Plant Species and Terrestrial Biodiversity Assessment

prepared in accordance with the
protocols for the specialist assessment and minimum report content requirements for environmental impacts on plant species and terrestrial biodiversity.



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Plant Species and Terrestrial Biodiversity Assessment Report for Erf 134, Infanta, Western Cape

20 August 2026

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Specialist details and declaration

This report has been prepared in accordance with the protocol for the specialist assessment and minimum report content requirements, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320, for environmental impacts on terrestrial plant species (October 2020), and terrestrial biodiversity (March 2020). It has been prepared independently of influence or prejudice by any parties.

Details of the specialist:

Specialist	Qualification and accreditation
Dr David Hoare (Pr.Sci.Nat.)	• PhD Botany • SACNASP Reg. no. 400221/05 (Ecology, Botany)

Declaration of independence

David Hoare of BioCensus (Pty) Ltd is an independent consultant and hereby declares that he does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by BioCensus (Pty) Ltd is not subject to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure

BioCensus (Pty) Ltd undertakes to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National

Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to BioCensus (Pty) Ltd by the client and in addition to information obtained during this study, BioCensus (Pty) Ltd presents the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practice.



_____ **20 August 2026**

Dr David Hoare Date

Executive summary

The Environmental Impact Assessment (EIA) for the proposed development of Erf 134 at Infanta, Western Cape, identified biodiversity sensitivities highlighted for the site.

Assessment of impacts on the proposed development site

- One Endangered plant species is confirmed to occur on site. A total of 35 plants of the Endangered species, *Erica oblongiflora*, were found on site within Limestone Fynbos. The site therefore has HIGH sensitivity with respect to the Terrestrial Plant Species Theme.
- The proposed development footprint avoids most plants that occur on site, and a large proportion of the most suitable habitat is avoided. The proposed layout is likely to have impacts of LOW significance on this Terrestrial Plant SCC.
- Small patches of CBA1 and ESA1 of very high sensitivity are mapped as occurring in the north-eastern corner of the site. All affected areas on site are previously disturbed and currently contain alien vegetation as well as transformed areas (existing house and associated infrastructure). No intact areas of the CBAs/ESAs will therefore be affected.
- The site is mapped as partially occurring within a listed ecosystem, namely Overberg Dune Strandveld, which is listed as Endangered. The vegetation type has been updated at SANBI in the 2024 release of the national vegetation map and is now called Southwestern Strandveld, which has been assessed by SANBI as Least Threatened. However, this update has not yet been made in the published Revised National Ecosystem List.
- The proposed development is likely to have impacts of VERY LOW significance on any Terrestrial Biodiversity features.

Assessment of impacts of the proposed water infrastructure

- The proposed water infrastructure comprises a reservoir and a narrow pipeline alignment that largely follows an existing disturbed boundary/access corridor, thereby minimising new disturbance to natural vegetation.
- Three Vulnerable plant Species of Conservation Concern (*Agathosma muirii, Berzelia cordifolia* and *Gladiolus vaginatus*) were confirmed within the affected area. Although individual plants may be lost, the affected populations represent a small proportion of the known populations, and the impact is assessed as LOW significance.
- The pipeline traverses natural vegetation associated with the Endangered Albertinia Sand Fynbos ecosystem and mapped CBA1, CBA2 and ESA areas. These areas have high biodiversity importance, but the proposed disturbance is narrow and localised and is not expected to materially compromise ecological connectivity or the ecological functioning of the biodiversity network.
- The impacts on terrestrial biodiversity are therefore assessed as LOW significance, provided that the construction footprint is strictly controlled and appropriate rehabilitation and alien invasive species management are implemented.

Overall, the proposed development is supported from a terrestrial biodiversity and plant SCC perspective, subject to implementation of the specified mitigation measures and obtaining all required flora permits.

Terms of reference

The assessment provided here is in support of a Basic Assessment process for a proposed development of part of Erf 134, Infanta. It is a follow-up of two previous botanical assessments that were conducted on site (Helme 2005, McDonald 2023). These were reviewed and an updated assessment provided to comply with current specialist requirements, as detailed below.

This report is prepared in compliance with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, and terrestrial plant species.

This 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), published in GN. No. 320 dated 20 March 2020 for Terrestrial Biodiversity, and in GN. No. 1150 dated 30 October 2020 for Terrestrial Plant Species. As per these Regulations, the approach for assessing sensitivity with respect to Terrestrial Plant Species is in accordance with guidelines described in the latest version of the "Species Environmental Assessment Guidelines," available at https://bgis.sanbi.org/.

The assessment and minimum reporting requirements of these protocols are associated with a level of environmental sensitivity identified by the Department of Forestry, Fisheries and the Environment (DFFE) national web based environmental screening tool (screening tool). The screening tool can be accessed at:

https://screening.environment.gov.za/screeningtool.

Introduction

Site location

The proposed development is directly north of the village of Infanta, Western Cape at the mouth of the Breede River (**Figure 1**). It is located on the coast immediately adjacent to the existing village of Infanta. The road to Infanta forms the western boundary of the proposed development site.

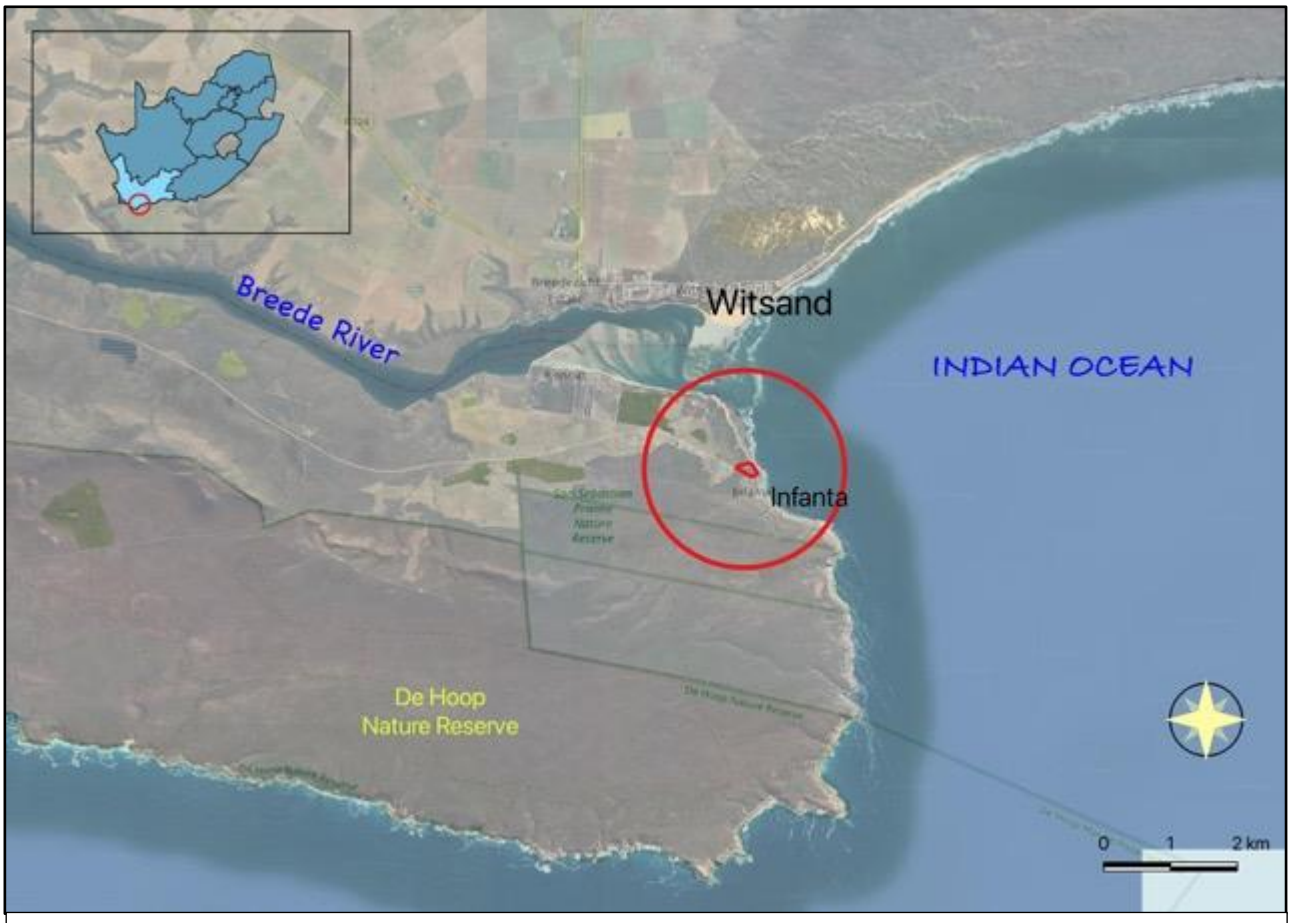


Figure 1: Location of the site.

A proposed housing development is to be undertaken on the eastern end of Erf 134, as shown highlighted in purple in **Figure 2** below. The southern boundary of the site is along the northern boundary of the existing Infanta village. The main road into Infanta forms the western boundary. The western corner of the site is also the eastern corner of Infanta Park, a separate component of the Infanta urban area.



Figure 2: Aerial image of the property ERF 134 showing proposed development highlighted in purple.

There are an existing house and outbuilding on the site, as well as lawns and an entrance road (**Figure 3**).



Figure 3: Aerial image of the proposed development site.

An additional component of the proposed development is a reservoir on nearby high ground within Erf 134, and a pipeline back to the main development, which follows the property boundary (**Figure 4**).

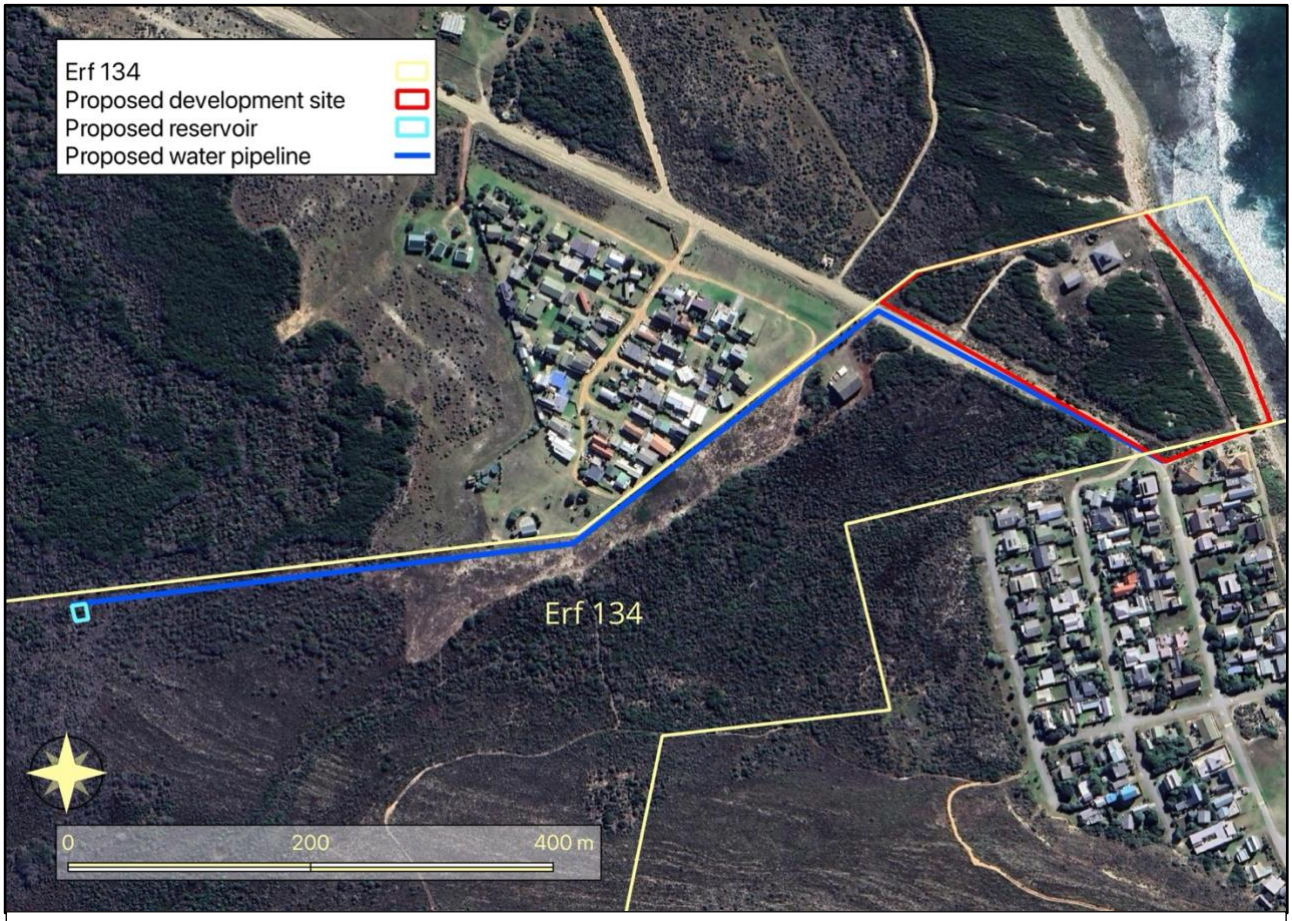


Figure 4: Aerial image of the reservoir and pipeline.

Identified Theme Sensitivities

A sensitivity screening report from the DFFE screening tool was requested in the application category:

Transformation of land | Indigenous vegetation

The screening tool report for the area, dated 23/10/2025, indicates the following ecological sensitivities:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Plant species theme

Areas of different sensitivity are shown in **Figure 5**. Species of Conservation Concern (SCC) that are flagged for the site are as follows:

Sensitivity	Feature
Medium	Acmadenia mundiana
Medium	Agathosma eriantha
Medium	Agathosma riversdalensis
Medium	Argyrolobium harmsianum
Medium	Aspalathus calcarea
Medium	Aspalathus prostrata
Medium	Aspalathus tylodes
Medium	Chrysocoma strigosa
Medium	Cliffortia longifolia
Medium	Cotula myriophylloides
Medium	Cynanchum zeyheri
Medium	Delosperma mariae
Medium	Diosma tenella
Medium	Dymondia margaretae
Medium	Elegia fenestrata
Medium	Elegia verreauxii
Medium	Erica oblongiflora
Medium	Euchaetis intonsa
Medium	Euchaetis laevigata

Medium	Felicia ebracteata
Medium	Gnidia spicata
Medium	Heliophila linearis var. reticulata
Medium	Hermannia lavandulifolia
Medium	Indigofera mundiana
Medium	Lampranthus ceriseus
Medium	Lampranthus fergusoniae
Medium	Lampranthus pauciflorus
Medium	Lebeckia gracilis
Medium	Leucadendron galpinii
Medium	Leucadendron linifolium
Medium	Lobelia valida
Medium	Orthochilus litoralis
Medium	Osteospermum subulatum
Medium	Otholobium sp. nov. (Esterhuysen 33240a BOL)
Medium	Pentameris calcicola var. hirsuta
Medium	Selago diffusa
Medium	Selago glandulosa
Medium	Senecio lycopodioides
Medium	Stoebe muirii
Medium	Thamnochortus muirii
Medium	Thamnochortus pluristachyus
Medium	Tribolium ciliare
Medium	Wahlenbergia polyantha
Medium	Wahlenbergia subulata var. congesta
Medium	Zostera capensis
Medium	Sensitive species 5
Medium	Sensitive species 53
Medium	Sensitive species 340
Medium	Sensitive species 500
Medium	Sensitive species 599
Medium	Sensitive species 800
Medium	Sensitive species 913
Medium	Sensitive species 1142
Medium	Sensitive species 1192



Figure 5: Plant species theme sensitivity for the site and surrounding areas.

Terrestrial Biodiversity theme

Areas of sensitivity are shown in **Figure 6** and sensitive features are indicated as follows:

Sensitivity	Feature
Very High	CBA: Terrestrial
Very High	ESA1: Terrestrial
Very High	FEPA subcatchment
Very High	EN_Overberg Dune Strandveld

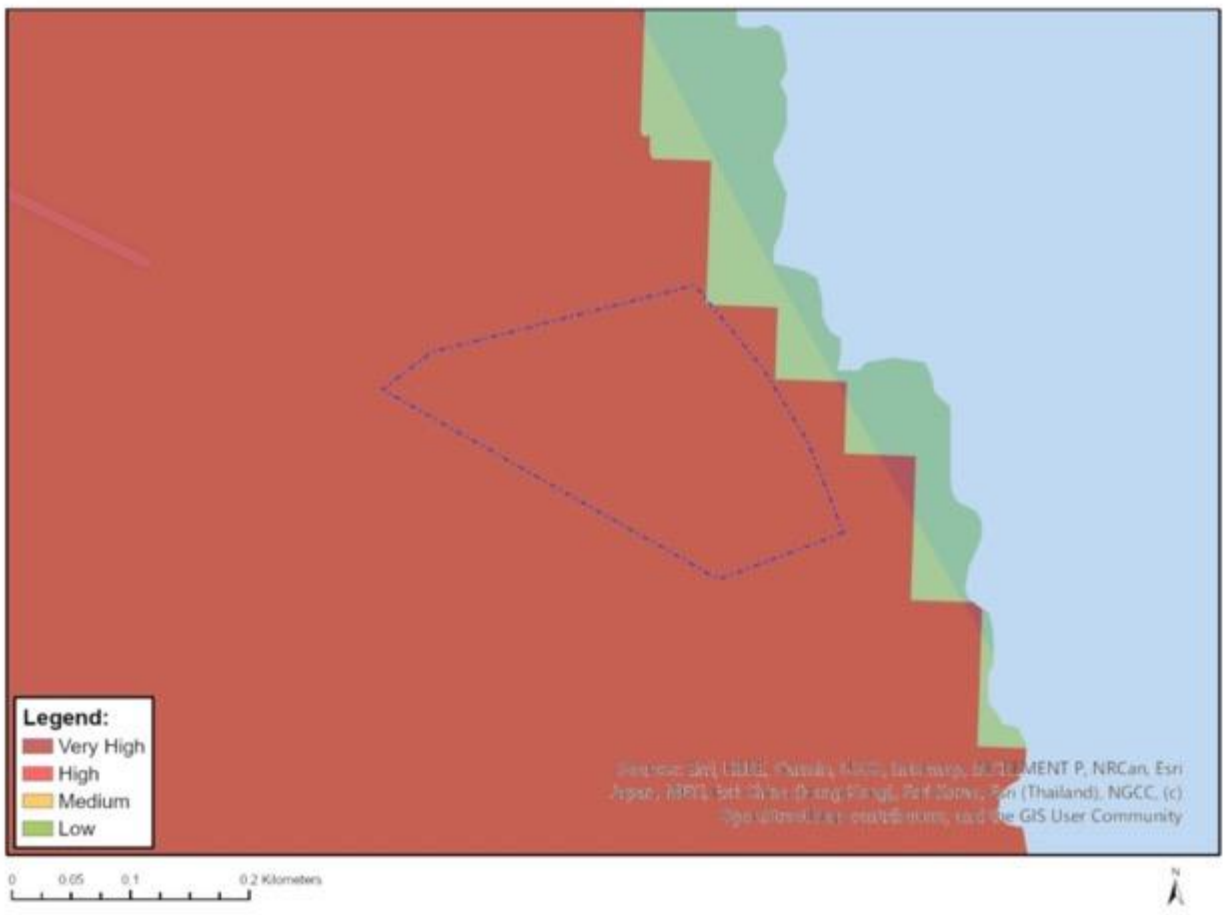


Figure 6: Terrestrial Biodiversity theme sensitivity for the site and surrounding areas.

Assessment methodology

The detailed methodology followed as well as the sources of data and information used as part of this assessment are described below.

Survey timing

The study commenced as a desktop-study followed by a site-specific field study on 17-18 March 2026. The site is within the Fynbos Biome of the Western Cape which has an all-year rainfall season peaking in March and November, with slightly cooler winter months (**Figure 7**). Rainfall seasonality drives most ecological processes, and the timing of the survey in March is therefore satisfactory in terms of assessing the flora and vegetation of the site. It was therefore possible to determine the overall condition of the vegetation with a high degree of confidence.

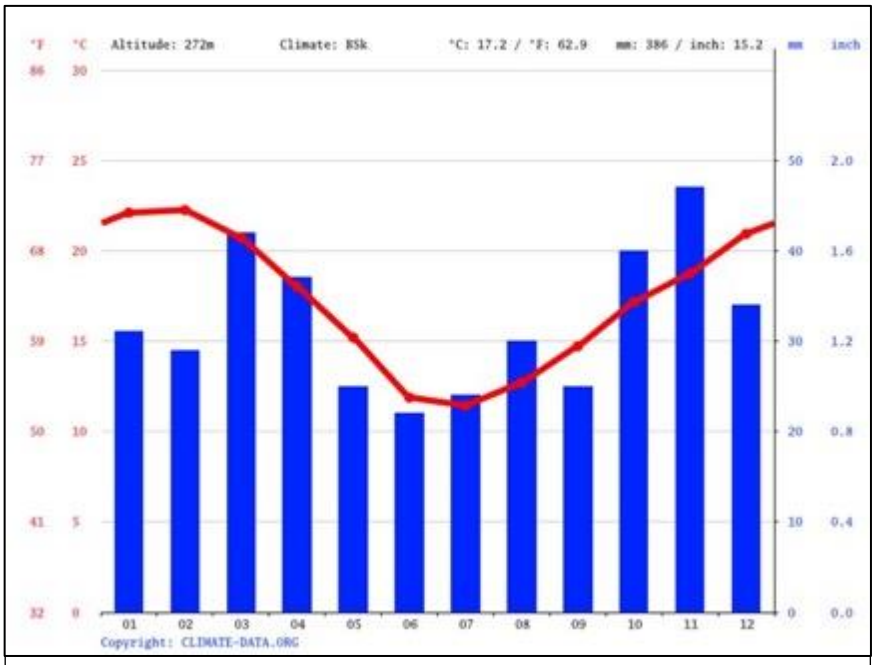


Figure 7: Monthly rainfall and temperature for Infanta.

Field survey approach

The field survey was undertaken on 17-18 March 2026. Field surveys of the site included meander searches of general areas, and active searching in habitats that were suitable for specific groups or species. Where sensitive species were encountered, co-ordinates for all individuals that occur on site were obtained as far as possible. A hand-held Garmin GPSMap 64S was used to record a track along which observations were made. Digital photographs were taken of features and habitats on site, as well as of all plant and animal species seen. Images of plants and animals recorded were uploaded to the iNaturalist website (https://www.inaturalist.org) and are accessible by viewing the observations for the site (use the Explore menu, zoom and pan until the study area is within the browser window, click the button "Redo search in map", and all observations for that area will be shown and listed).

Aerial imagery from Google Earth was used to identify and assess habitats on site. This included historical imagery that may show information not visible in any single dated image. Patterns identified from satellite imagery were verified on the ground. Digital photographs were taken at locations where features of interest were observed. During the field survey, particular attention was paid to ensuring that all habitat variability was ground truthed.

Impact assessment methodology

The analysis of impact uses a detailed assessment methodology based on several factors considering the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). These factors assess the sensitivity and significance of impacts on biodiversity resources, integrating criteria for biodiversity value and impact magnitude. The details of the impact assessment methodology are described and explained in Appendix 1.

Sources of information

Vegetation and threatened ecosystems

- South African National Biodiversity Institute (2006-2024). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, https://bgis.sanbi.org/Projects/Detail/2258, Version 2024.
- The conservation statuses of the vegetation types were obtained from the Revised National List of Ecosystems that are Threatened and in need of protection (GN2747 of 2022 in Government Gazette 47526), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).

Conservation plans

- Information from the National Protected Areas Expansion Strategy (NPAES) was consulted for possible inclusion of the site into a protected area in future (available on http://bgis.sanbi.org).
- CapeNature 2024. 2023 Western Cape Biodiversity Spatial Plan and Guidelines Overview V2.0.
- South Africa Protected Areas Database (SAPAD_OR_2024_Q3) retrieved from the Department of Forestry, Fisheries and the Environment website (https://egis.environment.gov.za/data_egis/data_download/current).

Aerial imagery

Satellite imagery for historical land use and vegetation cover was obtained from Google Earth Pro.

Archive of historical aerial photography dating back to the 1930's accessed from the Department of Agriculture, Land Reform and Rural Development's (DALRRD) National Geo-spatial Information (NGI) website (http://www.cdngiportal.co.za/cdngiportal/).

Plant species

Plant species description, conservation status, distribution and habitat information were obtained from the following sources:

- South African National Biodiversity Institute (SANBI) available on the Biodiversity Advisor website (https://biodiversityadvisor.sanbi.org/) and the NewPosa portal.
- SANBI's Red List (http://redlist.sanbi.org),
- World Flora Online (https://www.worldfloraonline.org/)
- Published literature.

Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa.

Assumptions, limitations and uncertainties

Assumptions, limitations, uncertainties regarding the assessment of the site are as follows:

- The assessment is based on the site visit as well as a desktop study of the available information. The time spent on site was adequate for understanding general vegetation patterns across the study area.
- There were no limitations with respect to the timing of the field survey (see "Survey timing" section of report above).
- Rare and threatened plant species are, by their nature, usually very difficult to locate and can be easily missed. Preparation for fieldwork in terms of desktop research for possible SCC improves the success of locating SCC. The screening tool output contains modelled distributions of all species that could occur on site, based on current knowledge of all SANBI databases.
- One of the regional vegetation types occurring on site is Southwestern Strandveld, which was previously Overberg Dune Strandveld at this location. Overberg Dune Strandveld is listed as Endangered in the Revised National List of Ecosystems, whereas the more recently recognised Southwestern Strandveld has been assessed by SANBI as Least Threatened (SANBI BGIS). For the purposes of this ecological assessment, the vegetation occurring on site is therefore regarded as Least Threatened, consistent with the current SANBI assessment. It is noted, however, that this revised classification has not yet been incorporated into the gazetted National List of Ecosystems.

Results

Desktop description of vegetation

As per the National Vegetation Map of South Africa (SANBI 2006-2024), the vegetation map shows that the site occurs within De Hoop Limestone Fynbos and Southwestern Strandveld (**Figure 8**). In a recent update to the national vegetation map (SANBI 2024), Overberg Dune Strandveld was split and a new vegetation unit was described, called Southwestern Strandveld (Cowling et al. 2023). This is relevant because the site was previously mapped as occurring within Overberg Dune Strandveld, which is listed as Endangered, whereas Southwestern Strandveld is not listed. The new vegetation unit is shown at position E in **Figure 8** in blue colour.

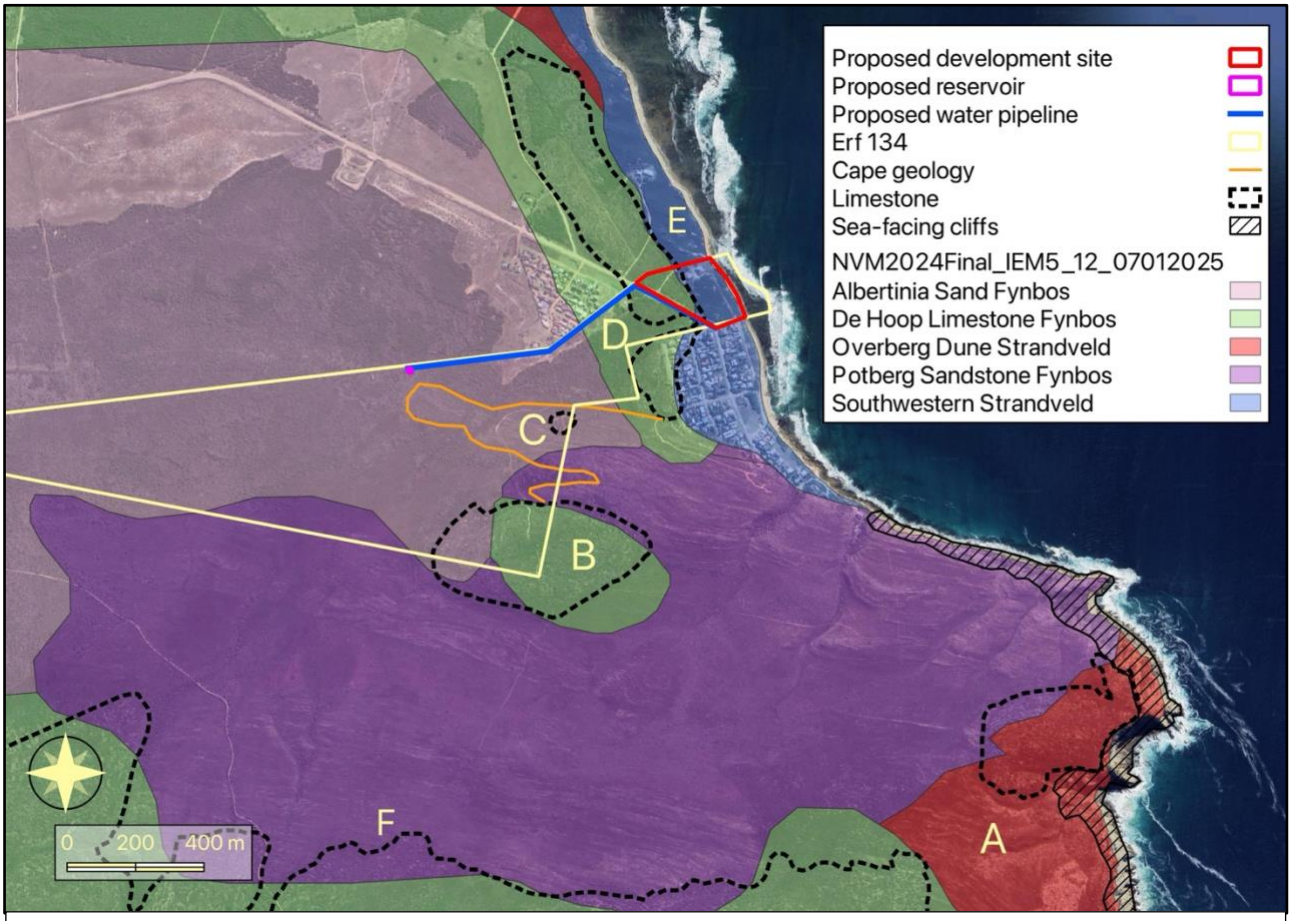


Figure 8: Regional vegetation types of the site and surrounding areas, according to the National Vegetation Map of South Africa (2024 version).

De Hoop Limestone Fynbos is inaccurately mapped in the broader area around the site. In **Figure 8** the boundary of limestone areas is shown as a dashed line at positions D, B and F - these are easily visible on aerial imagery - and they do not align exactly with the mapped vegetation units.

A further inaccuracy in the vegetation map in the broader area is at position C in **Figure 8**, where the boundary of sandstone extends further out to the west than the boundary of Potberg Sandstone Fynbos shows.

The published descriptions of the vegetation types found on site are provided below to place the on-site observations in context.

De Hoop Limestone Fynbos

Western Cape Province: Broad swathe on the coastal forelands from Struisbaai and Bredasdorp to Infanta at the Breede River Mouth, remaining seawards of the Potberg and including the hills of Bobbejaanskrans and Voëlneskrans north of De Hoop Vlei. Altitude 20–240 m.

Vegetation & Landscape Features

An inland range of hills, with plains and moderately undulating plains on the seaward foreland, in places dotted with karstic sinkholes and dry valleys (poljes). Some of the depressions can be longer than 2 km. Structurally it is mainly asteraceous and proteoid fynbos, with restioid fynbos in sandy areas. These areas were converted to grazing lawns in formerly disturbed (ploughed) areas currently with high game concentrations.

Neutral to acid sands support FFd 7 Agulhas Sand Fynbos and FFd 9 Albertinia Sand Fynbos. Extensive skeletal calcrete over shale on the inland border may once also have held limestone fynbos or renosterveld ecotone communities, but these have all been converted to pasture and wheatland, and their vegetation was not documented before their conversion.

Geology & Soils

Shallow, alkaline to neutral sand and bedrock, Glenrosa and Mispah forms on limestone of the Bredasdorp Formation. Topographically with less variegated relief than in the other limestone fynbos units, characterised by distinctive karstic valleys, sinkhole depressions and caves. Land types mainly Fc, Ib and Ic.

Important Taxa

Low Shrubs: *Leucadendron meridianum* (d), *L. muirii* (d), *Leucospermum truncatum* (d), *Metalasia calcicole* (d), *Passerina galpinii* (d), *Acmadenia densifolia*, *Adenandra obtusata*, *Agathosma serpyllacea*, *Aspalathus calcarea*, *A. incurvifolia*, *Asparagus capensis* var. *capensis*, *Erica propinqua*, *E. regia* subsp. *mariae*, *E. spectabilis*, *Euryops ericoides*, *E. hebecarpus*, *Metalasia erectifolia*, *Oedera squarrosa*, *Syncarpha canescens*, *Ursinia dentata*.

Tall Shrubs: *Chrysanthemoides monilifera* (d), *Euryops linearis* (d), *Protea obtusifolia* (d), *P. lanceolata*.

Herbs: *Cotula turbinata* (d), *Ursinia tenuifolia* subsp. *ciliaris*.

Geophytic Herbs: *Cyanella lutea* (d), *Freesia leichtlinii*, *Haemanthus coccineus*, *Lachenalia muirii*, *Ledebouria ovalifolia*, *Neopatersonia uitenhagensis*, *Polyxena ensifolia*, *Strumaria squarrosa*.

Graminoids: *Cynodon dactylon (d), Ficinia truncata (d), Thamnochortus paniculatus (d), Elegia microcarpa, Ficinia praemorsa, Ischyrolepis leptoclados, Pentaschistis calcicola, Thamnochortus erectus, T. guthrieae, T. lucens, T. pluristachyus.*

Endemic Taxa

Low Shrubs: Acmadenia mundiana, Argyrolobium harmsianum, Aspalathus pallescens, A. prostrata, Brachysiphon mundii, Cliffortia burgersii, Erica scytophylla, E. sperata, E. uysii, Euchaetis intonsa, Felicia ebracteata, Lobostemon daltonii, Pteronia diosmifolia, Sutera titanophila.

Herb: Galium bredasdorpense.

Southwestern Strandveld

It occupies an area of 322 km^2 from Mossel Bay to Cape Hangklip, excluding the stretch of calcareous sand northeast of Die Kelders that supports Grootbos Strandveld.

Vegetation & Landscape Features

The provided description of the vegetation and landscape features of this vegetation type are as follows: "This vegetation type occurs on a narrow dune surround. However, there are large dune fields in De Hoop, Cape Agulhas, and Walker Bay. The vegetation type shows strongest floristic links to Grootbos Strandveld and Southeastern Strandveld. The vast thicket areas in this unit are primarily Xeric Dune Thicket, with a few patches of *Sideroxylon inerme* dominating. Altitude between 8 – 210 metres (median 29m)."

Geology & Soils

The vegetation type is described as occurring primarily on Waenhuiskrans Formation sediments, some calcarenites but mostly unconsolidated, deep sands.

Climate

The area where the vegetation type occurs encompasses the transition from a non-seasonal to a weakly winter rainfall regime, reaching a maximum of about 500 mm.yr^{-1} . With mean midsummer temperatures are 20−22 °C, and midwinter temperatures 16−18 °C The wind regime is fierce, especially from Cape Agulhas to Danger Point where winter westerlies have a strong northerly component.

Important Taxa

Shrubs: *Helichrysum retortum* (d)*, Passerina paleacea* (d)*, Agathosma collina* (d)*, A. dielsiana* (d)*, A. geniculata* (d)*, Acmadenia obtusata* (d)*, Disparago anomala* (d)*, Lampranthus fergusoniae* (d)*, Indigofera calciphila* (d)*, I. harveyi* (d)*, Erica bredasiana* (d)*, E. vernicosa* (d)*, E. coccinea ssp. uniflora* (d), *Argyrolobium harmsianum* (d)*, Ruschia macowanii* (d) and *Berkheya coriacea* (d).

Succulents: *Euphorbia burmannii* and *E. mauritanica*, *Roepera morgsana* – found in the thicket patches.

Conservation

Conserved in Bosbokfontein Private Nature Reserve; Brian Mansergh Private Nature Reserve; Chaynouqua Private Nature Reserve; Skulpiesbaai Nature Reserve; De Mond Nature Reserve; Freshwater Sands Private Nature Reserve; Heuningnes River Private Nature Reserve; Annet Private Nature Reserve; Duivenhoksriviermond Private Nature; De Hoop Nature Reserve; Agulhas National Park; Kanon Private Nature Reserve. Area protected: 18.33 km^2 (44%).

Biodiversity Conservation Plans

The Western Cape Biodiversity Spatial Plan (WCBSP) classifies the habitats of the province according to conservation value in decreasing value, as follows:

1. Protected Areas (PA);
2. Critical Biodiversity Areas 1 (CBA1);
3. Critical Biodiversity Areas 2 (CBA2);
4. Ecological Support Area 1 (ESA1);
5. Ecological Support Area 2 (ESA2)

The WCBSP map shows that the footprint of the development is mostly outside of any Critical Biodiversity Area (CBA) or Ecological Support Area (ESA) (**Figure 9**). There is a narrow strip of CBA1 along the coastal side of the site, which includes the existing house and lawns, and a small area of ESA1 that enters the site from the northern side.

The CBA1 area corresponds with dune and sea-facing slopes along the coastline, mostly outside the fenced part of the site, therefore excluded from the proposed development footprint. Within the site, these are either modified or heavily invaded by *Acacia cyclops*.

The proposed water pipeline is almost entirely within CBA1, CBA2 and ESA1 areas, except for the part along the roadside next to the proposed development site (**Figure 9**). The proposed reservoir is within a CBA1 area.

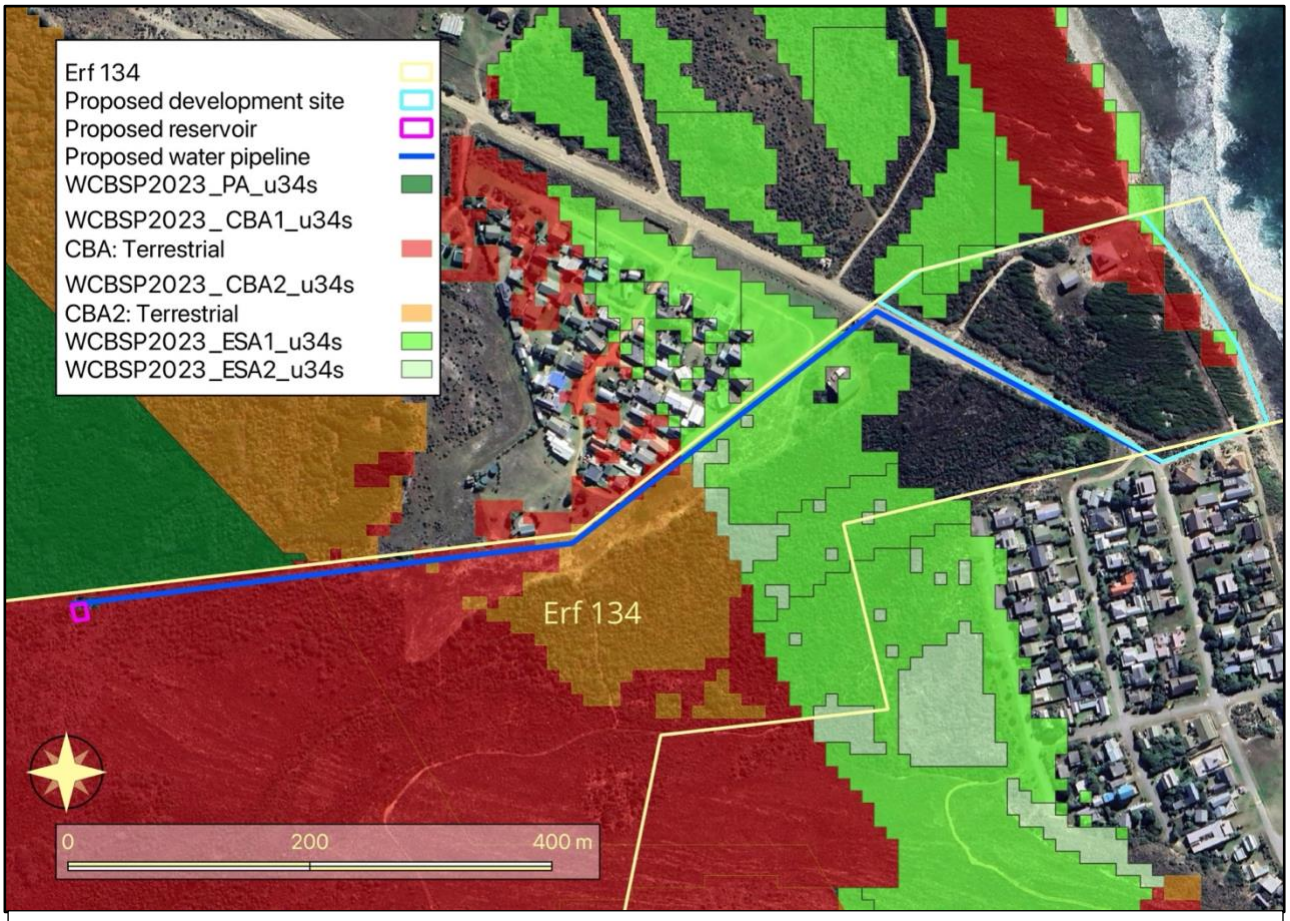


Figure 9: Western Cape Biodiversity Spatial Plan for the site and the proposed water pipeline.

Historical and current disturbance

An aerial photograph from 1942 shows no development at Infanta, only some cultivated lands and the main access road up to where Infanta Park is now located. An aerial image from 1954 (**Figure 10**) shows the early layout of Infanta. Of interest for the site assessment is the mobile dunes on the north-eastern corner of the site (point A in **Figure 10**), extending northwards, the cultivated lands or pastures (point B in **Figure 10**) and the clearly visible valley through the site (along the red dashed line between points C and D in **Figure 10**). The vegetation signal in this valley is dark enough to indicate that it was originally thicket, possibly dominated by milkwood trees (if compared to other known areas that still exist around Infanta). On this date there is no evidence of widespread wattle invasion of the coastal dune system.

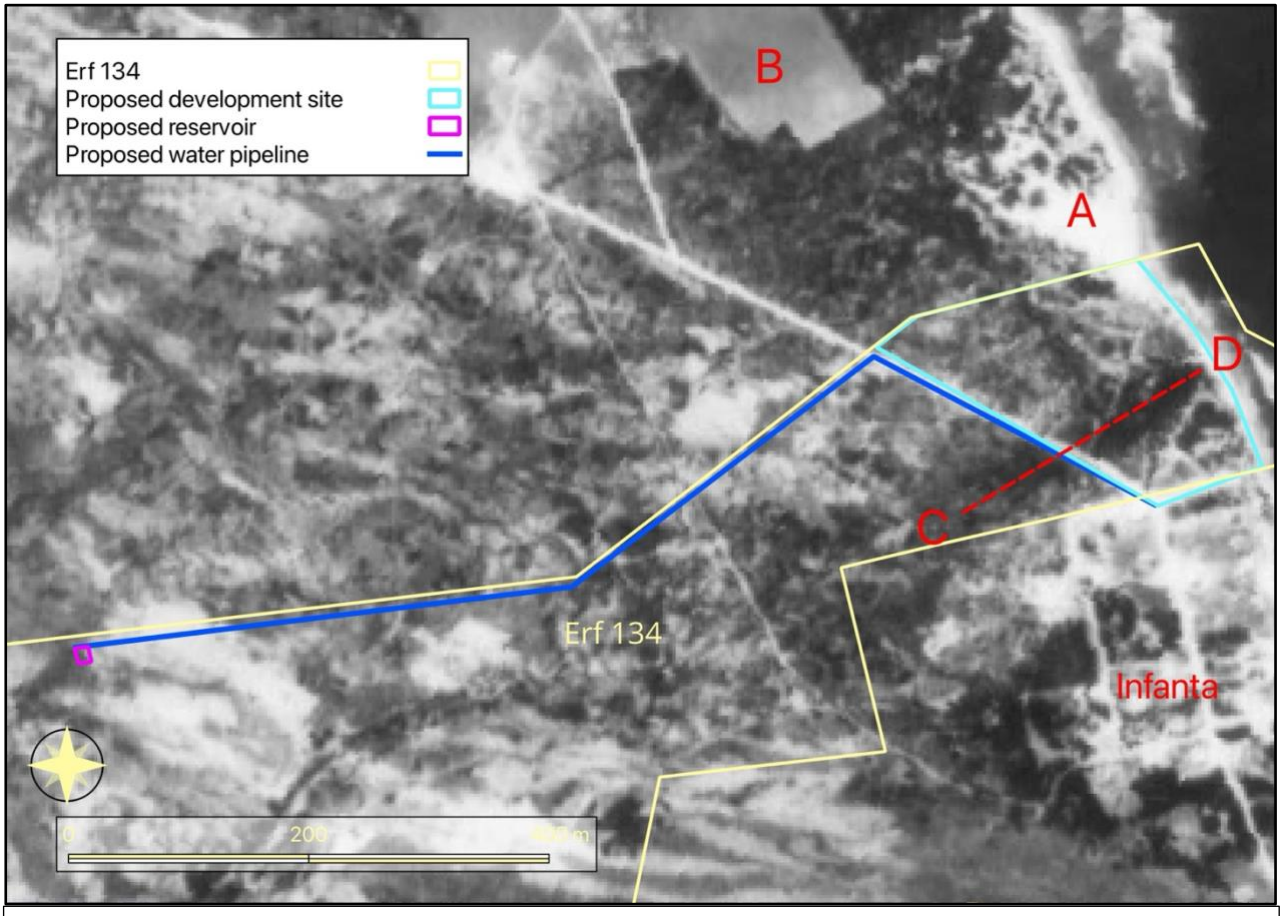


Figure 10: Historical aerial photograph of the site and surrounding areas from 1954.

An aerial photograph from 1989 (**Figure 11**) shows the current extent of Infanta and Infanta Park and the main access road relative to the site. The more extensive cultivation is also evident and is approximately equal to the current extent. Of interest to the current assessment is the following:

1. The house on site, including the lawns and cleared areas around it (point A in **Figure 11**). This matches the estimated disturbance zone currently visible on site that is associated with the house, lawns and heavily invaded areas on the margins of the lawns.
2. Disturbance on the south-western side of the road opposite to the site (point B in **Figure 11**). This corresponds with an area that is still visibly disturbed.

The main trend since 1989, which is visible in successive aerial images on Google Earth, is increased invasion of the coastal dune system from Infanta northwards towards the mouth of the Breede River. This dense alien invasion has replaced most of the original vegetation

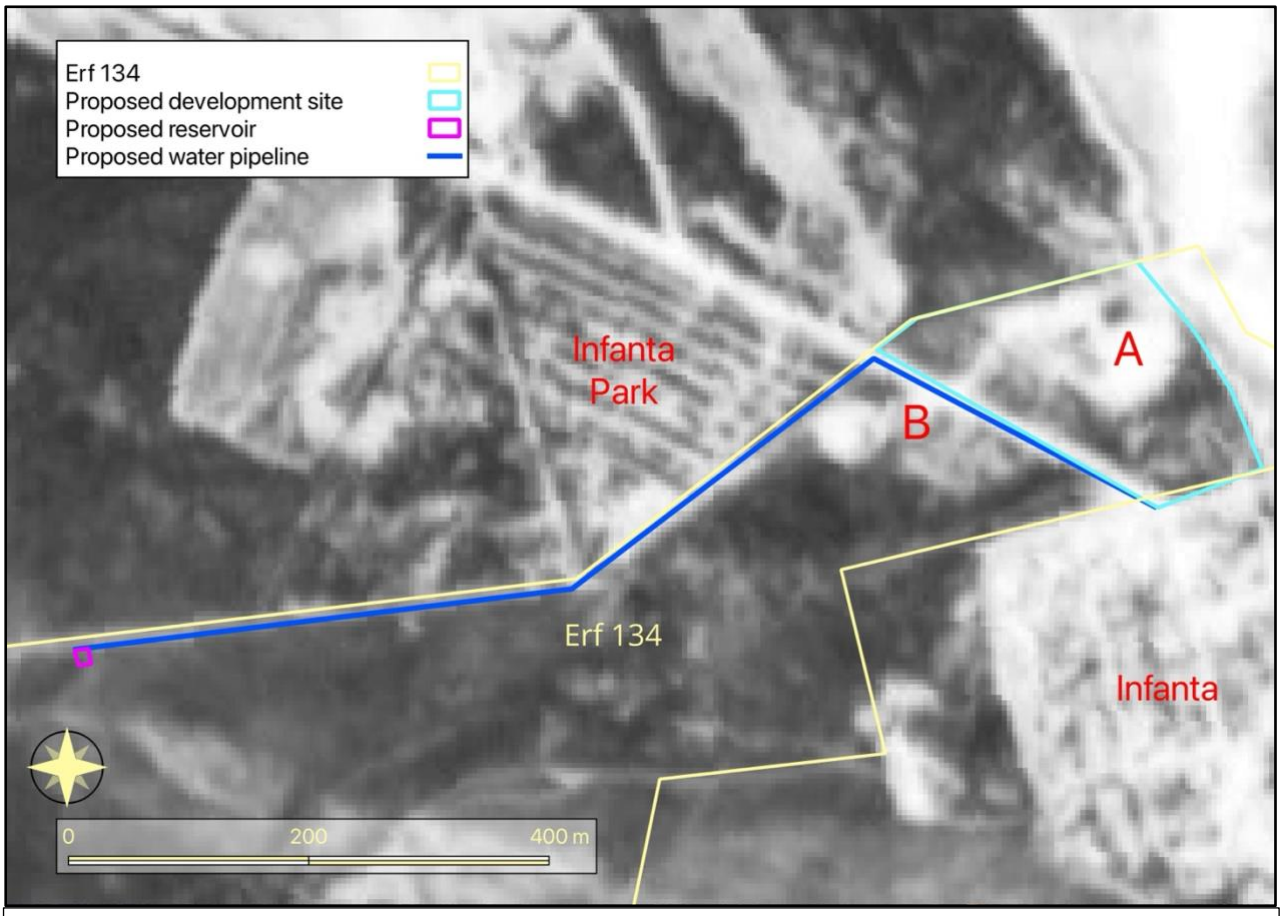


Figure 11: Historical aerial photograph of the site and surrounding areas from 1989.

on these dunes and is a significant factor that has led to loss of biodiversity and ecosystem function in this general area, up to the Breede River mouth. It has completely displaced the original natural vegetation that would have occurred in this zone on the site (as well as beyond the site). The invasion also extends into surrounding limestone areas, but less vigorously and only when promoted by disturbance, whereas dunes were invaded without human assistance.

The consequence of the historical disturbance patterns and the alien invasion over time is that the natural vegetation remaining on site is limited to a small corner of limestone in the western corner of the site that is bisected by the access road to the house on the site. This small patch of limestone vegetation is isolated from other areas of limestone by urbanisation (Infanta and Infanta Park), cultivated areas to the north, the main access road into Infanta, and natural breaks in the geology that support a different vegetation formation. It is currently also moderately invaded and suffering significant edge effects, including from dust settling on the vegetation from traffic past the site.

Verification of observations on site

According to the "AMENDMENT TO THE PROTOCOLS FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL ANIMAL AND PLANT SPECIES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998", a specialist report must include verifiable evidence from the specialist's site inspection, including as a minimum:

1. a map showing the specialist's GPS track in relation to the study area; and
2. at least four spatially representative sample site descriptions from across the study area that include as a minimum:

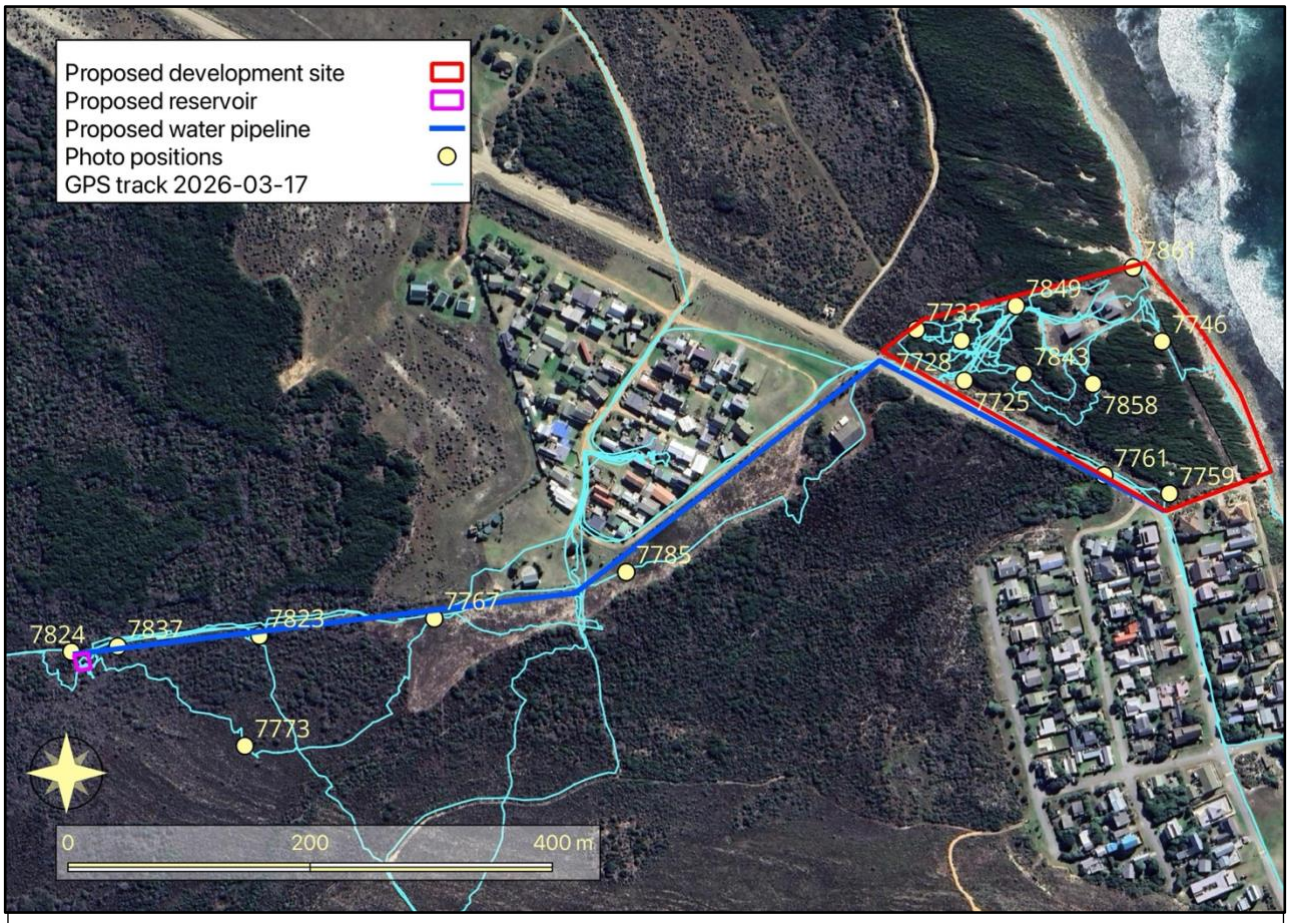


Figure 12: Location of photographs taken on site during the site inspection, as well as the GPS track log of areas traversed during the field assessment of the site.

(a) precise geographical coordinates of the sample site;

(b) at least one in situ photograph (taken on site by the specialist during the site inspection) of the sample site; and

(c) a habitat description of the sample site.

To address these specific requirements, photographs of landscapes on site were taken at various localities to show conditions on site. A map showing the location of these photographs is provided in **Figure 12**. This also shows the GPS track log of areas walked while undertaking this assessment.

Examples of the observed landscape are shown in the images below, and a description for each photograph is provided adjacent to each one.



Photo mosaic 7861

34°25'04.80"S, 20°51'14.29"E

North-eastern corner of the site looking southwards towards Infanta.
View shows lawns extending from the house to the boundary. On the left of the picture is natural erosion of limestone layers dropping down to a wave-cut platform that is covered by water at high-tide. The area between the boundary and the coast is entirely dominated by the alien, *Acacia cyclops*.

	**Photo 7725** **34°25'07.82"S, 20°51'08.83"E** **View from the gate of the property looking down the driveway. The dominant shrub is the invasive wattle, *Acacia cyclops*. The dominant ground cover on the road margins is the restio, *Elegia microcarpa*.**
	**Photo 7732** **34°25'06.45"S, 20°51'07.28"E** **View down firebreak on the northern boundary of the property. The dominant ground cover is the restio, *Elegia microcarpa*, a pattern characteristic of the limestone areas on site.**
	**Photo 7728** **34°25'06.75"S, 20°51'08.74"E** **Limestone fynbos on site. The full species composition is described in the text of this report. One of the dominant shrubs is the invasive wattle, *Acacia cyclops*.**

	**Photo 7849** **34°25'05.82"S, 20°51'10.51"E** **View along the northern boundary of the site close to the existing house and the coast. The substrate is dune sand. The shrubs in the picture are all the alien, *Acacia cyclops*.**
	**Photo 7843** **34°25'07.64"S, 20°51'10.75"E** **Limestone fynbos in the centre of the site. The houses of Infanta village are visible in the background. The dominant ground cover is the restio, *Elegia microcarpa*, a pattern characteristic of the limestone areas on site.**
	**Photo 7858** **34°25'07.91"S, 20°51'12.99"E** **Heavily invaded area near to the centre of the site. This location is on the edge of the dune sand on site, beyond which only dense invasive shrubs occur.**

	**Photo 7746** **34°25'06.78"S, 20°51'15.22"E** **View along the eastern (coastal) firebreak of the property. The vegetation in the picture on both sides of the firebreak is all the alien, *Acacia cyclops*. Along this boundary the substrate is dune sand. The depression in the middle of the firebreak is the coastal exit of the drainage valley.**
	**Photo 7761** **34°25'10.36"S, 20°51'13.35"E** **Upstream side of the road at the location where the shallow drainage valley crosses the main Infanta access road. The substrate is sand. The shrubs are all alien *Acacia cyclops*. The bottom of the depression has adequate moisture for the growth of exotic kikuya, *Cenchrus clandestinus.***
	**Photo 7759** **34°25'10.85"S, 20°51'15.46"E** **View along the western boundary of the site. It runs alongside the Infanta access road. The buildings in the background are Infanta Park. The topography visible in the picture is the shallow drainage valley that runs into the site from the left (west) towards the coast (towards the right in the picture). The vegetation in the picture is all the alien, *Acacia cyclops*.**

	**Photo 7785** **34°25'13.21"S, 20°50'57.67"E** **View along the south-western boundary of Infanta Park, showing the alignment of the proposed water pipeline along the fenceline. The foreground in the photograph is at location of the bend in the pipeline route approximately halfway down, and the far distance is the shed next to the road and the proposed development site. The natural vegetation has been mowed or brush-cut but still retains a natural species composition.**
	**Photo 7767** **34°25'14.26"S, 20°50'52.15"E** **View westwards along the pipeline route from approximately the central point where the route bends. The natural vegetation has been mowed or brush-cut but still retains a natural species composition. At this location the vegetation is dominated by the grass species, *Imperata cylindrica*, which is an indicator of seasonally moist conditions.**
	**Photo 7823** **34°25'14.48"S, 20°50'46.20"E** **View of the western part of the proposed pipeline route, which is the boundary fence of Erf 134, looking westwards. There is a jeep-track running along the inside of this boundary. The vegetation is in a natural state, except for the jeep-track.**

	**Photo 7824** **34°25'14.89"S, 20°50'40.62"E** **View of the western end of the proposed pipeline route at the location of the proposed reservoir.**
	**Photo 7837** **34°25'15.08"S, 20°50'40.01"E** **Location of the existing borehole at the site of the proposed reservoir.**
	**Photo 7773** **34°25'17.85"S, 20°50'45.96"E** **Example of undisturbed natural vegetation near to the proposed pipeline route.**

Vegetation found on site

Proposed development site

A map of habitats / landcover for the proposed development site is provided in **Figure 13**. The property originally contained two vegetation units, namely Limestone Fynbos and Strandveld (dunes), but the Strandveld has been completely lost to alien invasion. Altered areas (lawns, existing buildings and existing roads) have been labelled as "Transformed". There are firebreaks around the entire perimeter of the property where the vegetation has been cleared. In limestone areas, these have the groundcover that would occur in Limestone Fynbos, but on sands only weedy species have grown.

The **Limestone Fynbos** on site contained a total of 14 species, namely *Acacia cyclops* (alien invasive), *Berkheya coriacea*, *Brunsvigia orientalis*, *Colpoon compressum*, *Diosma echinulata*, *Elegia microcarpa*, *Erica oblongiflora* (Endangered), *Euchaetis burchellii*,



Figure 13: Vegetation found on site.

Leucadendron meridianum (Near threatened), *Leucadendron muirii* (Near threatened), *Phylica lasiocarpa*, *Searsia glauca*, *Searsia laevigata* and *Tribolium uniolae*. Firebreaks in limestone areas included additional species, namely *Achyranthemum paniculatum*, *Crassula subulata*, *Disparago anomala*, *Ficinia praemorsa*, *Mesembryanthemum aitonis*, *Metalasia calcicola* (Near threatened), *Polygala peduncularis* and *Roepera flexuosa*.

The **Strandveld** parts of the site (all disturbed or invaded) contained a total of 21 species, namely *Acacia cyclops* (alien invasive), *Aizoon pubescens*, *Brassica tournefortii*, *Asparagus suaveolens*, *Brunsvigia orientalis*, *Crassula expansa*, *Ehrharta villosa*, *Passerina rigida*, *Indigofera heterophylla*, *Jamesbrittenia albomarginata*, *Lachenalia bulbifera*, *Lycium pumilum*, *Mesembryanthemum aitonis*, *Muraltia saturejoides*, *Osteospermum moniliferum*, *Oxalis ciliaris*, *Pelargonium grossularioides*, *Phylica axillaris*, *Roepera morgsana*, *Ruschia calcicola* and *Wahlenbergia thunbergii*. Many of these are weedy species or dune pioneers. The two geophytes, *Brunsvigia orientalis* and *Lachenalia bulbifera*, are both common coastal species that emerge under favourable conditions. In the case of *Brunsvigia orientalis*, large numbers were seen as mass displays on the lawns and verges of several properties in Infanta.

A total of 41 species were recorded on the site, of which 1 is an alien invasive species. A full checklist of plant species found on site is provided in Appendix 2. Three of the species are listed as Near Threatened, namely *Leucadendron meridianum* (NT), *Leucadendron muirii* (NT) and *Metalasia calcicola* (NT). One species found on site is listed as Endangered, namely *Erica oblongiflora*. The occurrence of this species on site is discussed in more detail below.

Field assessment verifies that the site contains remnant patches of Limestone Fynbos in a natural state, and highly degraded or secondary communities of Strandveld vegetation.

Proposed pipeline route and reservoir

The vegetation along the proposed pipeline route is in a natural state, although partly disturbed in places. The proposed alignment is along the property boundary of Erf 134, which is the location of a jeep-track for maintenance purposes, as well as extensively managed areas alongside Infanta Park. The areas alongside Infanta Park are also disturbed

from activities associated with this urban node, more so with proximity to Retief Street (the access road into Infanta). The regional vegetation is mapped as Albertinia Sand Fynbos on the western two-thirds and De Hoop Limestone Fynbos along the remainder. However, there is a tongue of sandstone that projects into this area that has vegetation that matches Potberg Sandstone Fynbos.

Species recorded in the vicinity of the proposed pipeline (along the pipeline and in immediately surrounding areas) are the following: *Acacia cyclops, Acacia saligna, Agathosma muirii* (Vulnerable), *Amphithalea alba* (Near threatened), *Aspalathus crassisepala, Asparagus lignosus* (Near threatened), *Asparagus rubicundus, Aulax umbellata, Berzelia cordifolia* (Vulnerable), *Bobartia longicyma, Brunsvigia orientalis, Chascanum species, Corymbium africanum, Cuscuta angulata, Cymbopogon pospischilii, Disparago anomala, Erica globulifera, Erica placentiflora, Erica quadrangularis, Erica regia, Euchaetis scabricosta, Felicia muricata, Ficinia species, Gladiolus rogersii, Gladiolus vaginatus* (Vulnerable), *Gnidia juniperifolia, Heliophila subulata, Hermannia species, Hypoxis species, Imperata cylindrica, Indigofera pinnata, Indigofera priorii, Lachnaea axillaris* (Near threatened), *Lachnospermum imbricatum, Leucadendron meridianum* (Near threatened), *Leucadendron salignum, Leucospermum cuneiforme, Lobelia chamaepitys var. chamaepitys*, *Lobostemon trigonus, Morella quercifolia, Muraltia alopecuroides, Phylica* species, *Pittosporum* species, *Polygala garcini, Polygala peduncularis, Prismatocarpus campanuloides, Protea repens, Protea susannae* (Near threatened), *Rhynchosia smithiana, Roepera* species, *Serruria* 'ludwigii', *Serruria fasciflora, Stenotaphrum secundatum, Thamnochortus* species, *Themeda triandra, Tribolium uniolae, Trichocephalus stipularis, Ursinia* species and *Wahlenbergia* species.

Plant Species of Conservation Concern

The SCC that potentially occur on site were specifically searched for and their habitat assessed for their probability of occurrence. The probability of occurrence was rated on a scale from NEGLIGIBLE (no probability), LOW (habitat suitable but low quality; and/or conspicuous plant but not found on site during search; or out of known distribution range); MODERATE (habitat suitable but may be overlooked due to being inconspicuous); HIGH (habitat suitable and not transformed); to CONFIRMED. The results of the species assessments are recorded in the following table:

Taxon	***IUCN Status***	***Distribution***	***Habitat***	***Probability of occurrence***
Acmadenia mundiana	LC	Between De Hoop Nature Reserve and De Hoop Vlei.	Limestone Hills.	LOW Outside of known distribution area.
Agathosma eriantha	VU	Bredasdorp to Still Bay.	On sea level flats in dry clay soil interspersed with limestone chips.	LOW Has not historically been recorded from Cape Infanta.
Agathosma riversdalensis	VU	Arniston to Albertinia.	Arid transitions between limestone and sand plain fynbos. Recent record from Witsand.	MODERATE Possible but not found, habitat degraded
Argyrolobium harmsianum	EN	Agulhas to Mossel Bay.	Coastal limestone.	HIGH
Aspalathus calcarea	VU	Elim to Bredasdorp and Stilbaai.	Lowland limestone fynbos.	MODERATE
Aspalathus prostrata	VU	Agulhas Plain to Stilbaai.	Lowland fynbos on limestone, 50-100 m.	HIGH
Aspalathus tylodes	EN	Cape Flats to Albertinia.	Lowland marine flats and sandy areas below 400 m.	MODERATE
Chrysocoma strigosa	VU	Cape Agulhas to Still Bay.	Coastal limestone flats.	MODERATE
Cliffortia longifolia	VU	Coastal areas between Saldanha Bay and Gourits River Mouth.	Wetlands on alkaline coastal sands. No wetlands on site	NEGLIGIBLE
Cotula myriophylloides	CR	Cape Peninsula to Plettenberg Bay.	Submerged in seasonal coastal pools, but also in marshes and on wet sand. Mostly in brackish, but	NEGLIGIBLE

			also fresh, still or slowly moving water.	
Cynanchum zeyheri	VU	Saldanha, the Cape Peninsula and the Agulhas Plain	On flats and lower slopes in renosterveld, strandveld and limestone fynbos.	LOW
Delosperma mariae	VU	Agulhas Plain.	Limestone outcrops.	LOW Out of distribution range.
Diosma tenella	EN	Near the coast in the Bredasdorp Division, on the foothills of the Langeberg near Heidelberg and Riversdale and at Albertinia.	Sandy soils associated with a variety of formations including Bokkeveld shale, ferricrete, silcrete and gravels.	MODERATE
Dymondia margaretae	EN	Bredasdorp to Infanta.	Coastal flats, at edges of pans and marshes. Known from a vlei close to Infanta: -34.40144, 20.75166	NEGLIGIBLE
Elegia fenestrata	VU	Cape Peninsula to Bredasdorp, and Humansdorp.	Coastal marshy areas, and along the banks of small streams.	LOW
Elegia verreauxii	VU	Malmesbury to the Cape Flats and south-eastwards to Bredasdorp.	Seasonally waterlogged acid coastal sands, 100-120 m.	LOW
Erica oblongiflora	EN	Agulhas plain to Cape Infanta	Limestone pavements and depressions on limestone ridges. Confirmed by MacDonald (2017)	**DEFINITE** Found on site
Euchaetis intonsa		De Hoop Nature Reserve.	Southeast-facing slopes in coastal limestone fynbos	LOW Out of distribution range.
Euchaetis laevigata	VU	Cape Agulhas to Potberg.	In sandy pockets between limestone rocks in sparse fynbos dominated by restios and Leucadendron species.	LOW Out of distribution range.
Felicia ebracteata	VU	De Hoop to Ystervarkpunt.	Coastal limestone.	HIGH
Gnidia spicata	VU	Malmesbury to Potberg.	Coastal lowlands in marshy flats and dune slacks.	LOW
Heliophila linearis var. reticulata	VU	Hawston to Stilbaai.	Soft, crumbly aeolian “rock”/consolidated dunes from about 10 - 110 m a.s.l	LOW
Hermannia lavandulifolia	VU	Worcester to the Overberg, and along the southern Cape coastal	Clay slopes in renosterveld and valley thicket. Abundant in previously disturbed habitat.	HIGH

		lowlands to Plettenberg Bay.		
Indigofera mundiana	EN	Bredasdorp to Stilbaai.	Sandy coastal plains.	LOW Out of distribution range.
Lampranthus ceriseus	VU	Agulhas Plain to Riversdale.	Coastal limestone fynbos. An unconfirmed record on site.	HIGH, possibly DEFINITE
Lampranthus fergusoniae	VU	Pearly Beach to Knysna.	Calcareous soils often associated with limestone dunes.	HIGH, possibly DEFINITE
Lampranthus pauciflorus	EN	From De Hoop Cape Infanta to Keurbooms, Plettenberg Bay	On rocky coastal slopes and clay hills.	MODERATE
Lebeckia gracilis	EN	Gqeberha to Bredasdorp.	Coastal fynbos in deep sandy soils below 300 m.	MODERATE
Leucadendron galpinii	EN	De Hoop to Mossel Bay.	Low-lying areas between limestone hills on deeper, neutral soils.	LOW
Leucadendron linifolium	NT	Cape Flats to Riversdale.	Occurs on acid and alkaline sands that are seasonally waterlogged and appears to benefit from vegetation that is disturbed, overgrazed or too-frequently burned.	HIGH
Lobelia valida	VU	De Hoop to Stilbaai.	Coastal limestone hills.	HIGH
Orthochilus litoralis	EN	Kleinmond to Plettenberg Bay, Jonkershoek and Langeberg Mountains.	Well-drained, coarse sandy soils or coastal dunes, typically near sea level, with inland populations occurring at altitudes of ± 360 m.	LOW
Osteospermum subulatum	VU	Agulhas Plain.	Limestone fynbos.	HIGH
Otholobium sp. nov. (Esterhuysen 33240a BOL)	VU	Hawston to Stilbaai. Type locality: Hills north of De Hoop.	Coastal limestone soils. Canca Limestone Fynbos, De Hoop Limestone Fynbos, Agulhas Limestone Fynbos, Hartenbos Dune Thicket	MODERATE
Pentameris calcicola var. hirsuta	VU	Bredasdorp to Riversdale.	Limestone outcrops / limestone pavements.	MODERATE
Selago diffusa	VU	Gansbaai to Stilbaai.	Limestone flats, outcrops, slopes and hills, as well as sand dunes.	MODERATE
Selago glandulosa	VU	Potberg to Mossel Bay.	Coastal dunes and on limestone hills and outcrops.	MODERATE
Senecio lycopodioides	VU	Agulhas to Stilbaai.	Limestone rocks.	HIGH
Stoebe muirii	VU	Stilbaai to Bredasdorp.	Coastal limestone ridges, often in disturbed places and along	LOW

			roadsides. Distribution seems clustered.	
Thamnochortus muirii	VU	Potberg to Mossel Bay.	Deep sandy habitats associated with limestone, 30-200 m.	MODERATE
Thamnochortus pluristachyus	VU	Agulhas Plain to Stilbaai.	Coastal limestone pavements, in cracks in the limestone bedrock, 50-100 m.	MODERATE
Tribolium ciliare	VU	Agulhas Plain to De Hoop.	Limestone slopes and flats. On Bredasdorp limestone outcrops; disturbed areas with well-drained soils that are dry in summer.	LOW
Wahlenbergia polyantha	VU	Kleinmond to Knysna.	Sandy flats.	LOW
Wahlenbergia subulata var. congesta	VU	Cape Infanta.	On sand over limestone near the coast. Known from only 1 location? iNat seems to not recognise variety	LOW
Zostera capensis	EN (in South Africa only)	In South Africa from Olifants Estuary to Kosi Bay; also in Kenya, Madagascar, Mozambique and Tanzania.	Intertidal zone of permanently open estuaries in South Africa but can be found in temporarily closed estuaries when conditions are saline.	NEGLIGIBLE
Sensitive species 5	VU	Bredasdorp to Still Bay.	Limestone hills and flats near the coast. Top of low limestone ridges and hills, and in stony sand on limestone flats.	MODERATE
Sensitive species 53	VU	Cape Peninsula to Humansdorp.	Sodden marsh environments on peaty soil derived from a combination of blackened organic material and Table Mountain Sandstone derived soils, below 300 m.	NEGLIGIBLE
Sensitive species 340	VU	Agulhas Plain to Gouritz River. Appears to be a gap in the distribution at Infanta.	Shallow pockets of sandy soil between limestone boulders.	LOW
Sensitive species 500	EN	Cape Flats to Gqeberha. Large gap in distribution that excludes Infanta.	Lowland sandy flats, stabilised dunes and coastal rock promontories.	LOW
Sensitive species 599	VU	Elandsbaai to the Cape Peninsula and Bredasdorp.	Damp sandy flats.	NEGLIGIBLE
Sensitive species 800	VU	Cape Peninsula to Knysna.	Limestone and clay loam soil, fynbos and renosterveld on coastal lowlands.	HIGH
Sensitive species 913	VU	Franskraal to Riversdale.	Seasonally moist sandy soil in limestone fynbos.	LOW
Sensitive species 1142	VU	Between Bot River, Robertson, Mossel Bay	Rocky places in shale and coastal limestone.	LOW

		and Cape Agulhas. No recent collections near Infanta.		
Sensitive species 1192	LC	From Betty's Bay, Pearly Beach, Cape St Francis, Komga to Kentani.	Moist, sometimes brackish soils, in dune slacks immediately inland from the shoreline.	NEGLIGIBLE

The Endangered plant species, *Erica oblongiflora*, was found on the proposed development site in Limestone Fynbos. A total of 35 plants were found on site, scattered across the area of fynbos.

The conservation assessment for the species describes threats to the species as follows:

> "EOO 479 km², recorded from three locations, and declining due to invasive alien *Acacia cyclops* encroachment, brush cutting and livestock grazing."

The population on site has moderate to low importance for conservation of the species. This is based on the overall distribution of the species, which extends from Bredasdorp to Infanta, a distance of over 80 km in which there is over 400 km^2 of suitable habitat for the species. The De Hoop Nature Reserve is ideal habitat for the species, and it has been recorded many times there. In addition, there is a small limestone hill about 600 m south of the site where several hundred individuals of the plant were found. A summary analysis is therefore as follows:

1. The overall geographical range of the species is relatively large.
2. Several populations / large numbers of observations of the species occur within a formal protected area (De Hoop Nature Reserve). This constitutes the core population of the species and is secure. The threats to the species (alien invasion, brush cutting and livestock grazing) do not occur within the reserve.
3. A limestone outcrop near to the site contains a significantly larger number of plants than the site itself. This limestone outcrop is linked via unaltered natural landscapes to the De Hoop Nature Reserve.

4. The population on site is at the limit of the range of the species, in a relatively degraded landscape, and not well ecologically linked to the core population of the species. Loss of this population would result in a relatively insignificant range reduction and no impact on the core population.
5. The population on site is mostly contained within an area that is being retained as a green belt within the development.

There is a confirmed presence of SCC on site; therefore, a Terrestrial Plant Species Assessment is submitted in accordance with the requirements specified for high sensitivity in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species (GN. No. 320 of October 2020).



Figure 14: Location of plants of *Erica oblongiflora* found on site.

Outcome of the assessment

Site ecological importance: terrestrial plant species theme

The Species Environmental Assessment Guidelines require that a Site Ecological Importance is calculated for each habitat on site and provides methodology for making this calculation.

As per the Species Environmental Assessment Guidelines, Site Ecological Importance (SEI) is calculated as a function of the Biodiversity Importance (BI) of the receptor and its resilience to impacts (SEI = BI + RR). The Biodiversity Importance (BI) in turn is a function of Conservation Importance (CI) and Functional Integrity (FI), i.e. BI = CI + FI.

Following the methodology provided in the Species Environmental Assessment Guidelines to determine the importance of any habitat on site, the criteria shown in the table below apply to the Limestone Fynbos habitat on site for the proposed development site and the Sand Fynbos for the proposed pipeline.

None of the other habitats on site contained any plant SCC, therefore they all have LOW SEI with respect to the Terrestrial Plant Species theme.

Habitat	**Conservation importance** **(CI)**	**Functional integrity** **(FI)**	**Biodiversity Importance (BI = CI x FI)**	**Receptor resilience** **(RR)**	**Site Ecological Importance** **SEI = BI x RR)**
Limestone Fynbos	High Confirmed occurrence of EN species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	Medium Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance.	Medium	Very low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the	High

				disturbance or impact has been removed.	
Sand Fynbos (pipeline route only)	High Confirmed occurrence of VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	High Large (> 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	High	Very low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.	Very High
Degraded (heavily invaded) Limestone Fynbos	Low No suspected occurrence of SCC.	Low Several minor and major current negative ecological impacts - Disturbed, partially transformed and heavily invaded.	Low	Very low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.	Medium
Strandveld	Low No confirmed and highly unlikely populations of SCC.	Low Several minor and major current negative ecological impacts - Disturbed, partially transformed and heavily invaded.	Low	High Habitat that can recover relatively rapidly (~ 5 - 10 years) to restore > 75% of the <u>current</u> species composition and functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the	Very low

				disturbance or impact has been removed.	
Other	Very low No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	Low Several minor and major current negative ecological impacts - transformed.	Very low	Very high Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the current species composition and functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	Very low

The calculation of Site Ecological Importance includes an explicit recognition of the ability of each ecosystem to tolerate and recover from disturbance. Guidelines for development activities within different importance levels are given in the table below.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/ not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Remaining Limestone Fynbos areas on the proposed development site have HIGH sensitivity with respect to the Terrestrial Plant Species Theme. This is due to the confirmed presence of an Endangered plant species within these habitats on site, *Erica oblongiflora*. Surrounding areas dominated by alien plants have MEDIUM sensitivity because they are potential habitat for this Endangered species and could be rehabilitated to a more natural condition.

For the proposed water pipeline route, all areas mapped as Albertinia Sand Fynbos have HIGH sensitivity with respect to the Terrestrial Plant Species Theme. This is due to the confirmed presence of three species listed as Vulnerable, namely *Agathosma muirii* (Vulnerable), *Berzelia cordifolia* (Vulnerable), and *Gladiolus vaginatus* (Vulnerable). There are also five species listed as Near Threatened that are confirmed to occur along this pipeline route, namely *Amphithalea alba* (Near threatened), *Asparagus lignosus* (Near



Figure 14: Site Ecological Importance (SEI) of habitats on site for the Terrestrial Plant Species Theme.

threatened), *Lachnaea axillaris* (Near threatened), *Leucadendron meridianum* (Near threatened), and *Protea susannae* (Near threatened).

Habitat sensitivity: terrestrial biodiversity theme

According to the "PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY", there are two sensitivity classes for Terrestrial Biodiversity Theme: VERY HIGH or LOW. The VERY HIGH category includes any area of natural vegetation that falls within one of the following categories:

1. terrestrial Critical Biodiversity Areas (CBAs).
2. terrestrial Ecological Support Areas (ESAs).
3. protected areas as defined by the National Environmental Management: Protected Areas Act, 2004.
4. priority areas for protected area expansion.

Any area that is in a natural state and that falls within one of these categories is therefore automatically assigned a sensitivity class of VERY HIGH and requires a Terrestrial Biodiversity Specialist Assessment. Areas that do not fall into one of these categories are automatically assigned a sensitivity class of LOW.

The definition of natural vegetation, according to the National Environmental Management Act, 1998 (Act No. 107 of 1998) is "*vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years*." According to this description, the vegetation on site (including secondary vegetation) is legally in a natural state.

Proposed development site

The only feature on site that affects sensitivity with respect to the Terrestrial Biodiversity theme is CBA1 and ESA1 areas. The vegetation on site was originally Overberg Dune Strandveld, which is listed as Endangered. The vegetation type has been updated at SANBI and is now called Southwestern Strandveld, which has been assessed as Least Threatened. However, this update has not yet been made in the published Revised National Ecosystem List. Assuming that this legal status will change for this ecosystem (and that the

ecosystem will no longer be listed) the areas on site that are outside the CBA network but within Southwestern Strandveld (previously Overberg Dune Strandveld) will not have high sensitivity for the Terrestrial Biodiversity theme. This interpretation is applied here.

The CBA1 areas for the site are very blocky and do not align with any feature on the ground. The reason given for the CBA1 areas is "*areas in a natural state that are required to meet biodiversity targets, for species, ecosystems, or ecological processes and infrastructure*". It is suggested here that the boundary be aligned with the coastal ecosystems identified on site, namely the sea-facing slopes and associated wave-cut areas. The area in orange in **Figure 16** is therefore proposed as the area to be protected to meet the ecological processes target.

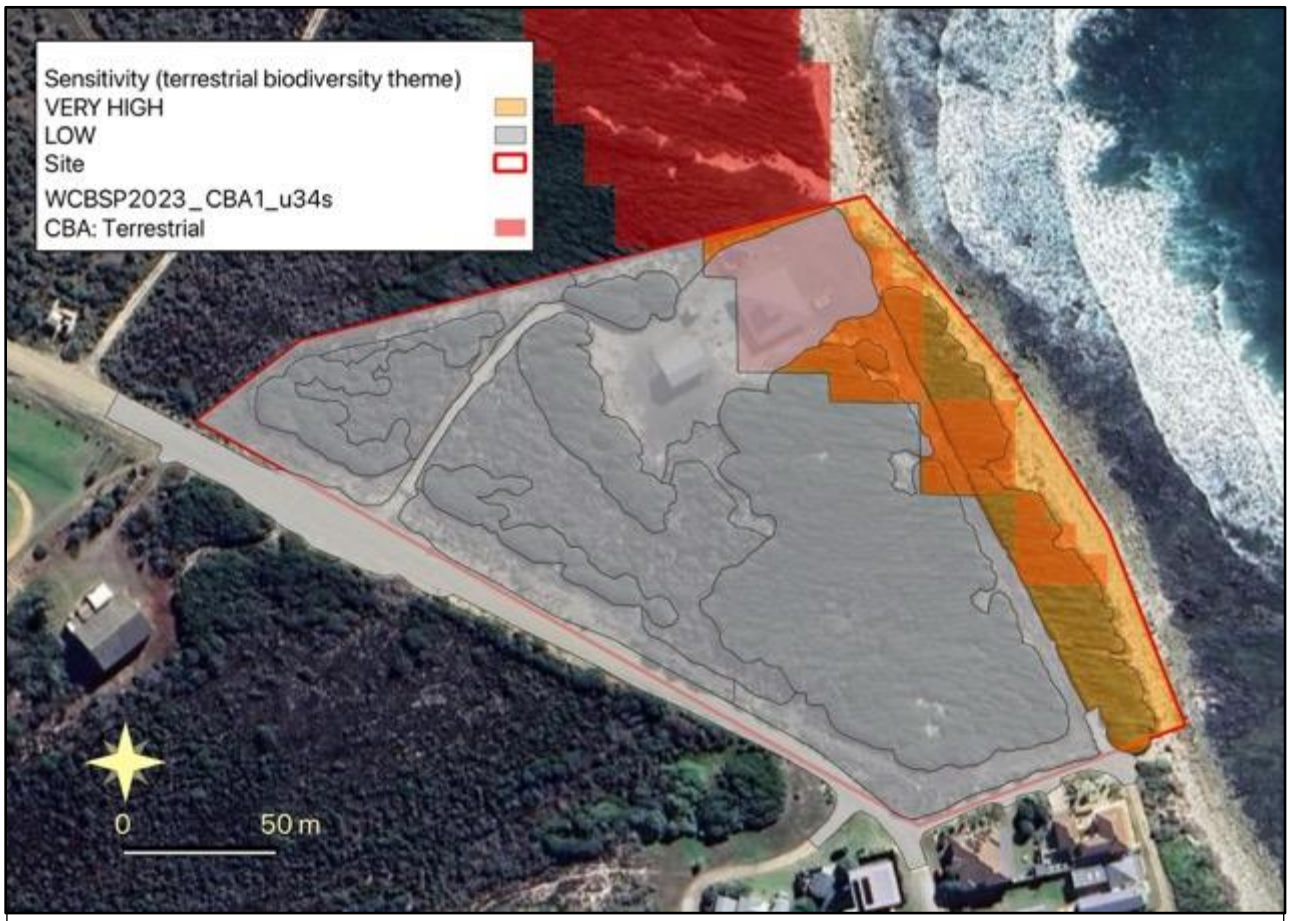


Figure 15: Site Sensitivity of habitats on site for the Terrestrial Biodiversity Theme.

Proposed pipeline and reservoir

The entire proposed pipeline route and reservoir site, except for where it crosses the main road into Infanta, is within CBA1, CBA2 and ESA1 areas. The CBA1 and CBA2 areas are also within a listed Endangered ecosystem, Albertinia Sand Fynbos. According to the definition of natural vegetation in the National Environmental Management Act, 1998 (Act No. 107 of 1998), all the vegetation along the proposed pipeline route and the proposed reservoir site, excluding the road crossing, is legally in a natural state. It is also ecologically intact and functional. The proposed water pipeline route and reservoir therefore have VERY HIGH sensitivity with respect to the Terrestrial Biodiversity Theme.

Impact assessment

Proposed development site

The proposal is to develop a small urban cluster on the site, retaining the existing buildings and driveway (**Figure 17**). This layout avoids the drainage valley, the coastal slopes and a significant part of the Limestone Fynbos on site in which the Endangered plant species, *Erica oblongiflora*, occurs.

The impacts assessed here are therefore as follows:

1. Impacts on SCC (plants).
2. Impacts on Critical Biodiversity and Ecological Support Areas.

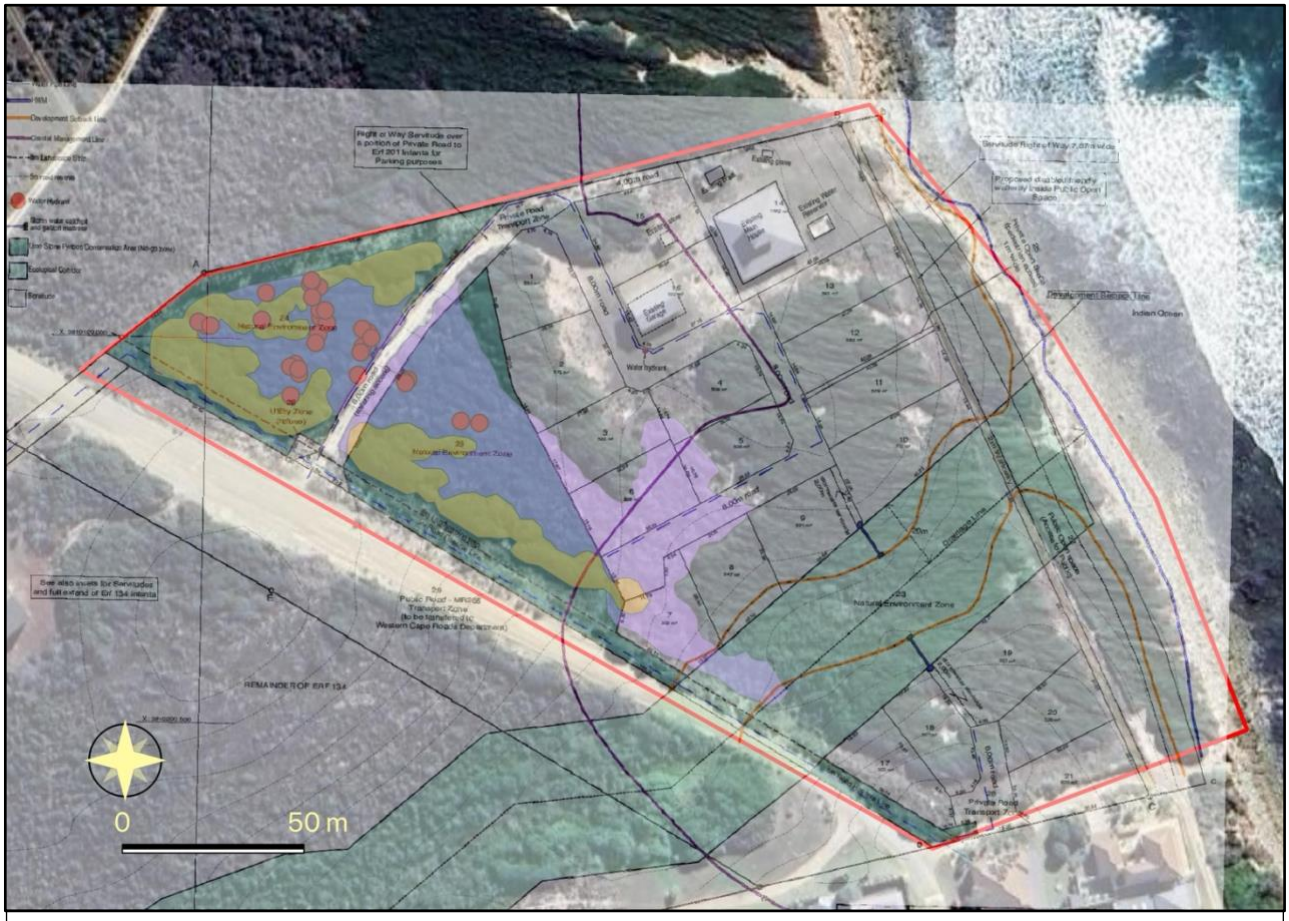


Figure 16: Proposed layout of stands. Locations of the threatened plant species are shown, as well as limestone fynbos habitats in which it occurs.

In assessing impacts of the proposed project, the mitigation hierarchy is followed. The mitigation hierarchy is a sequential process for managing environmental impacts by prioritising actions from most to least effective: first, avoiding impacts, then minimizing them, followed by rehabilitating or restoring affected areas, and finally, offsetting any remaining residual impacts.

The four steps of the mitigation hierarchy:

- **Avoid**: Prevent impacts from occurring in the first place. This is the most effective step and can involve avoiding sensitive habitats entirely.
- **Minimize**: Reduce the duration, intensity, or extent of impacts that cannot be avoided. This could involve modifying project design or phasing operations to lessen harm to species or ecosystems.
- **Rehabilitate/Restore**: Remediate or restore areas that have been affected by the project to a good condition. This can include replanting vegetation or repairing damaged habitats.
- **Offset**: Compensate for any remaining, unavoidable, residual impacts through actions in a different location. This step is only considered after the first three have been implemented and is often used to achieve a "no net loss" goal for biodiversity.

Impacts such as loss or degradation of natural habitat, and effects on threatened species are assessed with this methodology considering their irreplaceability, reversibility, spatial and temporal extent, and intensity.

Impacts on plant Species of Conservation Concern

Resource irreplaceability: The plant species that was found on site is *Erica oblongiflora* (Endangered). The species is relatively widespread (EOO of > 400 km^2) and only a very small proportion of the global distribution occurs within the Limestone Fynbos habitat on site adjacent to the development footprint. The population on site is at the limit of the distribution range of the species, is in peripheral, impacted habitat that is poorly connected to other populations, and is not within the core area of the population.

Threshold: The potential impact may affect this SCC indirectly, but it is a small proportion of the total population of the species.

Resource condition: The vegetation on site (within the proposed development footprint) is in moderate condition, although affected by alien invasion to various degrees. No SCC occur within the development footprint.

Reversibility of impact: Loss of SCC surrounding the development footprint would probably be irreversible.

Extent of impact: The impact would be limited to the population on site and would have a low impact on the total population of the SCC.

Duration of impact: Loss of any habitat in the footprint of the development is assessed as being permanent. Loss of habitat in surrounding areas is also permanent.

Intensity of impact: At a local scale, the impact is low, as SCC do not occur within the footprint of development.

Probability of occurrence: Based on the proposed development plan and the lack of habitat of SCC found on site, the probability of the impact occurring will be very low.

Confidence: There is a high understanding of the identity and on-site value of the habitat for SCC, as well as the nature and extent of the proposed activity. No measures are therefore required to improve the confidence in the assessed impact.

There is a high understanding of the identity and distribution of the species on site, as well as the nature and extent of the proposed activity.

Mitigation: Avoidance: the only possible avoidance is to shift infrastructure positions to avoid plants and the suitable habitat. Minimization: implement ecological management plan. Legal compliance: It is a legal requirement, according to Provincial legislation, to obtain a permit from CapeNature for destruction of any SCC. This requirement is independent of the Environmental Authorisation process. Provincial botanical controls are managed under the Nature Conservation Ordinance 19 of 1974 (and transitioning framework elements of the

Western Cape Biodiversity Act) administered directly by CapeNature. Commencing site clearance without the separate flora permit constitutes a criminal offense, even if the developer holds a valid NEMA environmental approval for the construction footprint.

	Biodiversity value				Impact magnitude			Probability	Significance
Impact on Plant SCC	**I**	**T**	**C**	**R**	**E**	**D**	**M**		
Before mitigation	3	2	3	4	1	5	2	Low	LOW
After mitigation	3	2	3	4	1	5	1	Improbable	LOW

Impacts on Critical Biodiversity Areas

Resource irreplaceability: Small parts of the site occur within CBA1 and ESA areas. The transformed vegetation on the coast does not have properties consistent with protecting biodiversity patterns and function.

Threshold: The proposed development will have a very small impact on the CBA networks.

Resource condition: The vegetation on site (within the proposed development footprint) is in very poor condition.

Reversibility of impact: Loss of highly degraded habitat on site (within the proposed development footprint) is probably fully REVERSIBLE - secondary vegetation can easily be restored to its current state through active rehabilitation in combination with natural succession.

Extent of impact: The impact will occur within the boundary of the footprint of development. It is unlikely that there will be spillover effects into surrounding areas.

Duration of impact: Loss of any habitat in the footprint of the development is assessed as being permanent, but this has already occurred.

Intensity of impact: At a local scale, the impact on CBAs is very low.

Probability of occurrence: Based on the proposed development plan, the probability of the impact on CBAs occurring will be low.

Confidence: There is a high understanding of the identity and on-site value of the vegetation, as well as the nature and extent of the proposed activity. No measures are therefore required to improve the confidence in the assessed impact.

Mitigation: Avoidance: The largest part of the CBA1 area on site is within the footprint of the existing buildings and lawns. It is not feasible to avoid this. Remediation: control aliens and rehabilitate coastal areas.

	Biodiversity value				Impact magnitude			Probability	Significance
Impact on CBAs	**I**	**T**	**C**	**R**	**E**	**D**	**M**		
Before mitigation	4	1	1	1	1	5	1	Definite	VERY LOW
After mitigation	4	1	1	1	1	5	1	Definite	VERY LOW

Proposed water pipeline and reservoir

The proposal is to construct a reservoir and a water pipeline to provide water to the proposed development. The pipeline is proposed to be aligned along the northern boundary of Erf 134 from the development site to the reservoir location. This runs past Infanta Park, but crosses mostly through an Endangered ecosystem, Albertinia Sand Fynbos, and CBA1 and CBA2 areas, as well as ESA1 areas in the parts of the pipeline that are within De Hoop Limestone Fynbos. Three plant species listed as Vulnerable are confirmed to occur along the proposed pipeline alignment.

The impacts assessed here are therefore as follows:

3. Impacts on SCC (plants).
4. Impacts on Critical Biodiversity and Ecological Support Areas.

Impacts on plant Species of Conservation Concern

Resource irreplaceability: The plant species that were found on site are namely *Agathosma muirii* (Vulnerable), *Berzelia cordifolia* (Vulnerable), and *Gladiolus vaginatus* (Vulnerable). All three species are relatively widespread (EOO of > 400 km^2) and only a very small proportion of the global distribution occurs within the affected habitat. For *Agathosma muirii*, the site is near to the western limit of the distribution range of the species. For *Berzelia cordifolia*, the site is on the north-eastern edge of the distribution range of the species. For *Gladiolus vaginatus* the site is approximately in the middle of the known distribution range, but the species is widespread, occurring from Cape Point to Plettenberg Bay. Although all three species have relatively extensive known distributions, the affected individuals occur within intact and connected natural vegetation, and the site contributes to the persistence of these species within their respective ranges. The occurrence is therefore of local conservation importance, although the loss of a small number of individuals is unlikely to materially affect the global or regional persistence of any of the species.

Threshold: Although the loss of individual SCC plants within the construction footprint would be effectively irreversible, the number of individuals affected represents only a small proportion of the local and wider populations and is not expected to affect population viability or ecological functioning. The relevant ecological threshold is therefore not expected to be approached.

Resource condition: The vegetation on site (within the proposed development footprint) is in moderate to good condition, although affected by edge effects associated with Infanta Park to various degrees.

Reversibility of impact: Loss of SCC surrounding the development footprint would probably be irreversible.

Extent of impact: The impact would be limited to individual plants on site and would have a low impact on the total population of the SCC.

Duration of impact: Loss of any habitat in the footprint of the development is assessed as being permanent.

Intensity of impact: At a local scale, the impact is low, and population dynamics are unlikely to be significantly affected.

Probability of occurrence: Based on the proposed development plan and the known occurrence of plants, the probability of the impact occurring is definite.

Confidence: Confidence in the assessment is high with respect to the identity and distribution of the SCC detected within the affected area and the nature and extent of the proposed activity. The exact number of individuals that may be affected has not been determined; however, this uncertainty is not considered material to the significance assessment because the affected area represents a small proportion of the available habitat and the proposed mitigation will minimise the construction footprint.

Mitigation: Avoidance: The proposed alignment follows an existing disturbed boundary/access corridor and therefore represents the preferred alignment from a biodiversity perspective. Alternative alignments that would require new disturbance within intact natural vegetation would be less desirable. The alignment should therefore not be moved into currently undisturbed natural vegetation to address other project constraints unless the alternative is subject to a comparative ecological assessment. Minimization: Before construction, undertake a walk-through survey of the final servitude, clearly demarcate the construction corridor, mark SCC individuals immediately adjacent to the corridor and prohibit vehicle movement outside the demarcated area. During construction, ensure that there is no unnecessary clearing of vegetation, no stockpiling outside the approved footprint, prevent soil contamination and retain topsoil separately. Rehabilitation: After construction, rehabilitate the temporary construction corridor, control alien species and monitor rehabilitation. Legal compliance: It is a legal requirement, according to Provincial legislation, to obtain a permit from CapeNature for destruction of any SCC. This requirement is independent of the Environmental Authorisation process. Provincial botanical controls are managed under the Nature Conservation Ordinance 19 of 1974 (and transitioning framework elements of the Western Cape Biodiversity Act) administered directly by CapeNature. Commencing site clearance without the separate flora permit constitutes a criminal offense, even if the developer holds a valid NEMA environmental approval for the construction footprint.

	Biodiversity value				Impact magnitude			Probability	Significance
Impact on Plant SCC	**I**	**T**	**C**	**R**	**E**	**D**	**M**		
Before mitigation	3	2	5	3	1	4	2	High	LOW
After mitigation	3	2	5	3	1	4	2	High	LOW

Localised loss and disturbance of CBA habitat

Resource irreplaceability: Most of the pipeline occurs within CBA1, CBA2 and ESA areas. It is also within an Endangered ecosystem, Albertinia Sand Fynbos. The CBAs are required for meeting biodiversity targets for the Endangered ecosystem.

Threshold: Although the pipeline traverses mapped CBA1, CBA2 and ESA areas, the proposed disturbance is narrow and linear and is largely confined to an existing disturbed boundary/access corridor. The impact therefore represents a small area of temporary and permanent disturbance relative to the extent of the mapped biodiversity network. Importantly, the proposed activity is not expected to result in fragmentation of the CBA network, sever ecological connectivity, or materially affect the ecological processes for which the areas were identified. The significance of the impact therefore relates primarily to localised vegetation loss rather than loss of the broader functionality of the CBA network.

Resource condition: The vegetation on site (within the proposed development footprint) is in good condition.

Reversibility of impact: Temporary disturbance associated with pipeline installation is considered largely reversible through appropriate rehabilitation, although recovery of the original vegetation composition and structure may take an extended period. The buried pipeline itself represents a permanent infrastructure element but is not expected to prevent subsequent development of vegetation over the servitude. Overall, the ecological effect is therefore considered substantially reversible at the surface level, subject to effective rehabilitation.

Extent of impact: The impact will occur within the boundary of the footprint of development. It is unlikely that there will be spillover effects into surrounding areas.

Duration of impact: Loss of any habitat in the footprint of the development is assessed as being long-term.

Intensity of impact: At a local scale, the impact on CBAs is very low.

Probability of occurrence: Based on the proposed development plan, the probability of the impact on CBAs occurring will be low - there will be a slight impact on processes.

Confidence: There is a high understanding of the identity and on-site value of the vegetation, as well as the nature and extent of the proposed activity. No measures are therefore required to improve the confidence in the assessed impact.

Mitigation: Avoidance: If the pipeline is required to follow this route then there is no feasible way to avoid the CBA1/CBA2 areas. Remediation: control aliens and rehabilitate impacted areas.

	Biodiversity value				Impact magnitude			Probability	Significance
Impact on CBAs	**I**	**T**	**C**	**R**	**E**	**D**	**M**		
Before mitigation	4	3	4	4	1	5	2	Definite	MODERATE
After mitigation	4	2	4	4	1	5	2	Definite	LOW

Conclusion

Proposed development site

PLANT SPECIES THEME:

1. The proposed development site was flagged as having MEDIUM sensitivity with respect to the Terrestrial Plant Species Theme.
2. The site inspection and desktop research determined the sensitivity to be HIGH—an Endangered plant species, *Erica oblongiflora*, was confirmed to occur on site. A total of 35 plants were found on site within Limestone Fynbos. The population on site is an isolated population on the edge of the known distribution of the species. It is within a small, fragmented and isolated patch of habitat far from the core areas where the species occur.
3. The proposed development footprint avoids most plants, and a large proportion of the most suitable habitat is avoided. The proposed layout is therefore likely to have impacts of LOW significance on this Terrestrial Plant SCC.

TERRESTRIAL BIODIVERSITY THEME:

1. The site consists of various degraded and transformed habitats, as well as small areas of limestone fynbos that is slightly within the direct footprint of the proposed project.
2. The site was flagged as having VERY HIGH sensitivity with respect to the Terrestrial Biodiversity Theme. The features of concern for this project are small patches of CBA1 and ESA1, as well as areas occurring within a listed ecosystem, namely Overberg Dune Strandveld, which is listed as Endangered. The vegetation type has been updated at SANBI and is now called Southwestern Strandveld, which has been assessed as Least Threatened. However, this update has not yet been made in the published Revised National Ecosystem List.
3. The site inspection and desktop research shows that all affected areas on site are previously disturbed and currently contain alien vegetation, which is legally defined

as being in a natural state, as well as transformed areas. The alien vegetation does not have the characteristics of the original untransformed vegetation that would have occurred there. No intact areas of the CBAs/ESAs will therefore be affected. Any disturbance can be rehabilitated to the current state within relatively short timeframes.

4. The proposed development is likely to have impacts of VERY LOW significance on any Terrestrial Biodiversity features.

It is therefore possible to develop the proposed development without having significant impacts on any natural features, on the following conditions:

- All construction-related impacts are to be kept within the proposed footprint areas.
- Employ construction best practices to minimise soil disturbance, runoff, and vegetation clearing.
- Develop and implement Alien Invasive Species Management Plans pre- and post-construction.

Minimal biodiversity impacts are expected if these conditions are met. This project based on the implementation of these recommendations is supported.

Specific issues relevant to the site are as follows:

Alien invasive species: Parts of the site are heavily invaded by *Acacia cyclops* (rooikrans). These are within the proposed footprint area of the development, but also extending into remaining limestone areas, along the coastal slopes, and in the drainage valley. If the development is approved then it will still be necessary to control aliens in the three remaining zones mentioned. Ideally, the entire coastline northwards needs proper alien control intervention, which would be a community-wide initiative and beyond the responsibility of a single property owner.

Hydrology: The drainage valley needs to be rehabilitated as best as possible, primarily through alien clearing. It is part of a dune ecosystem, therefore control of the aliens is likely to lead to natural propagation into the site of bird-dispersed shrub species, such as *Searsia*

laevigata, *Searsia glauca*, *Colpoon compressum* and others. It is likely that milkwoods (*Sideroxylon inerme*) will also eventually propagate into the site.

Limestone fynbos: The limestone fynbos on site is not in good condition and has been degraded by several historical factors, including fragmentation (Infanta road and property driveway), isolation from other limestone areas (due to urbanisation, cultivation, roads, alien invasion), edge effects, and invasion by alien species. Nevertheless, it is recommended that the core area is not developed and that it is managed as best as possible to improve its condition. Whether there is any long-term likelihood that it survives is debatable, but it is worth giving it a chance.

Coastal slopes: The heavily invaded areas overlooking the coast need to be cleared of aliens and rehabilitated. The natural vegetation would have been a wind-cropped milkwood-dominated dwarf thicket, but it is unlikely that this will be able to be re-established under current conditions. However, this zone is included in a CBA1 area and effort should be taken to restore natural function without alien species.

Proposed water pipeline route and reservoir

PLANT SPECIES THEME:

1. The proposed pipeline and associated infrastructure were flagged by the DFFE Screening Tool as having MEDIUM sensitivity with respect to the Terrestrial Plant Species Theme.
2. The site inspection and desktop assessment determined that the sensitivity is HIGH, based on the confirmed occurrence of three Vulnerable plant Species of Conservation Concern (SCC), namely Agathosma muirii, Berzelia cordifolia and Gladiolus vaginatus. Although these species are Vulnerable, they are relatively widespread and the populations occurring within the affected area represent only a small proportion of their overall populations and distributions.
3. The proposed pipeline alignment has been positioned along an existing disturbed boundary/access corridor, thereby limiting the extent of new disturbance to natural habitat. The proposed footprint is narrow and is expected to affect only a small

number of individuals of the confirmed SCC. The loss of these individuals is not expected to affect the persistence or population viability of any of the species.

4. The impact on plant SCC is therefore assessed as LOW significance, provided that the construction footprint is strictly controlled and the required plant permits and mitigation measures are implemented.

TERRESTRIAL BIODIVERSITY THEME:

1. The proposed pipeline and associated infrastructure were flagged by the DFFE Screening Tool as having VERY HIGH sensitivity with respect to the Terrestrial Biodiversity Theme.
2. The pipeline traverses natural habitat representative of Albertinia Sand Fynbos, an Endangered ecosystem. The affected areas are also mapped as CBA1, CBA2 and/or ESA areas, reflecting their importance for meeting biodiversity targets and maintaining ecological support functions.
3. The field assessment confirmed that the affected areas contain natural vegetation, although the habitat along the proposed pipeline alignment is locally influenced by existing disturbance associated with the property boundary and access. The proposed pipeline will therefore result in some direct disturbance and loss of natural vegetation within mapped biodiversity priority areas.
4. Notwithstanding the high biodiversity importance of the affected areas, the proposed impact is highly localised and linear, and the pipeline alignment follows an existing disturbed boundary/access corridor. The proposed development is not expected to result in significant fragmentation of the surrounding natural habitat, disrupt landscape connectivity, or materially compromise the ecological processes or biodiversity targets for which the CBA and ESA areas were identified. Temporary construction disturbance can also be substantially reduced through appropriate rehabilitation.
5. The impact on terrestrial biodiversity features is therefore assessed as LOW significance, provided that the construction footprint is strictly controlled and the specified mitigation and rehabilitation measures are implemented.

CONDITIONS OF APPROVAL / MITIGATION

It is considered possible to construct the proposed water infrastructure without significant residual impacts on plant SCC or terrestrial biodiversity features, provided that the following measures are made conditions of the Environmental Authorisation:

1. All construction-related disturbance must be restricted to the approved development and construction footprint. No unnecessary clearing, vehicle movement, material storage or other construction activities may occur within adjacent natural vegetation.
2. The proposed pipeline alignment should be retained along the existing disturbed boundary/access corridor and should not be relocated into currently undisturbed natural habitat without a comparative ecological assessment.
3. Construction must follow best-practice measures to minimise vegetation clearing, soil disturbance, erosion, runoff and sedimentation.
4. An Alien Invasive Species Management Plan must be developed and implemented before construction and maintained during and after construction.
5. All temporary disturbance associated with construction must be rehabilitated following completion of the pipeline installation, with appropriate topsoil handling and management of alien invasive species.
6. A CapeNature flora permit must be obtained before any listed plant SCC are damaged, destroyed or removed, where required by applicable provincial legislation.

The proposed water infrastructure will result in a small, localised loss and disturbance of natural vegetation within areas of high biodiversity importance. However, the proposed alignment has been selected to minimise new disturbance, follows an existing disturbed boundary/access corridor, and is not expected to compromise the ecological functionality, connectivity or biodiversity objectives of the surrounding CBA and ESA network. Similarly, the number of plant SCC individuals potentially affected represents only a small proportion of the relevant species' populations and is not expected to affect their population viability. The residual impacts are therefore assessed as LOW significance, provided that the mitigation, rehabilitation and legal compliance measures specified above are implemented. On this basis, the proposed water infrastructure is supported from a terrestrial biodiversity and plant SCC perspective.

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Appendix 1

Impact assessment factors used:

- Resource Irreplaceability (I): Measures the uniqueness and rarity of the biodiversity resource. This ranges from widespread/common resources (Low) to critically rare resources with persistence thresholds exceeded (High).
- Threshold (T): The scale of impact relative to the total distribution of the resource, representing how much the impact contributes towards ecological thresholds. Scores range from negligible to impact on a significant proportion.
- Resource Condition (C): The integrity and quality of the biodiversity resource, from severely degraded to fully functional in a natural state.
- Reversibility of Impact (R): How reversible the impact is, from reversible without rehabilitation to irreversible despite mitigation.
- Extent of Impact (E): The geographic scale of the impact, from site-specific to regional or global.
- Duration of Impact (D): Time over which the impact persists, ranging from immediate (0-1 year) to permanent (indefinite).
- Intensity of Impact (M): Degree of alteration, from no impact on processes to permanent cessation.
- Probability of Occurrence (P): Likelihood of impact occurring without mitigation, from improbable to definite.
- Confidence (not always scored explicitly): Level of certainty in the data and assessment.
- Significance of Impact (S): A combined score reflecting the biodiversity value, magnitude, and probability of the impact, classified as very low, low, moderate, high, or very high.
- The significance calculation is a function combining biodiversity importance and impact magnitude, with detailed scoring for each factor allowing an objective and transparent rating of impacts.

The impact assessment methodology assists in evaluating the overall effect of a proposed activity on the environment. The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). The rating system is applied to the potential impact on the receptor. The impact assessment methodology provided below explicitly takes into account the value and condition of the biodiversity resources affected. In assessing the significance of each issue the following criteria (including an allocated point system) are used:

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
BIODIVERSITY VALUE / SENSITIVITY CRITERIA					
Irreplaceability (I) The biodiversity value of the affected resource	Resource is widespread and common and /or regenerates itself (LC)	Resource is uncommon, endemic to a restricted area, moderately rare, or is already noticeably affected but still relatively widespread (e.g., NT, ESA)	Resource is naturally rare, restricted to limited localities, ephemeral, or is approaching a threshold of persistence (VU, CBA2)	Resource is highly localised / loss has already exceeded persistence thresholds (EN, CBA1)	Resource is critically rare / loss has already well exceeded persistence thresholds (CR, Protected)
Threshold (T) The scale of the impact relative to the overall distribution of a resource, therefore the degree to which the impact contributes towards exceeding an ecological threshold	Impact affects a negligible proportion of the overall biodiversity resource	Impact affects a proportion of the biodiversity resource that is within 6 orders of magnitude of the total extent / number of the resource (0.001-0.1%)	Impact affects a proportion of the biodiversity resource that is within 4 orders of magnitude of the total extent / number of the resource (0.1-1%)	Impact affects a proportion of the biodiversity resource that is within 2 orders of magnitude of the total extent / number of the resource (1-10%)	Impact affects a proportion of the biodiversity resource that is within 1 order of magnitude or more of the total extent / number of the resource (≧10%)
Condition (C) The integrity of the resource in terms of its intactness and functionality, the coherence of its ecological structure and function	Resource in very poor condition, displaying advanced degradation		Moderately affected resource, functional but displaying obvious signs of minor degradation		Fully functional and in a state expected in a completely natural state, unaffected by human influence.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation	Mostly reversible: requires minor mitigation	Partly reversible: Recoverable with more intense mitigation	Barely reversible: unlikely to be reversed, even with intense mitigation	Irreversible: Not possible despite action
IMPACT MAGNITUDE CRITERIA					
Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Within site boundary only	Site & surroundings: Extends for a limited distance beyond site boundaries	Landscape: Outside activity area	Regional: Affects patterns at a regional or provincial scale	Global: Across borders or boundaries
Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact, 0-1 years	Short term: 1-5 years	Medium term: 5-10 years	Long term: Project life, 10-25 years	Permanent: Indefinite
Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease or continue in a highly modified way	Very High: Permanent cessation of processes
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	High	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$\boldsymbol{S = [(E + D + M)/3 \times (R + I + T + C)/4]/5}$ $\boldsymbol{Significance = (Extent + Duration + Magnitude)/3 \times (Reversibility + Irreplaceability + Threshold + Condition)/4}$				
IMPACT SIGNIFICANCE RATING					
Total Score	**0 - 1**	**1 - 2**	**2 - 3**	**3 - 4**	**4 - 5**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

Appendix 2

Proposed development site:

Acacia cyclops (NEMBA Category 1b)
Achyranthemum paniculatum
Aizoon pubescens
Asparagus suaveolens
Berkheya coriacea
Brassica tournefortii
Brunsvigia orientalis
Chenolea diffusa
Colpoon compressum
Crassula expansa
Crassula subulata
Diosma echinulata
Disparago anomala
Ehrharta villosa
Elegia microcarpa
Erica oblongiflora (EN)
Euchaetis albertiniana
Ficinia praemorsa
Indigofera heterophylla
Jamesbrittenia albomarginata
Leucadendron meridianum (NT)
Leucadendron muirii (NT)
Lycium pumilum
Mesembryanthemum aitonis
Metalasia calcicola (NT)
Muraltia saturejoides
Osteospermum moniliferum
Oxalis ciliaris
Passerina rigida
Pelargonium grossularioides
Phylica axillaris
Phylica lasiocarpa
Polygala peduncularis
Roepera flexuosa
Roepera morgsana
Ruschia calcicola
Searsia glauca
Searsia laevigata
Sideroxylon inerme
Tribolium uniolae
Wahlenbergia thunbergii

Proposed water pipeline and reservoir:

Acacia cyclops,

Acacia saligna,
Agathosma muirii (Vulnerable),
Amphithalea alba (Near threatened),
Aspalathus crassisepala,
Asparagus lignosus (Near threatened),
Asparagus rubicundus,
Aulax umbellata,
Berzelia cordifolia (Vulnerable),
Bobartia longicyma,
Brunsvigia orientalis,
Chascanum species,
Corymbium africanum,
Cuscuta angulata,
Cymbopogon pospischilii,
Disparago anomala,
Erica globulifera,
Erica placentiflora,
Erica quadrangularis,
Erica regia,
Euchaetis scabricosta,
Felicia muricata,
Ficinia species,
Gladiolus rogersii,
Gladiolus vaginatus (Vulnerable),
Gnidia juniperifolia,
Heliophila subulata,
Hermannia species,
Hypoxis species,
Imperata cylindrica,
Indigofera pinnata, I
ndigofera priorii,
Lachnaea axillaris (Near threatened),
Lachnospermum imbricatum,
Leucadendron meridianum (Near threatened),
Leucadendron salignum,
Leucospermum cuneiforme,
Lobelia chamaepitys var. chamaepitys,
Lobostemon trigonus,
Morella quercifolia,
Muraltia alopecuroides,
Phylica species,
Pittosporum species,
Polygala garcini,
Polygala peduncularis,
Prismatocarpus campanuloides,
Protea repens,
Protea susannae (Near threatened),
Rhynchosia smithiana,
Roepera species,
Serruria 'ludwigii',
Serruria fasciflora,
Stenotaphrum secundatum,
Thamnochortus species,
Themeda triandra,
Tribolium uniolae,

Trichocephalus stipularis,
Ursinia species
Wahlenbergia species