

Terrestrial Plant Species Assessment

prepared in accordance with the
*"Protocol for the Specialist Assessment and minimum report content
requirements for environmental impacts on Terrestrial Plant Species"*

Portion 43/191 and 104 of the Farm Ganse Valleie 444 near
Plettenberg Bay in the Western Cape Province



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Terrestrial Plant Species Assessment Report for Portion 43/191 and 104 of the Farm Ganse Valleie 444 near Plettenberg Bay in the Western Cape Province.

For: Pierre du Preez

4 June 2022

TABLE OF CONTENTS

TABLE OF CONTENTS	2
SPECIALIST DETAILS & DECLARATION	4
DECLARATION OF INDEPENDENCE:.....	5
DISCLOSURE:.....	5
TERMS OF REFERENCE	6
INTRODUCTION	10
SITE LOCATION	10
IDENTIFIED THEME SENSITIVITIES	11
<i>Plant Species theme</i>	11
ASSESSMENT METHODOLOGY	13
PROJECT AREA OF INFLUENCE (PAOI)	13
SURVEY TIMING	13
FIELD SURVEY APPROACH	15
SOURCES OF INFORMATION.....	16
<i>Vegetation and plant species</i>	16
IMPACT ASSESSMENT METHODOLOGY	17
OUTCOME OF THE ASSESSMENT	20
NATURAL HABITATS ON SITE.....	20
PLANT SPECIES THAT ARE FLAGGED FOR THE SITE	20
<i>Muraltia knysnaensis (Polygalaceae – Knysna Butterflybush)</i>	30
PROTECTED TREES ON SITE	33
<i>Sideroxylon inerme (White milkwood)</i>	33
<i>Pittosporum viridiflorum (Cheesewood)</i>	33
<i>Afrocarpus falcatus (Outeniqua yellowwood)</i>	33
PROTECTED FLORA.....	34
ALIEN INVASIVE SPECIES	34
SITE ECOLOGICAL IMPORTANCE	35
IMPACT ASSESSMENT	38
LOSS OF HABITAT FOR AND AN INDIVIDUAL OF AN ENDANGERED PLANT SPECIES	38
<i>Extent of impact</i>	38
<i>Probability of occurrence</i>	38
<i>Reversibility of impact</i>	38
<i>Degree to which resources will be irreplaceably lost</i>	38
<i>Duration of impact</i>	38
<i>Intensity or magnitude of impact</i>	38
<i>Significance of impact</i>	38
<i>Possible mitigation measures</i>	39
ASSESSMENT OF NO-GO OPTION.....	39
DISCUSSION	41
CONCLUSION	43
RECOMMENDATIONS	43
APPENDICES:	44
APPENDIX 1: PLANT SPECIES RECORDED ON SITE	44
APPENDIX 2: LIST OF PROTECTED TREE SPECIES (NATIONAL FORESTS ACT, 1998).	46

APPENDIX 3: FLORA PROTECTED UNDER THE CAPE NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE 19 OF 1974 49

APPENDIX 4: FLORA SPECIES PROTECTED UNDER THE NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT 10 OF 2004) 52

SPECIALIST DETAILS & DECLARATION

This report has been prepared in accordance with the "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on **terrestrial plant species**", as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020. It has been prepared independently of influence or prejudice by any parties.

The details of Specialists are as follows –

Table 1: Details of Specialist

Specialist	Qualification and accreditation
Dr David Hoare	PhD Pr.Sci.Nat. 400221/05 (Ecological Science, Botanical Science)

Details of Author:

Dr David Hoare

PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth

Main areas of specialisation

- Vegetation and general ecology (grasslands, savanna, Albany thicket, fynbos, coastal systems, wetlands).
- Plant biodiversity and threatened plant species specialist.
- Alien plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

Professional Natural Scientist, South African Council for Natural Scientific Professions, Reg. no. 400221/05 (Ecology, Botany)

Member, International Association of Vegetation Scientists (IAVS)

Member, Ecological Society of America (ESA)

Member, International Association for Impact Assessment (IAIA)

Member, Herpetological Association of Africa (HAA)

Employment history

- 1 December 2004 – present, Director, David Hoare Consulting (Pty) Ltd. Consultant, specialist consultant contracted to various companies and organisations.
- 1 January 2009 – 30 June 2009, Lecturer, University of Pretoria, Botany Dept.
- 1 January 2013 – 30 June 2013, Lecturer, University of Pretoria, Botany Dept.
- 1 February 1998 – 30 November 2004, Researcher, Agricultural Research Council, Range and Forage Institute, Private Bag X05, Lynn East, 0039. Duties: project management, general vegetation ecology, remote sensing image processing.

Declaration of independence:

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

Disclosure:

David Hoare Consulting (Pty) Ltd undertakes to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

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



Dr David Hoare

4 June 2022

Date

TERMS OF REFERENCE

The specialist study is required to follow the published Protocols, provided in full below for the assessment of impacts on Terrestrial Plant Species. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

General information

1.1 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "**very high**" or "**high**" sensitivity for terrestrial plant species, must submit a Terrestrial Plant Species Specialist Assessment Report.

1.2 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "**medium** sensitivity" for terrestrial plant species, must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

1.3 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "**low**" sensitivity for terrestrial plant species, must submit a Terrestrial Plant Species Compliance Statement.

1.4 Where the information gathered from the site sensitivity verification differs from the screening tool designation of "very high" or "high" for terrestrial plant species sensitivity on the screening tool, and it is found to be of a "low" sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted.

1.5 Where the information gathered from the site sensitivity verification differs from the screening tool designation of "low" terrestrial plant species sensitivity and it is found to be of a "very high" or "high" terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted.

1.6 If any part of the development falls within an area of confirmed "very high" or "high" sensitivity, the assessment and reporting requirements prescribed for the "very high" or "high" sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol, means the area on which the proposed development will take place and includes the area that will be disturbed or impacted.

1.7 The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the study area.

1.8 Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.

1.9 Where the nature of the activity is expected to have an impact on SCC beyond boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.

Terrestrial Plant Species Specialist Assessment

2.1 The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP), within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.

2.2 The assessment must be undertaken within the study area.

2.3 The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline and must:

2.3.1 Identify the SCC which were found, observed or are likely to occur within the study area;

2.3.2 provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);

2.3.3 identify the distribution, location, viability and detailed description of population size of the SCC identified within the study area;

2.3.4 identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area;

2.3.5 determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, Red List of South African Plants, and/or other relevant databases;

2.3.6 determine the potential impact of the proposed development on the habitat of the SCC located within the study area;

2.3.7 include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;

2.3.8 identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;

2.3.9 identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified SCC and its long term viability;

2.3.10 determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; and

2.3.11 discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species; and

2.3.12 identify any alternative development footprints within the preferred development site which would be of "low" sensitivity" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.

2.4 The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report.

Terrestrial Plant Species Specialist Assessment Report

3.1 This report must include as a minimum the following information:

3.1.1 contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;

3.1.2 a signed statement of independence by the specialist;

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;

3.1.4 a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;

3.1.5 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

3.1.6 a description of the mean density of observations/number of samples sites per unit area of site inspection observations;

3.1.7 details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;

3.1.8 the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;

3.1.9 the location of areas not suitable for development and to be avoided during construction where relevant;

3.1.10 a discussion on the cumulative impacts;

3.1.11 impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);

3.1.12 a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and

3.1.13 a motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate.

3.2 A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

INTRODUCTION

Site location

The site is Portions 43/191 and 104 of the Farm Ganse Valleï 444 near Plettenberg Bay to the north-east of Plettenberg Bay. Refer to Figure 1 below for the general location. A recent aerial image of the site is provided in Figure 2.

The total area of the site is approximately 30 ha of which roughly 15ha is earmarked for cultivation (vineyards/orchards). A full habitat assessment undertaken on site shows that natural habitat includes fynbos, thicket and estuarine wetland vegetation as well as transformed areas.

The scope of this report is the entire property, although only part will be developed.

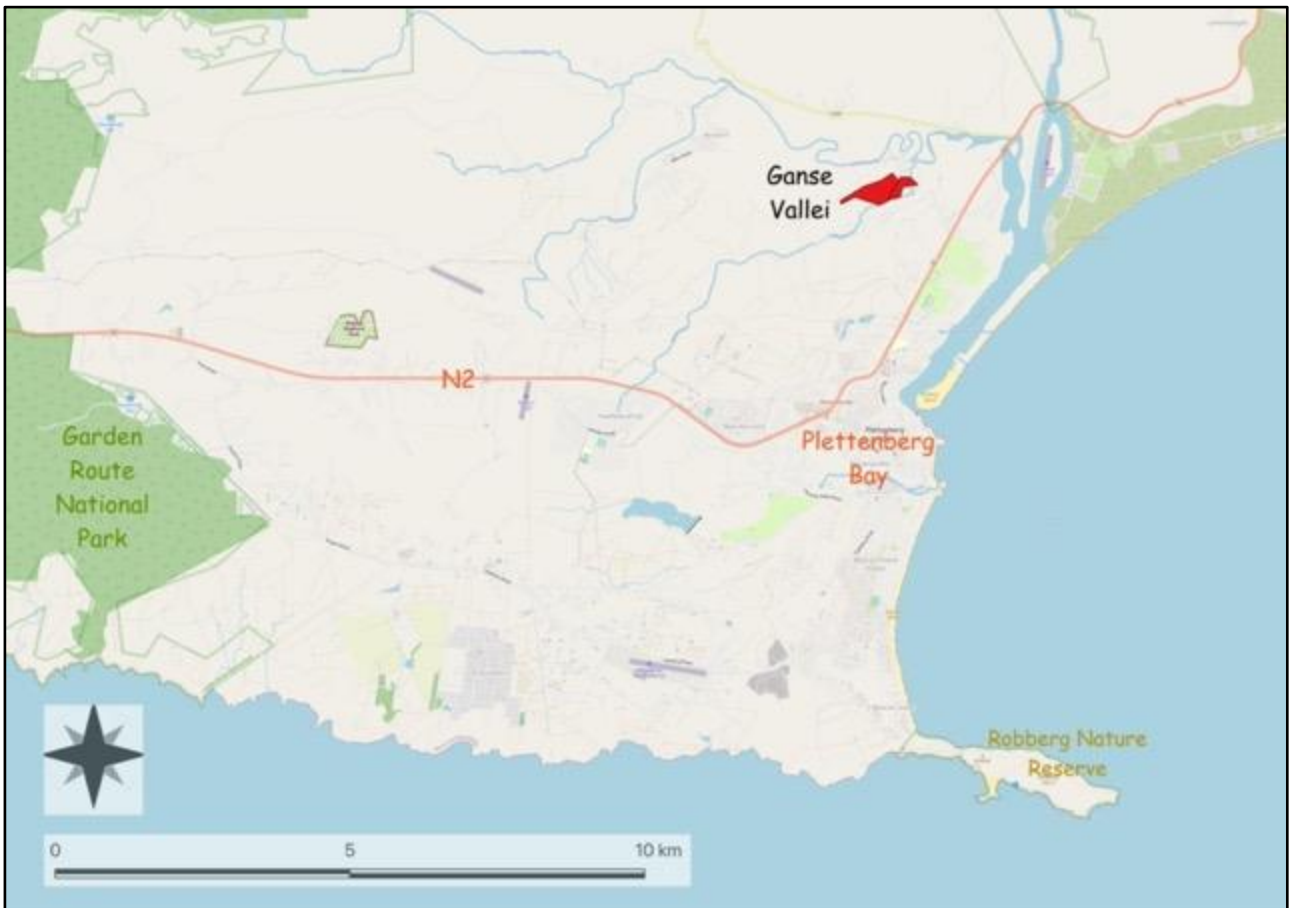


Figure 1: Location of the site north of Plettenberg Bay.



Figure 2: Aerial image of the site and surrounding areas.

Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool was requested in the application category: Transformation of land | Indigenous vegetation. The DFFE Screening Tool report for the area indicates the following ecological sensitivities:

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

Plant Species theme

Sensitivity features are indicated as follows:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Lampranthus pauciflorus
Medium	Ruschia duthiae
Medium	Lebeckia gracilis
Medium	Leucospermum glabrum
Medium	Selago burchellii
Medium	Sensitive species 419
Medium	Erica chloroloma

Medium	Erica glandulosa subsp. fourcadei
Medium	Hermannia lavandulifolia
Medium	Sensitive species 657
Medium	Sensitive species 1032
Medium	Cotula myriophylloides
Medium	Acmadenia alternifolia
Medium	Muraltia knysnaensis
Medium	Sensitive species 800
Medium	Erica glumiflora
Medium	Sensitive species 500
Medium	Sensitive species 763
Medium	Zostera capensis

The "Protocol For The Specialist Assessment And Minimum Report Content Requirements For Environmental Impacts On Terrestrial Plant Species" states as follows:

"1.2 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "**medium** sensitivity" for terrestrial plant species, must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4."

In accordance with GN 320 and GN 1150 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool).

The site was found to be confirmed habitat for a SCC, namely for *Muraltia knysnaensis*, listed as Endangered. A single plant of this species was found on site during the sensitivity verification survey. This Site Sensitivity Verification therefore concluded that the site has **HIGH** sensitivity for the Terrestrial Plant Species theme on the basis of the confirmed presence of this species.

ASSESSMENT METHODOLOGY

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

Project Area of Influence (PAOI)

The proposal is to develop vineyards on site, along with associated infrastructure. Anticipated impacts will mostly occur during the **construction phase**, with **few** discernible effects anticipated during **operation**. These impacts are not expected to extend beyond the boundaries of the study area. The PAOI is therefore treated here as the development footprint within which direct impacts will occur (red line shown in Figure 3).

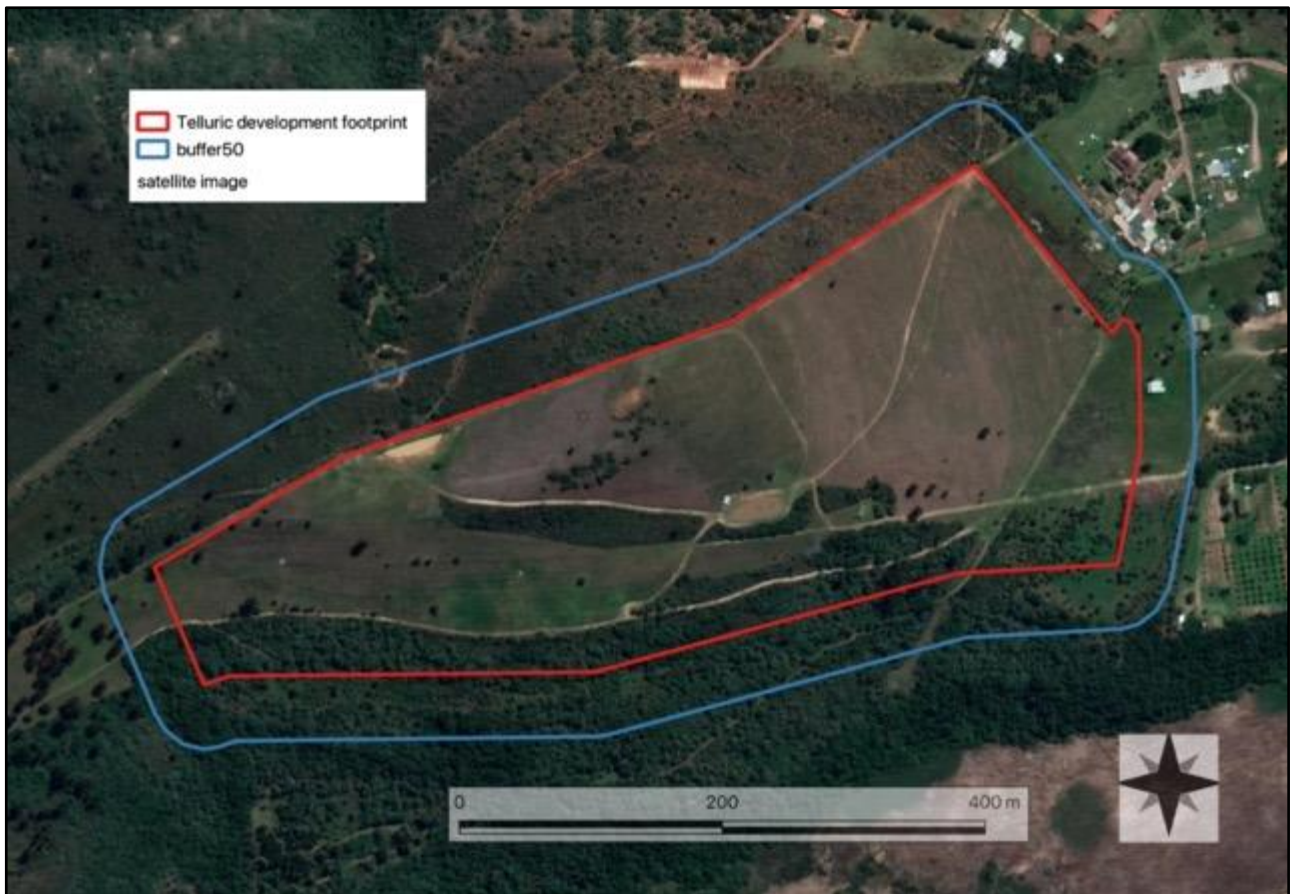


Figure 3: Proposed Project Area of Influence (PAOI).

Survey timing

The study commenced as a **desktop-study** followed by a **site-specific field study** on 29 April 2021 and 27 October 2021. The site is within the **Garden Route Shale Fynbos Biome** with an all-year rainfall season with a slight dip in early winter (Figure 4). A more accurate indication of rainfall seasonality, which drives most ecological processes, is shown in Figure 5, which shows that Plettenberg Bay has peak rainfall from August to November, with another smaller peak in March to April. The timing of **the**

survey in Autumn and then in early summer is therefore **optimal** in terms of **assessing the flora and vegetation** of the site. It was therefore possible to determine the overall condition of the vegetation with a **high degree of confidence**.

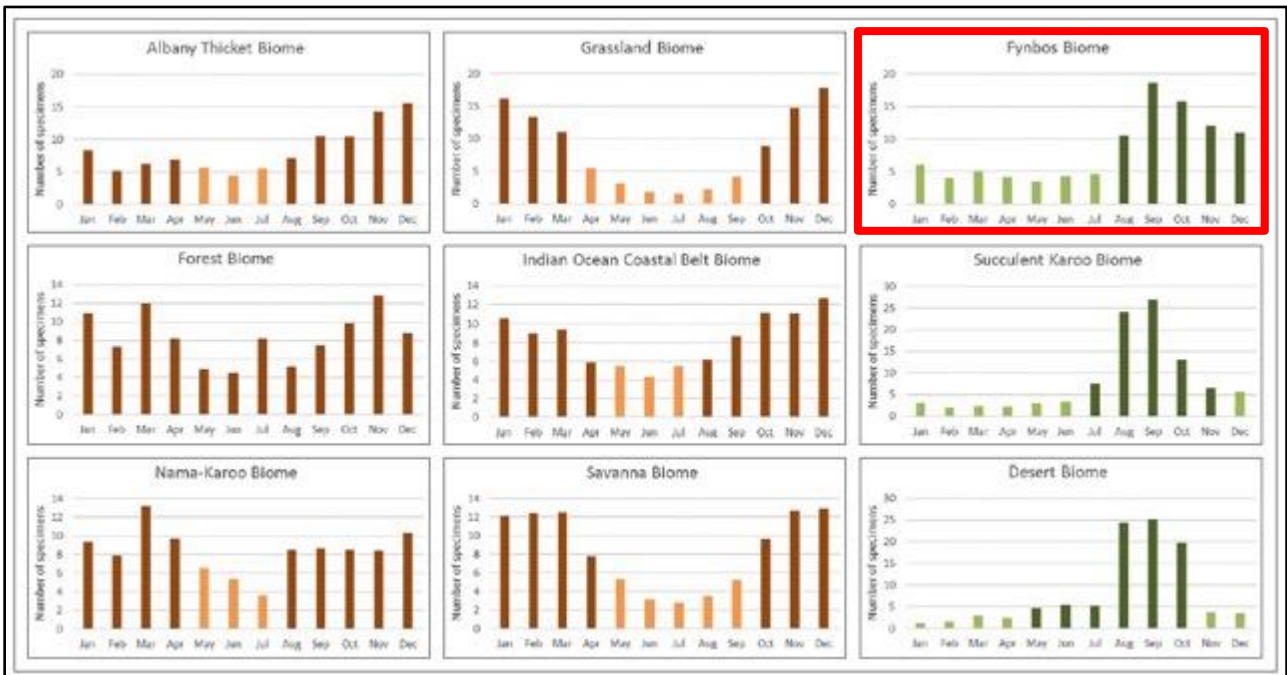


Figure 4: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines). The site is within the Fynbos Biome.

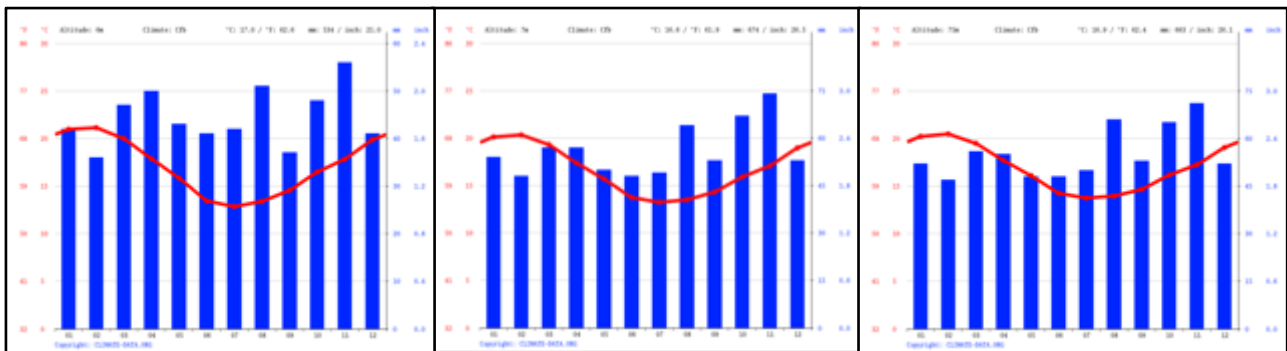


Figure 5: Climate diagrams showing monthly rainfall for Mossel Bay (left), Knysna (centre) and Plettenberg Bay (right).

Flowering time is important for detecting plant species of conservation concern that could occur on site. Detection is also influenced by other ecological factors, such as time elapsed since last burn.

The one species of **conservation concern** that was found on site, *Muraltia knysnaensis*, has historically been observed to flower during all months of the year except May (Figure 6), but it has a definite **peak of flowering in September to December**. The **second field survey** was in the middle of this peak flowering period.

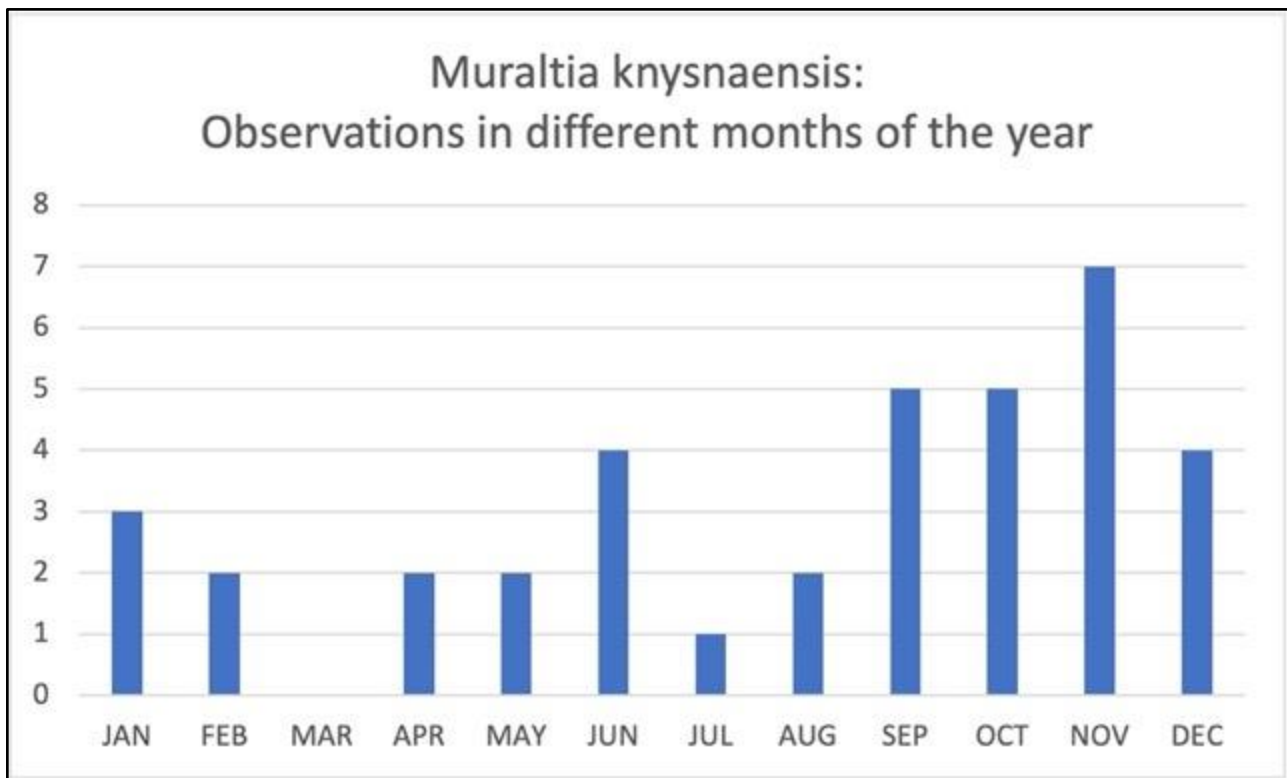


Figure 6: Number of observations of *Muraltia knysnaensis* in different months of the year (data according to SANBI herbarium records and iNaturalist).

Field survey approach

During the field survey of habitats on site, the **entire site was assessed on foot**. A meander approach was adopted with no time restrictions - the objective was to **comprehensively examine all natural areas**. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made. Digital photographs were taken of features and habitats on site, as well as of all plant species that were seen. **All plant species recorded** were uploaded to the iNaturalist website and are accessible by viewing the observations for this site.

During the second survey, specific attention was given to searching for **protected trees**. It was during this **second survey** (27 October 2021) that *Muraltia knysnaensis* was found, which is during the peak flowering period for this species. No specific population assessment for *Muraltia knysnaensis* was undertaken at the time, because the identity had not yet been confirmed and the study was not a formal plant species assessment. Therefore, a **detailed site-specific population assessment** of this species was undertaken on 1 March 2022. Despite being the least likely time to find flowering plants (Figure 6), the **original plant was found on site in full flower**.

Aerial imagery from Google Earth was used to identify and assess habitats on site. Patterns identified from satellite imagery were verified on the ground. Digital photographs were taken at locations where features of interest were observed.

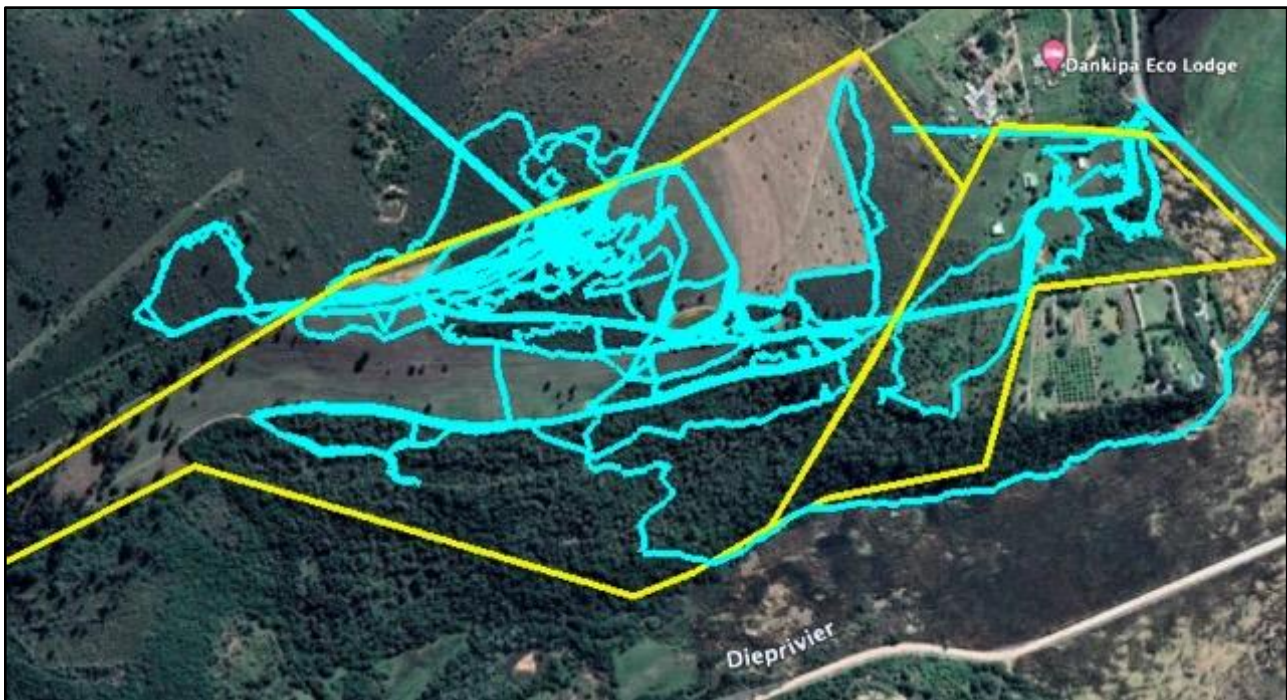


Figure 7: GPS track log of areas walked in the course of undertaking this assessment.

Sources of information

Vegetation and plant species

- Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates according to the SANBI BGIS website (<http://bgis.sanbi.org>), as follows:
 - Mucina, L. and Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
 - South African National Biodiversity Institute 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 23 September 2021.
- The plant species checklist of species that could potentially occur on site was compiled from a plant species checklist extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grid 2821CA.
- The primary list of plant species of concern for the site was extracted from the Screening Tool output for the site. This was cross-checked with other data sources to determine whether any additional species should be considered or not.
- The IUCN Red List Category for plant species, as well as supplementary information on habitats and distribution, was obtained from the SANBI Threatened Species Programme (Red List of South African Plants, <http://redlist.sanbi.org>).
- Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distributions of species on this list were obtained from online and published sources (e.g. van Wyk & van Wyk 1997).

Impact assessment methodology

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. Impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). The rating system is applied to the potential impact on the receptor. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 2: Rating of impact assessment criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		

This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:		
Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.		
The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		

5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

OUTCOME OF THE ASSESSMENT

Natural habitats on site

A **detailed landcover and habitat mapping exercise** was undertaken for the site. This identified various **natural and transformed habitats** that occur on site, shown in Figure 10.

Of importance is the presence and distribution of **fynbos, thicket** and **estuarine wetlands** on site, which constitute the remaining natural habitat.

The other habitat classes are **degraded, secondary or transformed** and have lower biodiversity value. The habitat assessment is important for understanding the suitability of habitat on site for various plant and animal species of concern, which usually have very specific habitat requirements.

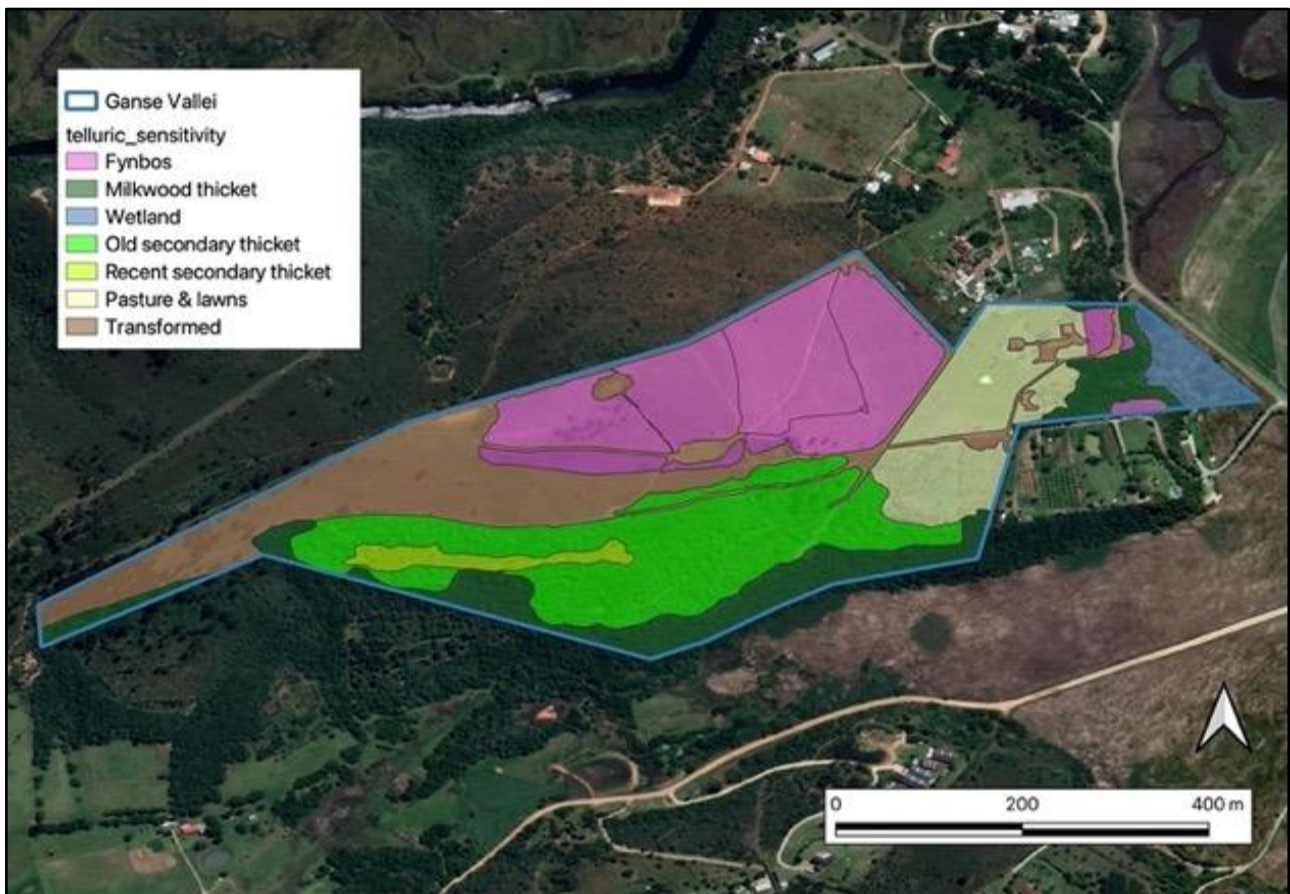


Figure 8: Map of habitats on site.

Plant species that are flagged for the site

According to the National Web-Based Environmental Screening Tool, a number of plant species of concern are flagged as of concern for the site (see previous section of this report). These are mostly **fynbos species**, or are **species found in intact natural habitat**. One of them, ***Muraltia knysnaensis***, listed as **Endangered**, was found on site during a general survey. Based on the **current natural status**

of the vegetation on site i.e. limited to no soil disturbance, other listed and/or flagged plant species of concern **could possibly occur** there, or the **habitat is suitable** for them in the vicinity the single plant was identified. A full list of the species is provided below in Table 3. Based on the ground-thruthing and field surveys the probability of occurrence of most of the flagged plant species are however found to be low, with the reason being not suitable habitat, not found/present or unlikely to occur.

Table 3: Plant species of concern flagged for the site.

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
RUTACEAE	<i>Acmadenia alternifolia</i>	None	VU	Plettenberg Bay to Knysna, possibly extending as far as Nature's Valley. A number of observations from inland areas, including the mountain foothills north of Keurbooms, and north of the N2 at Harkerville	Coastal headlands and steep slopes, exposed positions on dry cliffs near the coast from Knysna to Plettenberg Bay.	MEDIUM Distribution records and habitat suggest it could occur on site or nearby. It was not found on site.
ORCHIDACEAE	<i>Acrolophia lunata</i>	None	EN	Swellendam to Kouga Mountains.	Mesic fynbos from sea level to 750 m. Appears to be restricted to mountain fynbos type vegetation.	LOW No suitable habitat on site.
ASPHODELACEAE	<i>Aloe micracantha</i>	Fynbos Grass Aloe	NT	From near Uniondale eastwards along the coastal mountains to Port Elizabeth, and inland to the Kap River Mountains north-east of Grahamstown.	Lower slopes and flats in grassy fynbos, 0 - 700 m.	LOW Observations are mostly in the mountains in the southern Cape
THELYPTERIDACEAE	<i>Amauropelta knysnaensis</i>	Knysna wood fern	VU	George District	Southern Afrotropical Forest, damp places in coastal forest. Near streams and in seepage zones, sometimes away from streams.	LOW No suitable habitat on site.

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
FABACEAE	Aspalathus bowieana	None	EN	Outeniqua Mountains.	Mountain fynbos on mountain slopes and foothills below 850 m.	LOW , No suitable habitat on site (mountain fynbos).
ASTERACEAE	Cotula myriophylloides	Watergras	CR	Cape Peninsula to Plettenberg Bay. All observations are from Cape Agulhas to Cape Peninsula, except one from Plett in the Piesangs River above the road bridge.	Submerged in seasonal coastal pools, but also in marshes and on wet sand. Mostly in brackish, but also in fresh, still or slowly moving water.	LOW , All observations are in aquatic or semi-aquatic habitats
CYATHEACEAE	Alsophila capensis	Cape Tree Fern	LC	From the Cape Peninsula eastwards along the coast and northwards throughout the eastern half of South Africa and up to Tanzania.	Forest. Grows near waterfalls, streams and permanently moist seepages.	LOW , No suitable habitat on site (forest with stream).
CELASTRACEAE	Elaeodendron croceum	Common saffron	LC	Widespread from Knysna eastwards and northwards to Zimbabwe.	Margins of coastal and montane forests.	CONFIRMED
ERICACEAE	Erica chloroloma	None	VU	Wilderness to Fish River Mouth. Most observations are between Cape St Francis and Gqeberha. Nearest population known from Goukamma Nature Reserve (recent) and Buffalo Bay (1921).	Coastal dune fynbos.	LOW Known locations are coastal. It is therefore considered <u>unlikely</u> that this species would occur on site.
ERICACEAE	Erica glandulosa subsp. fourcadei	None	VU	Mossel Bay to Cape St. Francis.	Coastal fynbos. Common in Goukamma	LOW Although the site is in the middle of the

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
					Nature Reserve and on coastal cliffs SW of Plettenberg Bay	known distribution, all records are coastal and exclude areas inland of the bay of Plett. It is therefore considered <u>unlikely</u> that this species would occur on site.
ERICACEAE	<i>Erica glumiflora</i>	None	VU	Wilderness to East London, extending inland to Grahamstown. Recorded from Robberg peninsula near end.	Sandy coastal flats and dunes in low coastal hills. All observations are in sandy substrates.	LOW No suitable habitat on site.
ORCHIDACEAE	<i>Eulophia speciosa</i>	Large yellow eulophia	LC	Western Cape to tropical east Africa.	Occupies various habitats including sand dunes, bushveld, thornveld and mountain grasslands.	MEDIUM , available habitat and previously recorded in general area. Not found on site.
ASTERACEAE	<i>Felicia westae</i>		EN	Knysna to Humansdorp. Herbarium records show a distribution from Nature's Valley to Cape St Francis.	Streambanks in low-lying areas near the coast, including in Tsitsikamma Sandstone Fynbos.	LOW , outside known distribution.
IRIDACEAE	<i>Freesia liechtlinii</i> subsp. <i>alba</i>	White coastal freesia	NT	Stilbaai to Plettenberg Bay.	Sandy coastal dunes and flats or limestone fynbos, usually in rocky places.	MEDIUM , available habitat and previously recorded in general area

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
IRIDACEAE	<i>Gladiolus huttonii</i>	None	VU	East London to Plettenberg Bay. Recorded once from Plett in 1921, otherwise closest records are from Nature's Valley eastwards.	Sandy loam, clay or moderately fertile soils derived from the Witteberg slopes, mostly confined to coastal plain.	LOW Known locations are east of the site
MALVACEAE	<i>Hermannia lavandulifolia</i>	None	VU	Western Cape, from Worcester to the Overberg, and extending along the southern Cape coastal lowlands to Plettenberg Bay. All observations on iNaturalist are west of Knysna. Only single observation near Plett is on coast near Robberg.	Clay slopes in renosterveld and valley thicket. Collected on western part of Robberg Peninsula in 1960 (Acocks Coll. No. 21141).	LOW Known locations are west of the site.
AQUIFOLIACEAE	<i>Ilex mitis</i> var. <i>mitis</i>	Wild holly	LC -	Widespread through South Africa to tropical Africa and Madagascar.	Along rivers and streams in forest and thickets, sometimes in the open. Found from sea level to inland mountain slopes.	MEDIUM , habitat description suggests it could occur in thicket on site and previously recorded in general area. However, usually found in forest in this region. Not found on site.
AIZOACEAE	<i>Lampranthus pauciflorus</i>	None	EN	Found in the Western Cape from Cape Infanta to Plettenberg Bay. Four known locations remain after most of this species' habitat has been	on rocky coastal slopes and clay hills. Major habitats are Groot Brak Dune Strandveld, Blombos	LOW Known locations are along the coastline, and also exclude the inland part of the bay of

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
				transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna.	Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos Strandveld, Goukamma Dune Thicket.	Plettenberg Bay. It is therefore considered <u>unlikely</u> that this species would occur on site.
FABACEAE	Lebeckia gracilis	None	EN	Port Elizabeth to Bredasdorp. Two main areas of occurrence are in the Lakes District between Knysna and George, and in the Albertinia area.	Coastal fynbos in deep sandy soils below 300 m.	LOW Most recent observations are west of Plett. Habitat on site is NOT deep sandy soils. It is therefore considered <u>unlikely</u> that this species would occur on site.
PROTEACEAE	Leucospermum glabrum	Outeniqua Pincushion	EN	Outeniqua and Tsitsikamma mountains. Observed multiple times around George in the mountains, as well as north of Plett. and around Keurbooms.	Wet south slopes in Sandstone Fynbos.	LOW The key habitat appears to be mesic mountain fynbos on the southern flanks of mountains. It is possible it could occur on site but <u>unlikely</u> .

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
POLYGALACEAE	<i>Muraltia knysnaensis</i>	Knysna butterflybush	EN	Coastal lowlands between Mossel Bay and Keerbooms River.	Coastal fynbos on dry flats and hills.	CONFIRMED
LAURACEAE	<i>Ocotea bullata</i>	Stinkwood	EN	Widespread in South Africa from the Cape Peninsula to the Limpopo Province.	Grows in most high, cool, evergreen Afromontane forests.	LOW No suitable habitat on site.
POACEAE	<i>Pentameris barbata</i> subsp. <i>orientalis</i>	None	CR	Goukamma Nature Reserve.	Stabilised coastal dunes, in sand amongst fynbos.	LOW , outside known distribution, no suitable habitat on site
FABACEAE	<i>Psoralea vanberkelae</i>	Nicky's fountainbush	VU	Coastal cliffs south-west of Plettenberg Bay.	Quartzite outcrops. Grows in full sun on sandy soils on a gentle slope.	LOW , known distribution is nearby but within specific habitats that exclude the site and nearby areas.
ORCHIDACEAE	<i>Pterygodium newdigateae</i> var. <i>cleistogamum</i>	None	CR PE	Knysna to Grahamstown. Only known from collections before 1923.	Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.	LOW , probably extinct
MYRSINACEAE	<i>Rapanea melanophloeos</i>	Boekenhout	LC	Cape Peninsula to Malawi.	Coastal, swamp and mountain forest, on forest margins and bush clumps, often in damp areas from coast to mountains.	HIGH , available habitat and previously recorded in area. Not found on site.
AIZOACEAE	<i>Ruschia duthiae</i>	None	VU	A highly range-restricted but locally common species, known from 10	Gentle north-facing sandstone	LOW No recent records from Plettenberg

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
				locations from Sedgefield to Nature's Valley. Quite common in the sandy soils of the Lakes District between Wilderness and Knysna.	or shale slopes with grassy fynbos.	Bay. Habitat on site does not match common habitat found in Lakes area. It is therefore considered <u>unlikely</u> that this species would occur on site.
SCROPHULARIACEAE	<i>Selago burchellii</i>	None	VU	George to Plettenberg Bay, including Robberg coastal corridor, Knysna western heads, Goukamma, inland parts of the lakes area, and in the Outeniqua Mountains.	Coastal slopes and flats. Unverified observation from Robberg. Distribution data shows that it also occurs in the Outeniqua Mountains, which would be mountain fynbos.	MEDIUM Not previously recorded from anywhere north of Plettenberg Bay, although habitat on site is potentially suitable. It is therefore <u>possible but unlikely</u> that it occurs on site or nearby.
SCROPHULARIACEAE	<i>Selago rotundifolia</i>	None	VU	Knysna to Port Elizabeth.	Forest margins or grassy flats near the coast, 90-210 m.	LOW , outside known distribution, no suitable habitat on site
	Sensitive species 419		VU	George to Humansdorp. Recorded numerous times in Plett area.	Damp sandstone slopes in coastal fynbos. Numerous observations in mountains.	MEDIUM Distribution records and habitat suggest it could occur on site or nearby. Not found on site.
	Sensitive species 500		EN	Cape Flats to Gqeberha. Previously recorded from near Robberg.	Lowland sandy flats, stabilised dunes and coastal	MEDIUM Distribution records and habitat

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
					rock promontories. Observations include coastal and mountain habitats.	suggest it could occur on site or nearby. Not found on site.
	Sensitive species 657		EN	Great Brak River to Port Elizabeth.	Coastline. Coastal habitats.	LOW , confined to coastal littoral habitat
	Sensitive species 763		VU	Riversdale to Port St Johns. Recorded previously from near Keurbooms, as well as Diepwalle.	Dry coastal renosterveld and grassy places in coastal forest.	MEDIUM , available habitat and previously recorded in general area. Not found on site.
	Sensitive species 800		VU	Cape Peninsula to Knysna. One record from Plett airport in 1976.	Limestone and clay loam soil, fynbos and renosterveld on coastal lowlands	LOW , main distribution is west of Plett, except for single site near coastal cliffs at Robberg.
	Sensitive species 1032		VU	George to Port Alfred.	On stabilised (fixed) dunes close to the shoreline. 0-150 m.	LOW , confined to coastal habitat
ZOSTERACEAE	Zostera capensis	Eelgrass, seasgrass	LC	Olifants River Mouth on the Cape West Coast to Kosi Bay, northern KwaZulu-Natal. It also occurs in Kenya, Madagascar, Mozambique and Tanzania.	Intertidal zone of permanently open estuaries. It occasionally persists in temporarily closed estuaries when conditions are saline.	LOW No suitable habitat on site.

***Muraltia knysnaensis* (Polygalaceae – Knysna Butterflybush)**

Details of population found on site

A **single plant** was observed on site (<https://www.inaturalist.org/observations/100060886>). It was found in the **initial survey**, and again in the **follow-up detailed search**. **No additional plants** were found despite searching on hands and knees the entire area around the observed plant. A voucher specimen was submitted to SANBI's National Herbarium (PRE), where the identity was confirmed. It was found near to the top of the slope within recently bush-cut fynbos (see Figure 9 for location).

Description

Muraltia knysnaensis is a perennial dwarf shrub growing to a height of 100–200 mm high. It is described as a glabrescent subshrub, branching mainly from the base near ground level. It is a suffrutex growth form, meaning that it has a woody underground stem from which branches emerge every season. The leaves are sessile, solitary, sometimes fascicled, linear to ovate, ciliate when young, and apiculate. Flowers are sessile, axillary, and pink in colour. The capsules have short, slender horns.

The species is part of a genus with about 95 (or more) species. According to distribution records, there are 15 species of *Muraltia* that occur in the general area in which the site is located. *Muraltia knysnaensis* is superficially similar to *M. alopecuroides*, *M. ericoides*, *M. squarrosa*, and *M. empleuridioides* var. *empleuridioides*, but is distinguished from these species on the basis that the side petals are distinctly longer than the carina, whereas they are shorter, as long as, or rarely slightly longer than the carina in the other species (Figure 10).

Distribution of the species



Figure 9: Location of *Muraltia knysnaensis* found on site relative to the proposed development footprint.

Muraltia knysnaensis is **endemic** to South Africa and found in the **Western Cape** in the **Coastal Lowlands** between Mossel Bay and the Keurbooms River **in fynbos, on dry flats and hills**. Known observations are shown in the map in Figure 11. The observations are all within a short distance of the coast, as well as in some nearby inland areas, with the exception of the Lakes area between Knysna and Wilderness, where it appears to extend further inland.

The vegetation types in which it has been previously recorded are North Langeberg Sandstone Fynbos (close to the coast) and Hartenbos Dune Thicket in the Mossel Bay area, in Garden Route Granite Fynbos (coastal cliffs only) and Groot Brak Dune Strandveld in the George area, in Goukamma Dune Thicket, **Garden Route Shale Fynbos**, Knysna Sand Fynbos, and in South Outeniqua Sandstone Fynbos in the Sedgefield / Knysna area, and in South Outeniqua Sandstone Fynbos (coastal headlands only) and Garden Route Shale Fynbos in the Plettenberg Bay area.

Ecology

The species has been observed in fynbos vegetation, sometimes where there is a thicket component, but **only in areas where the fynbos has been relatively recently burnt or cleared**, or where **ecological factors**, such as shallow, rocky soil, or salt-laden coastal air, **tend to keep the vegetation more open**. The **recent bush-clearing** on the current site probably stimulated the observed plant to flower. The fire disturbance (or equivalent) appears to be a critically important ecological factor, which **removes above-ground biomass** in the host vegetation, thus **facilitating growth and reproduction**. The plants probably persist in older fynbos but are unlikely to flower under moribund vegetation conditions. **Fire, or similar disturbance, is therefore a critical factor in the long-term persistence** of the species within any particular patch of vegetation. This is supported by the significant number of observations of this species in recently burnt or cleared areas. The suffrutex growth form also suggests that the **species is a re-sprouter** and is therefore adapted to fire or some other form of defoliation. It is, however, a **low-growing shrublet and can therefore be easily overgrown**. Growth and flowering are also linked to recent rainfall, with most observations occurring with a small lag after normal seasonal rainfall peaks, although flowering has been observed to occur at any time of the year (see Figures 5 and 6 in earlier section of report).

Population dynamics

It is unknown to what degree re-seeding is important in population dynamics of *Muraltia knysnaensis*, but other herbaceous members of the genus are known to **grow well from seed**, and that seeds are either wind-dispersed or, more likely, ant-dispersed (Bond & Slingsby 1983; Pierce 1990). A study on the more common *Muraltia squarrosa* (Pierce 1990) indicates that it is ant-dispersed, and that seed



Figure 10: Flower of *Muraltia alopecuroides* on left, showing side petal about equal in length to carina, and plant of *Muraltia knysnaensis* from site, showing side petal distinctly longer than carina, a diagnostic floral character for this species.

germination is cued by removal of vegetation that results in **increased diurnal temperature variation**, rather than due to fire *per se*. The method of dispersal is important because **dispersal distances are unlikely to be more than several metres at a time** (facilitated by ants), and consequently, that loss of populations in specific locations would be relatively permanent in the absence of recruitment from surrounding areas. *Muraltia* **species are known to be self-pollinated**, which means that **a single plant can produce viable seed**.

Threats

According to the SANBI Red List assessment, the coastal fynbos habitat of *Muraltia knysnaensis* has already been **changed by at least 58 percent**, mostly for **agricultural cultivation, forestry plantations, and urban and coastal development**. Subpopulations living in small remnants of natural vegetation are endangered by foreign invasive plant invasions and fire exclusion, and habitat degradation continues. At the current site, **fire has been largely excluded**, but **bush-cutting** has been used to remove the above-ground biomass of fynbos vegetation. This has probably **favoured *Muraltia knysnaensis* on site in the short-term**, but **continued and persistent bush-clearing could damage the fynbos and compromise the plant's long-term survival** at this site.



Figure 11: Known observations of *Muraltia knysnaensis*, according to SANBI herbaria and iNaturalist.

Protected trees on site

Three **species of protected tree** were found on site (Figure 12). If any individuals are to be damaged by the proposed development, then a permit is required.

Sideroxylon inerme (White milkwood)

A large number (43 recorded) of white milkwoods (*Sideroxylon inerme*) were found on site, all within established thicket areas, or on the margins of cleared areas. These ranged in size from juveniles to large trees. In addition to those shown as points in Figure 12, the entire "Milkwood Thicket" habitat is dominated by white milkwoods. This species is protected under the National Forests Act of 1998.

Pittosporum viridiflorum (Cheesewood)

A moderate number (10 counted) of cheesewoods (*Pittosporum viridiflorum*) were found on site, all within established thicket areas, or on the margins of cleared areas. These were mostly medium-sized trees. This species is protected under the National Forests Act of 1998.

Afrocarpus falcatus (Outeniqua yellowwood)

A single yellowwood (*Afrocarpus falcatus*) was found on site, on the south-eastern side within the thicket. This was a medium-sized tree. This species is protected under the National Forests Act of 1998.



Protected flora

Flora protected under the Cape Nature and Environmental Conservation Ordinance 19 of 1974 that was found on site includes the following species:

- *Agathosma ovata* (Protected) Family: RUTACEAE
- *Aloiampelos ciliaris* (Protected) All species of the genus ALOE except those specified in Schedule 3 and the species *Aloe ferox*
- *Bobartia aphylla* (Protected) Family: IRIDACEAE
- *Bonatea speciosa* (Protected) Family: ORCHIDACEAE
- *Erica sparsa* (Protected) Family: MESEMBRYANTHEMACEAE (now Aizoaceae)
- *Aristea sp* (Protected) Family: IRIDACEAE
- *Moraea sp* (Protected) Family: IRIDACEAE
- *Trichodiadema sp* (Protected) Family: MESEMBRYANTHEMACEAE (now Aizoaceae)
- *Mesembryanthemum cordifolium* (Protected)
- *Ruschia knysnana* (Protected) Family: MESEMBRYANTHEMACEAE (now Aizoaceae)
- *Ruschia tenella* (Protected) Family: MESEMBRYANTHEMACEAE (now Aizoaceae)
- *Satyrium longicolle* (Protected) Family: ORCHIDACEAE
- *Satyrium membranaceum* (Protected) Family: ORCHIDACEAE

No nationally protected plant species (NEMBA) were found on site.

Alien invasive species

Alien invasive plant species found on site include the following species:

- *Acacia cyclops** (Category 1b)
- *Acacia mearnsii** (Category 2)
- *Cirsium vulgare** (Category 1b)
- *Eucalyptus sp.*
- *Hakea sericea** (Category 1b)
- *Opuntia ficus-indica** (Category 1b)
- *Pinus sp.** (Category 2)

The two **Acacia species** and **Hakea sericea** pose the **highest risk to natural habitats** on site and in adjacent properties and should be **prioritized for control**.

SITE ECOLOGICAL IMPORTANCE

The Species Environmental Assessment Guidelines require that a Site Ecological Importance is calculated for each habitat on site, and provides methodology for making this calculation. For the purposes of assessing the value of the habitat in which *Muraltia knysnaensis* occurs, this calculation is made here only for the fynbos habitat in which the species was found on site, and not for all other habitats on site.

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

Table 4: Conservation Importance (CI) criteria.

Conservation Importance (CI)	Fulfilling criteria
Very high	<ul style="list-style-type: none"> Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km². Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	<ul style="list-style-type: none"> Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. 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. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	<ul style="list-style-type: none"> Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	<ul style="list-style-type: none"> No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	<ul style="list-style-type: none"> No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

The Conservation Importance (CI) of the site, according to criteria in the Species Environmental Assessment Guidelines (page 28), is **HIGH** on the basis of the **site being confirmed habitat** for a listed threatened species where the listing is for any criterion other than A (*Muraltia knysnaensis* is listed under criterion B and is listed as Endangered).

Table 5: Functional Integrity (CI) criteria.

Functional Integrity (FI)	Fulfilling criteria
Very high	<ul style="list-style-type: none"> • Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. • No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	<ul style="list-style-type: none"> • Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. • Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. • Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	<ul style="list-style-type: none"> • Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. • Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. • Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	<ul style="list-style-type: none"> • Small (> 1 ha but < 5 ha) area. • Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat • and a very busy used road network surrounds the area. Low rehabilitation potential. • Several minor and major current negative ecological impacts.
Very low	<ul style="list-style-type: none"> • Very small (< 1 ha) area. • No habitat connectivity except for flying species or flora with wind-dispersed seeds. • Several major current negative ecological impacts.

The Functional Integrity (FI) of the site, according to criteria in the Species Environmental Assessment Guidelines (page 29), is **MEDIUM** on the basis of being medium in size, semi-intact area, and limited current negative ecological impacts and medium rehabilitation potential.

		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

On the basis of the HIGH CI and MEDIUM FI, the **Biodiversity Importance is derived as MEDIUM** (Species Environmental Assessment Guidelines, page 29).

The Receptor Resilience of the site, according to criteria in the Species Environmental Assessment Guidelines (page 30), is **LOW** on the basis that **fynbos that is completely removed is unlikely to return to its original species composition, even after long periods of time**. *Muraltia knysnaensis* would be expected to be lost permanently in the event of complete vegetation removal, and would not return, even if the vegetation is rehabilitated.

Site ecological importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

The criteria **do not take into account the fact that only one plant was found** on site. It is probable that plants occur **scattered on neighbouring properties**, as part of a larger subpopulation, and where they are likely to persist, **even if the current site is developed**. On this basis, the RR could be relaxed to HIGH for *Muraltia knysnaensis* for the general area that includes neighbouring properties, on the basis that the **species would persist despite development of the current site**.

On the basis of the MEDIUM BI and LOW RR, the Site Ecological Importance for the habitat in which the threatened plant species occurs is derived from the cross-matrix as **HIGH**. According to the Species Environmental Assessment Guidelines, the guideline in relation to proposed development activities is according to the following table (Table 6). This indicates that avoidance mitigation should be applied wherever possible.

Table 6: 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.

IMPACT ASSESSMENT

There is **one sensitive plant species receptor** on site, namely *Muraltia knysnaensis*, listed as Endangered. A **single individual** was seen on site after extensive searches. A detailed on-site assessment did not locate any additional plants within the site or in the project area of influence extending onto surrounding property.

The only significant impact assessed is therefore as follows:

1. LOSS OF INDIVIDUALS OF AN ENDANGERED PLANT SPECIES AS A RESULT OF CLEARING OF HABITAT FOR AGRICULTURAL ACTIVITIES.

A design phase intervention is a re-design of the project layout to avoid impacting on areas suitable for *Muraltia knysnaensis* and to **maintain connection corridors to neighbouring areas**. A 0.5ha botanical reserve was identified in order to reduce the impact of the proposed activity on this species.

It is the intention of the project to manage this area to promote persistence of the species. The Environmental Management Plan must facilitate this. The assessment below is therefore on this basis (avoidance mitigation being implemented).

Loss of an individual of an endangered plant species

Extent of impact

The impact will occur at the **local scale** and is assessed as SITE.

Probability of occurrence

The intention is to maintain the 0.5ha botanical reserve as suitable area of habitat in which the species occurs. The impact would be POSSIBLE on the basis that activities on site may possibly still lead to effects on any remaining natural habitat on site but there is a strong probability that good management of the site where the plant is located would lead to its persistence.

Reversibility of impact

Loss of the single individual of the species on site is REVERSIBLE in the sense that it could re-colonise the site, if habitat is maintained in a suitable condition.

Degree to which resources will be irreplaceably lost

The resource assessed here is the single individual of *Muraltia knysnaensis* on site. The resource also includes the habitat in which the plant occurs. In terms of the known populations of this species at other locations, the **loss of this single plant is a MARGINAL** loss of resources when the entire global population of the species is considered.

Duration of impact

Loss of the single plant on site would be **MEDIUM-TERM**, because it could potentially re-colonise the site. If a larger population exists nearby (speculated) then emigration is possible.

Intensity or magnitude of impact

Following the impact assessment scoring approach adopted here, the impact is scored as being of MEDIUM magnitude.

Significance of impact

The calculation of the significance of an impact uses the following formula:

Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.

On this basis, the impact is calculated as [(Extent = 1) + (Probability = 2 + (Reversibility = 2) + (Irreplaceability = 2) + (Duration = 2)] x (Intensity = 2)

Score = 18 = LOW significance

Table 7: Summary of assessment of impacts.

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Threatened plant species (<i>Muraltia knysnaensis</i>) that occurs on site	Inappropriate management leading to loss of plant on site.	1	2	2	2	2	2	18	-	Low
After mitigation		1	1	2	2	2	2	16	-	Low

Possible mitigation measures

The following mitigation is recommended:

1. Compile and implement **ecological management** through the Environmental Management Plan for the habitat.
2. Implement **alien vegetation control** through the Environmental Management Plan.
3. Limit unnecessary access to the habitat, especially from visitors to the site.
4. Disseminate information / educate staff on importance of the habitat, Possible biodiversity induction approach.

Assessment of No-Go option

Historical aerial imagery shows that the site has been managed for grazing by progressively bush-cutting fynbos, and then maintaining the cut status by regular cutting. This **promotes growth of grazeable material at the expense of natural fynbos**, which has a naturally low grazing value for domestic livestock. Under this **regime**, remnant natural Garden Route Shale fynbos is likely to be **progressively degrade** within the proposed development footprint.

Currently, almost the entire site has been bush-cut, including the location at which the individual of *Muraltia knysnaensis* was located (see aerial photo background in Figure 8). Initially, this provided circumstances that favour the growth and flowering of the plant, but under this regime continuously, it is possible that the **long-term survival of the plant will be compromised**. Therefore, under the current

management regime, the impact on the species will most likely result in **the loss of the habitat** and the species on site.

DISCUSSION

This Terrestrial Plant Species Assessment was undertaken as a result of the Site Sensitivity Verification confirming the site as having HIGH sensitivity with respect to plant species of concern. This is due to the occurrence of a **single individual** of an **Endangered plant species** on site, namely *Muraltia knysnaensis*.

An assessment was undertaken, based on database information, of all other species of concern that could possibly occur on site. There are six other threatened plant species, and one near threatened plant species for which there is a Medium possibility of occurring on site. This is due to the site being within the overall geographical range of these species and there being remnant natural habitat on site within which these species could possibly occur. However, **previous observation data does not suggest that there is a high risk of any of them occurring on site. None of them were found on site during three detailed floristic surveys.**

A detailed desktop assessment was undertaken of *Muraltia knysnaensis* to understand the importance of the single plant that was found on site. There are four main known populations of this species where it is regularly observed, at Mossel Bay, at Herold's Bay, at Eastford, and at Kranshoek. The observation at the current site is unexpected, based on known database information, and it has not been previously observed anywhere else nearby. Whether the individual plant seen on site is part of a bigger population or not is therefore unknown but it is logical to assume that it must be part of a larger population. The plants are relatively small and inconspicuous, and tend to emerge only after fire or other vegetation clearing activities. It is therefore easily overlooked. It is possible that it is more widespread and common than current data indicates, but this cannot be assumed at the expense of the long-term preservation of the species. The observation at the current site therefore has potentially important conservation implications for the species in that it extends the known range for the species.

Only a single plant was found on site, confirmed in a second survey. A detailed search in all suitable fynbos habitats on site and in the surrounding property found no additional plants. Assuming the species also occurs on the neighbouring property, the vegetation there is relatively moribund and would probably require a burn before any plants of *Muraltia knysnaensis* would emerge. Until that happens, it **will not be detected there, even if it occurs there**. Within the current property, it is possible that only a small proportion of the population emerges at any one time (a feasible ecological strategy for this species). It is therefore possible that more plants occur on site or nearby.

On the understanding that **the plant and identified suitable habitat on site will be conserved**, an assessment was undertaken of the potential significance of impacts on the species on site due to the proposed agricultural activities. The assessment was done at the site scale and was assessed as having LOW significance. This can be reduced further if **suitable management measures** are implemented.

It was also assessed that current activities on site (the **No-Go option**) could **lead to loss of fynbos vegetation on site**, which would **likely lead to loss of this individual of the species** of concern. Regular clearing of vegetation, whether by burning or by bush-cutting, **will inevitably lead to loss of fynbos species**, to be **replaced by grasses and weeds**. This happens through relatively rapid depletion of soil seed banks, in addition to mortality of adult plants.

Re-establishment of fynbos under these conditions will require **recruitment of fynbos species from surrounding intact vegetation** and is likely to **take a long time** and be **only partially successful**. *Muraltia knysnaensis* is initially advantaged by vegetation clearance, which allows it to grow and flower without competition from other fynbos species. Initially, this will lead to more successful seed production and dispersal into surrounding areas. However, persistent clearing will lead to mortality

of adult plants and population decline. Ideally, the species requires intact fynbos with intermittent disturbance.

The current proposal is to **retain the identified suitable habitat on site for the species** and to **manage it ecologically**. The maximum area of **suitable habitat** is shown in Figure 13. It is possible for the **planned development to continue** without loss of the species on site **on condition that this habitat is kept intact, managed as a natural area (No-Go area)**, and that **ecological connectivity to the neighbouring property is maintained**.



Figure 13: Location of *Muraltia knysnaensis* (orange) and the maximum area of potentially suitable habitat on site (purple area). Linkages to neighbouring where the species could occur is shown as blue arrows.

The site survey identified the presence of three species of protected tree species on site, namely *Sideroxylon inerme* (more than 50 individuals), *Pittosporum viridiflorum* (10 individuals) and *Afrocarpus falcatus* (1 individual). If any of these trees are affected by the proposed development then a permit would be required, according to the National Forests Act however the Preferred Alternative appears to accommodate all if not most of these trees.

A small number of flora protected under Provincial legislation were found on site. They were all common species, but are in plant families that are protected as a whole. For example, all species in the Family Orchidaceae (orchids) are protected, and three common species were found on site. Reasonable search and rescue is recommended for species that can be transplanted.

CONCLUSION

The following conclusions can be made regarding the outcomes of the Terrestrial Plant Species Specialist Assessment on site:

1. A **single individual of the Endangered species, *Muraltia knysnaensis***, was found on site. It is probably part of a larger population, the size of which is probably small (maximum of a few individuals) and **locally restricted** in extent, but this could not be confirmed due to the moribund/degraded state of suitable habitat.
2. the Site Ecological Importance for the habitat in which the threatened plant species occurs was calculated as being **HIGH**. According to the Species Environmental Assessment Guidelines, this indicates that **avoidance mitigation** should be applied, which will be achieved by conserving the suitable habitat.
3. An assessment was undertaken, the outcome of which indicates that the possible impacts on an individual plant of *Muraltia knysnaensis* is of **LOW negative significance**.
4. It is probable that **current activities on site** (No-Go option) **will lead to loss of this single plant and degradation of its habitat**.
5. Three species of **protected tree** were found on site. A permit will be required if any of these are affected by the proposed development.
6. A total of 13 plant species occur on site that are protected under the **Cape Nature and Environmental Conservation Ordinance 19 of 1974**.

RECOMMENDATIONS

The following is recommended:

1. The 0.5ha area of suitable habitat (botanical reserve) identified must be retained for *Muraltia knysnaensis* and must be ecologically managed, including through maintenance of connectivity to the adjacent property.
2. The environmental management plan must include monitoring requirements for the plant species as well as the suitable habitat area as identified.
3. Additional protective measures include managing alien invasive plants on site, limiting access to the conservation area, and providing education to personnel on the value of the habitat must be addressed in the environmental management plan.

APPENDICES:

Appendix 1: Plant species recorded on site.

*Acacia cyclops** (Category 1b)
*Acacia mearnsii** (Category 2)
***Afrocarpus falcatus* (PROTECTED)**
Agathosma ovata (Protected)
Agrimonia procera
Albuca bracteata
Albuca setosa
Aloe ferox
Aloiampelos ciliaris (Protected)
Anemia cafferorum
Anginon difforme
Anisodonteia scabrosa
Anthospermum aethiopicum
Apodytes dimidiata
Arctopus echinatus
Argyrolobium argenteum
Aspalathus ciliaris
Asplenium cordatum
Athrixia heterophylla
Berkheya heterophylla
Bobartia aphylla (Protected)
Bonatea speciosa (Protected)
Buddleja saligna
Capparis sepiaria
Carissa bispinosa
Cheilanthes viridis
Chironia baccifera
*Cirsium vulgare** (Category 1b)
*Coleus barbatus**
Colpoon compressum
Cotula australis
Cotyledon orbiculata
Crassula multicava
Crassula nudicaulis
Crassula orbicularis
Crassula sarmentosa
Crassula subulata
Cyanella lutea
Cynanchum ellipticum
Cynanchum viminale
Cynodon dactylon
Cyperus uitenhagensis
Dasineura dielsi
Dicerotheramnus rhinocerotis
Diospyros dichrophylla
Dyschoriste setigera
Ehrharta calycina
Elaeodendron croceum
Eragrostis capensis
Eragrostis curvula

Erica sparsa (Protected)
Eriocephalus africanus
Euclea undulata
Euphorbia procumbens
Euryops virgineus
Falkia repens
Gazania krebsiana
Aristea (Protected)
Asparagus
Bromus
Bulbostylis
Eriospermum
*Eucalyptus**
Ficinia
Ficus
Hypericum
Kedrostis
Moraea (Protected)
Pentameris
Phyllica
Phyllanthus
*Pinus**
Restio
Trichodiadema (Protected)
Wahlenbergia
Gerbera cordata
Grewia occidentalis
Gymnosporia buxifolia
Gymnosporia nemorosa
Haemanthus sanguineus
*Hakea sericea** Category 1b)
Halleria lucida
Helichrysum anomalum
Helichrysum cymosum
Helichrysum foetidum
Helichrysum nudifolium
Helichrysum teretifolium
Hermannia flammea
Heteropogon contortus
Hibiscus aethiopicus
Hyobanche sanguinea
Hyparrhenia hirta
Indigofera heterophylla
Juncus acutus
Knowltonia vesicatoria
Lactarius deliciosus
Lauridia tetragona
Lycium ferocissimum
Maytenus acuminata
Megathyrsus maximus
Mesembryanthemum cordifolium (Protected)

Metalasia densa
Monopsis unidentata
Monsonia emarginata
Montinia caryophyllacea
***Muraltia knysnaensis* (ENDANGERED)**
Myoporum insulare
Mystroxydon aethiopicum
Nidorella ivifolia
Notobubon laevigatum
Olea capensis
*Opuntia ficus-indica** (Category 1b)
Ornithogalum thyrsoides
Osteospermum moniliferum
Otholobium virgatum
Oxalis ciliaris
Oxalis imbricata
Passerina corymbosa
Pelargonium alchemilloides
Pelargonium candicans
***Pittosporum viridiflorum* (PROTECTED)**
Plantago lanceolata
Polygala garcinii
Polygala virgata
Pterocelastrus tricuspidatus
Rubus bergii × *rigidus**
Ruschia knysnana (Protected)
Ruschia tenella (Protected)
Satyrium longicolle (Protected)
Satyrium membranaceum (Protected)
Scabiosa columbaria
Schotia afra
Scolopia zeyheri

Scutia myrtina
Searsia lucida
Searsia pterota
Searsia pyroides
Searsia refracta
Sebaea aurea
Section *Delostemon*
Selago corymbosa
Senecio ilicifolius
Senecio purpureus
Setaria sphacelata
***Sideroxylon inerme* (PROTECTED)**
Solanum linnaeanum
Sporobolus africanus
Stachys aethiopica
Stenotaphrum secundatum
Stoebe capitata
Stoebe phyllostachya
Tarchonanthus littoralis
Tephrosia capensis
Themeda triandra
Thesium strictum
Thunbergia capensis
Trimeria grandifolia
Typha capensis
Urochloa serrata
Ursinia anthemoides
Viscum capense
Viscum rotundifolium
Vulpia myuros

Appendix 2: List of protected tree species (National Forests Act, 1998).

In terms of section 15(1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister of Agriculture, Forestry and Fisheries. The list of Protected Tree Species under the National Forest Act, 1998 (Act No. 84 of 1998) is attached here as Appendix 1. The most recent version of this list was published in the Government Gazette No. 41887 on 7 September 2018, designated as GN No. 536 of 2018, and contains 47 species distributed across South Africa.

SCHEDULE A

Botanical name	English common names	Other common names Afrikaans (A), Sepedi (P), Sesotho (S), Setswana (T), Tshivenda (V), isiXhosa (X), isiZulu (Z), Xitsonga (XT)	National tree number
<i>Acacia erioloba</i>	Camel thorn	Kameeldoring (A)/Mogohlo (NS)/Mogoŋlho (T)/	168
<i>Acacia haematoxylon</i>	Grey camel thorn	Vaalkameeldoring (A)/Mokholo (T)	169
<i>Adansonia digitata</i>	Baobab	Kremetart (A)/Seboi (NS)/Mowana (T)/Ximuwu (XT)	467
<i>Azalia quanzensis</i>	Pod mahogany	Peulmahonie (A)/Mutokota (V)/Inkehli (Z)	207
<i>Balanites</i> subsp. <i>maughamii</i>	Torchwood	Groendoring (A)/Ugobandlovu (Z)	251
<i>Barringtonia racemosa</i>	Powder-puff tree	Poeierkwasboom (A)/Iboqo (Z)	524
<i>Boscia albitrunca</i>	Shepherd's tree	Witgat (A)/Mohlōpi (NS)/Motlhoŋpi (T)/Muvhombwe (V)/Umgqomogqomo (X)/Umvithi (Z)	122
<i>Brachystegia spiciformis</i>	Msasa	Msasa (A)	198.1
<i>Breonadia salicina</i>	Matumi	Mingerhout (A)/Mohlome (NS)/Mutu-lume (V)/Umfomfo (Z)	684
<i>Bruguiera gymnorrhiza</i>	Black mangrove	Swartwortelboom (A)/isiKhangati (X)/IsiHlobane (Z)	527
<i>Cassipourea swaziensis</i>	Swazi onionwood	Swazi-ueihout (A)	531.1
<i>Catha edulis</i>	Bushman's tea	Boesmanstee (A)/Mohlatse (NS)/Igqwaka (X)/Umhlwazi (Z)	404
<i>Ceriops tagal</i>	Indian mangrove	Indiese wortelboom (A)/isinkaha (Z)	525
<i>Cleistanthus schlechteri</i> var. <i>schlechteri</i>	False tamboti	Bastertambotie (A)/Umzithi (Z)	320
<i>Colubrina nicholsonii</i>	Pondo weeping thorn	Pondo-treurdoring (A)	453.8

<i>Combretum imberbe</i>	Leadwood	Hardekool (A)/Mohwelere-tšhipi (NS)/Motswiri (T)/Impondondlovu (Z)	539
<i>Curtisia dentata</i>	Assegai	Assegai (A)/Umgxina (X)/Umagunda (Z)	570
<i>Elaeodendron transvaalensis</i>	Bushveld saffron	Bosveld-saffraan (A)/Monomane (T)/Ingwavuma (Z)	416
<i>Erythrophysa transvaalensis</i>	Bushveld red balloon	Bosveld-rooiklapperbos (A)/Mofalatsane (T)	436.2
<i>Euclea pseudebenus</i>	Ebony guarri	Ebbeboom-ghwarrie (A)	598
<i>Ficus trichopoda</i>	Swamp fig	Moerasvy (A)/Umvubu (Z)	54
<i>Leucadendron argenteum</i>	Silver tree	Silwerboom (A)	77
<i>Lumnitzera racemosa</i> var. <i>racemosa</i>	Tonga mangrove	Tonga-wortelboom (A)/isiKhahanesibomvu (Z)	552
<i>Lydenburgia abbottii</i>	Pondo bushman's tea	Pondo-boesmanstee (A)	407
<i>Lydenburgia cassinoides</i>	Sekhukhuni bushman's tea	Sekhukhuni-boesmanstee (A)	406
<i>Mimusops caffra</i>	Coastal red milkwood	Kusrooimeikhout (A)/Umthunzi (X)/Umkhakhayi (Z)	583
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	Lebombo wattle	Lebombo-wattel (A)/Umfomothi (Z)	191
<i>Ocotea bullata</i>	Stinkwood	Stinkhout (A)/Umhlungulu (X)/Umnukane (Z)	118
<i>Ozoroa namaquensis</i>	Gariep resin tree	Gariep-harpuisboom (A)	373.2
<i>Philenoptera violacea</i>	Apple-leaf	Appelblaar (A)/Mphata (NS)/Mohata (T)/isiHomohomo (Z)	238
<i>Pittosporum viridiflorum</i>	Cheesewood	Kasuur (A)/Kgalagangwe (NS)/Umkhwenkwe (X)/Umfusamvu (Z)	139
<i>Podocarpus elongatus</i>	Breede River yellowwood	Breeëriviergeelhout (A)	15
<i>Podocarpus falcatus</i> (<i>Afrocarpus falcatus</i>)	Outeniqua yellowwood	Outniekwageelhout (A)/Mogōbagōba (NS)/Umkhoba (X)/Umsonti (Z)	16
<i>Podocarpus henkelii</i>	Henkel's yellowwood	Henkel se geelhout (A)/Umsonti (X)/Umsonti (Z)	17
<i>Podocarpus latifolius</i>	Real yellowwood	Regte-geelhout (A)/Mogōbagōba (NS)/Umcheya (X)/Umkhoba (Z)	18
<i>Protea comptonii</i>	Saddleback sugarbush	Barberton-suikerbos (A)	88
<i>Protea curvata</i>	Serpentine sugarbush	Serpentynsuikerbos (A)	88.1
<i>Prunus africana</i>	Red stinkwood	Rooistinkhout (A)/Umkhakhase (X)/Umdumezulu (Z)	147
<i>Pterocarpus angolensis</i>	Wild teak	Kiaat (A)/Morōtō (NS)/Mokwa (T)/Mutondo (V)/Umvangazi (Z)	236
<i>Rhizophora mucronata</i>	Red mangrove	Rooiwortelboom (A)/isiKhangathi (X)/Umhlume (Z)	526
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	Marula	Maroela (A)/Morula (NS)/Morula (T)/Unganu (Z) /Nkanyi (XT)	360
<i>Securidaca longepedunculata</i>	Violet tree	Krinkhout (A)/Mmaba (T)	303

Sideroxylon inerme subsp. inerme	White milkwood	Witmelkhout (A)/Ximafana (X)/Umakhwelafingqane (Z)	579
<i>Tephrosia pondoensis</i>	Pondo poison pea	Pondo-gifertjie (A)	226.1
<i>Warburgia salutaris</i>	Pepper-bark tree	Peperbasboom (A)/Molaka (NS)/Mulanga (V)/isiBaha (Z)	488
<i>Widdringtonia cedarbergensis</i>	Clanwilliam cedar	Clanwilliamseder (A)	19
<i>Widdringtonia schwarzii</i>	Willowmore cedar	Baviaanskloofseder (A)	21
<i>Berchemia zeyheri</i> (RHAMNACEAE) LC	Red ivory Pink ivory	Rooi-ivoor (A) / Rooihout (A) / Monee (S) / umNeyi (SW) / umNini (Z, X) / Xiniyani (TS) / Moye (T) / Munia-niane (V)	450
<i>Diospyros mespiliformis</i> (EBENACEAE) LC	Jackal berry	Jakkalsbessie (A) / Musuma (V) / Muntoma (TS) / Mgula (TS)	606
<i>Schinziophyton rautanenii</i>	Manketti / Mongongo	Mankettiboom (A) / Monghongho (T) / Makongwa (T)	337
<i>Umtiza listeriana</i>	Umtiza	Umtiza (X) / Omtisa (A)	205

Species in **bold** have a geographical distribution that is close to the study area.

Appendix 3: Flora protected under the Cape Nature and Environmental Conservation Ordinance 19 of 1974

SCHEDULE 3: Endangered Flora

As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family: APOCYNACEAE	Common name / Additional notes
<i>Pachypodium namaquanum</i>	Halfmens (currently listed as LC)
Family: GESNERIACEAE	
<i>Charadrophila capensis</i>	Cape Gloxinia (currently listed as Rare)
Family: LILIACEAE	
<i>Aloe pillansii</i>	Now called <i>Aloidendron pillansii</i> , currently listed as Endangered
<i>Aloe buhrii</i>	Currently listed as Vulnerable
<i>Aloe erinacea</i>	Now called <i>Aloe melanacantha</i> , currently listed as Least Concern
Family: PROTEACEAE	
<i>Mimetes capitulates</i>	Currently listed as Endangered
<i>Mimetes hottentoticus</i>	Currently listed as Critically Endangered
<i>Mimetes stokoei</i>	Currently listed as Critically Endangered
<i>Orothamnus zeyheri</i>	Currently listed as Vulnerable
<i>Protea odorata</i>	Currently listed as Critically Endangered
Family: STANGERIACEAE	
<i>Stangeria eriopus</i>	Bobbejaankos (currently listed as Vulnerable)
Family: ZAMIACEAE	
<i>Encephalartos</i> spp.	Cycads, all species

SCHEDULE 4: PROTECTED SPECIES

As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family: AMARYLLIDACEAE	All species
Family: APOCYNACEAE	All species except those listed in Schedule 3
Family: AQUIFOLIACEAE	All species
<i>Ilex mitis</i>	
Family: ARACEAE	
<i>Zantedeschia elliottiana</i>	Yellow arum lily (currently DDT)
Family: ASCLEPIADACEAE (now Apocynaceae)	All species
Family: BORAGINACEAE	
<i>Echiostachys spicatus</i>	
Family: BRUNIACEAE	All species
Family: COMPOSITAE (now Asteraceae)	
<i>Senecio colyphyllous</i> (<i>coleophyllous</i> ?)	
<i>Cotula duckitteae</i>	
Family: CRASSULACEAE	
<i>Crassula columnaris</i>	
<i>Crassula perfoliata</i>	
<i>Crassula pyramidalis</i>	
<i>Kalanchoe thyrsiflora</i>	
<i>Rochea coccinea</i> (now <i>Crassula cochinea</i>)	
Family: CUNONIACEAE	

<i>Cunonia capensis</i>	
<i>Platylophus trifoliatus</i>	
Family: DIOSCOREACEAE	
<i>Testudinaria sylvatica</i> (now <i>Dioscorea sylvatica</i>)	
<i>Testudinaria elephantipes</i> (now <i>Dioscorea elephantipes</i>)	
Family: ERICACEAE	All species
Family: EUPHORBIACEAE	
<i>Euphorbia bupleurifolia</i>	
<i>Euphorbia fasciculata</i>	
<i>Euphorbia globosa</i>	
<i>Euphorbia horrida</i>	
<i>Euphorbia meloformis</i>	
<i>Euphorbia obesa</i>	
<i>Euphorbia schoenlandii</i>	
<i>Euphorbia symmetrica</i>	
<i>Euphorbia valida</i>	
Family: GEISSOLOM(AT)ACEAE	All species
Family: GESNERIACEAE	
<i>Streptocarpus</i>	All species
Family: GRAMINAE (now Poaceae)	
<i>Arundinaria tessellata</i> (<i>Thamnocalamus tessellatus</i>)	
<i>Secale africanum</i> (now <i>Secale strictum</i> subsp. <i>africanum</i>)	
Family: GRUBBIACEAE	All species
Family: IRIDACEAE	All species
Family: LEGUMINOSAE (now Fabaceae)	
<i>Erythrina acanthocarpa</i>	
<i>Erythrina humeana</i>	
<i>Liparia comantha</i>	
<i>Liparia sphaerica</i>	
<i>Liparia splendens</i>	
<i>Podalyria calyptrata</i>	
<i>Priestleya vestita</i>	
<i>Priestleya tomentosa</i>	
Family: LILIACEAE (now split into a number of families)	
All species of the genus ALOE except those specified in Schedule 3 and the species <i>Aloe ferox</i>	
<i>Gasteria beckeri</i>	
<i>Gloriosa superba</i>	
All species of the genus <i>Haworthia</i>	
All species of the genus <i>Kniphofia</i>	
All species of the genus <i>Lachenalia</i>	
<i>Littonia modesta</i>	
<i>Sandersonia aurantiaca</i>	
All species of the genus <i>Veltheimia</i>	
<i>Agapanthus walshii</i>	
<i>Daubenya aurea</i>	
Family: MELIACEAE	
<i>Nymania capensis</i>	

Family: MESEMBRYANTHEMACEAE (now Aizoaceae)	All species
Family: MUSACEAE (now Strelitziaceae)	
<i>Strelitzia</i>	All species
Family: NYMPHAEACEAE	
<i>Nymphaea capensis</i> (now <i>N. nouchali</i>)	
Family: ORCHIDACEAE	All species
Family: OXALIDACEAE	
<i>Oxalis nutans</i> (no such species)	
Family: PENAEACEAE	All species
Family: POLYGALACEAE	
<i>Muraltia minuta</i>	
Family: POLYPODIACEAE	
<i>Adiantum</i> (now Family Pteridaceae)	All species
<i>Hemitelia capensis</i> (now <i>Alsophila capensis</i> , Family Cyathaceae)	
<i>Polystichum adiantiforme</i> (now <i>Rumohra adiantiformis</i> , Family Dryopteridaceae)	
Family: PORTULACACEAE	
<i>Anacampseros</i> (now Family <i>Anacampserotaceae</i>)	All species
Family: PROTEACEAE	
<i>All species</i>	
Family: RANUNCULACEAE	
<i>Anemone capensis</i> (now <i>A. tenuifolia</i>)	
Family: RESTIONACEAE	
<i>Chondropetalum</i>	
<i>Acockii pillans</i> (no such species)	
<i>Elegia fenestrata</i>	
<i>Restio acockii</i>	
<i>Restio micans</i>	
<i>Restio sabulosus</i>	
Family: RETZIACEAE (now Stilbaceae)	
<i>Retzia capensis</i>	
Family: RHAMNACEAE	
<i>Phyllica pubescens</i>	
Family: RORIDULACEAE	All species
Family: RUTACEAE	All species
Family: SCROPHULARIACEAE	
<i>Diascia</i>	All species
<i>Harveya</i>	All species
<i>Nemesia strumosa</i>	
<i>Halleria</i>	All species
Family: THYMELAEACEAE	
<i>Lachnaea aurea</i>	

Appendix 4: Flora species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

(as updated in R. 1187, 14 December 2007)

CRITICALLY ENDANGERED SPECIES

Flora

Adenium swazicum
Aloidendron pillansii
Diaphanathe millarii
Dioscorea ebutsniorum (no such species!!)
Encephalartos aemulans
Encephalartos brevifoliolatus
Encephalartos cerinus
Encephalartos dolomiticus
Encephalartos heenanii
Encephalartos hirsutus
Encephalartos inopinus
Encephalartos latifrons
Encephalartos middelburgensis
Encephalartos nubimontanus
Encephalartos woodii

ENDANGERED SPECIES

Flora

Angraecum stella-africae
Encephalartos arenarius
Encephalartos cupidus
Encephalartos horridus
Encephalartos laevifolius
Encephalartos lebomboensis
Encephalartos msinganus
Jubaeopsis caffra
Siphonochilus aethiopicus
Warburgia salutaris
Newtonia hildebrandtii

VULNERABLE SPECIES

Flora

Aloe albida
Encephalartos cycadifolius
Encephalartos Eugene-maraisii
Encephalartos ngovanus
Merwillia plumbea
Zantedeschia jucunda

PROTECTED SPECIES

Flora

Adenia wilmsii
Aloe simii
Clivia mirabilis

Disa macrostachya
Disa nubigena
Disa physodes
Disa procera
Disa sabulosa
Encephelartos altensteinii
Encephelartos caffer
Encephelartos dyerianus
Encephelartos frederici-guilielmi
Encephelartos ghellinckii
Encephelartos humilis
Encephelartos lanatus
Encephelartos lehmannii
Encephelartos longifolius
Encephelartos natalensis
Encephelartos paucidentatus
Encephelartos princeps
Encephelartos senticosus
Encephelartos transvenosus
Encephelartos trispinosus
Encephelartos umbeluziensis
Encephelartos villosus
Euphorbia clivicola
Euphorbia meloformis
Euphorbia obesa
Harpagophytum procumbens
Harpagophytum zeyherii
Hoodia gordonii
Hoodia currorii
Protea odorata
Stangeria eriopus