Botanical Impact Assessment, Portion of Erf 134 Infanta, Swellendam Local Municipality, Western Cape Province

Berkheya coriacea

bergwind
Botanical Surveys & Tours

Report by Dr David J. McDonald
Bergwind Botanical Surveys & Tours CC.
14A Thomson Road, Claremont, 7708
Tel: 021-671-4056
Fax: 086 517-3806
e-mail: dave@bergwind.co.za

Report prepared for Doug Jeffery Environmental Consultants

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National Legislation and Regulations governing this report

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2010.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by Doug Jeffery Environmental Consultants in July 2010 to provide specialist botanical consulting services for the Botanical Impact Assessment for the proposed development of Portion of Erf 134, Infanta, Western Cape Province. The consulting services have comprised an assessment of potential impacts on the flora and vegetation in the designated study area by the proposed project. This project has thus has a long history.

Details of Specialist

Dr David J. McDonald Pr. Sci. Nat.
Bergwind Botanical Surveys & Tours CC
14A Thomson Road
Claremont
7708
Mobile: 082-876-4051
e-mail: dave@bergwind.co.za
Professional registration: South African Council for Natural Scientific Professions No. 400094/06

Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 40 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 600 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the survey was carried out under the aegis of, Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald nor Bergwind Botanical Surveys and Tours CC have any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Bergwind Botanical Surveys & Tours CC, its staff and appointed associates, reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

Declaration of independence:

I David Jury McDonald, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

27 November 2023

Date:

CONTENTS

1. Introduction

Infanta is a small coastal village on the south side of the Breede River in the Swellendam Local Municipality on the southern Cape coast. There are some permanent residents in the village but many of the houses are mainly for holiday use; the area is known for its coastal fishing and other recreational opportunities. The owner of Erf 134 Infanta started the process of seeking rights to develop his property in 2005. For that purpose, a botanical study of the property was carried out by Helme (2005). Since that time nothing further has happened until more recently when definite development plans were tabled (2010). Bergwind Botanical Surveys & Tours CC was appointed by Doug Jeffery Environmental Consultants to conduct a follow-up botanical assessment of the eastern part of Erf 134 (i.e. that part east of the main Infanta road) to confirm Helme's (2005) conclusions and to develop a constraints analysis for the area.

A botanical baseline assessment of Portion of Erf 134 Infanta ('the property') was therefore conducted in August 2010 (McDonald, 2010). The report is incorporated in its entirety here as Section 1. The main objective of the baseline assessment was to determine botanical constraints which would influence the development of the property. The baseline botanical study determined an area of the property which is considered a 'No Go' area and an area which is developable, details of which are given in Section 1. Section 2 is the 'Impact Assessment' which determines the impacts of the proposed development, taking the baseline constraints into consideration.

The study is conducted in terms of the National Environmental Management Act (NEMA) (No.7 of 1998) as amended and the 2014 Environmental Regulations. The purpose of the botanical impact assessment is to inform the environmental assessment process.

The reporting process follows published guidelines for evaluating potential impacts on the natural vegetation in an area earmarked for development (Brownlie, 2005, Cadman et al. 2016) and takes the protocols i.e., the terrestrial biodiversity protocol gazetted in March 2020 and the terrestrial plant species protocol gazetted in October 2020 into account. The Species Environmental Assessment Guideline (SANBI, 2020) has also been taken into consideration, as has the Western Cape Biodiversity Spatial Plan (Pence, 2017; Pool-Stanvliet, 2017) and the Red Listed Ecosystems (SANBI, 2022). 'The status of South Africa's ecosystems and biodiversity: Synthesis Report' by Skowno et al. (2019) was also consulted. Government Gazette, 2022. No. 47526: The revised National List of Ecosystems that are Threatened and in need of Protection, was applied.

This revision of the report attends to the following, to update the report for the current plans and layouts:

- The alternatives 2, 3 and 5 are revised to Alternatives 1, 2 and 3.
- The impact assessment tables are updated to reflect Alternatives 1, 2 & 3.

The original alternatives (previous versions of the report) have therefore been superseded and are not dealt with any further in this report.

2. Terms of Reference

Baseline assessment:

- Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of biodiversity patterns, identify or describe:
Community and ecosystem level

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- The types of plant communities that occur in the vicinity of the site
- Threatened or vulnerable ecosystems.

Species level

- Red Data Book species (give location if possible, using GPS)
- The viability of and estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other Red Data species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Other pattern issues:

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover on the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of biodiversity process, identify or describe:

- The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. corridors such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and vegetation boundaries such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
- Any possible changes in key processes e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Would the conservation of the site lead to greater viability of the adjacent ecosystem by securing any of the functional factors listed in the first bullet?
- Would the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?
- It must be indicated if there is a need for a more detailed assessment. If it is determined that there is no need for more detailed assessment, as established in discussions with Doug Jeffery Environmental Consultants (DJEC), constraints must be reported.

Impact assessment:

- Determine the impacts of the proposed development (Alternatives 3 & 4 – see below) and its various elements such as roads, landscaping, and storm-water management. Based on the botanical baseline assessment of Portion of Erf 134, Infanta, (McDonald, 2010).
- Assess the 'No Go' alternative.

3. Project Area

3.1 Locality and access

The full extent of Erf 134 Infanta is 86 ha but the study area is only a small part of Erf 134 Infanta. It is an almost triangular tract of land 3.1 ha in extent on the coast immediately north of the existing Infanta Village and east of the main road to Infanta, between Cape Infanta and the Breede River mouth (Figures 1 & 2). Centroid co-ordinates for locating the site are S 34° 25' 08.26 E 20° 51' 12.91". The south-west boundary lies parallel to the main road at Infanta and the east boundary lies along the sea-cliffs. The short south boundary is parallel to one of the 'outside' streets of the west part of Infanta Village and the north boundary is common with that of the farm to the north.

The study was focused mainly on the defined study area, but note was taken of the lower part of Erf 134 to the west of the main road which was included in Helme's (2005) study. This has relevance in terms of possible mitigation in the case of development of the eastern section of Erf 134 Infanta as discussed below.

3.2 Topography, Geology and Soils

The site has a gentle gradient from west to east with the highest point being approximately 20 m above mean sea level (a.m.s.l.) and the lowest point approximately 4 m a.m.s.l. The gradient also falls southwards from the north-west to a shallow watercourse (stream) that drains from Kadiekop through the property (see Snaddon, 2010). There is a second high point on the south boundary.

Underlying the study area are Cenozoic limestone deposits Bredasdorp Group. These are calcarenite deposits of marine origin were laid down during a period of marine transgressions after the continental break-up of Gondwana (Truswell, 1970; Deacon, 1983; Roberts *et al.* 2006). The limestone or calcrete is exposed on the north and upper north-west side of the study area and on the lower south and east side the limestone is covered by dune sand of the Strandveld Formation (Bredasdorp Group) (Roberts *et al.* 2006).

The soils are determined by the geological sediments with shallow, skeletal soils found capping the limestone. These are typically alkaline as are the deeper dune sands found

towards the coast and in the depressions. This has an important effect on the vegetation as is described below.

3.3 Climate

Cape Infanta and its surrounds are on the boundary between the winter-rainfall region of the Western Cape and the all-year-round rainfall zone of the southern Cape. Rain occurs throughout the year but displays a bimodal pattern with peaks in autumn (March and April) and spring (August to October). Cold fronts in the winter bring cyclonic rainfall from the north-west whereas south-east winds bring rain onshore in the spring and summer. Mean annual precipitation is 385 mm. The proximity to the sea ameliorates the temperatures with the coldest month being July where the temperature at night drops to 6.4 °C. Midday temperatures range from 17.9 °C in July to 25.7 °C in February, the hottest month.

Figure 1. Location of the study area (indicated by the black arrow) at Cape Infanta on the southern Cape coast.

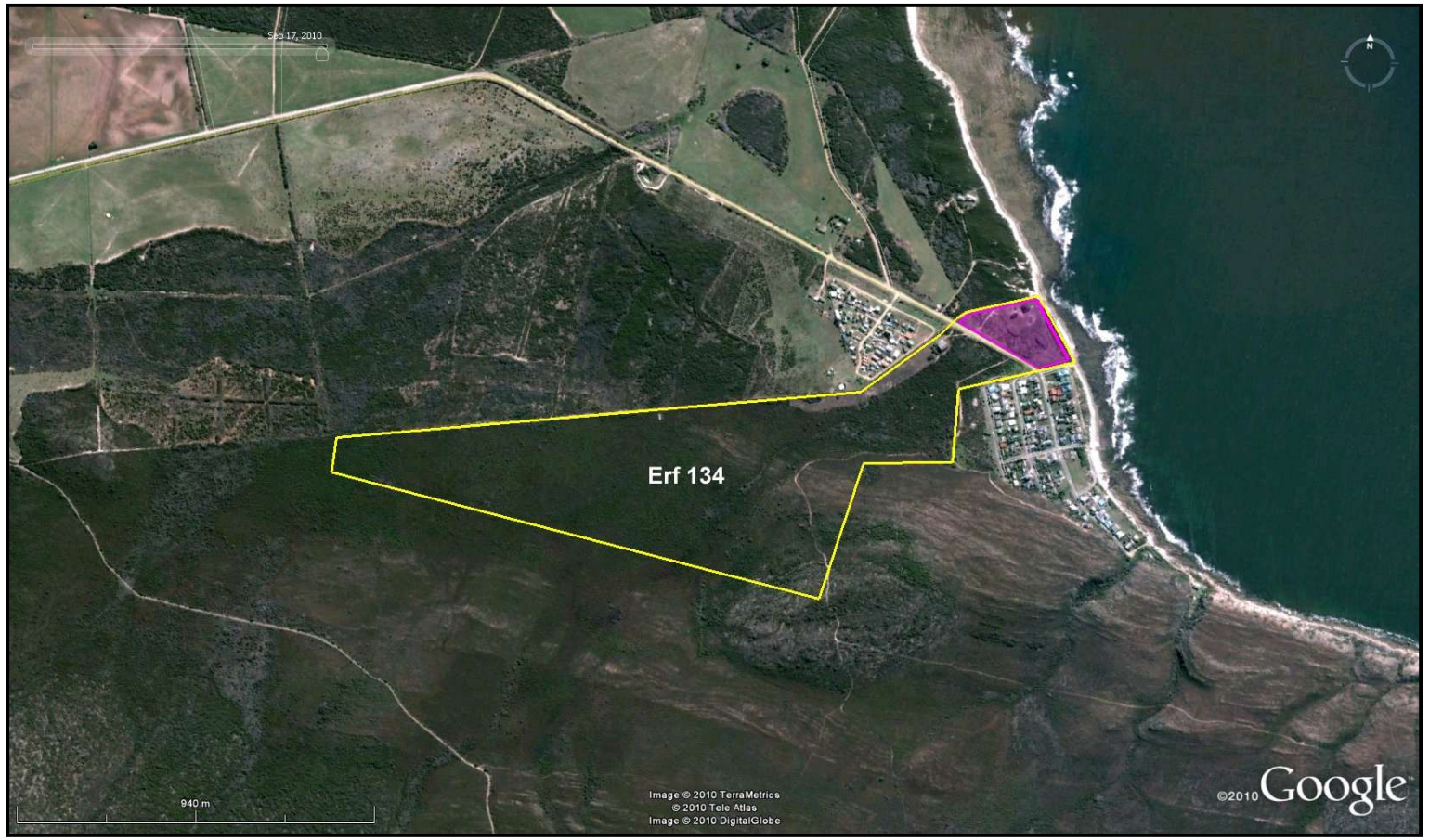


Figure 2. Aerial image from Google Earth © showing the full extent of Erf 134 Infanta (yellow boundary) and the study area highlighted in pink.

Figure 3. The portion of Erf 134 Infanta designated as the study area (red boundary) with the 'sample track' (blue line) and waypoints recorded during the botanical survey. The green arrows indicate piles of cleared vegetation that had been removed from the site by the time of the survey.

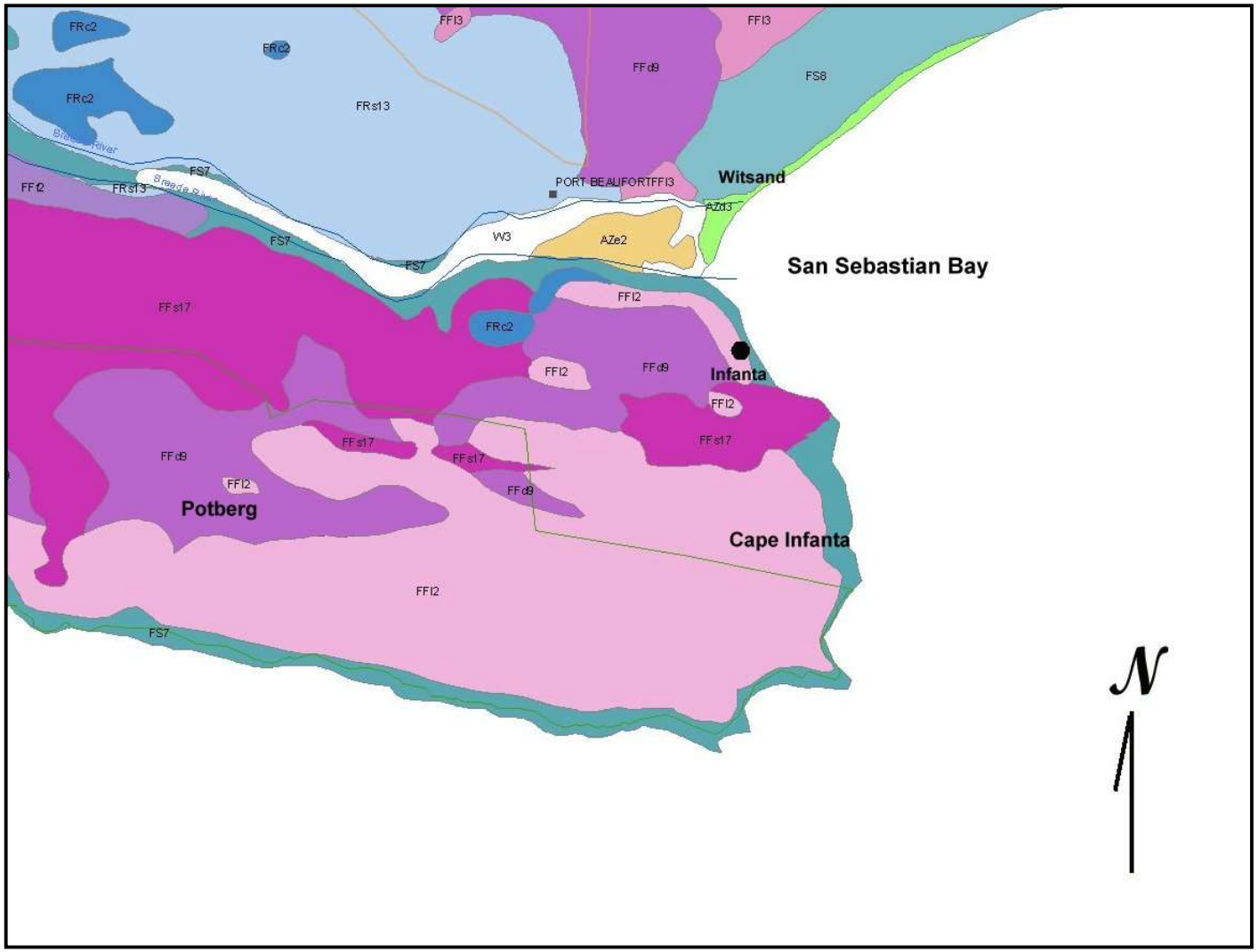


Figure 4. Portion of the vegetation map of southern Africa (Mucina *et al*. 2005) showing the Overberg Dune Strandveld (FS7) and De Hoop Limestone Fynbos (FFl 2) vegetation types found at the study area (black dot) at Cape Infanta.

4. Methods

4.1 Field Sampling

The initial field work for the assessment was carried out on 11 August 2010 and took approximately 6 hours. Erf 134, Infanta, was surveyed on foot. Waypoints were recorded using a handheld Garmin ® gps. Twelve waypoints and the 'sample track' were recorded (Figure 3). Condition of the terrain at each waypoint together with the species occurring were recorded and photographs taken to support the written observations. A second visit to the site was conducted approximately two years later, on 6 September 2012. The objective of the second visit was to assist a land surveyor with pegging out the proposed 'conservation area'. This exercise took two hours. Further photographs were obtained of plants, mainly on the limestone substrates in the area proposed for conservation.

4.2 Desk-top analysis and reporting

The photographs obtained in the field as well as available literature and Google Earth Pro ™ were used for description of the vegetation presented in this report. The National Vegetation Map (Mucina *et al.* 2005; SANBI, 2012; 2018) (referred to as VEGMAP) was used to determine the vegetation type. Google Earth was used for mapping purposes.

5. Limitations and Assumptions

At the time of the field work, invasive alien *Acacia cyclops* (rooikrans) and *Myoporum tenuifolium* (manatoka) had been controlled and the entire site was accessible. No physical or other limitations prevented a successful field survey. Thus, no assumptions were made.

6. The Vegetation

6.1 General description

In the Infanta area four principal vegetation types occur, namely Potberg Sandstone Fynbos, Albertinia Sand Fynbos, De Hoop Limestone Fynbos and Overberg Dune Strandveld. These vegetation types closely reflect the soil-types derived from the substrates on which they occur; Potberg Sandstone Fynbos is found on the hard, quartzitic sandstone of the Potberg Mountains, Albertinia Sand Fynbos is found on the acid regic sands at lower altitude, De Hoop Limestone Fynbos is strongly associated with the calcarenite limestone and the

Overberg Dune Strandveld is associated with the deeper, calcareous wind-blown dune-sands of the Strandveld Formation.

Rebelo *et al.* (2006 in Mucina & Rutherford, 2006) described De Hoop Limestone Fynbos as occurring in a 'broad swathe on the coastal forelands from Struisbaai and Bredasdorp to Infanta at the Breede River Mouth'. Mustart, Cowling & Albertyn (1997) described the limestone fynbos of the Southern Overberg as 'Limestone Proteoid Fynbos', rich in endemic species that have become specifically adapted to limestone substrates. Among these is a diverse ericoid component but somewhat less diverse restioid component. Proteoid species characteristic of limestone fynbos are *Protea obtusifolia* and *Leucadendron meridianum*.

Figure 5. The study area showing the location of the De Hoop Limestone Fynbos and Overberg Dune Strandveld. The limestone fynbos is also found in the green cross-hatched area west of the Infanta road. There is important connectivity between the limestone fynbos on both side of the road.

6.2. Vegetation of the project area

The hard limestone with its shallow soil is found covering the upper north-west sector of the study area and supports mid-high, mid-dense De Hoop Limestone Fynbos, as shown in Figure 5. It is obvious that the area was once heavily invaded by *Acacia cyclops* (rooikrans) but this was cleared 6 – 8 years ago. Now there are scattered individual shrubs of this species on the limestone, but they are starting to become more prominent again. A few shrubs of the exotic *Myoporum tenuifolium* are also present. The limestone fynbos is rich in species with numerous endemic species, and those recorded include *Acmadenia* sp., *Asparagus capensis, Berkheya coriacea* (Figure 8), *Carpobrotus acinaciformis*, *Crassula* sp., *Delosperma litorale*, *Diosma echinulata*, *Erica oblongiflora* **(CR)** (Figure 6), *Euchaetis meridionalis*, *Ficinia praemorsa*, *Hermannia trifoliata* (Figure 10), *Restio leptoclados*, *Jamesbritennia* sp., *Lampranthus* sp., *Leucadendron meridianum* (Figure 7), *Leucadendron muirii* (Figure 13), *Metalasia calcicola, Phylica* sp. (1), *Phylica* sp. (2), *Protea obtusifolia* **(NT)** (Figure 11), *Pseudoselago serrata*, *Seriphium* cf. *capitatum*, *Syncarpha paniculata, Thamnochortus insignis, Zygophyllum* cf. *fuscatum* **(VU**) and *Zygophyllum flexuosum.*

Erica mariae a species at home on limestone as well as sandstone was found in the undeveloped area across the road and to the west of the study area and not in the study area itself.

Originally calcareous dunes would have extended upslope from the coastline to an ecotonal area at the edge of the limestone outcrop. To the south of the house the dunes have remained intact except that they have been heavily invaded by alien wattles (mainly *Acacia cyclops*) and manatoka (*Myoporum tenuifolium*). The infestation of wattles was cleared prior to 2005 and now the dune thicket has become dense and almost impenetrable in places. Where the dune thicket vegetation is open, low herbaceous and succulent species are to be found. Species found in the dune vegetation include, *Babiana nana* (Figure 12)*, Bassia diffusa, Brunsvigia orientalis, Bulbine lagopus, Crassula expansa* subsp. *filicaulis, Drosanthemum hispidum, Ehrharta calycina, Felicia amoena* subsp. *latifolia, Jordaaniella dubia, Lycium cinereum, Massonia depressa, Mesembryanthemum crystallinum, Metalasia muricata, Osteospermum moniliferum, Passerina ericoides, Phylica* sp. (2), *, Roepera morgsana, Searsia crenata, Searsia glauca, Searsia laevigata Searsia lucida, Tetragonia fruticosa, Thesium* sp. and *Zygophyllum flexuosum.*

Helme (2005) lists a few species that were not recorded in the present study and in turn a number of species not recorded by Helme were found.

Figure 6. *Erica oblongiflora* – limestone endemic

Figure 7. *Leucadendron meridianum* – limestone endemic

Figure 8. *Berkheya coriacea* – limestone endemic

Figure 9. *Erica spectabilis* – found on limestone and sandstone

Figure 10. *Hermannia trifoliata* – limestone endemic

Figure 11. *Protea obtusifolia* – limestone endemic

Figure 12. *Babiana nana* – dune species

Figure 13. *Leucadendron muirii* – limestone endemic

Figure 14. Panoramic view over part of the area of De Hoop Limestone Fynbos on the northwest section of Erf 134 Infanta.

Figure 15. View of the southern part of the eastern section of Erf 134 Infanta looking towards Infant Village. The vegetation seen here is Overberg Dune Strandveld.

Figure 16. View northwards from the southern boundary of the study area (Overberg Dune Strandveld) to the northern area of De Hoop Limestone Fynbos beyond the watercourse. The Infanta road is seen on the west side of the study area.

7. Disturbance Regime

In the northern part of the study area the dunes were obviously flattened to form a building platform for the existing house and outbuildings. The vegetation of this area is transformed, and the house is surrounded by a lawn of *Cynodon dactylon* (couch grass) and *Pennisetum clandestinum* (Kikuyu grass). The driveway to the house from the entrance gate has been completely cleared of vegetation and the limestone exposed. The natural dune vegetation to the south of the house was heavily invaded by *Acacia cyclops* and to a lesser extent by *Acacia saligna* and *Myoporum tenuifolium*. The area of limestone to the west and above the

house was also invaded by *Acacia cyclops*. These invasive woody aliens were cleared a few years ago and the cleared material stacked in large heaps as can be seen in the aerial image (Figure 3). It was then subsequently removed as there was no trace of the cleared vegetation when the site was surveyed. However, there does not appear to have been any ongoing follow-up removal of alien species since these are now re-invading both the dune vegetation and the limestone fynbos.

Figure 17. *Acacia cyclops* re-invading the Overberg Dune Strandveld in the study area.

Figure 18. *Myoporum tenuifolium* (manatoka) and invasive exotic in the dune strandveld. Note the wind and salt-spray pruned branches.

Figure 19. *Low shrubs of Acacia* cyclops re-invading De Hoop Limestone Fynbos along the north boundary of the study area.

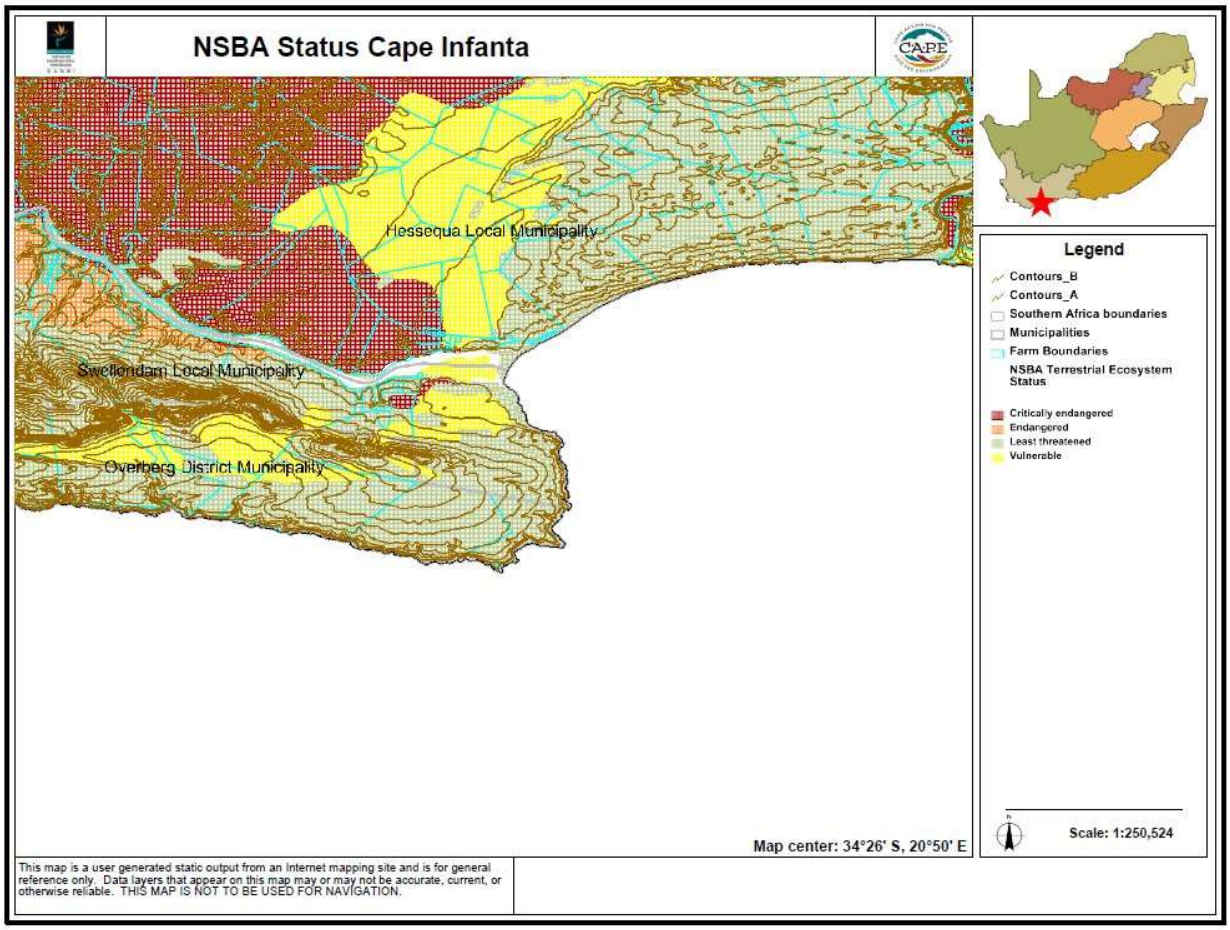


Figure 20. Map of conservation status of the Cape Infanta area according to the National Spatial Biodiversity Assessment (Rouget *et al.* 2004). This has not changed in the more recent assessment of Driver *et al.* (2012).

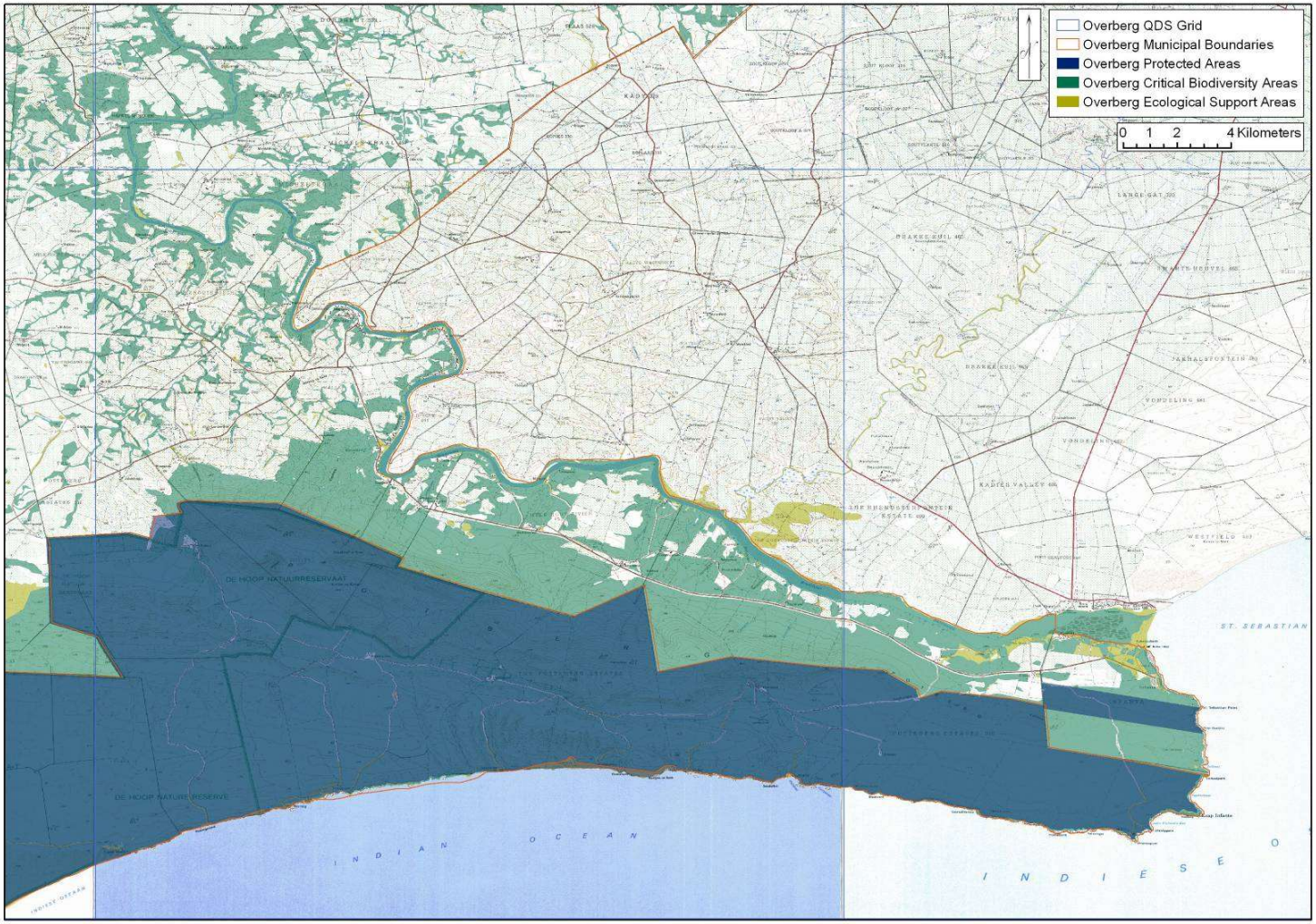


Figure 21. Critical Biodiversity Area map (Holness, 2010), for part of the Overberg District Municipality showing the study area (arrow) as falling within an Ecological Support Area.

8. Conservation Status

8.1 Critical Biodiversity Areas and Ecological Support Areas

At the time of Helme's (2005) survey the conservation status of the Overberg Dune Strandveld and the De Hoop Limestone Fynbos was rated as Least Threatened in the National Spatial Biodiversity Assessment (NSBA) (Rouget *et al.* 2004) (see Figure 20). Since then, there has been a revision of the conservation status of large parts of the Western Cape including the southern coast (Holness, 2010) and a revision of the national biodiversity status known as the National Biodiversity Assessment (Driver *et al.* 2012). De Hoop Limestone Fynbos is well conserved in the De Hoop Nature Reserve but despite this there are areas around Cape Infanta that have been assigned Critical Biodiversity Area status. This includes the western part of Erf 134 whereas the eastern part, i.e., the study area, has been assigned the status of Ecological Support Area (see Figure 21), still a category of high conservation importance. Neither Overberg Dune Strandveld nor De Hoop Limestone Fynbos is listed in the National List of Threatened Ecosystems (Government Gazette, 2022).

Subsequent to Holness' (2010) map, CapeNature published the Western Cape Biodiversity Spatial Plan (Pence, 2017; Pool-Stanvliet, 2017). This has the most up-to-date maps of Critical Biodiversity Areas and is included here as it applies to the study site (Figure 22). In addition, the National Web-based Screening Tool has also been applied to determine the sensitivity of the site (Figures 23 & 24).

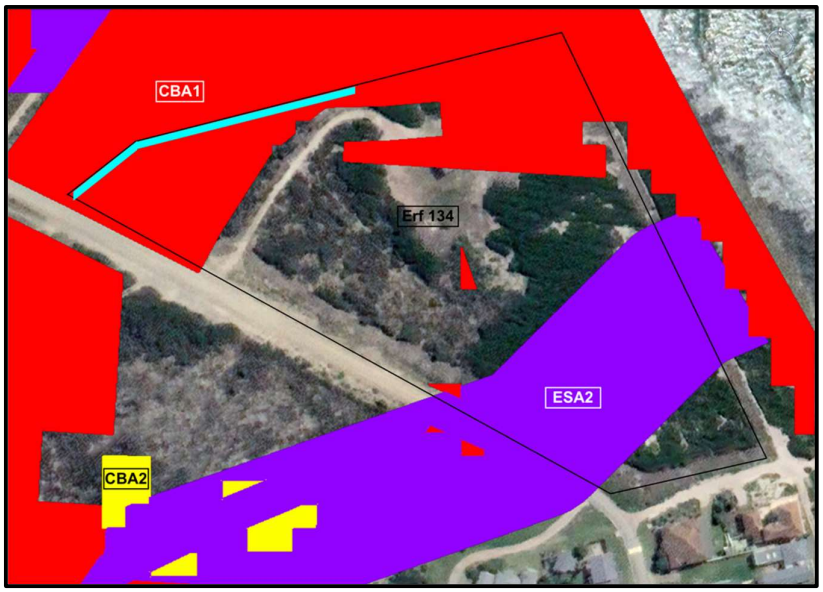
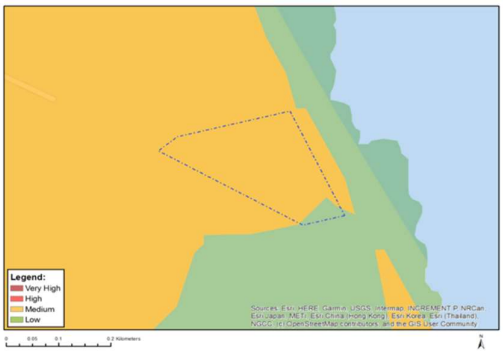


Figure 22. The red shading denotes CBA1; the yellow shading CBA2 and the purple shading ESA2. The light blue line shows the proposed pipeline servitude.

The application of the National Web-based Environmental Screening Tool resulted in the determination of the sensitivity of Erf 134, Infanta as being mainly **Medium** for The Relative Plant Species Theme Sensitivity (Figure 23). In my opinion, the 'conservation area that has been proposed for setting aside has **High** sensitivity and the remaining part of the site has **Low** sensitivity. In the case of the biodiversity sensitivity (Figure 24), the erf is classified as having **High** sensitivity. I strongly disagree with this 'blanket treatment'. Once again, the proposed 'conservation area' has **High** biodiversity sensitivity and the remainder of the site, **Medium to Low** biodiversity sensitivity.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

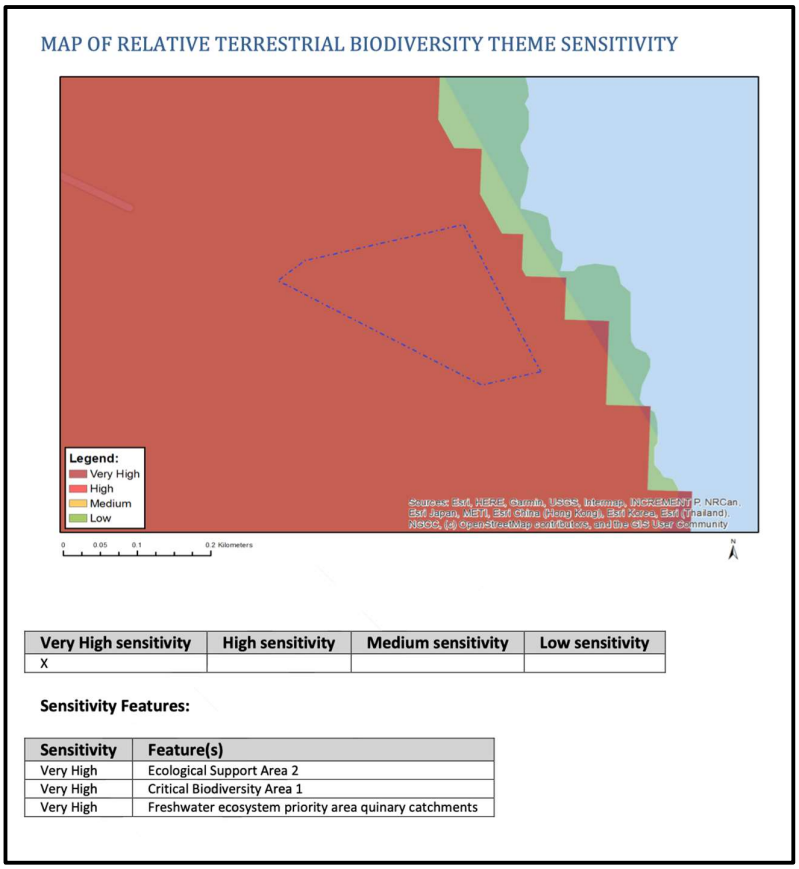


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Lampranthus ceriseus
Medium	Lampranthus fergusoniae
Medium	Lampranthus pauciflorus
Medium	Delosperma mariae
Medium	Argyrolobium harmsianum
Medium	Indigofera mundiana
Medium	Aspalathus calcarea
Medium	Aspalathus prostrata
Medium	Otholobium sp. nov. (Esterhuysen 33240a BOL)
Medium	Lebeckia gracilis
Medium	Leucadendron galpinii
Medium	Leucadendron linifolium
Medium	Wahlenbergia polyantha
Medium	Wahlenbergia subulata var. congesta
Medium	Selago diffusa
Medium	Selago glandulosa
Medium	Pentameris calcicola var. hirsuta
Medium	Tribolium ciliare
Medium	Sensitive species 340
Medium	Lobelia valida
Medium	Erica oblongiflora
Medium	Hermannia lavandulifolia
Medium	Sensitive species 1142
Medium	Thamnochortus muirii
Medium	Thamnochortus pluristachyus
Medium	Elegia fenestrata
Medium	Cynanchum zeyheri
Medium	Sensitive species 1192
Medium	Heliophila linearis var. reticulata
Medium	Gnidia spicata
Medium	Felicia ebracteata
Medium	Dymondia margaretae
Medium	Senecio lycopodioides
Medium	Cotula myriophylloides
Medium	Osteospermum subulatum
Medium	Chrysocoma strigosa
Medium	Stoebe muirii
Medium	Diosma tenella
Medium	Agathosma eriantha
Medium	Agathosma riversdalensis
Medium	Acmadenia mundiana
Medium	Euchaetis intonsa
Medium	Euchaetis laevigata
Medium	Cliffortia longifolia
Medium	Sensitive species 5
Medium	Sensitive species 913
Medium	Orthochilus litoralis
Medium	Aspalathus tylodes
Medium	Sensitive species 800
Medium	Sensitive species 599
Medium	Elegia verreauxii
Medium	Sensitive species 500
Medium	Sensitive species 53
Medium	Zostera capensis

Figure 23. The Relative Plant Species Theme Sensitivity as generated by the National Web-based Environmental Screening Tool.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Ecological Support Area 2
Very High	Critical Biodiversity Area 1
Very High	Freshwater ecosystem priority area quinary catchments

Figure 24. The Relative Plant Species Theme Sensitivity as generated by the National Web-based Environmental Screening Tool.

8.2 Plant species of conservation concern (SCC)

Erica oblongiflora (Figure 6) was previously known from only one locality near Groot Hagelkraal west of Cape Agulhas near Pearly Beach. The discovery of this species at Erf 134, Infanta, is not only the single other population now known but it is an eastward range extension of 120 km for this species. This is highly significant and of high conservation importance. The Infanta population of this species may be slightly different from the western population and in the words of *Erica* specialist Ross Turner could represent “evolution-on-the-go”. To lose this population of *E. oblongiflora* would be highly undesirable.

The presence on the limestone substrates of *Erica oblongiflora*, an Endangered (**EN**) species found in this survey and not recorded by Helme (2005) and the following species recorded by Helme and not in this survey, *Eriospermum vermiforme* (**R**), *Protea susannae* (**NT**), *Athanasia quinquedentata* (**VU**), *Gladiolus miniatus* (**VU**), together with *Protea obtusifolia* (**NT**), found in

both surveys, indicate the highly sensitive and important conservation value of limestone-associated vegetation. Helme (2005) stated that he considered the limestone area found east to the Infanta road to be **irreplaceable**. All the botanical evidence found in this survey supports this view and that the limestone area with its vegetation must be conserved. It is important that the status of this area be raised to a Critical Biodiversity Area rather than the slightly less important Ecological Support Area. (Note: The status of each species was checked in the latest Red List of South African Plants – Raimondo *et al.* 2009).

8.3 The Red Listed Ecosystems (RLE)

An appraisal of remnants of important ecosystems of South Africa was published by SANBI (2021) as the 'Red List of Ecosystems' (RLE). The available 'remnants' shapefile was overlaid on a Google Earth Pro ™ image together with a boundary outline and the conservation area of the proposed development at Erf 134, Infanta. It is interesting that the 'Conservation Area' was completely missed in the RLE analysis, probably due to the high density of woody alien invasive plants (Figure 25).

9. Ecological Processes

One of the most important ecological drivers in fynbos is fire. Fynbos is dependent on fire for rejuvenation and for sustaining the species diversity of its communities, but fire often presents major concerns for people who have built houses in fire-prone fynbos environments. This conflict has led to the diminishing of fire events and areas over which fires move and the consequent loss of vigour and diversity of fynbos plant communities. In the present case at Infanta, potential future residents in the 'developable area' of Erf 134 would not want fire close to their houses and would actively seek to prevent fires. This will mean either the creation of wide firebreaks, and /or the extinguishing of fires as soon as possible after they have started. The consequence would be that the limestone fynbos would deteriorate over time and many of the species such as the **Endangered** *Erica oblongiflora* would disappear due to the lack of an appropriate fire regime. To conserve the limestone fynbos on Erf 134 east of the Infanta road will require a well-defined fire-management policy that is carefully implemented to foster the fynbos while still protecting the property of nearby residents.

The area of natural vegetation on Erf 134 to the west of the Infanta Road also has some limestone fynbos and there is a gradient into sandstone fynbos and sand

fynbos (see Helme, 2005). Despite the physical barrier of the road there is still some ecological connectivity between the fynbos on the east side of the road with that on the west side e.g., mobile insect and bird pollinators can move between these sites, ensuring movement of pollen within and between the plant communities. This connectivity should be conserved as far as possible.

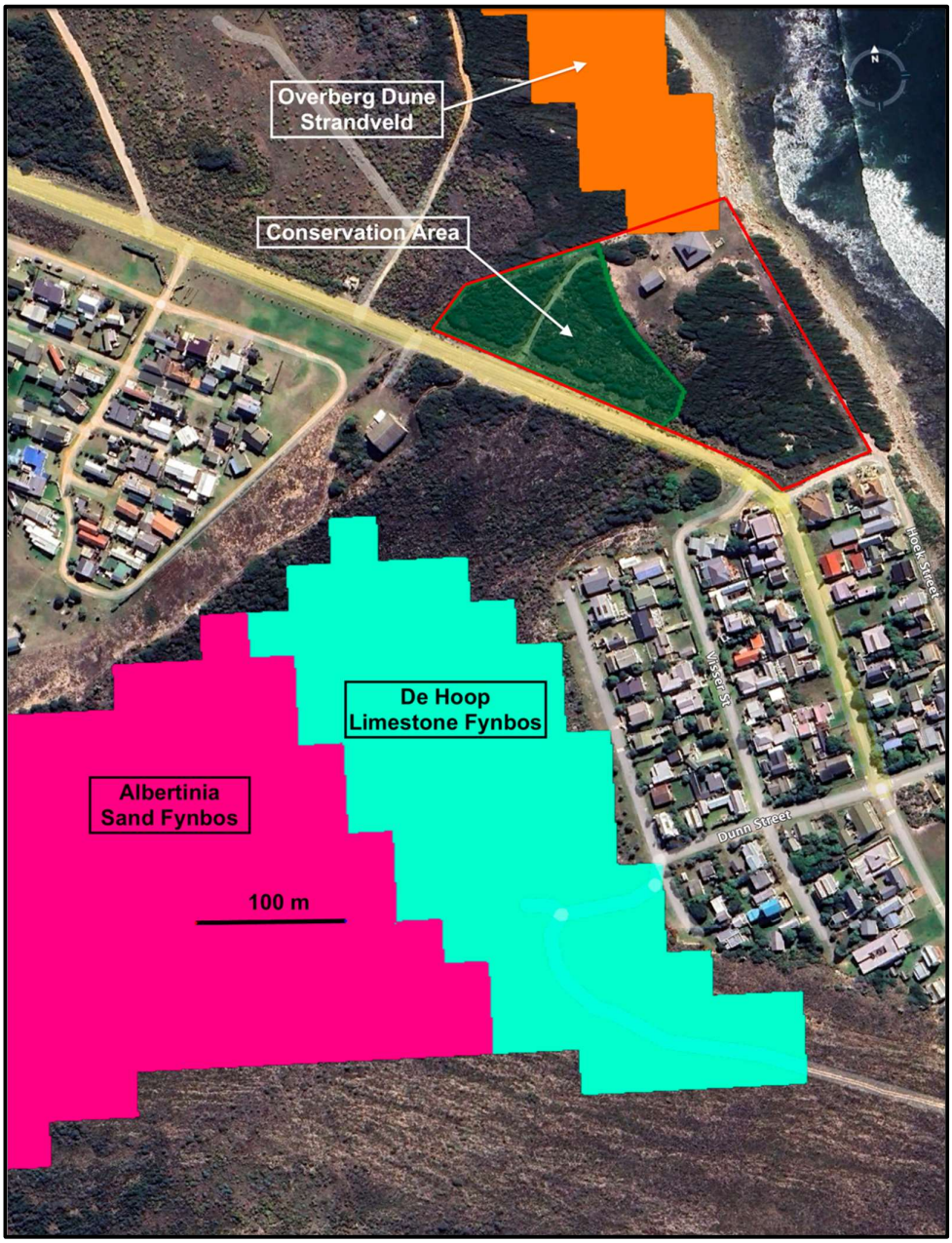


Figure 25. The remnants layer for Red Listed Ecosystems showing that Erf 134, Infanta (red boundary) has only a small area of Overberg Dune Strandveld indicated as a RLE. The proposed conservation area was completely missed.

10. Section 1: Baseline Assessment and Constraints Analysis

Arising from the description of the vegetation and flora of the eastern section of Erf 134, Infanta is the very clear imperative to conserve the De Hoop Limestone Fynbos on the site. This is sensitive vegetation for the reason given above whereas the Overberg Dune Fynbos is not sensitive and in the opinion of the author does not present any major obstacles for development. The only definite constraint would be the necessary setback from the watercourse. The recommendations as detailed by Snaddon (2010) for adequate setbacks from the streambed should be applied.

Three alternatives have been developed and are described in the Basic Assessment Report (BAR) as follows:

Alternative 1: This alternative comprises 23 erven, 16 of which would be single storey and 7 would be double storey. This alternative was produced through an iterative process where a number of specialist baseline studies were undertaken and their resulting opportunities, constraints and recommendations were used to design this layout alternative **(Figure 26).**

This alternative allows for the conservation of some of the De Hoop Limestone Fynbos on the site, a 40m ecological corridor over the stream area and the coastal setback line as originally proposed by Pieter Badenhorst Professional Services.

This alternative was assessed by the specialists but was found to be unacceptable from a botanical point of view as there was an encroachment into the recommended botanical conservation area.

Alternative 2: Comprises of 21 erven. The existing house is to remain as is and incorporated into the development as a separate erf. 15 units will be single storey and 5 will be double storey. Approximately 50% of the site will be developed **(Figure 27).**

This alternative also makes provision for a 40m ecological corridor catering for the watercourse and surrounding Overberg Dune Strandveld. It also accommodates the 'limestone conservation area' in the northwest part of the site.

The 8m landscaped strip, as proposed by the heritage specialist, is accommodated in this layout as is the updated coastal setback line as proposed by the coastal consultant.
Two access roads are proposed and are in accordance with the recommendations of the traffic specialist. However, the road authorities have indicated that they do not support the access points in this alternative.

Alternative 3: This is the preferred alternative. It comprises of 21 erven. The existing house is to remain as is and is incorporated into the development as a separate erf. 15 units will be single storey and 5 will be double storey. Approximately 45% of the site will be developed **(Figure 28 & 29).**

This alternative also makes provision for a 40m ecological corridor catering for the watercourse and surrounding Overberg Dune Strandveld. It also accommodates the 'limestone conservation area' in the northwest part of the site.

The 8m landscaped strip, as proposed by the heritage specialist, is accommodated in this layout as is the updated coastal setback line as proposed by the coastal consultant.
The following key amendments have been made to the development proposal:

- The main vehicular entrance to the majority of the units (16) has been repositioned to the existing access point and follows the existing access route.
- The lower vehicular access point to the remainder of the 5 units is now indicated as two possible options. Either option is acceptable from a traffic engineering perspective. The final option will rely on whether the existing unmade road is formalised as a road or not.
- The configuration of the erven and the road layout has been revised to address urban design and geometric layout issues.
- All the residential erven have been moved entirely out of the 40m wide ecological corridor. This 40-metre-wide corridor will now be open common ownership space dedicated as an open space system.
- This amendment means that the area to be rezoned as 'Open Space' has increase in size.
- All proposed building footprints have been revised to ensure compliance with the erosion setback line as identified by the coastal consultant.
- A pedestrian footpath has been added to provide pedestrian access from the 16-unit side of the development to the coastline.
- The Open Space component of the proposal has been increased by 5% from 50% to 55% of the entire property

The development of alternatives has been an important iterative process to arrive at a preferred layout proposal that has a much greater positive response to the sensitivity of the site than the original proposal. Alternatives 1, 2 and 3 and the 'No Go' alternative are assessed below.

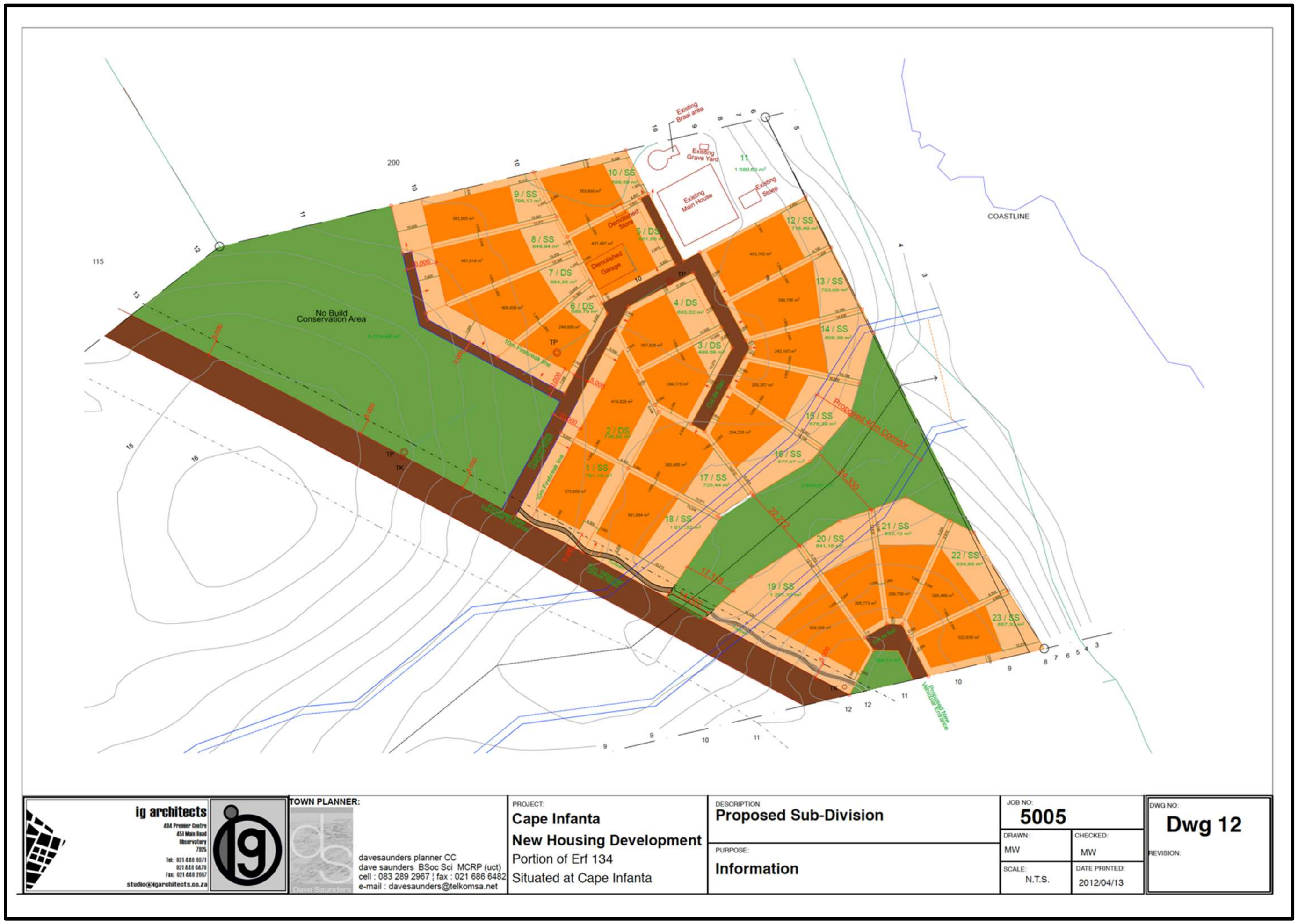


Figure 26. Layout proposal developed in 2012 that is referred to as Alternative 1.

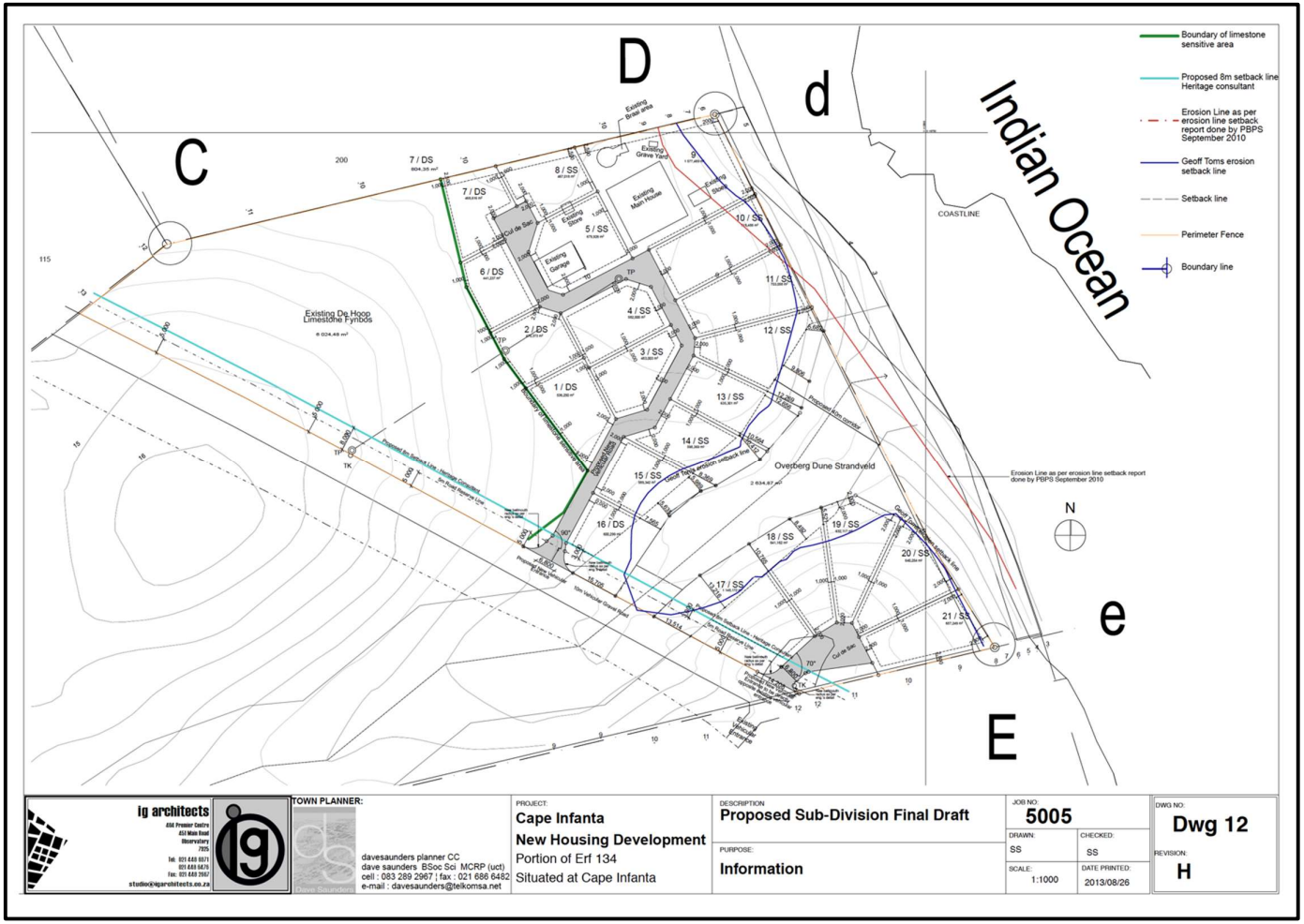


Figure 27. Layout proposal developed in 2013 that is referred to as Alternative 2.

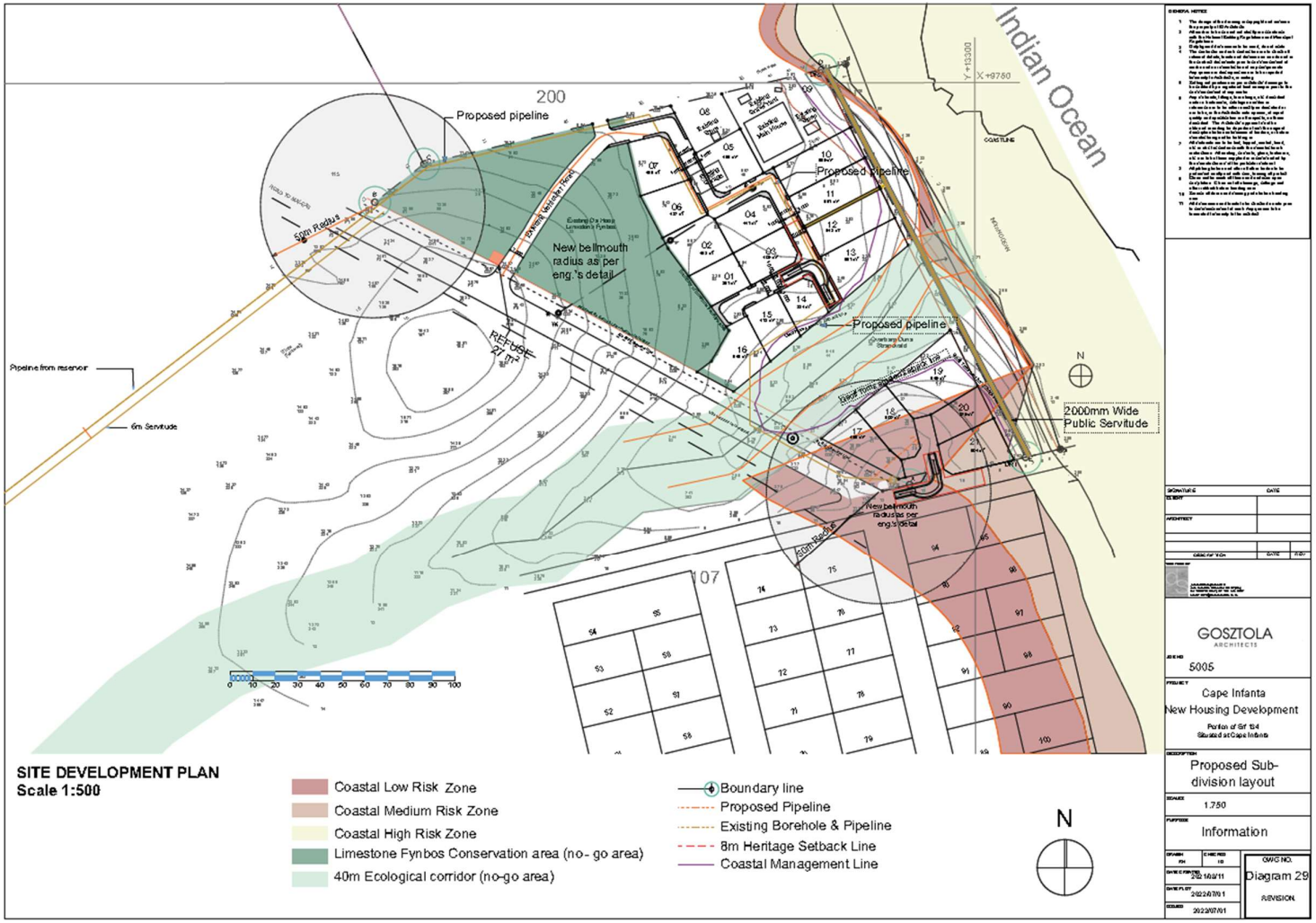


Figure 28. Layout proposal developed in 2023 that is referred to as Alternative 3, the preferred alternative.

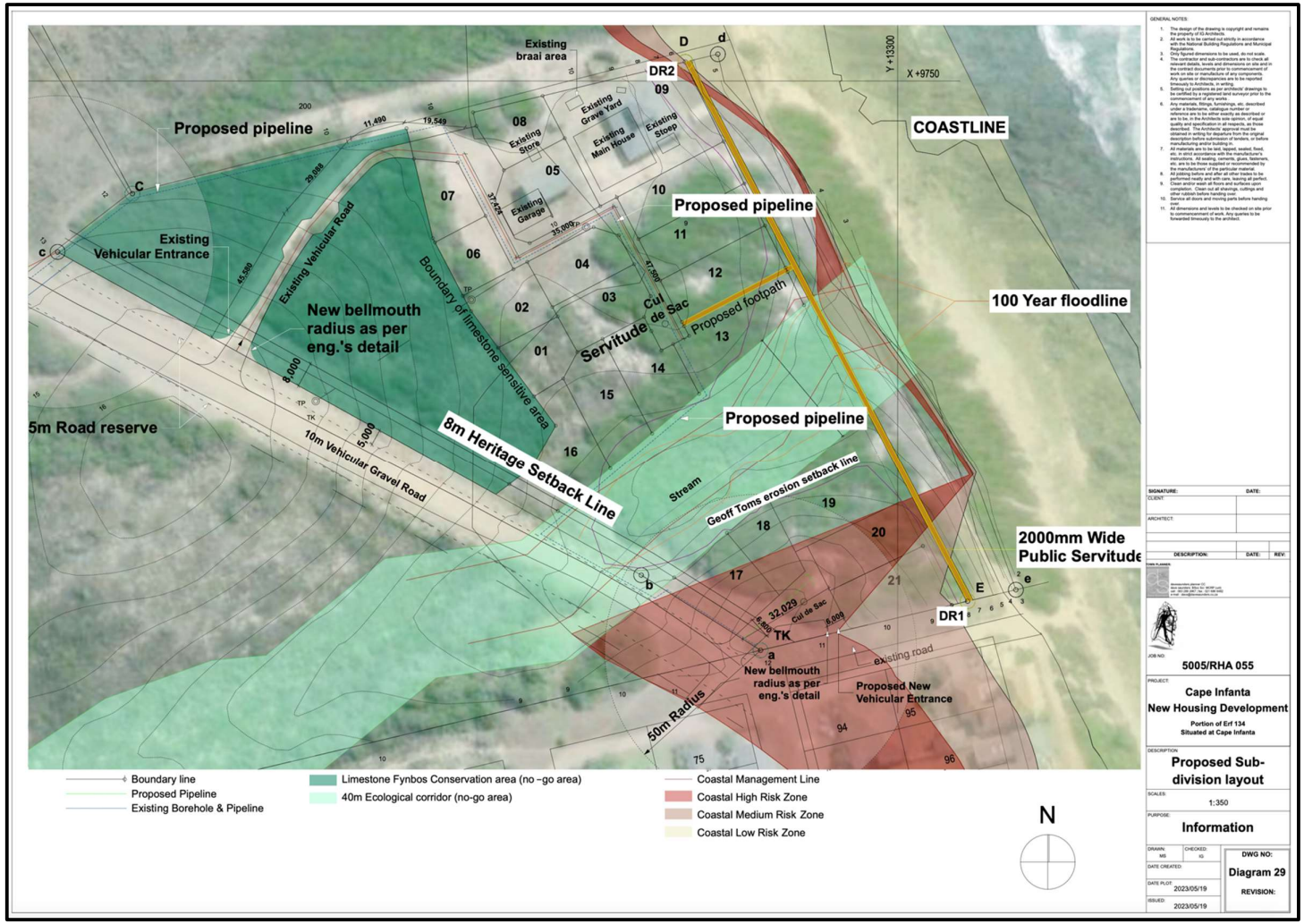


Figure 29. Detailed layout of the preferred alternative, Alternative 3.

10. Section 2: Impact Assessment – Residential development

The assessment of impacts follows the criteria as given in Appendix 1.

The assessment is applied to Alternative 1, Alternative 2 and Alternative 3 (the preferred alternative) bearing in mind that a lengthy iterative process was followed from the baseline assessment phase to the final 'preferred' layout stage.

The iterative process mentioned above has been a highly desirable process to achieve a workable solution which accommodates both environmental (in this case botanical) concerns and constraints and the desire of the developer to optimize development of the property.

10.1 Assessment of impacts of the housing development (excluding the pipeline)

10.1.1 Assessment of impacts for the 'No Go' alternative.

The 'No Go' or 'leave as is' would see the prevailing *status quo* remain in place with no subdivision of the property and no houses built. From a botanical perspective one of two scenarios could result.

The first possibility would be that the site would once again be poorly managed and become completely overgrown with invasive alien trees, mainly *Acacia cyclops* (rooikrans) but also with *Myoporum tenuifolium* (manatoka). This would be highly undesirable and would have long-term negative impacts and implications for the site. It would result in virtual exclusion of the natural flora and would also pose a high fire risk.

The second possibility would be that the site would be adequately managed and that an on-going programme of eradication of alien invasive plants would be in place. This would ensure that the natural vegetation could persist and be conserved. The fire risk would be lower but not entirely absent.

The second scenario would be financially onerous to the landowner and the chances of it occurring are predicted to be lower than the first scenario which amounts to a 'do nothing' scenario with minimal if any intervention or activity on the site.

10.1.2 Assessment of impacts for development Alternatives 1 and 2.

The development alternatives are assessed only as they would affect the flora and vegetation on the site. The main consideration is conservation of the flora and vegetation or lack thereof. This would mean maintaining areas of viable size or meaningful corridors of natural vegetation. Such considerations as storm-water management, road design, and architectural design do not have great bearing on the botanical impact assessment. These elements of the development are thus not assessed individually but are understood to be part of the overall impact on the vegetation. Landscape design has relevance with the intention to maintain the natural vegetation (Overberg Dune Strandveld) within the watercourse corridor as shown in Figure 29.

Alternative 1 has **23** erven. The whole of one erf and part of a second (see Figure 27) would lie within the proposed on-site 'limestone conservation area'. This area harbours sensitive limestone-endemic plant species and the impact would be **High Negative** with no mitigation possible because the plants and habitat would be lost. This option is therefore much less desirable than Alternatives 2 and 3 (Tables 1 & 2).

The Alternative 2 layout makes provision for **21** erven i.e., the erven that would transgress the boundary between the proposed developable area and the 'limestone conservation area' are excluded (compare Figures 28 and 29 with Figure 26). This consolidates the 'limestone conservation area' as originally proposed from the botanical baseline and constraints analysis (see **Section 9.**) and is the more desirable layout option compared with Alternative 1 (Figure 26). In addition, the landscape design makes provision for a wide corridor along the watercourse, spreading out along the eastern boundary. This provides for a meaningful biodiversity corridor which extends from the west Erf 134 on the west side of the Infanta Road to the coast. This is a highly positive mitigation in the design layout.

With the painstaking iterative process to conserve the De Hoop Limestone Fynbos in as large an area as possible on the property, together with conservation of a corridor along the watercourse, it is submitted that significant mitigation has been considered in Alternative 2, the preferred alternative. The result is that the development, instead of having a **High Negative** impact without mitigation, would have a **Low Negative** impact with respect to the vegetation and flora with the mitigation as described (Table 1).

10.1.3 Assessment of impacts for development Alternative 3 (the preferred alternative).

The construction phase of the residential development would have typical impacts associated with a building site (Table 1). The significance of the impact would be **High negative** prior to mitigation and **Low negative** after mitigation. It would be imperative to cordon off 'No Go' areas (mitigation measure) to ensure that no areas set aside for conservation or as 'green' corridors are affected during construction. Builders must be made aware of the sensitivity of the vegetation in the conservation areas and that they would be out of bounds.

During the 'operational' phase, residents would have access to the 'green' areas. However, these areas must be strictly observed and not seen as areas for dumping of garden refuse and other waste material. The 'green' areas must also be managed to foster the biodiversity and should not become 'gardens'. It may be necessary to apply fire management to the De Hoop Limestone Fynbos conservation area at some time. Such activity should be carefully managed with the involvement of all stakeholders but especially CapeNature. The operational phase would result in Medium negative impacts before mitigation and Low negative impacts after mitigation (Table 2).

Table 1. Summary of impacts during the construction phase: Residential Development

Potential impacts on the vegetation and flora:	Alternative 1	Alternative 2	Alternative 3 (preferred alternative)	No-Go Alternative
Nature of impact:	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**
Extent and duration of impact:	**Medium-term**	**Medium-term**	**Medium-term**	**Long-term**
Consequence of impact or risk:	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**No further loss of limestone fynbos and strandveld**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Highly probable**	**Unlikely**
Degree to which the impact can be reversed:	**Partly reversible**	**Partly reversible**	**Partly reversible**	**Reversible**
Degree to which the impact may cause irreplaceable loss of resources	**Low**	**Low**	**Medium**	**Low**
Indirect impacts:	**None identified**	**None identified**	**None identified**	**None identified**
Cumulative impact prior to mitigation	**High negative**	**Medium negative**	**Medium negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Low negative**	**High negative**	**Low negative**
Degree to which the impact can be avoided:	**Low**	**Low**	**Low**	**High**
Degree to which impact can be managed:	**Medium**	**Medium**	**Medium**	**Not required**
Degree to which the impact can be mitigated:	**Low**	**High**	**High**	**High**

Proposed mitigation:	**No mitigation possible**	**Exclusion of two erven on limestone area; (Alternative 4 is a mitigation action to offset the negative impacts of Alternative 3)**	**Management of the greater part of the 'limestone area' site for conservation ensuring that alien invasive plants are controlled, especially along the road.**	**Management of the site for conservation purposes ensuring that alien invasive plants are controlled**
Residual impacts:	**High negative**	**Low negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**High negative**	**Low negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Low negative**	**Low negative**	**High positive**

Table 2. Summary of impacts during the operational phase: Residential Development.

Potential impacts on the vegetation and flora:	**Alternative 1**	**Alternative 2**	**Alternative 3 (preferred alternative)**	**No-Go Alternative**
Nature of impact:	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**	**Impact on natural flora and vegetation, especially limestone fynbos**
Extent and duration of impact:	**Permanent**	**Permanent**	**Permanent**	**Long-term**
Consequence of impact or risk:	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**Loss of intact limestone fynbos and Overberg Dune Strandveld**	**No further loss of limestone fynbos and strandveld**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Highly probable**	**Unlikely**
Degree to which the impact can be reversed:	**Irreversible**	**Partly reversible**	**Irreversible**	**Reversible**
Degree to which the impact may cause irreplaceable loss of resources:	**High**	**Medium**	**Medium**	**High**
Indirect impacts	**None identified**	**None identified**	**None identified**	**None identified**
Cumulative impact prior to mitigation:	**High negative**	**Low negative**	**High negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Low negative**	**Medium negative**	**Low negative**
Degree to which the impact can be avoided	**Low**	**Low**	**Low**	**High**
Degree to which impact can be managed	**Medium**	**Medium**	**Medium**	**High**
Degree to which the impact can be mitigated:	**Low**	**High**	**High**	**High**
Proposed mitigation:	**No mitigation possible**	**Appropriate management of 'green'**	**Management of the greater part of the 'limestone area'**	**Management of the entire erf site for conservation**

		areas for biodiversity conservation (Alternative 4 is a mitigation action to offset the negative impacts of Alternative 3)	**site for conservation ensuring that alien invasive plants are controlled, especially along the entrance road.**	**purposes ensuring that alien invasive plants are controlled**
Residual impacts:	**High negative**	**Low negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**Medium negative**	**Low negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**Low negative**	**Low negative**	**Low negative**	**High positive**

10.1.4 Assessment of impacts for development Alternative 3 (the preferred alternative) of the entrance road.

The main change that has taken place between Alternative 2 and Alternative 3 (the preferred alternative) is that the position of the entrance road for the northern area of the proposed development has changed. This was dictated by traffic regulations and hence there was little flexibility about the location of the entrance. The only possibility was to revise the layout from Alternative 2 to use the existing entrance of the property, upgrade it and construct passing bays to keep the overall footprint of the road as small as possible (Alternative 3 - Figures 28 & 29). Alternative 3 would significantly affect and negatively impact the proposed limestone conservation area since the proposed entrance road would effectively fragment it into two unequal-sized areas. Whereas this is unfortunate, and the least desirable option from a botanical perspective, **the reality is that other factors beyond the conservation / botanical aspects of the project have been taken into consideration** in a holistic approach to the problem of the location of the entrance road. Notwithstanding that the proposed entrance road in the Alternative 3 layout will have a **High negative** impact pre-mitigation, the impact can be ameliorated and reduced to **Medium negative** by applying mitigation measures. The most important mitigation would be to totally clear all invasive alien plants (especially *Acacia cyclops*) and to implement constant monitoring to ensure no further invasion of the site by such species. During the construction phase, no building activity or access beyond the sides of the entrance road should take place. A low picket fence should be erected to demarcate the edge of the entrance road and all construction activities must take place only within the zone of the entrance road. This mitigation would serve to maintain as much of the proposed conservation area as possible in the best possible state.

In response to comments from the Infanta Ratepayers' and Residents' Association (IRRA), who expressed that they felt that the entrance road construction and operation needs specific assessment, the requested assessment follows here in Tables 3 & 4.

Table 3. Summary of impacts during the construction phase: Entrance Road

Potential impacts on the vegetation and flora:	Alternative 2	Alternative 3 (preferred)	No-Go Alternative
Nature of impact:	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**
Extent and duration of impact:	**Medium term**	**Long term**	**Long-term**
Consequence of impact or risk:	**Loss of intact limestone fynbos**	**Minimal further loss of limestone fynbos**	**Loss of intact limestone fynbos**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Likely**
Degree to which the impact can be reversed:	**Very low**	**Partly reversible**	**Reversible**
Indirect impacts:	**None identified**	**None identified**	**None identified**
Degree to which the impact may cause irreplaceable loss of resources	**High**	**Medium**	**Low**
Cumulative impact prior to mitigation	**High negative**	**Medium negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Medium negative**	**Low negative**
Degree to which the impact can be avoided:	**Low**	**Low**	**High**
Degree to which the impact can be managed:	**Low**	**Medium**	**High**
Degree to which the impact can be mitigated:	**Low**	**Medium**	**High**
Proposed mitigation:	**No mitigation possible**	**Ongoing clearance of alien vegetation to encourage natural vegetation to regenerate on the area disturbed by construction. Ongoing removal of any alien plants that may attempt to establish. Prevention of incursion into the conservation area.**	**Management of the 'conservation area' for conservation purposes ensuring that alien invasive plants are controlled**
Residual impacts:	**Medium negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**Medium negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**Medium negative**	**Low negative**	**High positive**

Table 4. Summary of impacts during the operational phase: Entrance Road

Potential impacts on the vegetation and flora:	Alternative 2	Alternative 3 (preferred)	No-Go Alternative
Nature of impact:	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**
Extent and duration of impact:	**Long term**	**Long term**	**Long term**
Consequence of impact or risk:	**Minimal further loss of limestone fynbos**	**Minimal further loss of limestone fynbos**	**Minimal further loss of limestone fynbos**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Probable**
Degree to which the impact can be reversed:	**Irreversible**	**Partly reversible**	**Reversible**
Indirect impacts:	**None identified**	**None identified**	**None identified**
Degree to which the impact may cause irreplaceable loss of resources	**High**	**Medium**	**High**
Cumulative impact prior to mitigation	**Medium negative**	**Low negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**Medium negative**	**Low negative**	**Low negative**
Degree to which the impact can be avoided:	**Medium**	**Medium**	**High**
Degree to which the impact can be managed:	**High**	**High**	**High**
Degree to which the impact can be mitigated:	**Medium**	**Medium**	**Medium**
Proposed mitigation:	**No mitigation possible**	**Ongoing clearance of alien vegetation to encourage natural vegetation to regenerate on the area disturbed by construction. Ongoing removal of any alien plants that may attempt to establish. Prevention of incursion into the conservation area.**	**Management of the 'conservation area' for purposes, ensuring that alien invasive plants are controlled**
Residual impacts:	**Medium negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**Medium negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**Low negative**	**Low negative**	**High positive**

10. Section 3: Impact Assessment of rising main water supply

Subsequent to the assessment of the site development alternatives, an additional impact arose, namely the necessity of a rising main water supply pipeline. Two alternatives were considered. With the first alternative, the pipeline would be laid in a 6 m wide servitude inside the property boundary, running parallel to the main Infanta road (not illustrated). This alternative was deemed likely to result in and **Very High Negative** impact on the 'conservation area' that would not be easily mitigated. The second alternative (preferred pipeline route) is shown in Figure 30. It would run within the boundary on the north side of the property in a 6 m wide servitude for a distance of ± 128 m. The construction of this pipeline would also negatively affect the proposed 'conservation area' but the impact would be **Medium Negative** and could be mitigated to **Low Negative** if mitigation measures are strictly observed (Tables 5 & 6). The 'No Go' Alternative is also assessed in Tables 5 & 6.

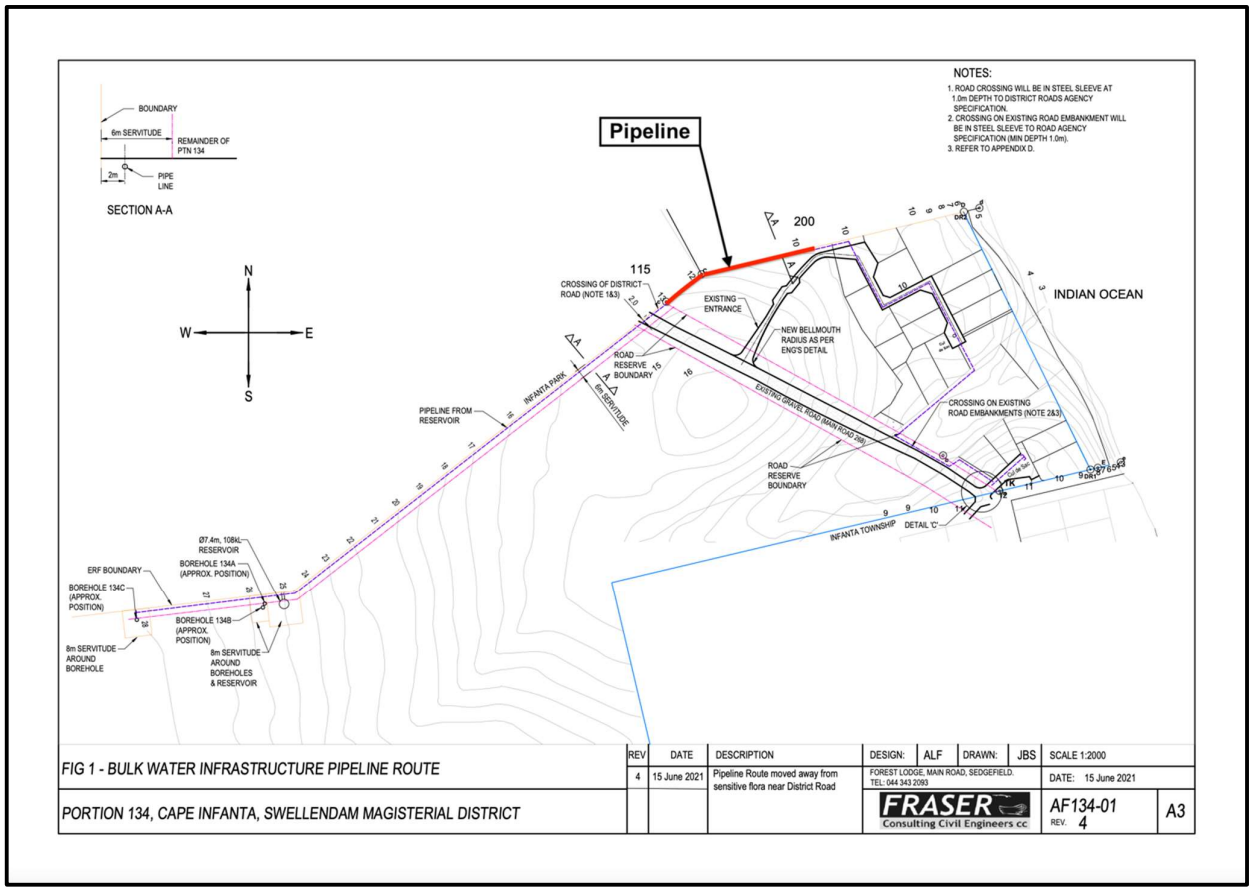


Figure 30. Engineer's diagram for proposed works on Erf 134, Infanta, modified to show the route of the proposed water pipeline (preferred alternative).

Table 5. Summary of impacts during the construction phase: Rising main

Potential impacts on the vegetation and flora:	Alternative 1	Alternative 2 (preferred)	No-Go Alternative
Nature of impact:	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**
Extent and duration of impact:	**Medium term**	**Medium-term**	**Long-term**
Consequence of impact or risk:	**Loss of intact limestone fynbos**	**Loss of intact limestone fynbos**	**Loss of intact limestone fynbos**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Likely**
Degree to which the impact can be reversed:	**Very low**	**Partly reversible**	**Reversible**
Indirect impacts:	**None identified**	**None identified**	**None identified**
Degree to which the impact may cause irreplaceable loss of resources	**High**	**Medium**	**Low**
Cumulative impact prior to mitigation	**High negative**	**Low negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**Very high negative**	**Medium negative**	**Low negative**
Degree to which the impact can be avoided:	**Low**	**Low**	**High**
Degree to which the impact can be managed:	**Low**	**Low**	**High**
Degree to which the impact can be mitigated:	**Low**	**Medium**	**High**
Proposed mitigation:	**No mitigation possible**	**Strict adherence to recommended mitigation measures.**	**Management of the 'conservation area' for conservation purposes ensuring that alien invasive plants are controlled**
Residual impacts:	**Medium negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**High negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Low negative**	**High positive**

Table 6. Summary of impacts during the operational phase: Rising main

Potential impacts on the vegetation and flora:	**Alternative 1**	**Alternative 2**	**No-Go Alternative**
Nature of impact:	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**	**Impact on natural flora and vegetation, mainly limestone fynbos**
Extent and duration of impact:	**Long term**	**Long term**	**Long term**
Consequence of impact or risk:	**Minimal further loss of limestone fynbos**	**Minimal further loss of limestone fynbos**	**Minimal further loss of limestone fynbos**
Probability of occurrence:	**Highly probable**	**Highly probable**	**Probable**
Degree to which the impact can be reversed:	**Irreversible**	**Partly reversible**	**Reversible**
Indirect impacts:	**None identified**	**None identified**	**None identified**
Degree to which the impact may cause irreplaceable loss of resources:	**High**	**Medium**	**High**
Cumulative impact prior to mitigation:	**High negative**	**Low negative**	**Low negative**
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	**High negative**	**Low negative**	**Low negative**
Degree to which the impact can be avoided:	**Medium**	**Medium**	**High**
Degree to which the impact can be managed:	**High**	**High**	**High**
Degree to which the impact can be mitigated:	**Medium**	**Medium**	**Medium**
Proposed mitigation:	**No mitigation possible**	**Ongoing clearance of alien vegetation to encourage natural vegetation to regenerate on the area disturbed by construction. Ongoing removal of any alien plants that may attempt to establish.**	**Management of the 'conservation area' for purposes, ensuring that alien invasive plants are controlled**
Residual impacts:	**Low negative**	**Low negative**	**Low negative**
Cumulative impact post mitigation:	**Medium negative**	**Low negative**	**High positive**
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	**Low negative**	**Low negative**	**High positive**

10.5 Indirect impacts

No indirect impacts were identified.

10.6 Cumulative impacts

The main concern in terms of cumulative impacts would be the loss of De Hoop Limestone Fynbos as a vegetation type but also specifically loss of the *Erica oblongiflora* (**Endangered**) in the Infanta area. For Alternative 1 cumulative impacts for would be **High negative** for both the construction and operational phases of the project prior to mitigation. This would remain **High negative** because no mitigation would be possible. For Alternative 2 the cumulative impacts would be **Medium negative** for the construction phase but **Low negative** for the operational phase prior to mitigation. After mitigation, which in essence would be setting aside a conservation area of De Hoop Limestone Fynbos, cumulative impacts would be **Low negative.** For Alternative 3 (the preferred alternative), the cumulative impacts would be **High negative** for the construction phase but **Medium negative** for the operational phase prior to mitigation. After mitigation, which in essence would be setting aside a conservation area of De Hoop Limestone Fynbos, cumulative impacts would remain **Medium negative** (Tables 1 & 2) at a site-specific scale.

Cumulative impacts for Overberg Dune Strandveld are considered **Low negative** for Alternatives 1 and 2, but **Medium negative** for Alternative 3.

10.7 Mitigation

As mentioned above, the main mitigation for the entire development would be the setting aside of a conservation area. It should be fenced with a low picket fence to demarcate its boundaries. The area must be carefully managed in the long term to ensure that alien invasive plant species are controlled and do not outcompete the sensitive fynbos.

The proposed Alternative 2 pipeline route (preferred) would be along the northern boundary of the ‘conservation area’. During construction, the management of material that is removed from the pipeline trench is vital. The trenched material should be temporarily deposited on the existing entrance track, separating the top 300 mm of material from the ‘subsoil’. When the soil material is returned to the trench, the subsoil should be returned first and then the topsoil. This would facilitate more rapid regeneration of the fynbos from the soil-stored

seedbank. The working area should be kept to a minimum width and at no time should the excavated material be 'dumped' on vegetation outside the working area. Once the pipeline has been laid, an important ongoing mitigation measure would be to regularly check for and remove any invasive alien plant species.

11. Conclusions & Recommendations

- Two vegetation types are found in the designated study area on Erf 134 Infanta, namely De Hoop Limestone Fynbos and Overberg Dune Strandveld. On a regional and national scale Overberg Dune Strandveld is considered **Endangered**. De Hoop Limestone Fynbos is classified as **Least Threatened**, but this classification should be treated with circumspection at the local scale at Infanta. Even the rating of Ecological Support Area for Erf 134 should be reviewed and raised to a Critical Biodiversity Area given the sensitivity (presence of numerous endemic and threatened species) on the De Hoop Limestone Fynbos on the site.

- The De Hoop Limestone Fynbos on the eastern section of Erf 134 Infanta was deemed irreplaceable by Helme (2005) and there is complete agreement with that conclusion from the findings of the present study.

- *Erica oblongiflora*, an **Endangered** fynbos species, was found at Infanta on Erf 134 for the first time during this survey. This is a highly significant discovery and together with the presence of other Red List plant species, makes the limestone part of the study site extremely conservation worthy.

- The constraints analysis based on the botanical survey of the eastern section of Erf 134 determined the high importance of conservation of the area of De Hoop Limestone Fynbos whereas the area of Overberg Dune Strandveld was found to have lower conservation value due to its condition, permitting development with no significant constraints.

- The constraints analysis was taken into consideration in a protracted process to mitigate for any impacts on the De Hoop Limestone Fynbos on Erf 134 Infanta. Early development proposals were rejected as potentially having **High Negative** impacts that would destroy the area of limestone fynbos with no opportunity for mitigation. Alternative 3 (preferred alternative) was also found to be flawed (**High Negative** impact) but was assessed for

comparison with alternatives 1 and 2 (the preferred alternative), to highlight the mitigation impacts and mitigation measures for the proposed 'limestone conservation area'.

- Alternative 2 was found to be acceptable from a botanical perspective for two main reasons: (1) The setting aside of a conservation area for De Hoop Limestone Fynbos and (2) the definition of a biodiversity corridor (which will accommodate some Overberg Dune Strandveld) along the watercourse extending to the eastern boundary of the property on the coastal side. The anticipated impact of Alternative 2 is **Low Negative**.

- Alternative 3 was developed due to traffic regulation constraints and although less desirable than Alternative 4 from a botanical perspective, with anticipated **Medium negative** impacts after mitigation, this alternative is considered acceptable as long as the mitigation measures are strictly applied.

- It is strongly recommended that a management plan should be compiled to ensure the correct management of the conservation area of De Hoop Limestone Fynbos and the 'watercourse biodiversity corridor'.

- Attention should be paid to the high incidence of alien invasive species, in particular *Acacia cyclops* (rooikrans) on the property. These alien invasive plants must be controlled but note should also be taken of the large quantity of seed in the soil. Construction disturbance on the site would stimulate germination of the dormant seed and in addition no soil which could contaminate other places should be removed from the site.

- Concerning the proposed construction and operation of a rising water main (preferred alternative), the proposed mitigation measures must be strictly observed to reduce the impact of construction. Management of invasive alien plants would also be important along the disturbed pipeline route.

- If the recommendations made in this report and the mitigation measures required are strictly observed, the proposed development with adjunct activities would be supported from a botanical perspective.

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Appendix 1. Criteria for Assessment

These criteria are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 and the Department of Environmental Affairs and Development Planning, Guidelines for involving Biodiversity Specialists in EIA Processes, 2005. These criteria include:

Nature of the impact

This is an appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.

Extent of the impact

Extent defines the physical extent or spatial scale of the impact. The impact could:

- Site specific: limited to the site.
- Local: limited to the site and the immediate surrounding area (1-10km)
- Regional: covers an area that includes an entire geographic region or extends beyond one region to another.
- National Scale: Across national boundaries and may have national implications.

Duration of the impact

The specialist should indicate whether the lifespan of the impact would be:

- Short term: 0-5 years.
- Medium term: 5-15 years.
- Long term: Beyond the operational phase, but not permanently).
- Permanent: Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.

Intensity

Intensity establishes whether the impact is destructive or benign and should be qualified as low, medium or high.

Probability of occurrence

Probability describes the likelihood of the impact occurring. The likelihood can be described as:

- Improbable/unlikely: Low likelihood of the impact occurring
- Probable: Distinct possibility the impact will occur
- Highly probable: Most likely that the impact will occur
- Definite: Impact will occur regardless of any prevention measures.

Reversibility

This refers to the degree to which an impact can be reversed.

- Fully reversible: Where the impact can be completely reversed.
- Partly reversible: Where the impact can be partially reversed.
- Irreversible: Where the impact is permanent.

Irreplaceable loss of resources

Describes the degree to which resources will be irreplaceably lost due to the proposed activity.

- Fully replaceable: Resources can be fully replaced.
- Partly replaceable: Resources can be partially replaced.
- Irreplaceable: Resources cannot be replaced.

Degree to which an impact can be mitigated

This indicates the degree to which an impact can be reduced. The impact can either be fully or partly mitigated or not mitigated at all.

Cumulative effect

An effect which in itself may not be significant but may become significant if added to other existing or potential impacts that may result from activities associated with the proposed development.

Significance

Based on a synthesis of the information contained in the above-described procedure, the potential impacts can be assessed in terms of the following significance criteria:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment.

Appendix 2: Minimum Content Requirements for Terrestrial Biodiversity Specialist Reports as per Protocol for the Specialist Assessment of Environmental Impacts on Terrestrial Biodiversity (GN 320 of 20 March 2020)

Protocol ref	**Terrestrial Biodiversity Specialist Assessment Report Content**	**Section / Page**
3.1.1.	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page 2
3.1.2.	a signed statement of independence by the specialist;	Page 4
3.1.3.	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Page 14
3.1.4.	a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Page 14
3.1.5.	a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Page 14
3.1.6.	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Page 30--33
3.1.7.	additional environmental impacts expected from the proposed development;	N/A
3.1.8.	any direct, indirect and cumulative impacts of the proposed development;	Pages 34--46
3.1.9.	the degree to which impacts and risks can be mitigated;	Page 47
3.1.10.	the degree to which the impacts and risks can be reversed;	Pages 34—46
3.1.11.	the degree to which the impacts and risks can cause loss of irreplaceable resources;	Pages 34--46
3.1.12.	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Page 48--49
3.1.13.	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
3.1.14.	a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Page 45
3.1.15.	any conditions to which this statement is subjected.	N/A

Appendix 3: Curriculum Vitae

Dr David Jury McDonald Pr.Sci.Nat.

Name of Company: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

Work and Home Address: 14A Thomson Road, Claremont, 7708

Mobile: 082-8764051

E-mail: dave@bergwind.co.za

Website: www.bergwind.co.za

Profession: Botanist / Vegetation Ecologist / Consultant / Tour Guide

Date of Birth: 7 August 1956

Employment history:

- Nineteen years with National Botanical Institute (now SA National Biodiversity Institute) as researcher in vegetation ecology.
- Five years as Deputy Director / Director Botanical & Communication Programmes of the Botanical Society of South Africa
- Eighteen years as private independent Botanical Specialist consultant (Bergwind Botanical Surveys & Tours CC)

Nationality: South African (ID No. 560807 5018 080)
Languages: English (home language) – speak, read and write.
Afrikaans – speak, read and write.

Membership in Professional Societies:

- International Association for Impact Assessment (SA)
- South African Council for Natural Scientific Professions (**Ecological Science, Registration No. 400094/06**)
- Field Guides Association of Southern Africa

Key Qualifications :

- Qualified with a M.Sc. in Botany (1983) and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute)

- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.
- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications; involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.

- Further tasks involved the day-to-day management of a large non-profit environmental organisation.

- **Independent botanical consultant** (2005 – to present) Over 600 projects have been completed providing botanical assessment components for environmental impact assessments in the Western, Southern, Northern and Eastern Cape, Karoo and Lesotho for urban development, agricultural development, roads, dams, transmission lines and renewable energy projects (wind & solar). A list of reports or copies of selected reports are available on request.

Higher Education

Degrees obtained
and major subjects passed:

B.Sc. (1977), University of Natal, Pietermaritzburg
Botany III
Entomology II (Third year course)

B.Sc. Hons. (1978) University of Natal, Pietermaritzburg
Botany (Ecology /Physiology)

M.Sc. - (Botany), University of Cape Town, 1983.

Thesis title: 'The vegetation of Swartboschkloof, Jonkershoek, Cape Province'.

PhD (Botany), University of Cape Town, 1995.

Thesis title: 'Phytogeography endemism and diversity of the fynbos of the southern Langeberg'.

Certificate of Tourism: Guiding (Culture: Local)
Level : 4 Code: TGC7 (Registered Tour Guide: WC 2969).

Employment Record:

January 2006 – present: Independent specialist botanical consultant and tour guide in own company: **Bergwind Botanical Surveys & Tours CC**

August 2000 – December 2005:	Deputy Director, later Director: Botanical & Communication Programmes, Botanical Society of South Africa
January 1981 – July 2000:	Research Scientist (Vegetation Ecology) at National Botanical Institute
January 1979—Dec 1980:	National Military Service

Further information is available on my company website: www.bergwind.co.za