Botanical Impact Assessment,
Kyk'ie C Holiday Resort
Erf 610, Dwarswegstrand, Mossel Bay Municipality
Western Cape Province

Gladiolus floribundus

bergwind
Botanical Surveys & Tours

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Prepared for Cape EAPrac

APRIL 2023

CONTENTS

i. 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, 2014, in compliance with the Specialist Protocols (2020).

ii. Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by CapeEAPrac to provide specialist consulting services for the proposed development of the Kyk'ie C Holiday Resort, at Dwarswegstrand, Mossel Bay Municipality, Western Cape Province. The consulting services have comprised of a study of the vegetation to determine botanical 'Red Flags' based on the work of the author and other botanical specialists as reported here.

iii. Details of Specialist

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iv. 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 and Ecology.
- 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)

v. Declaration of 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.

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;
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all 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:
Company: Bergwind Botanical Surveys & Tours CC Date: 24 April 2023

Curriculum Vitae: Appendix 3.

vi. 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.

vii. Terms of Reference

- Consider the existing botanical assessment reports that were used to inform the development of a layout that would accommodate the identified constraints ;
- Conduct a botanical impact assessment as per the Specialist Protocols (NEMA – 2020) of the proposed Kyk'ie C Holiday Resort development that takes the following into consideration:
    1. Sensitive habitats;
    2. Any plant species of conservation concern;
    3. Relevant environmental regulations / policies / plans stipulated by the Department of Environmental Affairs and CapeNature in terms of, amongst others, the National Environmental Management Act (NEMA) and the National Environmental Management Biodiversity Act (NEMBA);
    4. Comments from Cape Nature.

viii. Limitations and Assumptions

Since this report is a composite assemblage (summary) of information from numerous specialist studies, it stands to reason that there are some gaps where brevity prevented elaboration as in the specialist reports. It is assumed that the historical specialist reports for the area of the proposed development would be read by anyone adjudicating the environmental application, so an attempt has been made to avoid repetition. All limitations in the reviewed specialist reports thus equally apply to this report.

1. Introduction and Background

It is well-recognized that natural habitats are underpinned by plant species that respond to the abiotic environment, forming interacting communities that in turn support the existence of other biota in a given area. This is roughly the biological diversity or 'biodiversity' which is the diversity of organisms that inhabit a specified space. The organisms that contribute to any specified area range from soil micro-organisms to fungi to invertebrates to vertebrates such as reptiles, birds and mammals. The study of the interaction of these biota is often complex and not easily teased out and / or described. Therefore, an assessment of the biodiversity, and more specifically the terrestrial biodiversity is only possible at the coarse level of a general assessment. It is limited by the number of studies of different specialists in a specified area, and is really only a superficial overview of the biodiversity of a given area.

Plans to develop Erf 720, Mossel Bay District, have been in place since prior to 2012. Initially, it was the intention of the Kaapland Onderwys Trust (KoT), the applicant, to obtain Environmental Authorisation to develop a larger extent of the above property. Bergwind Botanical Surveys & Tours CC (Bergwind) [Dr D.J. McDonald] was involved with a botanical analysis in 2012. The project has been scaled down as is described below. CapeEAPrac has been, and continues to be, the environmental consultant company responsible for the environmental compliance applications.

The applicable botanical studies that have been concluded for the study site include those of McDonald, 2012 and Vlok, 2019.

This botanical assessment takes careful note of the requirements and recommendations of CapeNature and the Botanical Society of South Africa for proactive assessment of the biodiversity of proposed development sites and follows published guidelines for evaluating potential impacts on the said biodiversity in an area earmarked for some form of development (Brownlie 2005, Cadman *et al.* 2016). The requirements and recommendations of CapeNature for assessment of biodiversity of proposed development sites have also been considered and the 2020 Species Environmental Assessment Best Practice Guideline and protocols for terrestrial biodiversity specialists (Government Gazette, 2020; Enviro Insight, 2020) have been applied.

2. Project Description

It is proposed to develop a holiday resort on Erf 720, Mossel Bay District, on an area of 1.65 ha adjacent

to Morrison Road and H.C. Botha Street, Dwarswegstrand. This area (the study area) is part of the property zoned as 'Open Space' that would require rezoning to enable the development to take place. The applicant (KoT) intends to apply for authorisation (EA) to develop 27 holiday units on the upper, relatively flat portion of the study area. The development would consist of 18 single bedroom units and nine two-bedroom units. As part of the development proposal, the KoT intends to provide the following amenities and private use: (1) A conference room, and (2) a pool with ablution facilities. Services would include an on-site package plant for sewerage in the south-western corner of the property and a municipal water connection along H.C. Botha Street.

3. Physiography

3.1 Location

As mentioned above, the area proposed for development is in the corner formed by Morrison Road and H. C. Botha Street, and following the crest of the vegetated dune diagonally west to east from a south-west point at H.C. Botha Street to a north-east point at Morrison Road; the area shaded blue in Figure 1. The area shaded green in Figure 1 will remain intact as 'open space'.

Figure 1. Erf 610, Dwarswegstrand, showing the area proposed for development shaded blue and the rest of the erf that would remain undeveloped shaded green.

3.2 Topography

The area proposed for development (black triangle in Figure 2) is relatively flat as shown by the widely spaced 5 m contours.

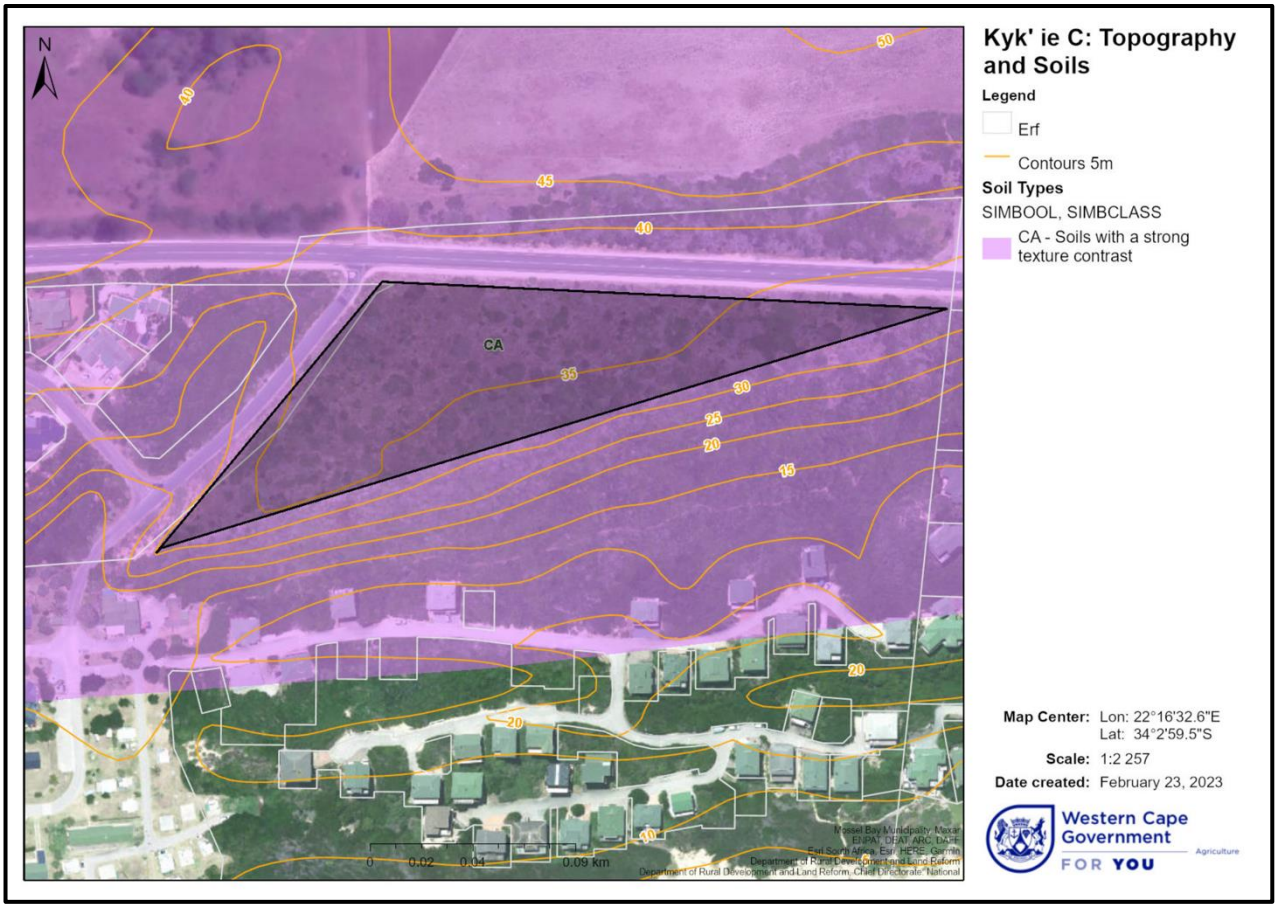


Figure 2. The area Erf 610, Dwarswegstrand proposed for development (black outline) with 5 m contours and the pink shading showing the CA-soils that are sandy and have a strong texture contrast.

3.3 Geology and Soils

Geologically the site is underlain by the George Pluton of the Cape Granite Suite. However, the granitic rocks have been buried by Holocene sand, so the soils are sandy and are described as well-drained soils with a strong texture contrast (Figure 2).

3.4 Climate

In the past, the vegetation that is found at the study site was classified as Groot Brak Dune Strandveld (Mucina *et al.* 2006). It has now been more clearly defined as Hartenbos Dune Thicket (Grobler *et al.* 2018). For purposes of climate delineation the climate diagram of Groot Brak Dune Strandveld is given

(Figure 3) as representative of the prevailing climate at the study site. Additional climate information for Glentana, the nearest main centre is given in Figure 4. Note the bimodal pattern of peak winds, with the winter winds less strong than the summer winds. The climate at the study site is relatively even and reflects the 'all-year-round' rainfall pattern typical of the Garden Route in the Western Cape Province.

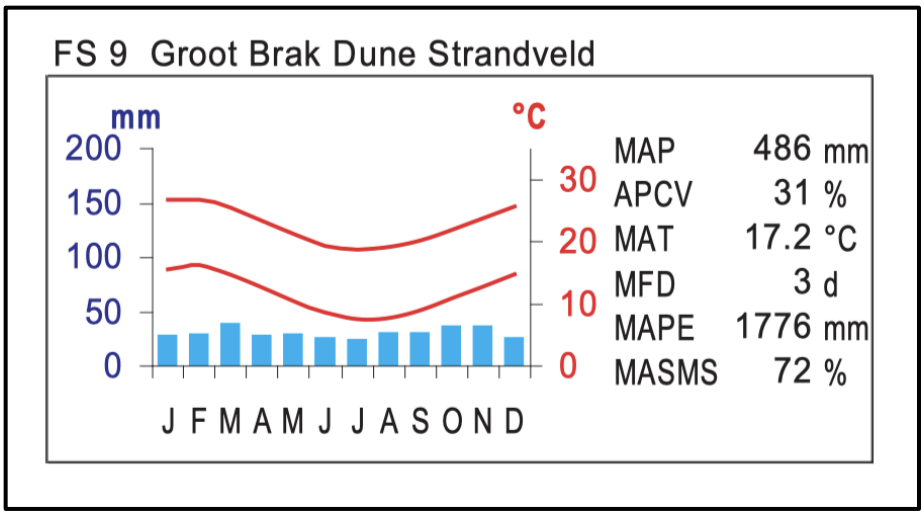


Figure 3. Climate diagram for Groot Brak Dune Strandveld. Blue bars show the median monthly precipitation. The upper and lower red lines show the mean daily maximum and minimum temperature respectively. MAP: Mean Annual Precipitation; APCV: Annual Precipitation Coefficient of Variation; MAT: Mean Annual Temperature; MFD: Mean Frost Days (days when screen temperature was below 0°C); MAPE: Mean Annual Potential Evaporation; MASMS: Mean Annual Soil Moisture Stress (% of days when evaporative demand was more than double the soil moisture supply (Rebelo *et al.* 2006 in Mucina & Rutherford, 2006)

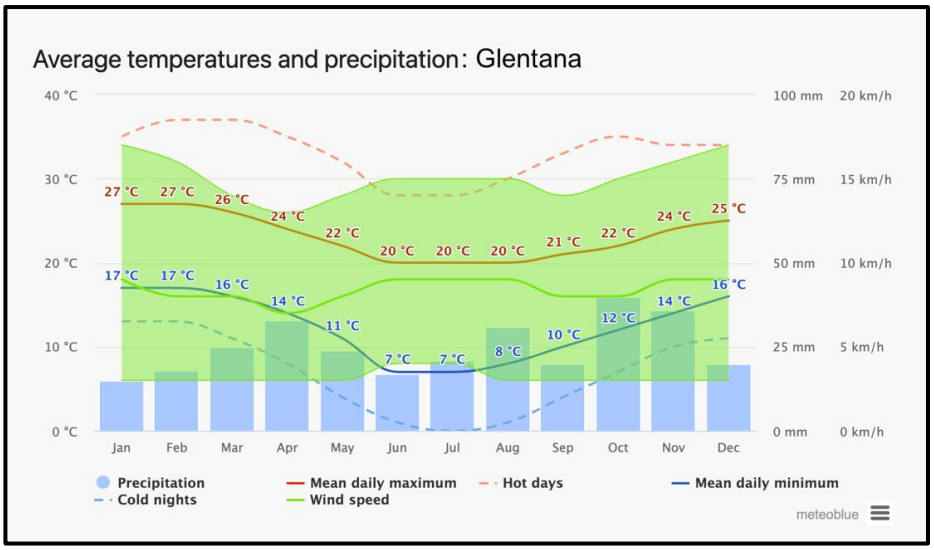


Figure 4. Average temperatures and precipitation, and wind speed for Glentana, the closest major location near Dwarswegstrand.

4. Methods

4.1 Approach

Erf 610 was first visited and surveyed in March 2012. The survey route that was followed on that occasion is illustrated by the irregular blue line in Figure 5. It included several sample points (DWG#) in the current area of interest (blue area in Figure 5) as well as a record of the forested slope on the vegetated dune (green area: Waypoints DWG9 & DWG10). The latter area is not part of this study. The current area of interest was revisited on 23 September 2022 in the company of Dr Jonathan Colville, Faunal Specialist. The route followed is illustrated by the red line in Figure 5, which was confined to the current study area. Sample waypoints were not recorded but 154 geo-referenced photographs were taken as illustrated in Figure 6.

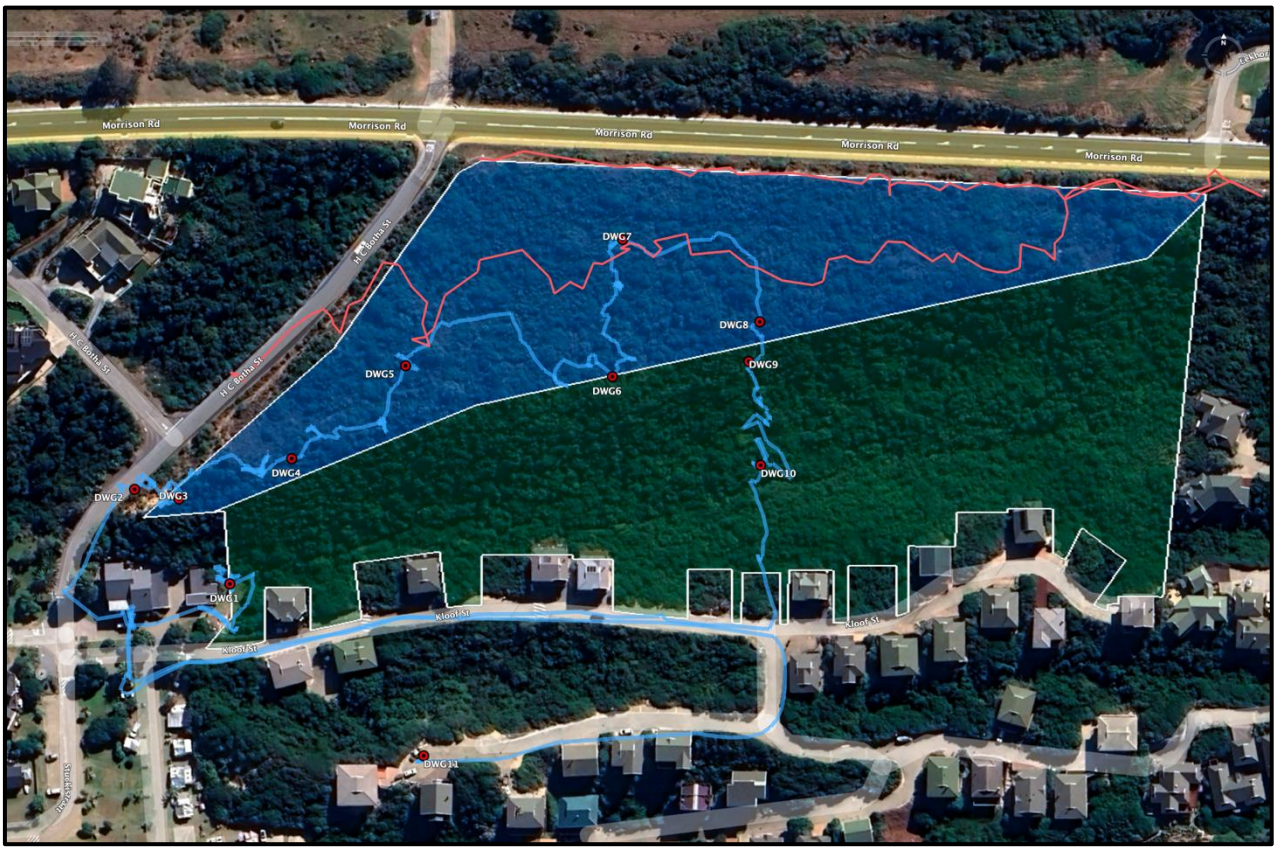


Figure 5. Aerial image (Google Earth Pro ™) showing the sample track and waypoints recorded in March 2012 (blue line with waypoints DWG#) and the sample track recorded in September 2022 (red line).

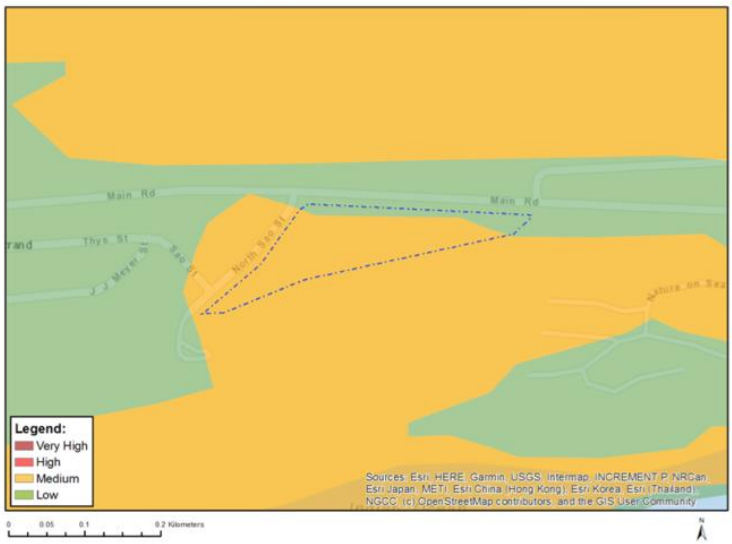
Figure 6. Locations and quantity of photographs taken at Erf 610, Dwarswegstrand, at each 'photographic waypoint' on 22 September 2022.

5. Sensitivities identified from the DFFE Online Screening Tool

5.1 Relative Plant Species Theme Sensitivity

The National Web-based Screening Tool was applied to the study area and the result was that the site has mostly a **MEDIUM** sensitivity with a small area on the northern perimeter with **LOW** sensitivity, with respect to the relative plant species theme sensitivity (Figure 7). There are also not many sensitive species (the names of those species not listed were obtained from SANBI but as per protocol are not published here).

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 fergusoniae
Medium	Lampranthus pauciflorus
Medium	Lebeckia gracilis
Medium	Wahlenbergia polyantha
Medium	Selago villicaulis
Medium	Erica unicolor subsp. mutica
Medium	Erica glandulosa subsp. fourcadei
Medium	Hermannia lavandulifolia
Medium	Sensitive species 153
Medium	Sensitive species 268
Medium	Agathosma muirii
Medium	Euchaetis albertiniana
Medium	Muraltia knysnaensis
Medium	Nanobubon hypogaeum
Medium	Sensitive species 516
Medium	Sensitive species 800
Medium	Sensitive species 500
Medium	Sensitive species 654
Medium	Muraltia knysnaensis
Medium	Nanobubon hypogaeum
Medium	Sensitive species 516
Medium	Sensitive species 800
Medium	Sensitive species 500
Medium	Sensitive species 654

Figure 7. Sensitivity map (plant species sensitivity) of the proposed development area of Erf 610 Dwarswegstrand, as classified by the National Web-based Screening Tool.

6. The Vegetation

6.1 Vegetation Type

Several vegetation studies have classified the vegetation of the southern Cape Coast but in the most widely recognized broad-scale classification of the vegetation of southern Africa, the study area was included within the area described and mapped as Groot Brak Dune Strandveld (Rebelo *et al.* 2006). Fine-scale vegetation mapping has been carried out for the Garden Route including the Mossel Bay Municipality. In the latter case the classification of Rebelo *et al.* (2006) has been adopted (see Maree & Vromans, 2010) and Groot Brak Dune Strandveld has been upheld as a unit. This vegetation type is also recognized in the Sub-tropical Ecosystem Project (STEP) (Pierce & Mader, 2006) and Gouritz Initiative (Lombard & Wolf, 2004). However, more recent analysis has placed the vegetation in a newly-described unit, **Hartenbos Dune Thicket** (Grobler *et al.* 2018) that replaces the former classification of the vegetation as Groot Brak Dune Strandveld (Rebelo *et al.* 2006 in Rutherford & Mucina, 2006). Hartenbos Dune Thicket has been included in the most recent edition of the national vegetation map (VEGMAP: SANBI, 2018).

Hartenbos Dune Thicket has been described by Grobler *et al.* (2018) as follows:

Vegetation & Landscape Features: On flat to moderately undulating coastal dunes. A mosaic of low (1 - 3 m) thicket, occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low (1 - 2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests. Succulent karroid elements (*Aloe ferox, A. arborescens, Eriocephalus africanus*) occur along bands of mudstone and shale.

Important Taxa (d=dominant, e=South African endemic, e t =possibly endemic to a vegetation type)

Growth Form	Species
Small tree	*Pterocelastrus tricuspidatus* (d), *Sideroxylon inerme* (d)
Succulent tree	*Aloe ferox*
Succulent shrub	*Aloe arborescens, Carpobrotus acinaciformis* (d), *Carpobrotus edulis, Conicosia pugioniformis, Cotyledon orbiculata, Crassula nudicaulis, Cleretum bellidiforme, Euphorbia burmannii, Euphorbia caput-medusae, Jordaaniella dubia, Roepera morgsana* (d)
Succulent herb	*Carpobrotus muirii, Haworthia mirabilis* var. *paradoxa, Euphorbia bayeri*
Geophytic herb	*Brunsvigia orientalis, Chasmanthe aethiopica, Freesia leichtlinii, Haemanthus coccineus, Ixia orientalis*
Low Shrub	*Eriocephalus africanus, Eriocephalus africanus* var. *paniculatus*, *Felicia echinata, Helichrysum patulum, Muraltia spinosa, Salvia africana-lutea* (d),

	Agathosma apiculata (d), *Agathosma muirii, Athanasia cochlearifolia, Athanasia quinquedentata* subsp. *rigens*, *Diosma aristata, Euchaetis albertiniana*, *Hermannia muirii, Muraltia barkerae, Muraltia depressa*
Graminoid	*Restio eleocharis* (d), *Sporobolus fimbriatus*, *Stenotaphrum secundatum* (d), *Thamnochortus insignis* (d), *Themeda triandra* (d)
Tall shrub	*Azima tetracantha, Carissa bispinosa, Cassine peragua, Cussonia thyrsiflora, Euclea racemosa* (d), *Grewia occidentalis, Lauridia tetragona, Maytenus procumbens* (d), *Metalasia muricata* (d), *Morella cordifolia, Mystroxylon aethiopicum, Olea exasperata* (d), *Osteospermum moniliferum* (d), *Passerina rigida* (d), *Putterlickia pyracantha, Robsonodendron maritimum, Scutia myrtina, Searsia crenata* (d), *Searsia glauca, Searsia lucida, Searsia pterota, Leucospermum praecox*
Herbaceous climber	*Cynanchum ellipticum, Rhoicissus digitata, Solanum africanum*
Woody succulent climber	*Cynanchum viminale*

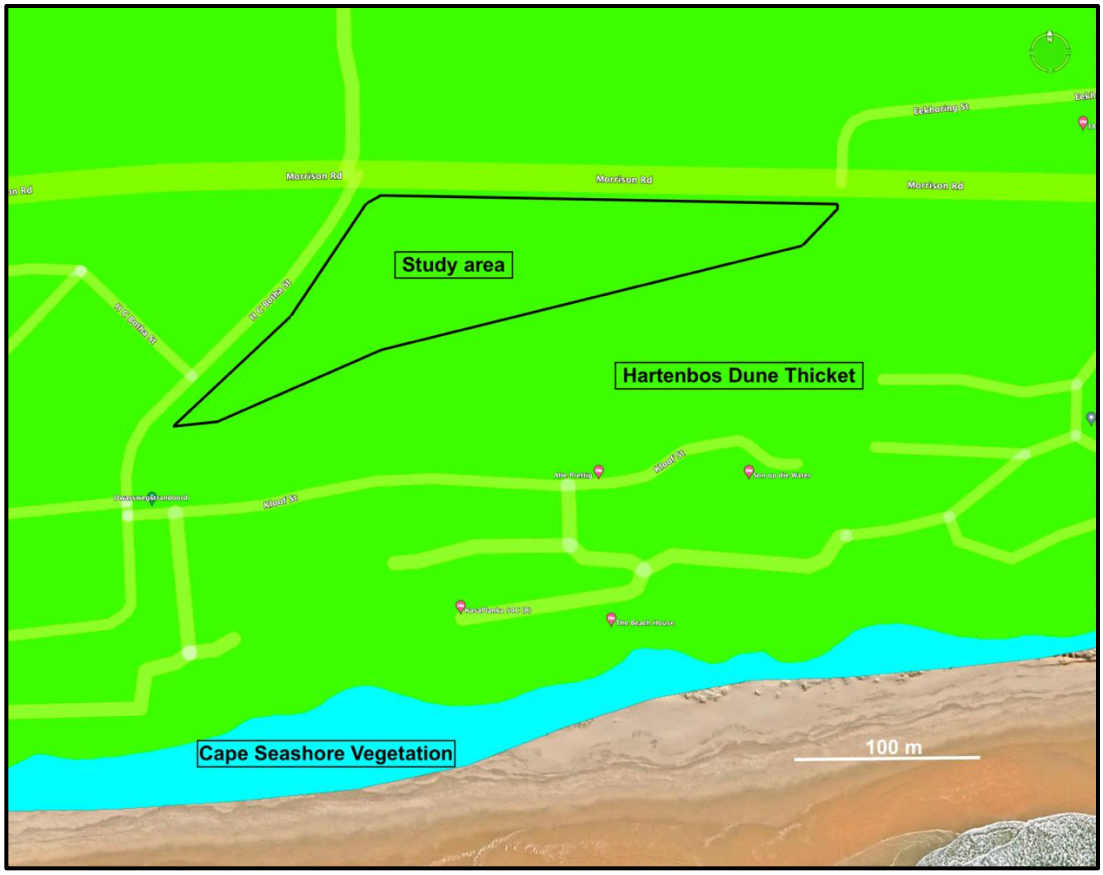


Figure 8. The Erf 610, Dwarswegstrand study area (black boundary) is firmly located in Hartenbos Dune Thicket vegetation.

A Botanical Sensitivity Report was com[piled for the study area by Cape EAPrac (2011) in which a list of plants encountered was published. McDonald (2012) listed plant species not observed by Cape EAPrac (2011). Most of these species were recorded again for this study and a few additional plant species are listed (2022). Two notable additional species, *Gladiolus floribundus* (cover photo) and *Ixia orientalis* were found near the boundary of the study area along Morrison Road. This emphasizes the importance of

visiting sites in this vegetation type in spring (September) since, had the 2022 site visit been earlier or later, these geophytes would not have been seen. It could be argued, however, that spring and autumn visits are necessary in this vegetation because some geophytes such as *Brunsvigia orientalis* (Figures 9—11), flower in March and April.

List of plant species of the study area recorded by Cape EAPrac (2011)

Agapanthus africanus Bloulelie
Agathosma capensis Buchu
Aloe aborescens Kransaalwyn
Aloe microstigma Speckled Aloe (misidentified – should be *Aloe maculata*)
Asparagus aethiopicus Asparagus
Asparagus asparagoides Bridal Creeper
Azima tetracantha Needle Bush
Brachylaena discolor Coastal Silver-oak
Brunsvigia litoralis Chandelier Lily (misidentified – should be *B. orientalis*)
Carissa macrocarpa Big Num-num (misidentified – should be *Carissa bispinosa*)
Carpobrotus edulis Sour Fig
Cassine peragua Cape Saffron
Chasmanthe aethiopica Cobra Lily
Cynanchum sp. Bokhorinkies
Cussonia spicata Common CabbageTree
Diospyros dichrophylla Common Star-apple
Euphorbia sp. Melkbos (*Euphorbia burmannii*)
Eriocephalus sp. Wild Rosemary (*Eriocephalus africanus*)
Grewia occidentalis Cross-berry
Gymnosporia buxifolia Common Spike-thorn
Helichrysum teretifolium Strooiblom
Helichrysum sp. Strooiblom
Hermannia sp. Doll's Rose
Muraltia sp. Purple Gorse
Olea exasperata Dune Olive
Osteospermum moniliferum Tickberry
Passerina corymbosa Gonnabos
Pelargonium betulinum Kanferblaar
Pelargonium capitatum Kusmalva
Pelargonium peltatum Ivy-leaved Geranium
Pittosporum viridiflorum Cheesewood
Polygala myrtifolia September Bush
Pterocelastrus tricuspidatus Candlewood
Putterlickia pyracantha False Spike-thorn
Searsia (Rhus) glauca Blue Kuni-bush
Searsia (Rhus) lucida Glossy Currant
Rhoicissus digitata Baboon Grape
Tarchonanthus camphoratus Wild Camphor Bush
Sideroxylon inerme White Milkwood

List of plant species recorded by McDonald (2012) that were not recorded by Cape EAPrac (2011)

*Aloe maculata (*misidentified *as Aloe microstigma* by Cape EAPrac*)*
Argyrolobium collinum
*Carissa bispinosa (*not *C. macrocarpa* as listed by Cape EAPrac*)*
Chironia baccifera
Chrysocoma ciliata
Conyza bonariensis (exotic weed)
Conyza scabrida
Cotyledon orbiculata
Crassula orbiculare
Crassula rupestris
Ehrharta cf. ramosa
Eragrostis curvula
Euclea racemosa
Helichrysum cymosum
Myoporum tenuifolium (exotic invasive)
Mystroxylum aethiopicum (dune kooboo-berry)
Phylica ericoides
*Sarcostemma viminale (*now *Cynanchum viminale)*
Scutia myrtina
Selago sp.
Solanum africanum
*Zygophyllum morgsana (*now *Roepera morgsana)*

List of additional species recorded by the author in September 2022

Acacia cyclops (exotic invasive)
Bolusafra bituminosa
Dipogon lignosus
Erica sp. (tall shrub with minute flowers)
Gladiolus floribundus
Gymnosporia buxifolia
Hermannia flammea
Hermannia althaeifolia
Ixia orientalis
Passerina falcifolia
Ruschia sp.
Salvia africana-lutea
Searsia spinosa
Secamone alpini

Figure 9. *Brunsvigia orientalis* in flower, having a spherical umbel.

Figure 10. Two inflorescences of *B. orientalis* at seed-set. The umbels would break loose from the bulb, to be blown by the wind as 'tumblers' thereby distributing the recalcitrant seeds that germinate immediately.

Figure 11. The leaves of *Brunsvigia orientalis*, drying out prior to summer when the plants are dormant as bulbs beneath the soil surface.

6.2 The Vegetation of the Study Area and its condition

The vegetation of the Study Area is typical of the 'upland' phase of Hartenbos Dune Thicket on the dune crest or plateau. It is less dense than the 'slope phase' of the vegetation type on the steeper, south-facing slopes that has more large and well-developed trees. This could possibly be ascribed to drier, more exposed conditions on the dune crest, with sandy well-drained soil. The vegetation is nevertheless quite dense in places but this is due to the shrub stratum. Patches of white milkwood (*Sideroxylon inerme*) and other trees of low stature e.g. candlewood (*Pterocelastrus tricuspidatus*) and cheeswood (*Pittosporum viridiflorum*) occur amongst the shrubs (Figure 12). (Vlok, 2019, mapped all the protected tree patches which informed the development layout). Some parts of the site are distinctly grassy (Figure 13), as a result of the removal of alien *Acacia cyclops* that had a marked shading effect. In other places, the branches of felled *Acacia cyclops* (rooikrans) trees have simply been left and this has had a negative, suppressive effect, with few shrubs being able to regenerate (Figure 14) in these places.

Figure 12. Cheesewood and candlewood occur in the dense thicket vegetation in the Erf 610, Dwarswegstrand, study area.

Figure 13. Site of removal of an Acacia cyclops (rooikrans) tree. The disturbance has encouraged the growth of grasses.

Figure 14. Woodcutters cut alien *Acacia cyclops* trees for firewood but unfortunately leave the thin branches which do not readily decompose resulting in suppression of the native vegetation as well as presenting a risk as fuel for uncontrolled fires.

The vegetation and habitat in the study area are in fair to good condition. A few *A. cyclops* plants are scattered through the site with several *Myoporum tenuifolium* (manatoka) also present. In general the observations on the site support the sensitivity classification of the plants by the screening tool as MEDIUM.

9. Conservation Status

9.1 The Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan [WCBSP] (Pence, 2017, Pool-Stanvliet *et al.* 2017) was consulted to determine conservation status and critical biodiversity areas of Erf 610, Dwarswegstrand. The required shapefiles were obtained from the South African National Biodiversity Institute (SANBI) BGIS website and then the critical biodiversity areas (CBA) map for the study area was overlaid on a Google Earth ™ image. The image was carefully examined to compare what was observed in the field with the aerial image when overlaid with the CBA map. The presence of CBAs (and ESAs -- Ecological Support Areas) suggests that areas where they have been mapped are ecologically sensitive.

Only a strip along the north side adjacent to Morrison Road is mapped as CBA1 with no areas mapped as CBA2. The rest of the site is classified and mapped as ESA1 (Figure 15). From field observations there is little correlation between the WCBSP map and the sensitivity of the habitat for the CBA1 area. In my view, the entire site should be classified as ESA1 since there is little difference between the ESA1 area and CBA1 area.

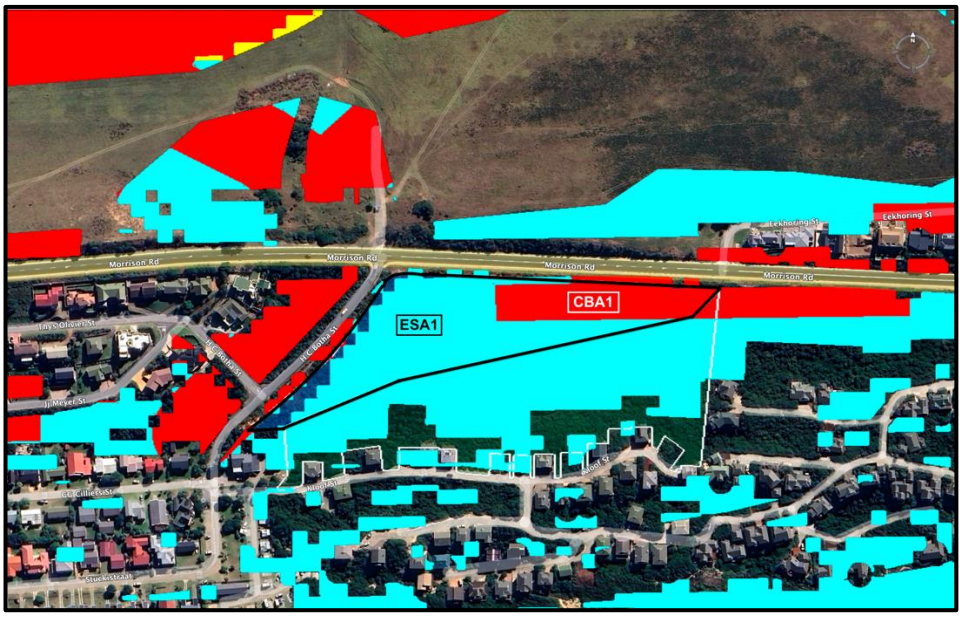


Figure 15. Critical Biodiversity Areas map for Erf 610, Dwarswegstrand (black boundary). Red=CBA1 and Light blue = ESA1.

9.2 Red Listed Ecosystems

An appraisal of remnants of important ecosystems of South Africa was carried out by Skowno *et al.* (2019) and published by SANBI (2021) as the 'Red List of Ecosystems' (RLE). The available shapefile was overlaid on a Google Earth Pro ™ image together with a boundary outline of the study area. The resulting composite image (Figure 16) shows that the study area is mostly within an ENDANGERED remnant, determined by the restricted distribution of the vegetation type and threats to the ecological integrity of the vegetation type. This can mostly be ascribed to coastal ribbon development.

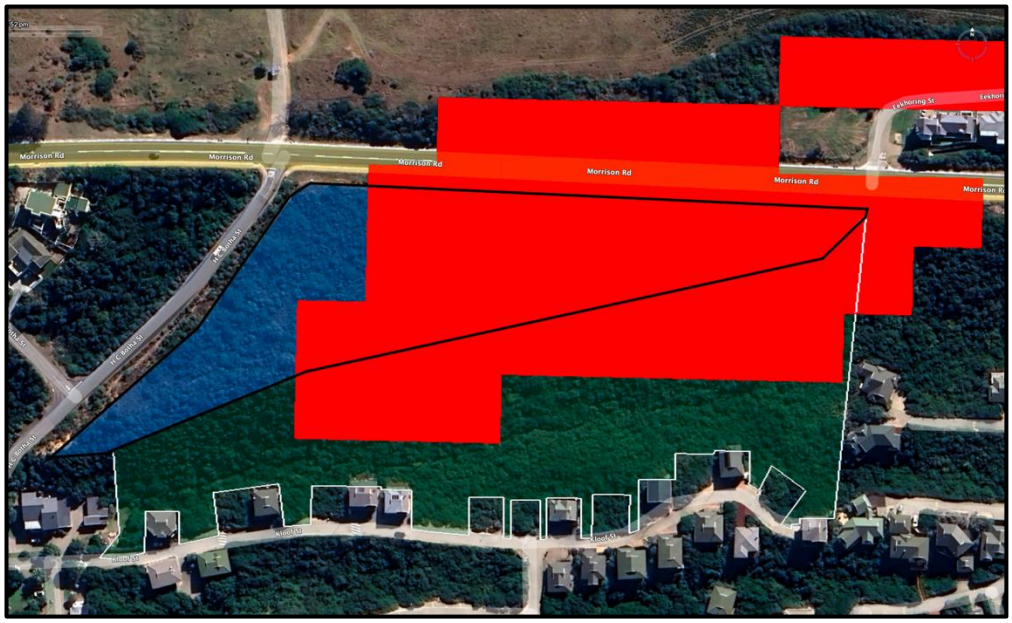


Figure 16. Google Earth Pro ™ aerial image with Red List Ecosystem (RLE) [Endangered] represented by red shading.

9.3 Plant Species of Conservation Concern

No plant species of conservation concern (SCC) were found on the study site.

10. Botanical Constraints

Two points concerning the botanical constraints of the study area were given by the author (McDonald, 2012):

- No development should take place on the south-facing dune face (vegetated with dense Groot Brak Dune Strandveld) of in the dune-slack or dune valley up to the paved road. This area should be conserved and kept as intact as possible as from a conservation perspective this an extremely important tract of Groot Brak Dune Strandveld with many mature trees, particularly white milkwood (*Sideroxylon inerme*) which is a protected species.

Comment: Since note was taken of the above point, no plans for further development of the south-facing dune face, nor the dune valley have been pursued.

- Limited development of a sensitive, low-impact nature can be considered for the high-lying plateau north of the 'ridgeline' as described and defined by Cape EAPrac (2011) (A buffer zone of 10 m from the ridgeline would be necessary to accommodate the ecotone between the plateau and the steep slope). Such development could be in the form of a camp-site development where the large trees should be retained and only indigenous plants (preferably locally occurring species such as *Aloe arborescens*) used for landscaping.

Comment: The proposed development assessed below has resulted directly from the evaluation point above that indicated in the 2012 botanical constraints analysis (McDonald, 2012) that some form of development would be acceptable.

11. Site Ecological Importance

The Species Environmental Assessment Guidelines (SANBI, 2020) require that Site Ecological Importance is calculated for each habitat on site and provides a methodology for making this calculation. The dominant vegetation (habitat) in the footprint of the proposed development at Dwarswegstrand is Hartenbos Dune Thicket. The ecological importance is calculated for this habitat.

As per the Species Environmental Assessment Guidelines (SANBI, 2020), Site Ecological Importance (SEI) is calculated as a function of (1) the Biodiversity Importance (BI) i.e. a function of Conservation Importance (CI) and Functional Integrity (FI) [The functional integrity of the receptor site (in this instance determined as **MEDIUM**] , therefore BI = CI + FI and (2) its resilience to impacts (RR) In this instance determined as **LOW**.) SEI=BI + RR

Table 1. Site ecological importance for Hartenbos Dune Thicket in the study area.

Habitat (H)	Conservation importance (CI)	Functional integrity (FI)	Receptor resilience (RR)	Site Ecological Importance (SEI)
Hartenbos Dune Thicket	**HIGH** Confirmed or highly likely populations of SCC. Confirmed or highly likely populations of range-restricted species. Small area (>0.01% but <0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0.1%) of natural habitat of VU ecosystem type.	**LOW** Small (>1ha but <5ha) Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.	**LOW** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	(BI = **MEDIUM**) SEI = **HIGH**

Table 2. Guidelines for interpreting SEI in the context of the proposed development activities:

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.

The Site Ecological Importance (SEI) of the study area has thus been determined as **HIGH** *(which does not agree with the sensitivity resulting from the application of the screening tool and the assessment by the author in Section 10. Botanical Constraints.*

A **multi-taxon SEI analysis** has not been carried out but is inferred from the habitat analysis.

12. The proposed development layout

The applicants, Kaapse Onderwys Trust, propose developing a low-density development with a significant amount of open space between the buildings (Figure 17). In addition, the clusters of sensitive trees (mainly White Milkwood *(Sideroxylon inerme)* and Cheesewood (*Pittosporum viridiflorum*) amongst others, have been mapped and excluded from any impact from the access road or the buildings.

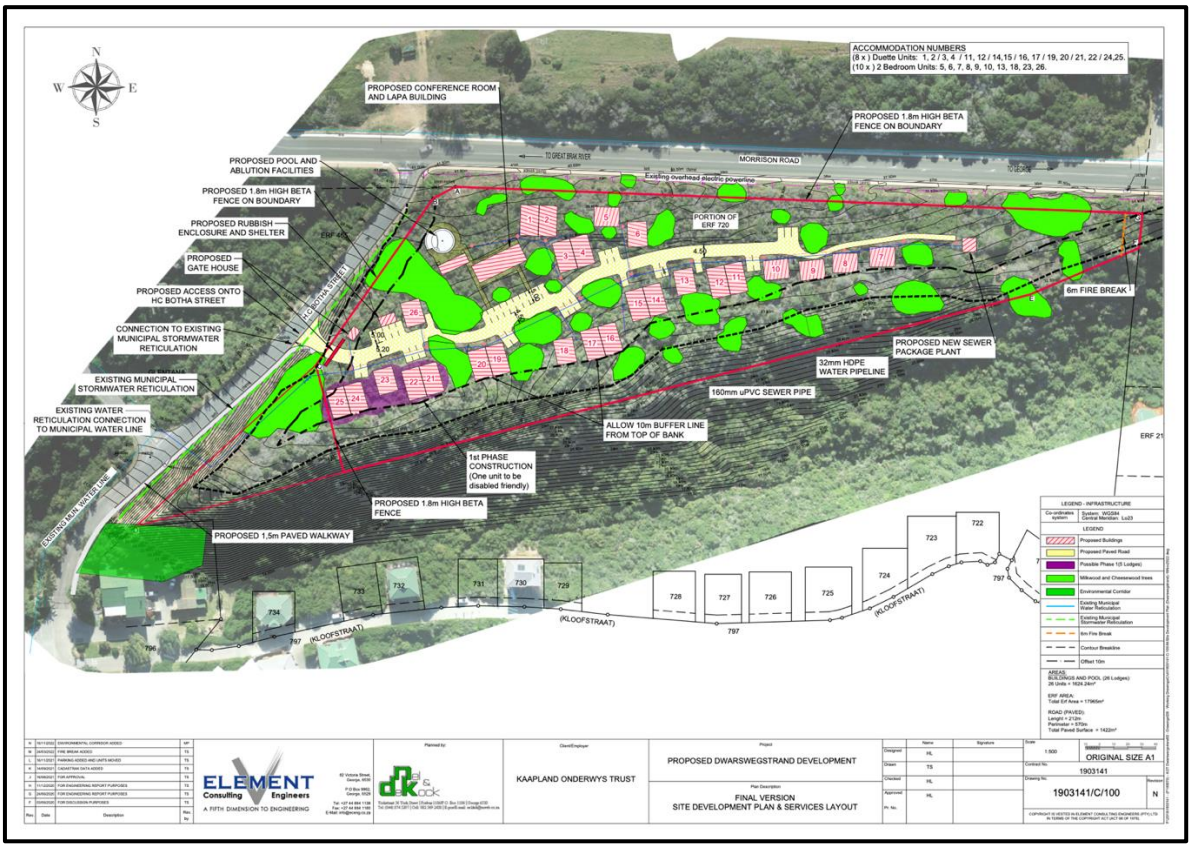


Figure 17. The proposed development layout for the northern development area of Erf 610, Dwarswegstrand. The green shading shows the locations of sensitive trees that would be retained.

13. Impact assessment of the proposed development

13.1 The No Go Alternative

The 'no-development' or 'No-Go' scenario is treated as Alternative 1 (Table 3). There would be little change from the *status quo*, except that alien woody plants could proliferate. No mitigation would be necessary.

Table 3. Impact of the loss of Hartenbos Dune Thicket due to the **non-development** of the proposed Kyk'ie C Holiday Resort (**Alternative 1- 'No Go'**).

NO LOSS OF VEGETATION				
PROJECT PHASE	*N/A*			
DIRECT IMPACT	*No removal of natural vegetation but likely spread of alien invasive plants, possible illegal dumping and risk of uncontrolled wildfire.*			
INDIRECT IMPACT	*None determined*			
CUMULATIVE IMPACT	*None*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*3*	*Long-term*	*-10*	*2*
EXTENT	*2*	*The non-development impacts would be localized to the designated site as described.*		
SEVERITY	*-2*	*The severity of the potential impact would be moderate (medium) negative.*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEBLE RESOURCES	*0*	*No irreplaceable resources would be impacted.*		
SIGNIFICANCE	*-20*	***Low Negative***		
PROPOSED MITIGATION MEASURES				
None				

POST-MITIGATION				
DURATION	4	*Long Term*	*-6*	*2*
EXTENT	2	*The extent of the impact is treated as the 'Site' as if it would be developed, and adjacent properties*		
SEVERITY	-1	*The severity of the 'impact' is rated as **Low Negative** as there would be limited impact on intact Hartenbos Dune Thicket.*	***Negligible***	***Definite***
IMPACT ON IRREPLACEBLE RESOURCES	0	*No irreplaceable resources would be impacted.*		
SIGNIFICANCE	-12	***Very Low Negative***		
CONFIDENCE LEVEL				
High				

13.2 Direct Impacts

The direct impact during the construction phase will be the removal of vegetation from approved locations on the site, leaving all protected trees and as much other vegetation as possible in place (Table 4). The operational phase would entail managing the vegetation that will remain amongst the residential and other buildings to allow for persistence of the natural vegetation while providing adequate safety (e.g. from fire) for the buildings and inhabitants.

Table 4. Impact of the loss of Hartenbos Dune Thicket due to the **construction phase** of the proposed Kyk'ie C Holiday Resort (**Alternative 2 - preferred**).

LOSS OF VEGETATION				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Removal of Hartenbos Dune Thicket (with consequent loss of habitat).*			
INDIRECT IMPACT	*None determined*			
CUMULATIVE IMPACT	*Loss of Hartenbos Dune Thicket.*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will be short-term*	*-12*	*3*
EXTENT	*2*	*The impacts will be localized to the site as described*		
SEVERITY	*-3*	*The severity of the potential impact would be **High Negative** prior to mitigation.*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEBLE RESOURCES	*0*	*No irreplaceable resources would be impacted.*		
SIGNIFICANCE	***-36***	***Low Negative***		
PROPOSED MITIGATION MEASURES				
(1) The mitigation measures necessary would be the relocation of *geophytes from the development footprint (especially the* Brunsvigia orientalis *bulbs). Ideally the bulbs should be lifted when they are dormant (summer) but that would mean traversing the entire area of the proposed development in the preceding winter and marking every occurrence of these plants. A more practical approach would be to unearth the bulbs during the construction phase and to then relocate and*				

*plant them soon after removal. (**Note: A clearing permit as well as a permit for removal of and relocation of geophytic plants would be required from Cape Nature.**)* *(2) All construction activities must take place within the footprint of the development. Areas outside the development footprint (except for access roads) MUST be avoided. Any areas within the development footprint that will not be used later should rehabilitated with natural vegetation native to the area.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last at least 5 years and therefore it is considered to be Long Term.*	*-12*	*3*
EXTENT	2	*The extent of the impact is treated as the footprint of the buildings and access road.*		
SEVERITY	-2	*The severity of the impact is rated as **Medium Negative** post-mitigation*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEBLE RESOURCES	0	*No irreplaceable resources would be impacted.*		
SIGNIFICANCE	**-36**	***Low Negative***		
CONFIDENCE LEVEL				
High				

Table 5. Impact of the loss of Hartenbos Dune Thicket due to the **operational phase** of the Kyk 'ie C Holiday Resort (Alternative 2 - preferred).

LOSS OF VEGETATION				
PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Post-construction removal of Hartenbos Dune Thicket.*			
INDIRECT IMPACT	*None determined*			
CUMULATIVE IMPACT	*Loss of Hartenbos Dune Thicket*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term.*	*-5*	*3*
EXTENT	*1*	*The extent of the impact is the area of the 'footprint' as it will only affect the area in which the proposed activity will occur.*		
SEVERITY	*-1*	*The severity of the impact is rated as **Low Negative** as the impact affects the environment in such a way that natural, functions and processes are minimally affected.*	***Negligible***	***Definite***
IMPACT ON IRREPLACEBLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-15***	***Very Low Negative***		
PROPOSED MITIGATION MEASURES				
*Undertake vegetation clearing during the dry season; Keep vegetation cut low **but not eradicated** along firebreaks.* *Only clear vegetation where absolutely necessary.*				

POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last > 5 years and as such is rated as long term*	*-5*	*2*
EXTENT	1	*The extent of the impact is recognized as the footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-1	*The severity of the impact is rated as **Low Negative** since the impact during the operational phase will not affect the environment in such a way that natural, functions and processes will be affected any more than in the construction phase.*	***Negligible***	***Likely***
IMPACT ON IRREPLACEBLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	***Very Low Negative***		
CONFIDENCE LEVEL				
Medium				

13.3 Indirect impacts

By definition, indirect impacts occur away from the 'action source' i.e., away from the development site. The impact here is specifically how the proposed holiday resort would have indirect impacts on vegetation and flora away from the development area.

No indirect impacts are obvious for any of the alternatives.

13.4 Cumulative impacts

The proposed Kyk'ie C development would be in an area of the Garden Route known for its natural beauty. It will also be placed in an area mapped partly as CBA1 but mostly ESA1. However, as has noted above, the footprint of the development would be fragmented, allowing for protected trees and thicket habitat to be preserved between the buildings.

Alternative 1: 'No Go' (*Status Quo*) – **Very Low Negative,** since there would be no alteration to the site apart from effects of lack of management (e.g. proliferation of invasive trees).
Alternative 2: Preferred alternative – **Low Negative**, since the vegetation will be retained wherever possible, between the buildings and access road.

13.5 Residual Impacts

Residual impacts are those impacts that would adversely affect any of the identified environmental components that would **remain after mitigation measures have been applied**. At the Erf 610, Dwarswegstrand study site, the residual impact that would persist after mitigation would be the fragmentation of the site. Although fragmentation would be mitigated by leaving protected trees as well as some thicket where possible, the fabric of the site as in the undisturbed state would be changed. The residual impact would be **Very Low Negative** since despite the development, efforts will be made to retain connectivity on the site as well as implementing management measures to enhance the natural environment e.g. removal and control of alien invasive trees.

14. General Assessment and Recommendations

- A single vegetation type, Hartenbos Dune Thicket is mapped as occurring on the footprint Erf 610, Dwarswegstrand.
- Hartenbos Dune Thicket is classified as ENDANGERED due to coastal ribbon-development and since it is not conserved in any formal conservation area over its range. The loss of the

dune thicket at Erf 610, Dwarswegstrand, would represent a realtively small further loss of this vegetation / habitat type.

- No rare or threatened plant species were found during the site visits. The probability of the occurrence of species of conservation concern (SCC) in the development footprint is low.
- The National Web-based Environmental Screening Tool analysis for plant species sensitivity is supported by the observations recorded on the site.
- The application of the Site Ecological Importance (SEI) equation results in the site having **High Ecological Importance** and the Biodiversity Importance (BI) as **Medium.** This is ascribed to the endangered status of the vegetation type.
- Colville & Cohen (2022) have pointed out some concerns with the location of the staircase and entrance to the site. They have recommended changing the location of both these elements of the development to lower negative impacts. Their recommendation are supported and reference should be made to their report for details. These changes to the layout would not affect the overall negative impacts as discussed in this report.
- Based on the data collected and analyzed for the target area for the development of Kyk'ie C Resort, no fatal flaws or any other obstacles were found with respect to the habitat and terrestrial biodiversity as a whole.

15. Conclusions

From a botanical perspective the portion of Erf 610, Dwarswegstrand, that is earmarked for development is much less sensitive than the portion of the erf that would not be developed. The development portion still have a moderate level of sensitivity and it is the expressed intention of the developers to maintain all protected trees and where possible other indigenous vegetation (no exotic plants would be planted in any landscaping exercise). The intention to keep the development site as natural as possible with the development in place would mitigate for some of the loss of the integrity of the habitat but would allow some habitat and connectivity to remain.

In view of the above mitigation and having assessed the probably impact of development **Low** to **Very Low Negative**, the proposed development is supported from a botanical perspective. This support is given providing that the changes to the layout are made as proposed by Colville & Cohen (2022) and that the mitigation measures are applied.

16. References

Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. *CSIR Report No. ENV-S-C 2005-053 C*. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.

Cadman, M. 2016. (ed.) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape, Edition 2. Fynbos Forum, Cape Town, 201pp.

Cape EAPrac, 2011. Botanical sensitivity for Dwarswegstrand, Portion 20 of 251. Report Reference: MOS122/01.

Colville, J & Cohen, C. 2022. Terrestrial Faunal Impact Assessment –Hartenbos Hills Garden Estate, Erf 3122, Mossel Bay. Unpublished report for Cape EAPrac.

Enviro Insight, 2020. Best Practice Guidelines for the implementation of the Flora (3c) & Terrestrial Fauna (3d) Species Protocols as well as the Aquatic Biodiversity Protocol (3b) for environmental impact assessments in South Africa. DRAFT for Public Comment for BirdLife South Africa and SANBI.

Government Gazette No. 43110. 2020. Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation.

Grobler, A., Vlok, J., Cowling, R, van der Merwe, S., Skowno, A.L., Dayaram, A. 2018. Technical Report: Integration of the Subtropical Thicket Ecosystem Project (STEP) vegetation types into the VEGMAP national vegetation map 2018.

Lombard & Wolf CC, 2004. GIS Specialist Services, Gouritz Initiative, Final Report. Prepared for Western Cape Nature Conservation Board.

Maree, K.S. and Vromans, D.C. 2010. The Biodiversity Sector Plan for the Hessequa and Mossel Bay Municipalities: *Supporting land-use planning and decision-making in Critical*

Biodiversity Areas and Ecological Support Areas. Produced by CapeNature as part of the C.A.P.E. Fine-scale Biodiversity Planning Project. Kirstenbosch.

McDonald, D.J. 2012. Botanical Constraints Analysis Remainder Portion 20 of Erfdeel 251, Dwarswegstrand, Western Cape. Unpublished report for CapeEAPrac.

Mucina, L., Rutherford, M.C., & Powrie, L.W. (Eds.). 2005, 2009. Vegetation map of South Africa, Lesotho, and Swaziland 1:1 000 000 scale sheet maps. South African National Biodiversity Institute, Pretoria. ISBN 1-919976-22-1.

Mucina, L. & Rutherford, M.C. 2006. (eds.)The Vegetation of South Africa. Lesotho & Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Pierce SM & Mader AD. 2006. The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development. Centre for African Conservation Ecology (ACE). Report Number 47 (Second Edition). Nelson Mandela Metropolitan University, South Africa.

Pence, G.Q.K. 2017. The Western Cape Biodiversity Spatial Plan: Technical Report. Unpublished report. Western Cape Nature Conservation Board (CapeNature), Cape Town.

Pool-Stanvliet, R., Duffell-Canham, A., Pence, G. & Smart, R. 2017. *The Western Cape Biodiversity Spatial Plan Handbook*. Stellenbosch: CapeNature.

Skowno, A.L., Poole, C.J., Raimondo, D.C., Sink, K.J., Van Deventer, H., Van Niekerk, L., Harris, L.R, Smith-Adao, L.B., Tolley, K.A., Zengeya, T.A., Foden, W.B., Midgley, G.F., and Driver, A., 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. Pretoria, South Africa, 214 pp.

South African National Biodiversity Institute (SANBI) 2019, Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2018. Available from the Biodiversity GIS website http://bgis.sanbi.org/SpatialDataset/Detail/18.

South African National Biodiversity Institute (SANBI), (2020), Species Environmental Assessment Guideline. Guidelines for the Implementation of the Terrestrial Fauna and Terrestrial Flora

Species Protocols for Environmental Impact Assessments in South Africa. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2021 Red List of Ecosystems (RLE) for terrestrial realm for South Africa - remnants [Vector] 2021. Available from the Biodiversity GIS website, downloaded on 30 August 2022.

Vlok, J.H.J. 2019, Botanical Assessment for proposed development at Dwarswegstrand (Portion of Erf 720) in the George District. Unpublished report for CapeEAPrac.

Report submitted: 24 April 2023

Appendix 1: Impact Assessment Methodology (from GIBB Environmental)

The objective of the assessment of potential impacts is to identify and assess all the significant, potential impacts that may arise as a result of the project.

For each of the main project phases the existing and potential future impacts and benefits (associated only with the project) will be described using the criteria listed below. The assignment of ratings has been undertaken based on past experience of the team, as well as through research. Subsequently, mitigation measures will be identified and considered for each impact and the assessment repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

Table 1: Impact Assessment Criteria

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the effect of the impact related to the proposed development
	Negative	
Extent	Footprint	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur
	Site	The extent of the impact is rated as site as it will affect only the development area
	Local	The extent of the impact is rated as Local as it affects the development area and adjacent properties
	Regional	The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries
	National	The extent of the impact is rated as National as the effects of the impact extends beyond more than 2 regional/ provincial boundaries

Criteria	Rating Scales	Notes
	International	The extent of the impact is rated as International as the effect of the impact extends beyond country borders
Duration	Temporary	The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary
	Short term	The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term
	Medium term	The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term
	Long term	The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term
Severity	High negative	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
	Moderate negative	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	Low negative	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Low positive	The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved
	Moderate positive	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected
	High positive	The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.
Potential for impact on irreplaceable resources	No	No irreplaceable resources will be impacted.
	Yes	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, intensity and the potential for impact on irreplaceable resources
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	
	Slightly beneficial	

Criteria	Rating Scales	Notes
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	
Likelihood of the impact occurring	Unlikely	It is highly unlikely or less than 50 % likely that an impact will occur.
	Likely	It is between 50 and 75 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance	Very high - negative	A function of Consequence and Likelihood
	High - negative	
	Moderate - negative	
	Low - negative	
	Very low	
	Low - positive	
	Moderate - positive	
	High - positive	
	Very high - positive	

Table 2: Impact Assessment Criteria and Rating Scales

Duration		Extent		Irreplaceable Resources		Severity		Consequence = (Duration + Extent + Irreplaceable Resources) x Severity		Likelihood		Significance (Consequence x Likelihood)		Confidence
1	Temporary	1	Footprint	1	Yes	-3	High - negative	-25 to -33	Extremely detrimental	1	Unlikely	-73 to -99	Very high - negative	Low
2	Short term	2	Site	0	No	-2	Moderate - negative	-19 to -24	Highly detrimental	2	Likely	-55 to -72	High - negative	Medium
3	Medium term	3	Local			-1	Low -negative	-13 to -18	Moderately detrimental	3	Definite	-37 to -54	Moderate - negative	High
4	Long term	4	Regional					-7 to -12	Slightly detrimental			-19 to -36	Low - negative	
		5	National			1	Low -positive	0 to -6	Negligible			0 to -18	Very low - negative	
		6	International			2	Moderate - positive							
						3	High - positive	0 to 6	Negligible			0 to 18	Very Low - positive	
								7 to 12	Slightly beneficial			19 to 36	Low - positive	
								13 to 18	Moderately beneficial			37 to 54	Moderate - positive	
								19 to 24	Highly beneficial			55 to 72	High - positive	
								25 to 33	Extremely beneficial			73 to 99	Very high - positive	

Ascribing Significance for Decision-Making

The best way of expressing these cost benefit implications for decision-making is to present them as risks. Risk is defined as the consequence (implication) of an event multiplied by the probability (likelihood)1 of that event. Many risks are accepted or tolerated on a daily basis because even if the consequence of the event is serious, the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, is potentially death but the likelihood of such an event happening is so low that parachutists are prepared to take that risk and hurl themselves out of an airplane. The risk is low because the likelihood of the consequence is low even if the consequence is potentially severe.

It is also necessary to distinguish between the event itself (as the cause) and the consequence. Again using the parachute example, the consequence of concern in the event that the parachute does not open is serious injury or death, but it does not necessarily follow that if a parachute does not open that the parachutist will die.

Various contingencies are provided to minimise the likelihood of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute. In risk terms this means distinguishing between the inherent risk (the risk that a parachutist will die if the parachute does not open) and the residual risk (the risk that the parachutist will die if the parachute does not open but with the contingency of a reserve parachute) i.e. the risk before and after mitigation.

Consequence

The ascription of significance for decision-making becomes then relatively simple. It requires the consequences to be ranked and likelihood to be defined of that consequence.

In **Table 3** below a scoring system for consequence ranking is shown. Two important features should be noted in the table, namely that the scoring doubles as the risk increases and that there is no equivalent 'high' score in respect of benefits as there is for the costs. This high negative score serves to give expression to the potential for a fatal flaw where a fatal flaw would be defined as an impact that cannot be mitigated effectively and where the associated risk is accordingly untenable. Stated differently, the high score on the costs, which is not matched on the benefits side, highlights that such a fatal flaw cannot be 'traded off' by a benefit and would render the proposed project to be unacceptable.

Table 3: Ranking of Consequence

Environmental Cost	Inherent risk
Human health – morbidity/ mortality, loss of species	High
Material reductions in faunal populations, loss of livelihoods, individual economic loss	Moderate – High
Material reductions in environmental quality – air, soil, water. Loss of habitat, loss of heritage, amenity	Moderate
Nuisance	Moderate – Low
Negative change – with no other consequences	Low
Environmental Benefits	**Inherent benefit**

[1] Because 'probability' has a specific mathematical/empirical connotation the term 'likelihood' is preferred in a qualitative application and is accordingly the term used in this document.

Net improvement in human health and welfare	Medium – High
Improved environmental quality – air, soil, water. Improved individual livelihoods	Moderate
Economic development	Moderate – Low
Positive change – with no other benefits	Low

Likelihood

Although the principle is one of probability, the term 'likelihood' is used to give expression to a qualitative rather than quantitative assessment, because the term 'probability' tends to denote a mathematical/empirical expression. A set of likelihood descriptors that can be used to characterise the likelihood of the costs and benefits occurring, is presented in **Table 4** below.

Table 4: Likelihood Categories and Definitions

Likelihood Descriptors	Definitions
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur but a balance of probability suggests it will
Highly likely	The consequence may still not occur but it is most likely that it will
Definite	The consequence will definitely occur

It is very important to recognise that the likelihood question is asked twice. The first time the question is asked is the likelihood of the cause and the second as to the likelihood of the consequence. In the tables that follow the likelihood is presented of the cause and then the likelihood of the consequence is presented. A high likelihood of a cause does not necessarily translate into a high likelihood of the consequence. As such the likelihood of the consequence is not a mathematical or statistical 'average' of the causes but rather a qualitative estimate in its own right.

Residual Risk

The residual risk is then determined by the consequence and the likelihood of that consequence. The residual risk categories are shown in **Table 5** below where consequence scoring is shown in the rows and likelihood in the columns. The implications for decision-making of the different residual risk categories are shown in **Table 6** below.

Table 5: Residual Risk Categories

Consequence	High	Moderate	High	High	Fatally flawed	
	Moderate – high	Low	Moderate	High	High	High
	Moderate	Low	Moderate	Moderate	Moderate	Moderate
	Moderate – low	Low	Low	Low	Low	Moderate
	Low	Low	Low	Low	Low	Low
		Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
		Likelihood				

Table 6: Implications for Decision-Making of the different Residual Risk Categories

Rating	Nature of implication for Decision – Making
Low	Project can be authorised with low risk of environmental degradation
Moderate	Project can be authorised but with conditions and routine inspections
High	Project can be authorised but with strict conditions and high levels of compliance and enforcement
Fatally Flawed	The project cannot be authorised

Appendix 2: Minimum Content Requirements for Botanical and 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	**Botanical and 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;	Cover & Page 4
3.1.2.	a signed statement of independence by the specialist;	Page 5
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 11
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 11
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;	N/A
3.1.6.	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	N/A
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 26—31
3.1.9.	the degree to which impacts and risks can be mitigated;	Pages 26—31
3.1.10.	the degree to which the impacts and risks can be reversed;	Pages 26—31
3.1.11.	the degree to which the impacts and risks can cause loss of irreplaceable resources;	Pages 26—31
3.1.12.	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	N/A
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	Pages 31--32
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 Firm: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

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

Tel: (021) 671-4056 **Mobile:** 082-8764051 **Fax:** 086-517-3806

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:

- 19 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
- Seventeen 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:

- South Africa Association of Botanists
- 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. (1983) in Botany 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 300 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is 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 - 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 website: www.bergwind.co.za