Fynbos (Vlok variant- CR)
Feature 11	Southern Coastal Belt Permanent Upper Foothill River		

Figure 31: The BSP reasons for designating CBAs and ESAs within the proposed development site. Reasons listed for each polygon is summarised in the extracted attribute table below the map.