

Plant Species and Terrestrial
Biodiversity Impact assessment for a
section 24G unlawful clearing of
indigenous vegetation on Annex
Klein Zout Rivier 39, Napier, Western
Cape

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PREPARED FOR
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Executive Summary

This ecological assessment report details the findings of a plant species and terrestrial biodiversity impact assessment conducted on 02 December 2025 for a section 24G application regarding Annex Klein Zout Rivier 39, Napier, Western Cape. Specifically, this report has been compiled to support an application for Retrospective Environmental Authorization (EA) following the unlawful commencement of listed activities, namely the clearing of indigenous vegetation between 2023 and 2024.

The extent of the unauthorized clearing activities covers approximately 7.4 hectares. A key finding is that while national datasets flag the region as “Very High” sensitivity due to its mapping as Central Rûens Shale Renosterveld and a Critical Biodiversity Area (CBA2), ground-truthing revealed inaccuracies in these classifications. The affected area is situated within a lowland floodplain rather than the critically endangered renosterveld ecosystem found on the surrounding slopes and which has a distinctly different species composition. Furthermore, the CBA2 aquatic designation was found to be inappropriate for what is essentially a terrestrial, albeit periodically flooded, environment. Importantly, the analysis distinguishes between truly natural and secondary floodplain vegetation on land historically ploughed before 2003. This distinction is vital because, although legally protected under the National Environmental Management Act (NEMA) after ten years of being fallow, the soil profiles and microbial networks of these “anthrosols” (soil that has been formed, heavily modified, or profoundly influenced by long-term human activity) remain fundamentally altered. Consequently, only 47% of the cleared land — roughly 3.5 hectares — consisted of never-ploughed natural indigenous floodplain vegetation.

Field investigations and the use of nearby reference sites confirmed that the study area holds a “Very Low” Site Ecological Importance (SEI), in contrast to the surrounding Central Rûens Shale Renosterveld fragments which yielded a “Very High” score. Furthermore, while the latter collectively contain five plant Species of Conservation Concern (SCC), none were located within the actual footprint of the cleared areas during surveying, and neither were any found to occur in the respective reference sites used to infer conditions prior to clearing. The botanical composition of the cleared sites was dominated by pioneer species and weedy indigenous plants, such as *Galenia africana*, alongside invasive alien species like *Ricinus communis* and *Lolium* spp. The assessment found that the study area was not essential for meeting national biodiversity targets, as it does not overlap with any listed threatened ecosystems. However, it likely functioned as an Ecological Support Area (ESA) by providing a buffer and connectivity for the high-value renosterveld fragments nearby. The high receptor resilience of the floodplain vegetation suggests that many species could return if the impacts were removed, further supporting a lower ecological sensitivity of the specific cleared footprint.

The evaluation of impacts associated with the construction phase — specifically the clearing of vegetation — determined that the significance of the loss of plant communities ranges from “Medium-Low” to “Low” following the consideration of potential mitigation. Because it is highly unlikely that any plant SCC were present in the cleared footprint, the impact regarding potential loss of plant SCC species is classified as “Low”. The assessment also highlighted that the proliferation of invasive alien plants was a pre-existing issue at the baseline level, which could be addressed through active management. In a cumulative context, the unauthorized clearing is unlikely to have significantly disrupted broad-scale ecological processes or hindered the achievement of conservation targets, given the transformed nature of a large portion of the site and the absence of critical habitat for SCC.

Given the relatively small development footprint it is highly unlikely that any fatal flaws would have been present, and EA would have been proposed conditional on fulfilling the proposed mitigation measures.

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i. List of Abbreviations

BODATSA:	Botanical Database of Southern Africa
CARA:	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA:	Critical Biodiversity Area
CITES:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR:	Critically Endangered (species threat status)
DD:	Data Deficient (species threat status)
DDD:	Data Deficient – Insufficient Information (species threat status)
DDT:	Data Deficient – Taxonomically Problematic (species threat status)
DEA&DP:	Department of Environmental Affairs and Development Planning
EA:	Environmental Authorization
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment: EIA regulations promulgated under section 24(5) of NEMA and published in Government Notice R. 543 in Government Gazette 33306 of 18 June 2010
EMPr:	Environmental Management Programme
EN:	Endangered (species threat status)
EO:	Environmental Officer
EOO:	Extent of Occurrence
ESA:	Ecological Support Area
EW:	Extinct in the Wild (species threat status)
EX:	Extinct (species threat status)
FEPA:	Freshwater Ecosystem Priority Area
IAPs:	Invasive Alien Plant species
IUCN:	International Union for Conservation of Nature
LC:	Least Concern (species threat status)
MP:	Moderately Protected (according to the National Biodiversity Assessment 2018 Ecosystem Protection Levels)
NE:	Not Evaluated (species threat status)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:BA A&IS:	NEM:BA Alien and Invasive Species Regulations, 2020
NEMA:	National Environmental Management Act (Act 107 of 1998)
NFA:	National Forests Act 1998 (No. 84 of 1998)
NFEPA:	National Freshwater Ecosystem Priority Areas; identified to meet national freshwater conservation targets (CSIR, 2011)
NP:	Not Protected (according to the National Biodiversity Assessment 2018 Ecosystem Protection Levels)
NT:	Near Threatened (species threat status)
NWA:	National Water Act 36 of 1998
NWM:	National Wetland Map
ONA:	Other Natural Area
PA:	Protected Area
PAOI:	Project Areas of Influence
POSA:	Plants of southern Africa (online database)
PP:	Poorly Protected (according to the National Biodiversity Assessment 2018 Ecosystem Protection Levels)
RE:	Regionally Extinct (species threat status)
REEA:	SA Renewable Energy EIA Application Database (https://egis.environment.gov.za/)
RLE:	Red List of Ecosystems for South Africa
SANBI:	South African National Biodiversity Institute
SCC:	Species of Conservation Concern (includes species listed under the IUCN Red List Criteria as Critically Endangered [CR], Endangered [EN], Vulnerable [VU], Near Threatened [NT], or Data Deficient [DD], as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [sometimes also termed “Critically Rare”])
SSV:	Site Sensitivity Verification
SWSA:	Strategic Water Source Area
VegMap:	National Vegetation Map of Southern Africa, Lesotho, and Swaziland (as per Mucina and Rutherford, 2006, with subsequent updates, e.g., 2018, 2024)
VU:	Vulnerable (species threat status)
WP:	Well Protected (according to the National Biodiversity Assessment 2018 Ecosystem Protection Levels)

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v. Report Minimum Legal Requirements

The Protocol for the Specialist Assessment and Minimum Report Content Requirements For Environmental Impacts on Terrestrial Plant Species (GN 1150, 43855, 30 October 2020) and the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 43110, 30 October 2020) are presented here, together with their fulfilments within this report.

Where protocol reference numbers differ between the two protocols, they are indicated either as PS (occurring in the Terrestrial Plant Species protocol) or TB (occurring in the Terrestrial Biodiversity protocol); otherwise they are the same between the protocols.

Protocol Reference	Plant Species and Terrestrial Biodiversity Specialist Assessment Report Content	Sections in this Report	Page
3.1.1.	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	12	94
3.1.2.	A signed statement of independence by the specialist	vi	xi
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	2.3	20
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	9 and 10	75 and 82
3.1.5.	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations	1.5	6
3.1.6.	A description of the mean density of observations/number of samples sites per unit area of site inspection observations	10	82
3.1.7. PS	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported	2.3.3	45
3.1.7. TB	Additional environmental impacts expected from the proposed development	3	54
3.1.8. PS	The online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area	8	72
3.1.8. TB	Any direct, indirect, and cumulative impacts of the proposed development	3	54
3.1.9. PS 3.1.6 TB	The location of areas not suitable for development and to be avoided during construction where relevant	2.3.6	54
3.1.9. TB	The degree to which impacts and risks can be mitigated	3	54
3.1.10 TB	The degree to which the impacts and risks can be reversed	3	54
3.1.10. PS	A discussion on the cumulative impacts	3	54
3.1.11. PS	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr)	4	61
3.1.11 TB	The degree to which the impacts and risks can cause loss of irreplaceable resources	3	54
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	5	63
3.1.13.	A motivation must be provided if there were any development footprints identified that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate	Not Applicable	Not Applicable
3.1.14. TB	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not	5.2	64
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vi. Declaration of Consultant Independence

The consultant hereby declares that he:

- Is an independent specialist in this application;
- Regards the information contained in this report as it relates to specialist input/study to be true and correct at the time of publication;
- Do not, and will not, have any financial interest(s) in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA Environmental Impact Assessment Regulations, 2014, and any specific environmental management Act;
- Do not, and will not, have any vested interest(s) in the proceedings of the proposed activities;
- Have disclosed, to the applicant, EAP, and/or competent authority(-ies), any information that have, or may have, the potential to influence the decision of the competent authority(-ies) or the objectivity of any report, plan, or document required in terms of the NEMA Environmental Impact Assessment Regulations 2014, and any specific environmental management Act;
- Is fully aware of, and meet, the responsibilities in terms of the NEMA Environmental Impact Assessment Regulations 2014 (specifically in terms of regulation 13 of GN No. R. 326), and any specific environmental management Act, and that failure to comply with these requirements may result in disqualification;
- Have provided the competent authority(-ies) with access to all necessary information at his disposal at the time of publication regarding the application, whether such information is favourable to the applicant or not; and
- Is aware that a false declaration is an offense in terms of regulation 48 of GN No. R. 326.

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Fields of Expertise: Botany; Biogeography; Terrestrial Biodiversity; Vegetation Surveys and Mapping; Invasive Alien Plant Species Identification, Management, and Monitoring; Biological Sciences; Biodiversity Informatics; Experimental Design and Analysis; Geographic Information Systems; and Statistical Computing and Data Analysis.

Summary of Qualifications: BSc (*cum laude*) Chemistry with Physics and Biology; BSc (Hons *cum laude*) Botany (majoring in Plant Taxonomy, Plant Ecology, and Plant Physiology); MSc Botany (Invasive Plant Species and Risk Assessment); PhD Botany (Invasive Plant Species and Impacts); GIS Intermediate (GISB1500S NQF Level 5); SAGIC Invasive Species Consultant; Professional Natural Scientist (Botanical Science: 121678).



March 2026

PART 1: Introduction, Background, and Findings of the Assessment

EcoFloristix
Specialist Botanical Surveys

1. Introduction

1.1. General Information

This project, as well as any and all related areas/sites, will from here on interchangeably be referred to as either the “Project”, “Project Area”, “development site”, or “study area”. The “project areas of influence” (PAOI) is defined and used where relevant where an activity or activities impact on Species of Conservation Concern (SCC) or the environment beyond the boundary of the preferred site. The development footprint in the context of this document means the area that was directly disturbed or impacted. The term “property” might also be used to refer to one or more cadastral property boundaries, and not just the study area.

Lornay Environmental Consulting (hereafter referred to as the “client”), on behalf of DJ Fourie (hereafter referred to as the “applicant”), approached EcoFloristix Specialist Botanical Surveys to conduct a Plant Species and Terrestrial Biodiversity Impact assessment for a section 24G unlawful clearing of indigenous vegetation on Annex Klein Zout Rivier 39, Napier, Western Cape.

1.2. Terms of Reference (ToR)

The main aim of this assessment was to provide a professional opinion on botanical and terrestrial biodiversity issues related to the unlawful activities (section 1.3.2) within the study area. Specifically, this assessment intends to provide the relevant information that would have been given for guiding and mitigating the risk(s) associated with the activities and their impacts on the local plant communities and associated ecosystems within the study area and surrounds by conducting a desktop analysis and a Site Sensitivity Verification (also referred to as a “SSV”).

Briefly, the following activities were performed:

- A desktop assessment to identify relevant ecologically important geographical features (for example, unique habitats, Critical Biodiversity Areas (CBAs), and threatened ecosystems);
- A desktop assessment to compile a list of species that might occur in the study area and surrounds, with a focus on plant Species of Conservation Concern (SCC);
- A field survey to assess the general species composition of the plant communities within and around the study area, as well as the presence of any SCC;
- A delineation and mapping of the plant communities and/or habitat types that occur within the study area, and a determination of their respective Site Ecological Importance values;
- An identification of the potential impacts of the activities on the SCC and plant communities of the study area, and an evaluation of the risks associated with these potential impacts; and
- A prescription of mitigation measures and recommendations for the identified risks.

1.3. Locality and Details of Activities

1.3.1. Locality and General Details

The study area is situated approximately 10 km directly north of Napier, Western Cape (Map 1, Map 2). The study area occurs within the farm Annex Klein Zout Rivier 39. The property itself has an approximate size of 190 ha.

1.3.2. Details of Activities

During 2023 and 2024, two separate areas of indigenous vegetation were cleared (Map 2; the areas are labelled as C1 and C2). These areas were historically ploughed but were laid fallow for more than ten years, thus legally acquiring indigenous vegetation status. As a result, DEA&DP determined that the landowner commenced with listed activities without the necessary EA, thereby triggering the need for a Section 24G application to rectify the unlawful commencement of these activities and apply for Retrospective EA.

The term “activities” will from here on specifically refer to the unlawful activities as defined in this section.

1.3.3. Alternatives

Two “Alternatives” are assessed here, namely the “Baseline” (or “No Development Scenario”, i.e. as if the then present circumstances would have been maintained with the activities never having proceeded) and Alternative 1 (A1), namely the activities and associated areas as presented in section 1.3.2 and 1.3.1, respectively.

1.3.4. Project Areas of Influence (PAOI)

The PAOI is defined as the total area of the following (Map 2):

- Cleared area C1 (2.9033 ha)
- Cleared area C2 (4.5006 ha)

The total size of the cleared areas is approximately 7.4039 ha (2.9033 ha for C1 and 4.5006 ha for C2). The study area is defined in terms of this PAOI.



Map 1: Localities of the study area, zoomed out to give a broad context. The inset map shows the main map extent within the broader (national) context of South Africa.



Map 2: Overview of the study area indicating the two unlawfully cleared areas (C1 and C2).

1.4. Conditions of This Report

This report deals exclusively with the study area as defined in sections 1.1 and 1.3, and the impacts upon plant diversity and natural ecosystems in that area. Therefore, all relevant project information provided by the applicant and/or the client, as well as any other relevant Environmental Impact Assessment practitioner(s), to the biodiversity specialist was assumed to be correct and valid at the time of its provision and at the time of compilation. This report is not liable to include and assess any alterations to the study area, as provided by the client, if such alterations occurred after the survey date(s).

All findings, recommendations, and conclusions provided in this report are based on the author's best scientific and professional knowledge at the time of compilation, as well as information available at the time of compilation. This report, whether in full or in part, may not be amended or extended in any way whatsoever without the prior explicit written consent of the author. Any recommendations, statements, or conclusions drawn from, or based on, this report must clearly cite or make reference to this report, making sure to include the following reference: PR.25.046. This report must be included in its entirety whenever any recommendations, statements, or conclusions relating to this report form any part of another report.

1.5. General Assumptions and Potential Limitations

Temporal variation plays an important role in the structure and patterns of plant biodiversity, communities, and species occurrences. One site visit (or even multiple visits), or a single season's survey, might not fully catalogue plant species diversity in an area (for example, due to seasonal variation in vegetation and plant growth patterns).

Specifically, some annual, short-lived, ephemeral (plants surviving unfavourable conditions as seeds), geophytic (species with underground storage organs), or other cryptic species might not be observable/detectable. That is, many plant species are known to completely die back during certain times of the year, depending on respective life strategies. Thus, during these times such species remain unobservable/undetectable and survive only as dormant bulbs, corms, tubers, or rhizomes (for geophytes), or seeds (for ephemeral species) below the soil surface. Together with this, rare and threatened plant species are generally uncommon and/or localized, and can easily be overlooked. Even multiple site visits might fail to locate such species.

Furthermore, flowers and fruits are crucial for the complete and accurate identification of plant species, and any absence of such flowers and fruits might prevent the complete and accurate identification of such plant species. Flowering and fruiting times are species specific, and there are invariably always some plant species not flowering and/or fruiting during surveying. This not only impacts identifiability, but also detectability/visibility.

Finally, in practice it is almost always impossible to survey any area to its full extent, both spatially (i.e., over land surface area) and temporally (i.e., over time). The total number of plant species recorded in any area is, therefore, almost always an underestimate of the potential number of species that could occur in such an area.

Considering all of the aforementioned, the possibility always exists that certain plant species might not be observable/detectable on site during the time of surveying, as a result of their potential annual, short-lived, dormant, cryptic, or ephemeral nature, or their rare and/or localized distributions on site, or the incomplete and inaccurate identification of plant species which lacked flowers and/or fruits and/or other characteristic features during surveying. This presents a gap

in knowledge, but can be mitigated to a great extent by supplementing site species lists with records from online databases (see section 9.3 for more details).

1.6. Key Legislative Requirements

The lists below provide legislation, policies, and guidelines that are applicable to the current Project in terms of biodiversity and ecological support systems. Although these lists are extensive, they are not exhaustive, and other legislation, policies, and guidelines may also apply.

International Legislation:

- Convention on Biological Diversity (CBD, 1993)
- The Convention on Wetlands (RAMSAR Convention, 1971)
- The United Nations Framework Convention on Climate Change (UNFCCC, 1994)
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)

National Legislation:

- Constitution of the Republic of South Africa (Act No. 108 of 1996)
- The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
- The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
- The National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), Threatened or Protected Species Regulations
- Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
- Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
- The National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
- The Environment Conservation Act (Act No. 73 of 1989)
- National Protected Areas Expansion Strategy (NPAES)
- Natural Scientific Professions Act (Act No. 27 of 2003)
- National Biodiversity Framework (NBF, 2009)
- National Forest Act (Act No. 84 of 1998)
- National Veld and Forest Fire Act (101 of 1998)
- National Water Act (NWA) (Act No. 36 of 1998)
- National Spatial Biodiversity Assessment (NSBA)
- World Heritage Convention Act (Act No. 49 of 1999)
- Municipal Systems Act (Act No. 32 of 2000)

- Alien and Invasive Species Regulations and, Alien and Invasive Species Lists, published under NEM:BA (NEM:BA A&IS Regulations)
- South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)

Provincial Legislation and Other:

- Western Cape Nature Conservation Ordinance, (Act No. 19 of 1974)
- Western Cape Nature Conservation Regulations, (Act No. 955 of 1975)
- Western Cape Nature Conservation Board Act, (Act No. 15 of 1998)
- Western Cape Nature Conservation Laws Amendment Act, (Act No. 3 of 2000)
- Western Cape Biodiversity Act, (Act No. 6 of 2021)

2. Results

For all relevant methodology, see sections 9 and 10 at the end of this document.

2.1. Desktop Analyses: Botanical Assessment

2.1.1. Vegetation Types of Study Area and Surrounds

According to VegMap, the study area overlaps with only one vegetation type, namely Central Rûens Shale Renosterveld (FRs 12) (Map 3 and Map 4; Table 1). This is not entirely accurate for the study area. While Central Rûens Shale Renosterveld does occur in the surrounding area, the specific area affected by the activities forms part of a lowland floodplain which has distinctly different vegetation comparing to the true Central Rûens Shale Renosterveld occurring nearby (see section 2.3 for details). No other vegetation types are mapped for the study area. Thus, only Central Rûens Shale Renosterveld is therefore treated here.

Table 1: Total area sizes (approximate) for vegetation types occurring within, or near, the study area, as mapped by the National Vegetation Map 2024.

Vegetation Type	Historic Distribution		Current Distribution			RLE Threat Status
	Total Area (km ²)	Total Area (ha)	Total Area (km ²)	Total Area (ha)	Percentage Remaining (%)	
Central Ruens Shale Renosterveld (FRs 12)	2 028	202 750	176	17 586	8.7	CR

2.1.1.a) Central Rûens Shale Renosterveld (FRs 12)

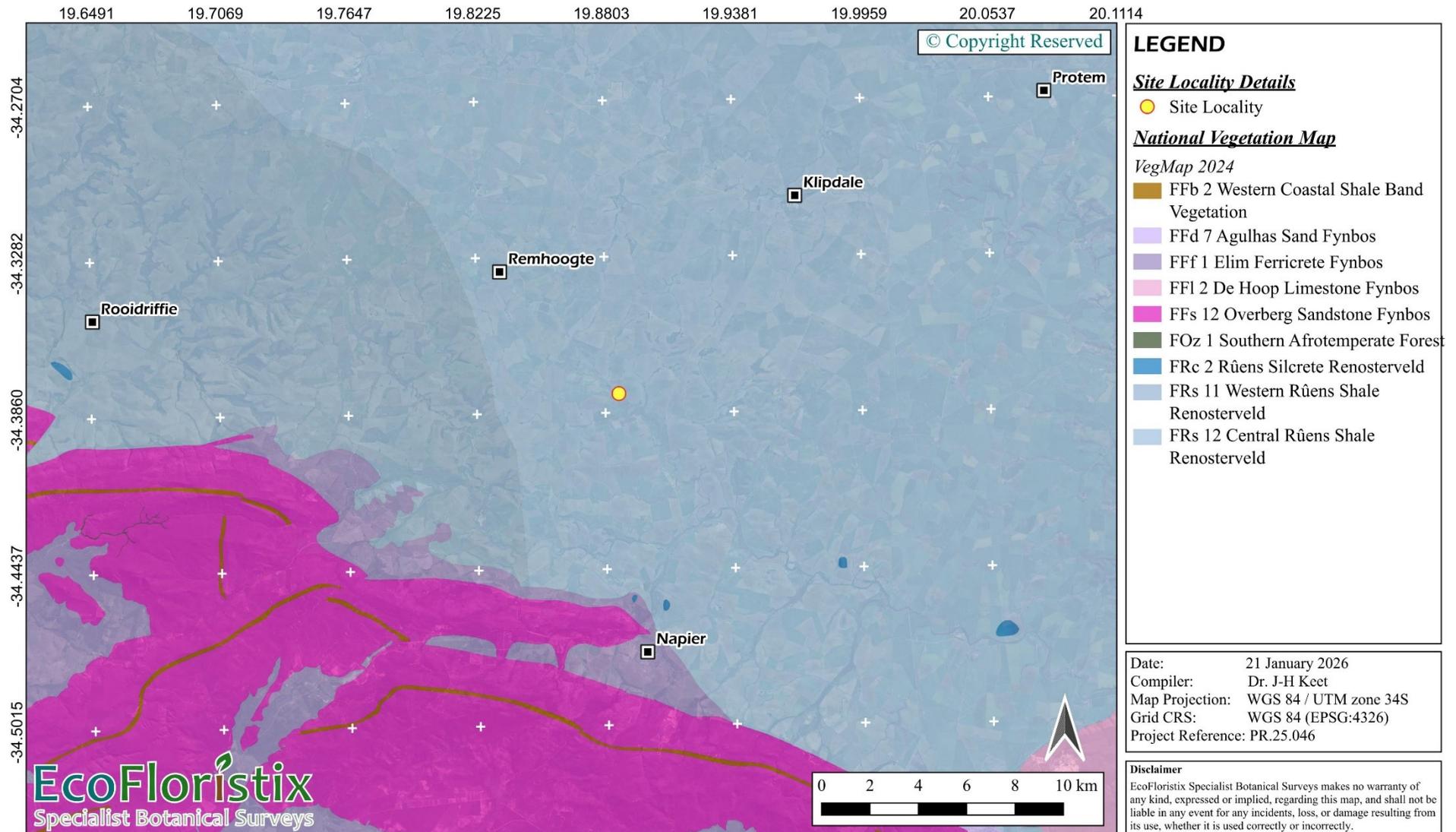
This vegetation type is distributed in the Western Cape Province Central parts of the Rûens region (Overberg) from Greyton and Stormsvlei (and Bromberg) to Napier and Bredasdorp and centred on Klipdale and Protém. It also occurs on the coastal flats southeast of Bredasdorp towards Arniston. Fragmented outliers are found on the southern part of the Agulhas Plain between Soetendalsvlei and Waskraalsvlei.

It is characterized by moderately undulating plains and pans. Vegetation is open to medium dense cupressoid and small-leaved, low to moderately tall grassy shrubland, usually dominated by renosterbos. It is distinguished from the Eastern Rûens Shale Renosterveld by the absence of *Aloe ferox*. Shrubby Asteraceae increase as grazing reduces the palatable grassy component (mostly *Hyparrhenia hirta*) and subsequent erosion results. Heuweltjies are not conspicuous, except in the south of the area. South of Bredasdorp this type is restricted and replaced by FFF 1 Elim Ferricrete Fynbos in wetter areas. Soils are characterized by clays and loams derived from Bokkeveld Group shales, with Glenrosa and Mispah forms dominant.

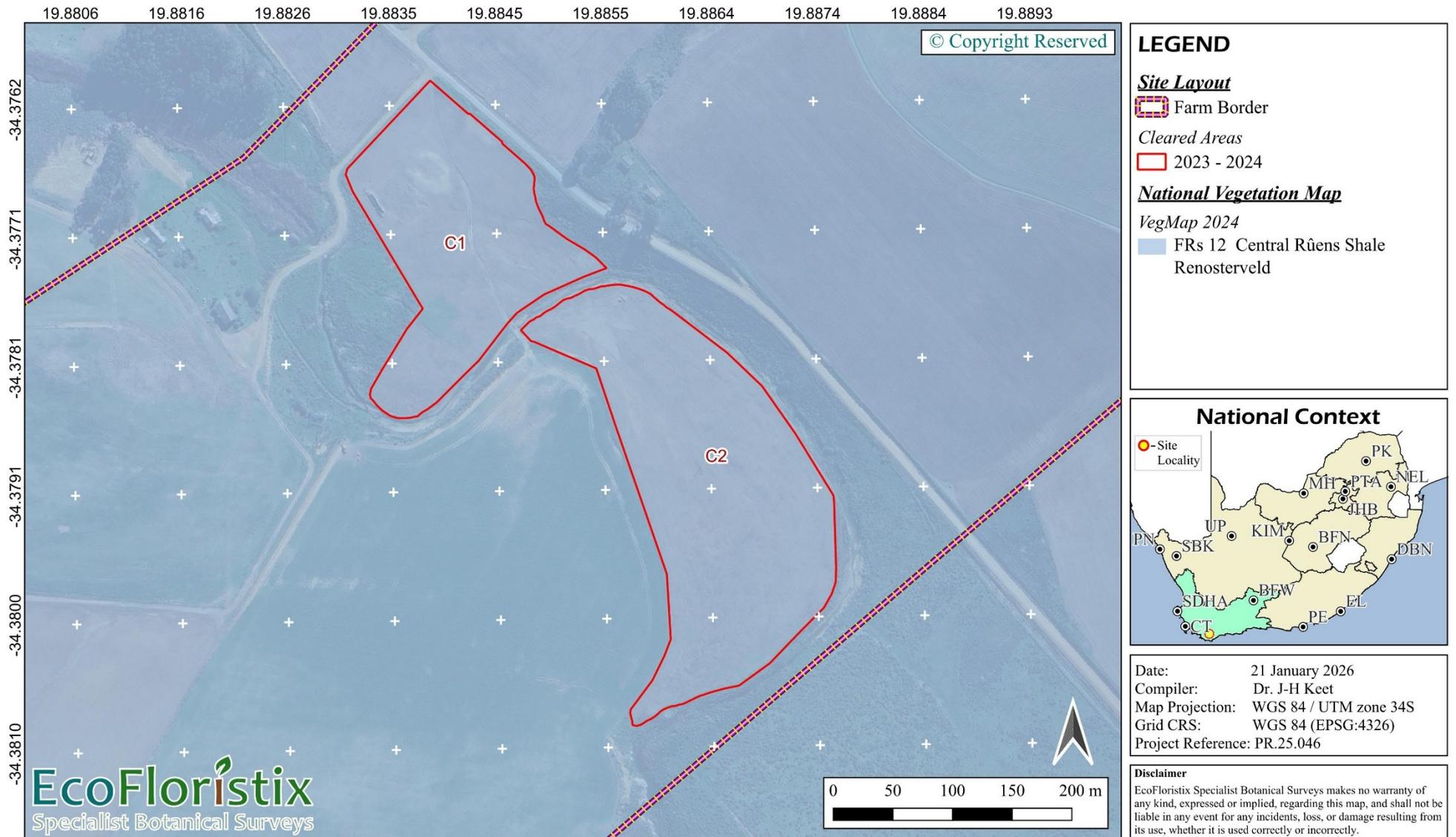
Conservation: CR according to RLE2021. Target: 27% according to VegMap 2024, which cannot be attained since the majority of the area has already been transformed by cultivation. Small patches are conserved in the Agulhas National Park. Remnants are mainly on the sides of steeper hills. There is a notable absence of alien woody plants.

Key species associated with Central Rùens Shale Renosterveld (FRs 12).

IMPORTANT SPECIES	
Growth Form	Key Species (d = “Dominant”)
Tall Shrub	<i>Searsia pallens</i> (d)
Low Shrubs	<i>Aspalathus steudeliana</i> (d), <i>A. submissa</i> (d), <i>Asparagus capensis</i> var. <i>capensis</i> (d), <i>Athanasia dentata</i> (d), <i>A. trifurcata</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Helichrysum petiolare</i> (d), <i>Hermannia flammea</i> (d), <i>H. saccifera</i> (d), <i>Oedera genistifolia</i> (d), <i>O. squarrosa</i> (d), <i>Printzia polifolia</i> (d), <i>Pteronia incana</i> (d), <i>Stoebe plumosa</i> (d), <i>Aspalathus campestris</i> , <i>A. pinguis</i> subsp. <i>pinguis</i> , <i>A. pycnantha</i> , <i>Oedera garnotii</i>
Succulent Shrubs	<i>Ruschia lineolata</i> (d), <i>Drosanthemum flavum</i>
Geophytic Herbs	<i>Geissorhiza nana</i> , <i>Romulea minutiflora</i>
Graminoids	<i>Cymbopogon pospischilii</i> (d), <i>Ficinia nigrescens</i> (d), <i>F. oligantha</i> (d), <i>Tenaxia disticha</i> (d), <i>T. stricta</i> (d), <i>Themeda triandra</i> (d)
ENDEMIC SPECIES	
Growth Form	Key Species (d = “Dominant”)
Low Shrubs	<i>Aspalathus barbiger</i> , <i>A. smithii</i> , <i>Oedera spatulifolia</i>
Succulent Shrubs	<i>Drosanthemum lavisii</i> , <i>Erepsia dubia</i>
Herb	<i>Arctotis dregei</i>
Geophytic Herb	<i>Moraea minuta</i>

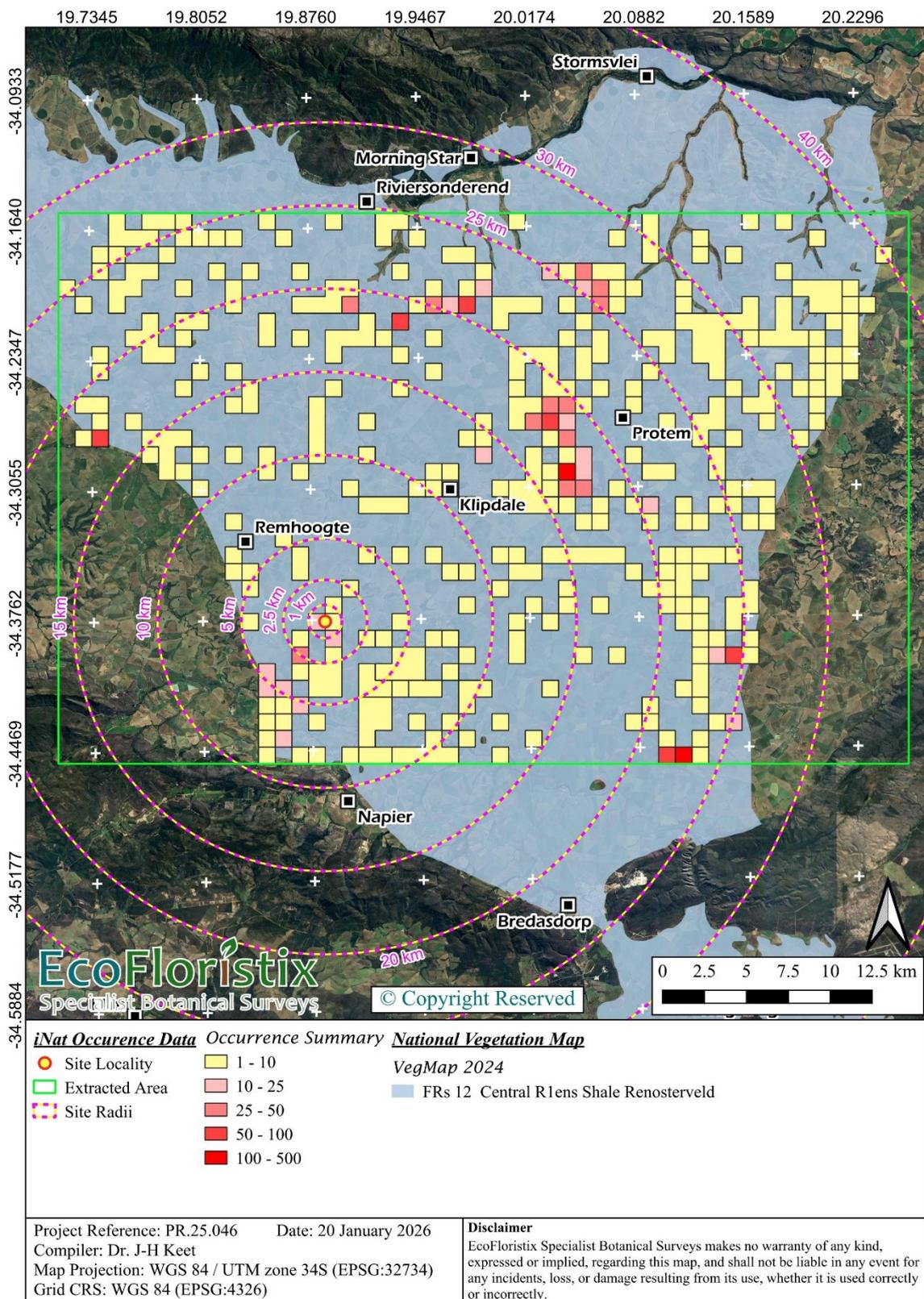


Map 3: Vegetation types (according to VegMap 2024) for the study area and surrounds. This map is specifically zoomed out to also show the broader extent of each vegetation type surrounding the study area (see Map 4 for site specific vegetation).



Map 4: Specific vegetation types (according to VegMap 2024) of the study area and surrounds.

2.1.2. Species of Conservation Concern and General Species Occurrences



Map 5: Plant species occurrence data from iNaturalist, displayed as the number of records per grid square. Also shown are the mapped vegetation types (from VegMap) underlying the study area. See section 9.3.1 for more details on methodology.

Only SCC that might potentially occur in the study area and surrounds, as predicted by online databases (see section 9.3.1; Map 5), are listed in this section. The field survey(s) aimed to validate which of these species occur within the study area, and whether any additional species were present that may not yet have been recorded in official databases (see section 2.3). Also see section 1.6 for key legislation used to assess SCC and protected plant species. Note that many records that are in the POSA database do not have an IUCN listing, or might have a “Not Evaluated” listing, even though they are indigenous. This is because such records represent older taxonomic groupings that have subsequently been assigned criteria at higher, or lower, taxonomic levels (for example, a subspecies name that is no longer valid and which has been assigned an IUCN value at species level, or a record of a species that has subsequently been divided into subspecies, and therefore assigned IUCN values at subspecies level instead of species level). These records have been included in the analysis for the sake of comprehensiveness since they still represent valuable data.

A combined total of 3 462 records were extracted from the online POSA (1 307 records) and iNaturalist (2 155 records) databases. The total area used to extract the records covered 171 684 hectares (1 717 km²), with the records covering a minimum convex hull area of 130 157 hectares (1 302 km²). The records were aggregated to cells measuring 1 x 1 km to visually estimate how many records occur near the study area.

Together, these records consisted of a combined total of 1 649 plant species that have been recorded within the extracted area (representing a total of 1 546 species at an inclusive level, i.e., without considering subspecies, varieties, etc.), with the top three representative families being Asteraceae (173 spp.), Fabaceae (132 spp.), and Iridaceae (130 spp.).

This list included a total of 220 SCC, including 118 threatened species (full summary: 1 CR PE, 9 CR, 53 EN, 55 VU, 65 NT, 1 Critically Rare, 19 DDT, 4 DDD, 1009 LC, and 63 Not Evaluated). It should be noted that the high number of SCC is likely due to the use of an excessively large area for species record collection. Consequently, it is highly improbable that many of these species would have been present within the study area or its immediate vicinity.

A total of 118 of these SCC are protected. Apart from these, a further 416 species are also protected (thus yielding a total of 534 protected plant species).

Finally, the online screening report also revealed the potential presence of 15 Sensitive Species (some of these might have been included in the other online databases). Note that, for their protection, some of the identities of these species will not be made public, and they have therefore been assigned random names.

The following is a full summary of threatened plant species, according to descending threat status (this list might include sensitive species; if this is the case, note that, for their protection, their identities will not be made public, and they have therefore been assigned random names):

- *Anisodonteia dissecta* (CR)
- *Cyrtanthus guthrieae* (CR; Protected [Provincial Schedule 4])
- *Erica recurvata* (CR; Protected [Provincial Schedule 4])
- *Pentameris elegans* (CR)
- *Polhillia brevicealyx* (CR)
- *Polhillia connata* (CR)
- *Romulea pilosa* (CR; Protected [Provincial Schedule 4])
- *Sensitive Species X3* (CR)
- *Wiborgiella bowieana* (CR)
- *Acrodon purpureostylus* (EN; Protected [Provincial Schedule 4])
- *Acrodon quarciicola* (EN; Protected [Provincial Schedule 4])
- *Acrodon subulatus* (EN; Protected [Provincial Schedule 4])

- *Anthospermum ericifolium* (EN)
- *Argyrolobium pachyphyllum* (EN)
- *Aristea palustris* (EN; Protected [Provincial Schedule 4])
- *Aristea teretifolia* (EN; Protected [Provincial Schedule 4])
- *Aspalathus rosea* (EN)
- *Aspalathus smithii* (EN)
- *Drosanthemum lavisii* (EN; Protected [Provincial Schedule 4])
- *Elegia squamosa* (EN)
- *Erica agglutinans* (EN; Protected [Provincial Schedule 4])
- *Erica cunoniensis* (EN; Protected [Provincial Schedule 4])
- *Erica irregularis* (EN; Protected [Provincial Schedule 4])
- *Erica lageniformis* (EN; Protected [Provincial Schedule 4])
- *Erica penduliflora* (EN; Protected [Provincial Schedule 4])
- *Erica regia subsp. regia* (EN; Protected [Provincial Schedule 4])
- *Euphorbia pseudoglobosa* (EN)
- *Gnidia ericoides* (EN)
- *Hesperantha muirii* (EN; Protected [Provincial Schedule 4])
- *Ixia erubescens* (EN; Protected [Provincial Schedule 4])
- *Ixia longituba subsp. longituba* (EN; Protected [Provincial Schedule 4])
- *Lampranthus debilis* (EN; Protected [Provincial Schedule 4])
- *Leucadendron coriaceum* (EN; Protected [Provincial Schedule 4])
- *Leucadendron elimense subsp. elimense* (EN; Protected [Provincial Schedule 4])
- *Leucadendron laxum* (EN; Protected [Provincial Schedule 4])
- *Leucospermum hypophyllocarpodendron subsp. hypophyllocarpodendron* (EN; Protected [Provincial Schedule 4])
- *Lotononis viborgioides* (EN)
- *Lotononis villosa* (EN)
- *Macrostylis cauliflora* (EN; Protected [Provincial Schedule 4])
- *Merciera azurea* (EN)
- *Mesembryanthemum napierense* (EN; Protected [Provincial Schedule 4])
- *Muraltia barkerae* (EN)
- *Phyllica anomala* (EN)
- *Sensitive Species X1* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X11* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X12* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X14* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X5* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X6* (EN; Protected [Provincial Schedule 4])
- *Sensitive Species X8* (EN; Protected [Provincial Schedule 4])
- *Serruria rebeloi* (EN; Protected [Provincial Schedule 4])
- *Serruria williamsii* (EN; Protected [Provincial Schedule 4])
- *Sparaxis fragrans* (EN; Protected [Provincial Schedule 4])
- *Stoebe rugulosa* (EN)
- *Tetragonia caesia* (EN; Protected [Provincial Schedule 4])
- *Thesium ecklonianum* (EN)
- *Treichelia dodii* (EN)
- *Trichodiadema pygmaeum* (EN; Protected [Provincial Schedule 4])
- *Tritoniopsis flexuosa* (EN; Protected [Provincial Schedule 4])
- *Tulista marginata* (EN)
- *Xiphotheca guthriei* (EN)
- *Zyrrhelia corymbosa* (EN)

2.1.3. Alien and Invasive Plant Species

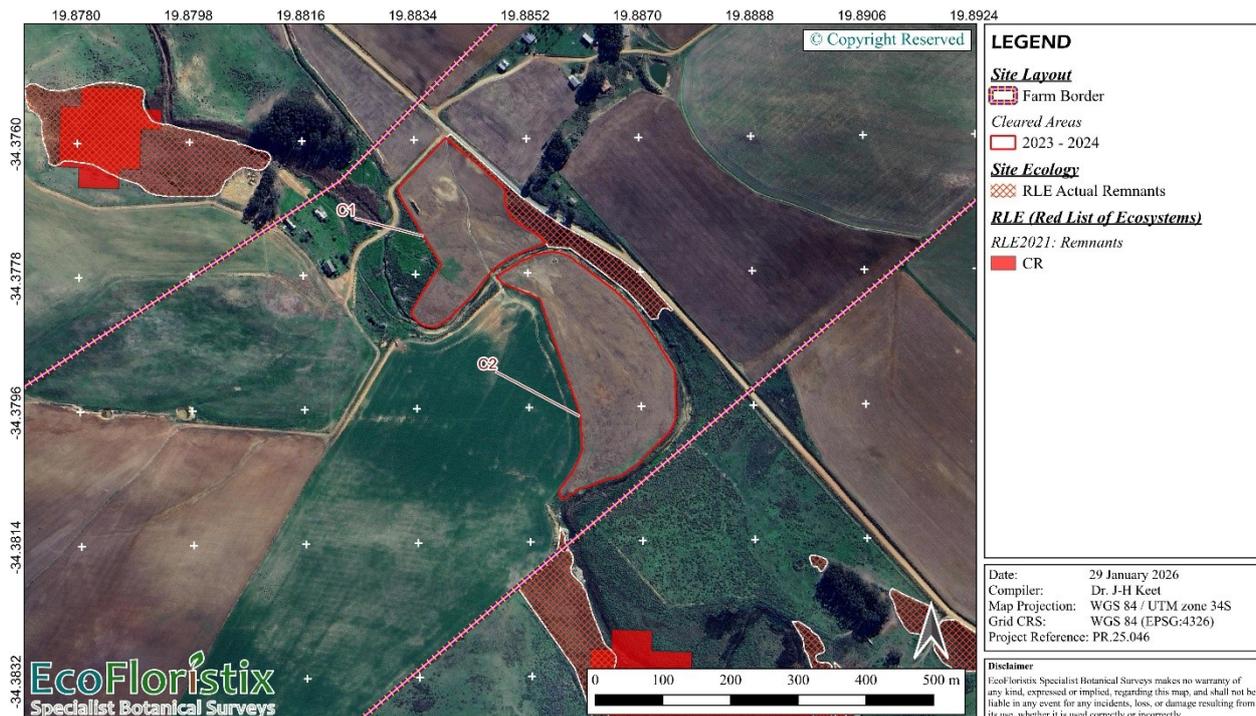
A total of 64 alien plant species have been recorded within the extracted area, with 14 of them being listed invasive species within the NEM:BA A&IS Regulations (note that if “Category Multi” exists in this list, then it is intended to indicate that the listing of the species in question is context dependent; should such a species be found on site, then the category

applicable to its context will be made clear in the sections on site-specific results). The NEM:BA A&IS Regulations species are:

- *Acacia cyclops* (Red eye; Category 1b)
- *Acacia melanoxylon* (Australian blackwood; Category 2)
- *Acacia pycnantha* (Golden wattle; Category 1b)
- *Acacia saligna* (Port Jackson, Port Jackson willow; Category 1b)
- *Ammophila arenaria* (Marram grass; Category Multi)
- *Argemone ochroleuca* (White-flowered Mexican poppy; Category 1b)
- *Cirsium vulgare* (Spear thistle, Scotch thistle; Category 1b)
- *Datura stramonium* (Common thorn apple; Category 1b)
- *Eucalyptus conferruminata* (Spider gum; Category Multi)
- *Opuntia ficus-indica* (Mission prickly pear, Sweet prickly pear; Category Multi)
- *Opuntia monacantha* (Cochineal prickly pear, Drooping prickly pear; Category 1b)
- *Phytolacca octandra* (Forest inkberry; Category 1b)
- *Ricinus communis* (Castor-oil plant; Category 2)
- *Salsola kali* (Tumbleweed; Category 1b)

2.2. Desktop Analyses: Ecologically Important Landscape Features

2.2.1. Ecosystem Threat Status: RLE 2021



Map 6: Ecosystem Threat Status, according to the Red List of Ecosystems for South Africa (2021), associated with the study area and surrounds.

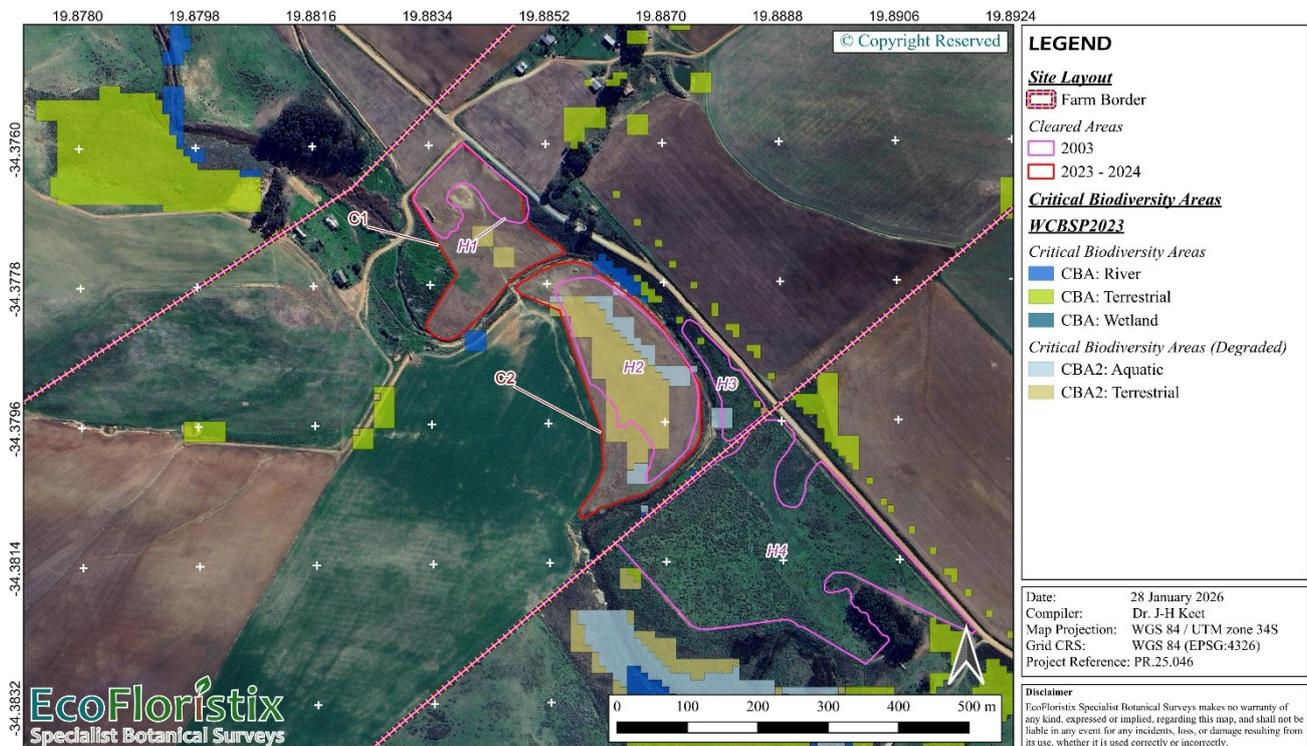
According to the Red List of Ecosystems for South Africa (RLE 2021) spatial dataset the study area does not overlap with any listed ecosystems (Map 6).

Ground truthing determined that this is indeed accurate — that is, the study area does not overlap with any listed ecosystems. Furthermore, the areas that are mapped as Critically Endangered remnants are mostly correct insofar as they

overlap with fragments of Central Rûens Shale Renosterveld. A smaller fragment that occurs directly northeastern of area C2 should also be included (also see section 2.3.2).

See section 9.2.1 for more details and notes on Ecosystem Threat Status categories.

2.2.2. Critical Biodiversity Areas and Ecological Support Areas



Map 7: Layout of Critical Biodiversity Areas within the study area and surrounds.

The study area is mapped as occurring within CBA2 (Terrestrial) and CBA2 (Aquatic) areas (Map 7). These mostly overlie area C2)

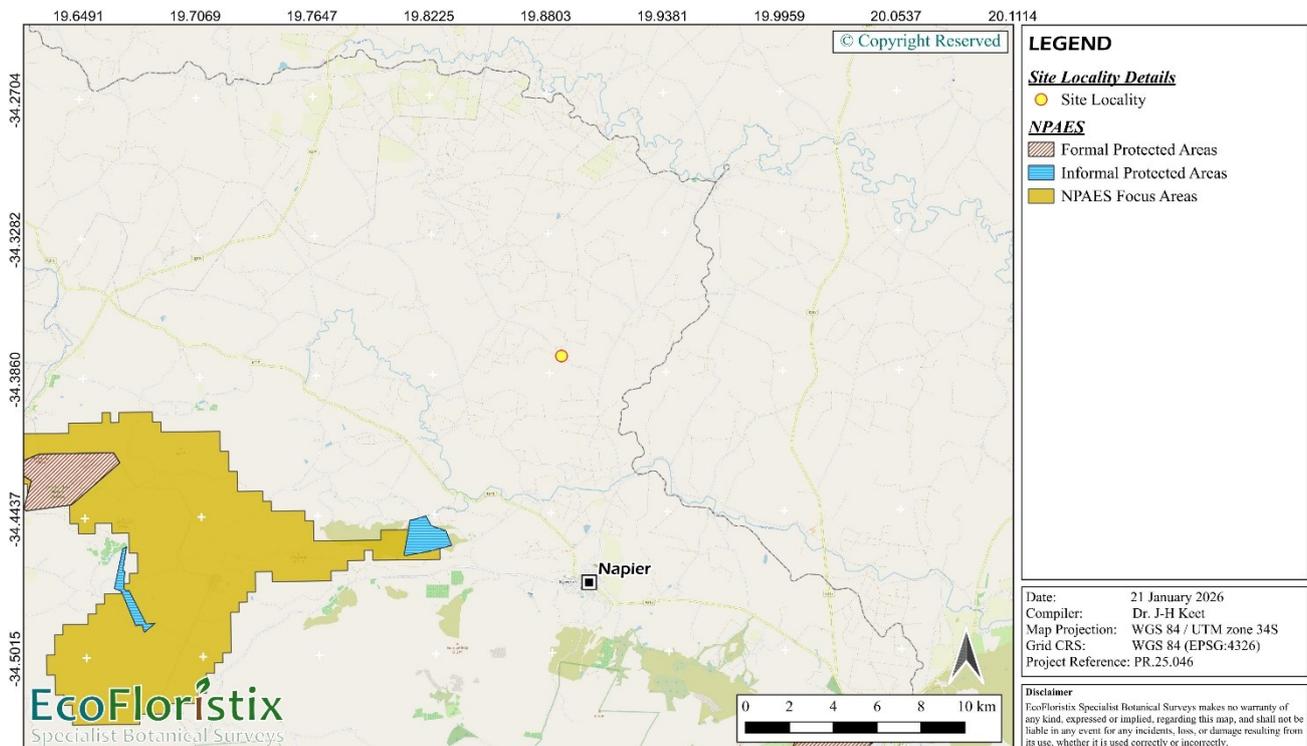
This CBA2 (Aquatic) classification is not accurate since the entire study area is of a terrestrial nature, even though it is a largely floodplain vegetation. That is, although the area would subject to periodic flooding on long time scales, it is not a strictly aquatic environment.

Secondly, the CBA2 (Terrestrial) classification of area C2 mostly overlies a historically ploughed area (H2; see section 2.3.1) and is thus likewise not completely accurate. That is, the cleared areas consist of a mix of natural floodplain vegetation (never ploughed before) and secondary floodplain vegetation (historically ploughed and subsequently revegetated). While these historically ploughed area are on a trajectory to attaining a similar composition compared the natural floodplain vegetation, the impacts of such ploughing still remains (see section 2.3.2 for more details). Moreover, the vegetation of the study area is not of a threatened ecosystem type. Therefore, the study area would not have been essential for meeting biodiversity targets given that it is not a listed ecosystem, and also due to the legacy effects of historic agricultural activities. Nevertheless, it could likely have been classified as an ESA since it would have been important for

supporting the surrounding Central Rûens Shale Renosterveld (which indeed conforms to CBA1 conditions) and. ESAs are functional, but not necessarily pristine and natural.

See section 9.2.6 for more details and notes on CBA and ESA categories.

2.2.3. National Protected Area Expansion Strategy

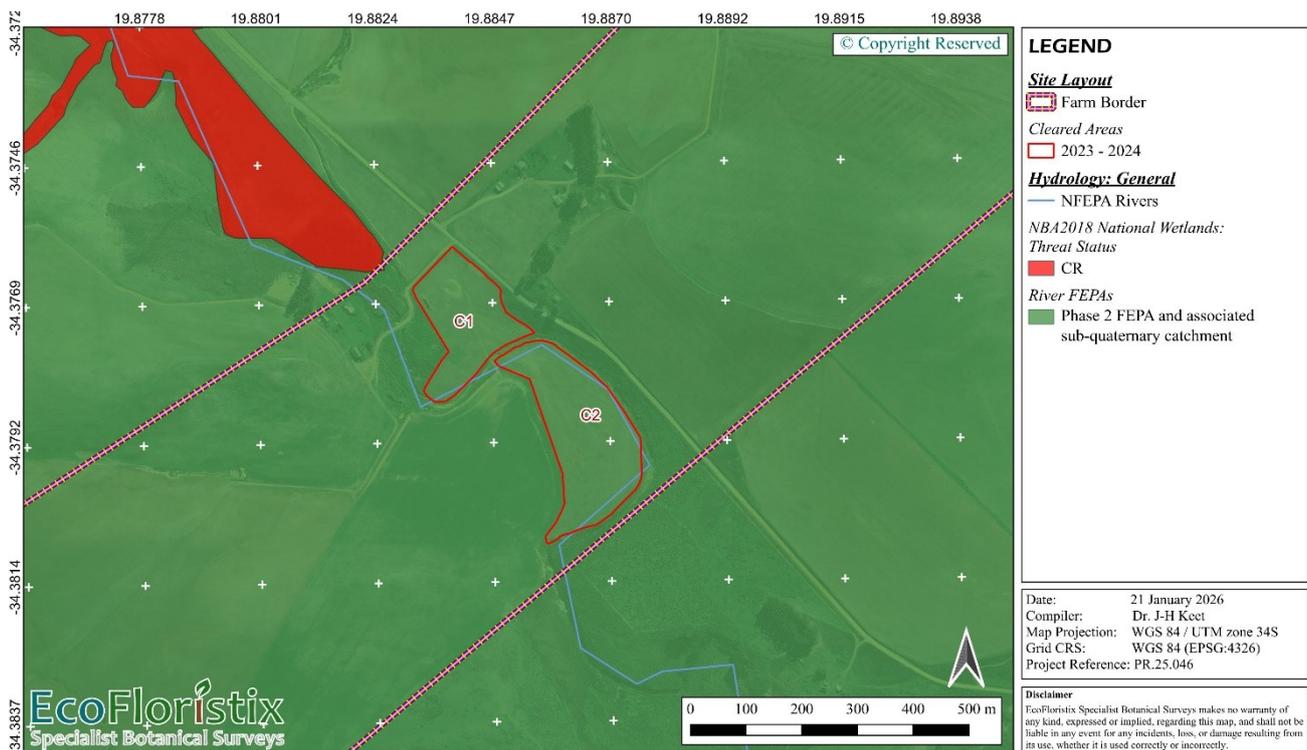


Map 8: Study area locality in relation to designated areas of the National Protected Area Expansion Strategy (NPAES).

The study area does not overlap with any NPAES Focus Areas (Map 8). Furthermore, the study area does not occur in or near any protected or conservation areas. Thus, the activities would not have had any impacts on any NPAES area targets.

See section 9.2.3 for more details and notes on the NPAES.

2.2.4. Hydrological Features



Map 9: Hydrological setting of the study area and surrounds in the context of Strategic Water Source Areas (SWSA) and Freshwater Ecosystem Priority Areas (FEPA), as well as general hydrology .

The study area is not located within any SWSA. However, it is located within a phase 2 FEPA and associated sub-quaternary catchment (Map 9).

An unnamed Critically Endangered wetland (East Coast Renosterveld Bioregion — Valley-bottom) occurs upstream (northwest) of the study area (specifically area C1).

Finally, an NFEPA river (Klein-Sout) is mapped to traverse the study area.

The NFEPA river has been coarse and does not actually cross the study area. Instead, it flows past the two cleared areas and specifically in between them (i.e. where their borders are closest). The unnamed wetland would not have been affected by the clearing activities since because it occurs upstream. Lastly, given the small development footprint, it is highly unlikely that the activities would have had any major impacts on the phase 2 FEPA and associated sub-quaternary.

Note that this section is intended to give a broad overview only and a dedicated Aquatic Specialist Report should be commissioned if deemed necessary.

Also note that NFEPA rivers and river FEPAs differ from each other in a key way: an NFEPA river specifically refers to the river itself (represented by a line in Map 9), whereas a river FEPA refers to a geographical area — more specifically a sub-quaternary catchment (represented by a polygon in Map 9) — that has been earmarked to achieve biodiversity targets for river ecosystems and threatened/near threatened fish species. Essentially, a river FEPA is a management unit that includes NFEPA rivers (or portions of them) and the surrounding land that drains into them.

See sections 9.2.4 and 9.2.5 for more details and notes on NFEPA and SWSA.

2.3. Fieldwork and Site Inspection: Assessment of the Development Site and Surrounds

This section describes the different habitats and vegetation patterns, as expressed in plant community types, observed within the study area and surrounds. As these are field-based observations, they are more reliable and applicable than the coarsely mapped results of VegMap, which does not yet adequately represent such finer details.

The botanical survey was conducted on 02 December 2025. This timeframe falls somewhat at the end of the optimum surveying period (which is generally accepted to be during spring; also see section 1.5 for assumptions and potential limitations). Despite this, the vegetation was in a relatively good condition for surveying, and in fact quite a number of species were flowering, which was highly beneficial. Many species also still had remnant fruits, which aided identification.

A total distance of ± 6.5 km was surveyed on foot across the study area as well as by vehicle. Together with this, numerous drone reconnaissance trips (total of ± 5 km) were made to gather data and insights on various landscape features, such as differences in vegetation composition and structure, watercourses, anomalies, potential infestations of invasive alien plant species, etc.

The study area was therefore well surveyed given that the maximum distance between any two points of any polygon or polygon aggregate is ± 566 m, with the total area being about 7.4 ha and its total convex hull perimeter about 1.4 km.

2.3.1. Historic Site Vegetation and Comparison with Current Conditions

The study area is located in a region characterized by agricultural activities, notably crop cultivation. As such, ploughing forms a large part of these activities. Regarding the study area itself, sections of it were historically ploughed (represented by H1 and H2 in Map 10 and overlain with the unlawfully cleared area in Map 11) prior to March 2003, but were subsequently left fallow. The surrounding areas were not ploughed; consequently, those that have remained to this day can be considered true natural indigenous vegetation, albeit at least from the perspective that the topsoil has never been disturbed or broken by ploughing. These areas are labelled N1 – N4 in Map 12.

Between 2023 and 2024, two separate areas of indigenous vegetation (i.e., the study area) were cleared (C1 and C2 in Map 11). By superimposing the historically ploughed areas on current satellite imagery, then it becomes clear that some of these, specifically H1 and H2, partially underlie the unlawfully cleared areas.

In the context of South African environmental legislation, specifically the National Environmental Management Act (NEMA), the classification of land that has remained fallow for more than ten years as “virgin” or “indigenous” serves as a vital regulatory safeguard. This ten-year threshold acts as a pragmatic administrative mechanism to prevent the incremental loss of biodiversity, ensuring that land which has begun to revert to a natural state is protected from unchecked cultivation.

However, while this is a commendable legal strategy, it bears little resemblance to the actual temporal scales of ecological and pedological (soil) recovery. From an ecological perspective, ten years is an inconsequential window in the life of an ecosystem. True “virgin” land implies a state of primary succession that has remained undisturbed for centuries or even

millennia, allowing for the development of complex, multi-layered biological communities. A decade — or even slightly more than two decades, as is the case here — of rest may allow for the return of hardy pioneer plant species, but it might not facilitate the return of the climax species or the intricate symbiotic relationships that define a truly pristine environment. The vegetation present after a field has been ploughed is almost always a secondary successional community, which lacks the structural diversity and resilience of the original landscape.

When land is tilled or mechanically cleared, the distinct soil horizons are homogenized, and the delicate microbial networks and mycorrhizal fungi are decimated. A few decades of fallow growth is not enough time for these geochemical and biological processes to reconstruct the original soil profile. Consequently, while the surface may appear “natural” to a casual observer or a legal inspector, the substrate remains an anthrosol — a human-altered soil — that continues to bear the physical and chemical scars of previous agricultural exploitation. Therefore, the author does not regard fallow land to be truly natural indigenous vegetation, irrespective of the legal definition. Instead, it is regarded as secondary indigenous vegetation.

In the context of the aforementioned, it is clear that the historically ploughed sections (H1 and H2) within the study area would not truly have represented natural indigenous vegetation from an ecological point of view. Thus, when these areas are subtracted from the areas that were never ploughed before as determined from the best available satellite evidence, only two truly natural vegetation fragments were affected by the recent clearing activities (labelled as CN1 and CN2 in Map 12). The total size of the recently and unlawfully cleared areas is 7.4039 ha (2.9033 ha for C1 and 4.5006 ha for C2). Of this, 3.9316 ha represents secondary vegetation (H1 and H2). Thus, only 3.5080 ha would have been natural indigenous vegetation (1.9323 ha for CN1 and 1.5757 ha for CN2). In other words, only 47% of the unlawfully cleared areas consisted of natural indigenous vegetation at the time of their clearing.

A significant and obvious challenge in retrospectively determining on-site conditions is that the study area has already been cleared. In other words, the fact that the activities already took place, means there is no longer an option to survey the original environment. Consequently, the use of proxies — specifically reference or benchmark areas — is necessary to reconstruct this original environment.

Such a requirement can prove exceptionally difficult. However, in this instance, a very fortunate situation exists: reference areas for both natural and secondary floodplain vegetation are available in very close proximity to the unlawfully cleared sites. These areas share the same topography and lithology as the study area (i.e., the unlawfully cleared areas). Additionally, pristine fragments of natural renosterveld occur nearby.

These proxies allow for an effective multi-step analysis:

1. **Baseline Determination:** Establishing the state of both natural and secondary floodplain vegetation (both of which occurred in the study area) prior to clearing.
2. **Comparative Analysis:** Determining the degree of similarity between the natural and secondary floodplain vegetation (to determine if impacts would have been similar on these or not).
3. **Vegetation Verification:** Comparing these proxies to nearby renosterveld fragments to determine if renosterveld species would have been affected, rather than just the floodplain vegetation initially mapped from satellite images.

The sections that follow elaborate on these findings in greater detail.

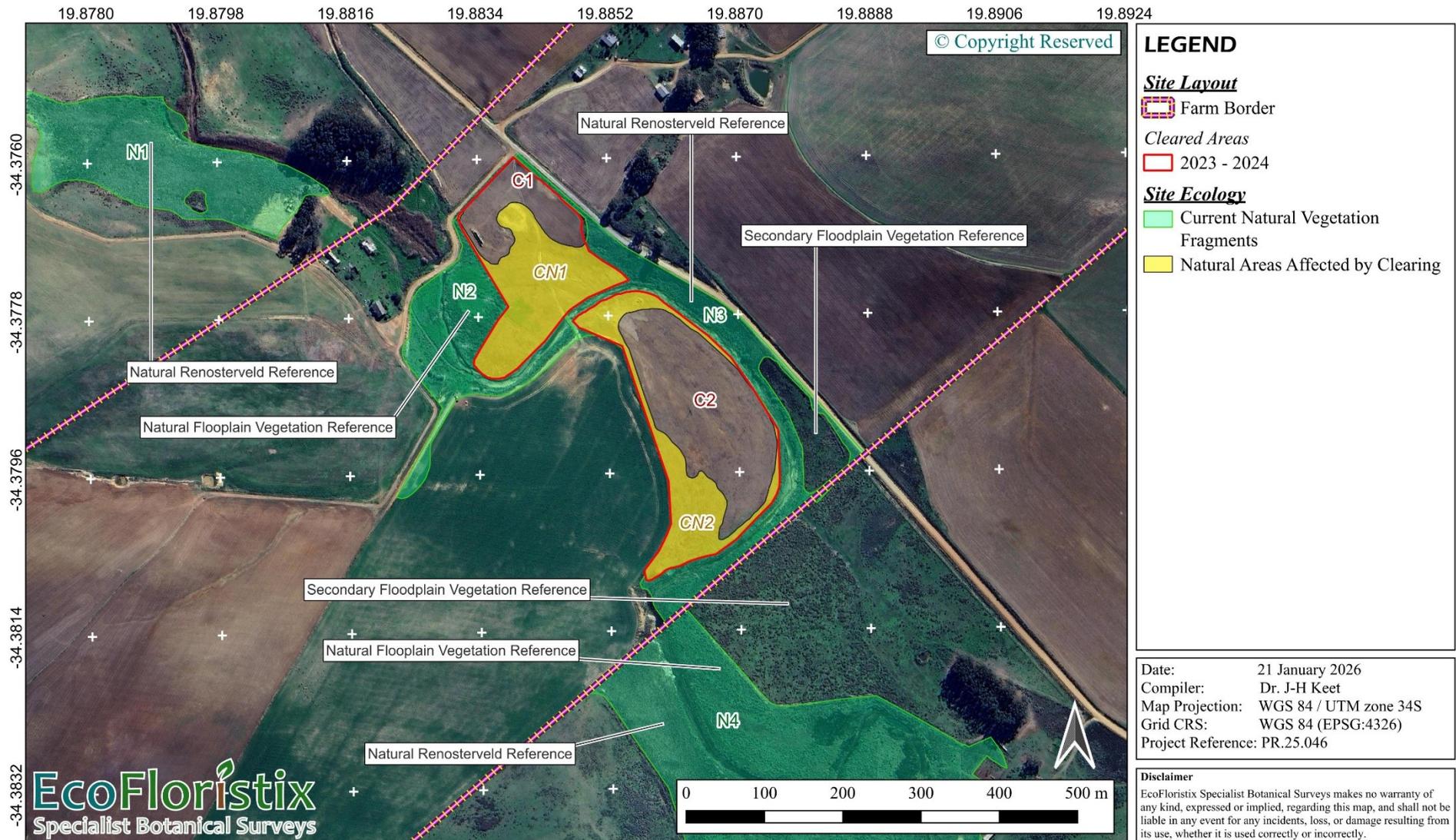
Finally, while historical satellite imagery is an invaluable tool, it remains a proxy for estimating — rather than perfectly reconstructing — site conditions prior to the unauthorized clearing. Although it is one of the most robust methods available for discerning past environmental states, it cannot provide an absolute or exhaustive record of the site’s status before the disturbances occurred.



Map 10: Historic satellite imagery (dated March 2003) of the study area and surrounds showing areas that were ploughed at that time. Superimposed onto this are the recent unlawfully cleared areas (C1 and C2), showing the extent to which they either conform or deviate from the ploughed areas. Compare with Map 2 and Map 11.



Map 11: Similar to Map 10, but using the latest available satellite imagery. The extents of the historically ploughed areas (H1 – H4) are specifically indicated and overlain with the unlawfully cleared areas (C1 and C2).



Map 12: Natural vegetation fragments that occurred on-site at the time of surveying. These are areas that not at all been ploughed in the past based on satellite imagery. Also indicated are the specific reference areas (used as proxies and for comparison) as well as natural areas that were affected by the clearing activities.

2.3.2. Plant Community Types

The study area is mapped by VegMap as being exclusively Central Rûens Shale Renosterveld (FRs 12) (Map 4). Ground truthing determined that this is not completely accurate. While Central Rûens Shale Renosterveld (or simply “natural” or “true renosterveld” for the purposes of this report) does occur in the surrounding area, specifically on the hill slopes, the specific area affected by the activities forms part of a lowland floodplain which has distinctly different vegetation compared to the true Central Rûens Shale Renosterveld occurring nearby.

For the purposes of this study, 5 plant community types are defined:

- Cleared Areas (these have subsequently been slightly revegetated since initial clearing)
- Natural Floodplain Vegetation (never ploughed before)
- Secondary Floodplain Vegetation (historically ploughed and subsequently revegetated)
- Natural Renosterveld
- Riparian Vegetation

Plant community types are based on characteristic dominant plant species, and are discussed in more detail in the subsequent sections, with representative photos given where applicable. These were the major plant community types present in the study area; however, it must be noted that variation occurs across the landscape, and species presences and abundances are not constant.

The following is a brief overall summary (the sections hereafter present specific details): a total of 98 plant species were found within the surveyed areas, which consisted of 86 native, 5 SCC, 10 protected (note: there is overlap between the number of SCC and protected species, since 2 of the SCC also protected), 20 PEN (Provincial Endemic), 12 alien, and 3 NEM:BA A&IS Regulations listed species.

Furthermore, a total of 19 species were recorded within the surveyed areas that were not recorded within online databases for the area (i.e., POSA and iNaturalist), 3 of which are protected and 4 are alien). Also see Table 2.

Table 2: Plant species summary statistics for the plant community types/subtypes of the study area and broader surrounding area (compare with Map 13). “Unique” species were only observed in the specific plant community type/subtype in question, and not in others (note: this does not mean such species cannot or do not occur in others, but only that they were not specifically observed in the others during surveying; see section 1.5 for general survey limitations). “Shared” species were shared between two or more types/subtypes. Note that overall total values might be less than the sum of all the respective values, given that species can be shared between plant community types. Also note that these are summary values, and are expanded more in-depth in the sections that follow. SCC = Species of Conservation Concern; THREAT = Threatened species (“CR PE”, “CR”, “EN”, or “VU”; see section 9.3.1); PEN = Provincial Endemic; NEM:BA = Species listed under NEM:BA Alien and Invasive Species Regulations; N/A = Not Applicable. The row in green indicates the plant community type/subtype that had the highest number of plant species, while the row in light-red indicates the plant community type/ subtype that had the lowest number of plant species. Note that only main plant community types are included here. Also note that surveyed Agulhas Limestone Fynbos units are also included in this table for comprehensiveness and comparison purposes, even though they occur outside the development footprint / PAOI.

	Total	Shared	Unique	%Unique	SCC	THREAT	Protected	PEN	Native	Alien	NEM:BA
<u>Plant Community</u>											
Cleared Areas	15	12	3	20	0	0	1	0	9	6	1
Natural Floodplain Vegetation	20	19	1	5	0	0	1	2	12	8	1
Natural Renosterveld	75	18	57	76	5	2	9	19	72	3	0
Riparian Vegetation	7	0	7	100	0	0	0	1	7	0	0
Secondary Floodplain Vegetation	27	24	3	11	0	0	1	3	17	10	2
<u>Totals</u>											
N/A	98	N/A	N/A	N/A	5	2	9	20	86	12	2

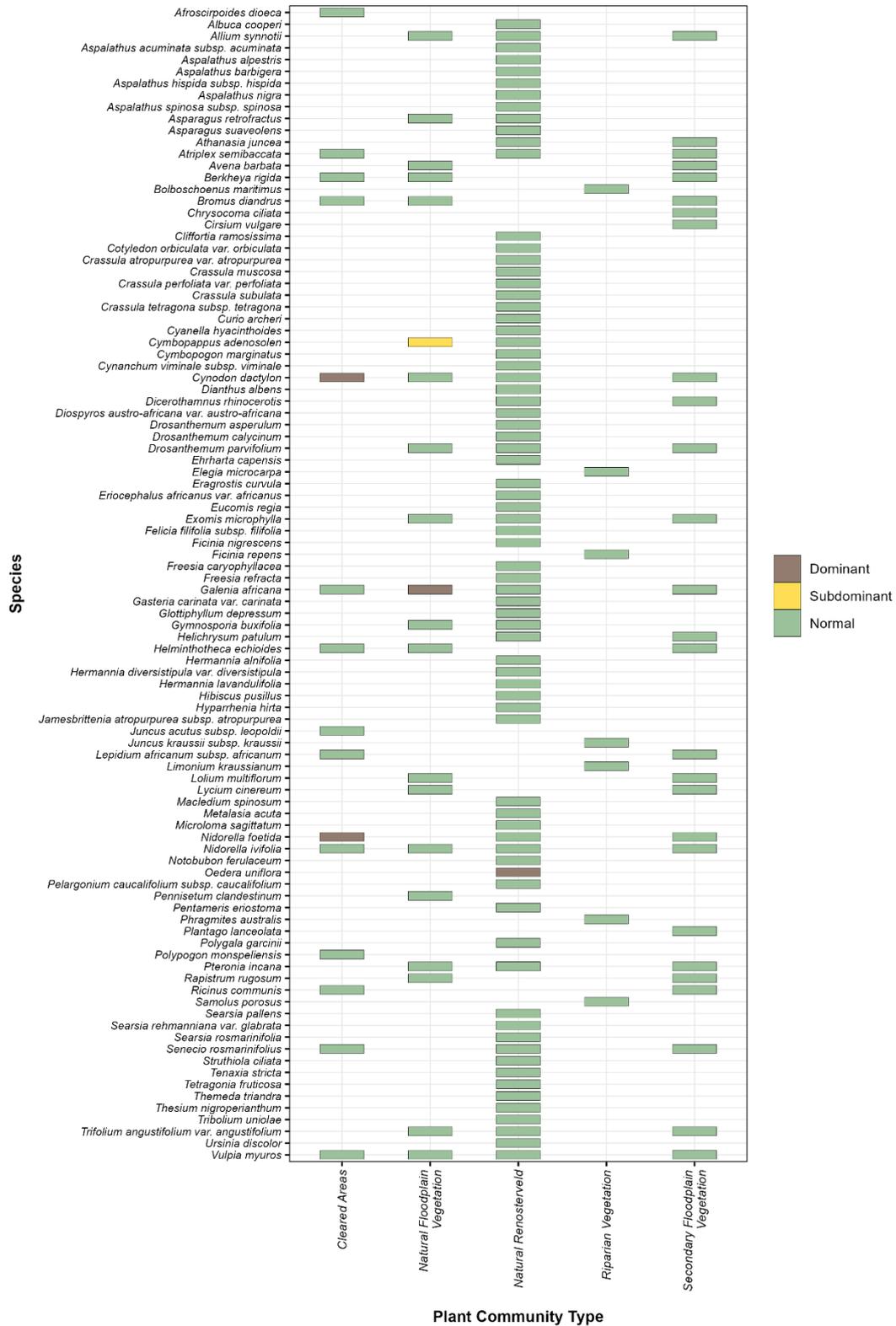
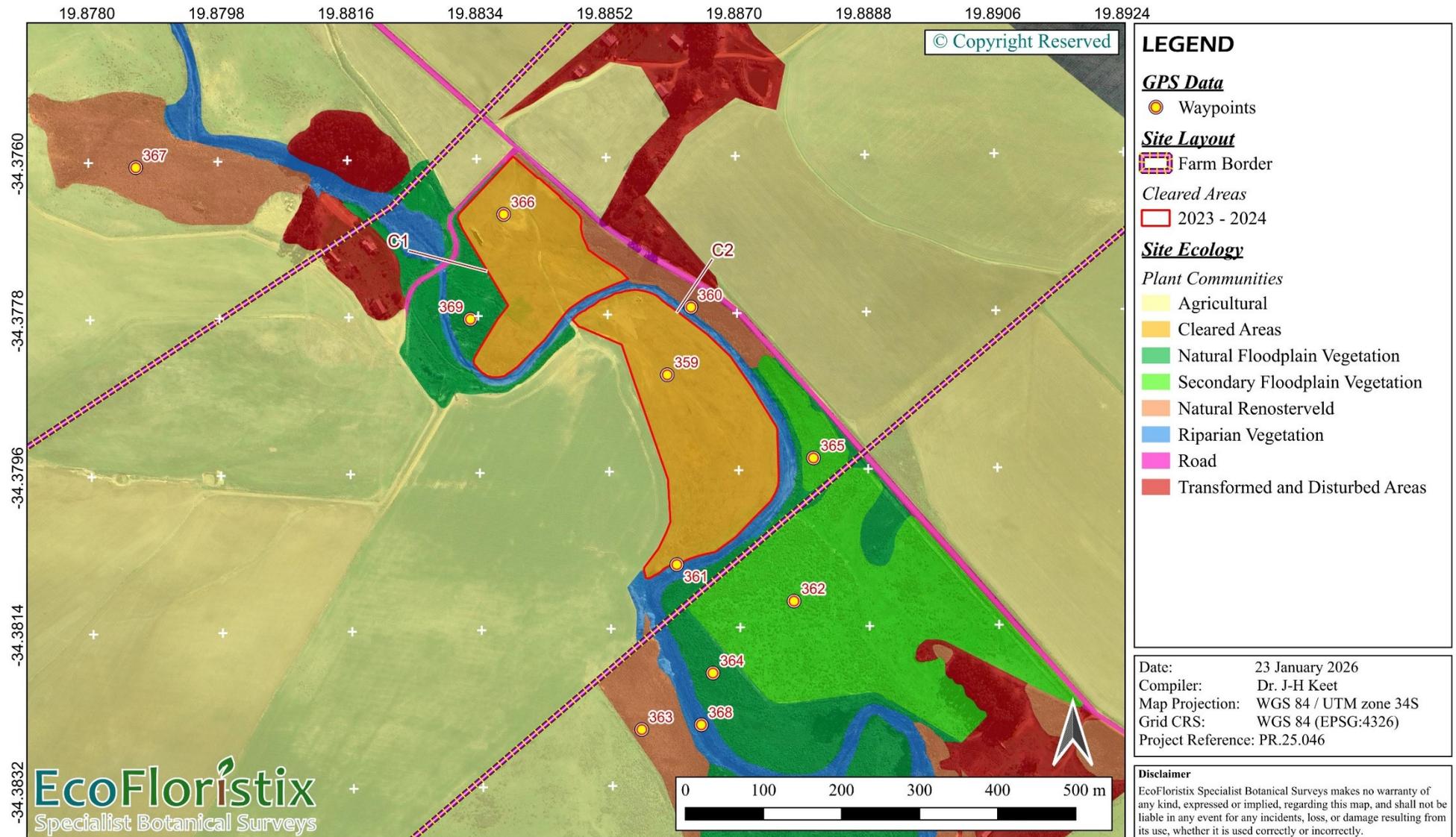


Figure 1: Presence/absence matrix of plant species for each plant community (or subcommunity) type within the study area and broader surrounds. The presence of a block indicates the presence of the respective plant species within the respective plant community. This figure is a valuable reference to visually determine either how many (and which) species occurred in a specific plant community, or in how many (and which) plant communities a specific species occurred. Note that surveyed Agulhas Limestone Fynbos units are also included in this table for comprehensiveness and comparison purposes, even though they occur outside the development footprint / PAOI.



Map 13: Plant communities and other land types that were observed in the study area and immediate surrounds. See Figure 3 and Figure 5 for photos.

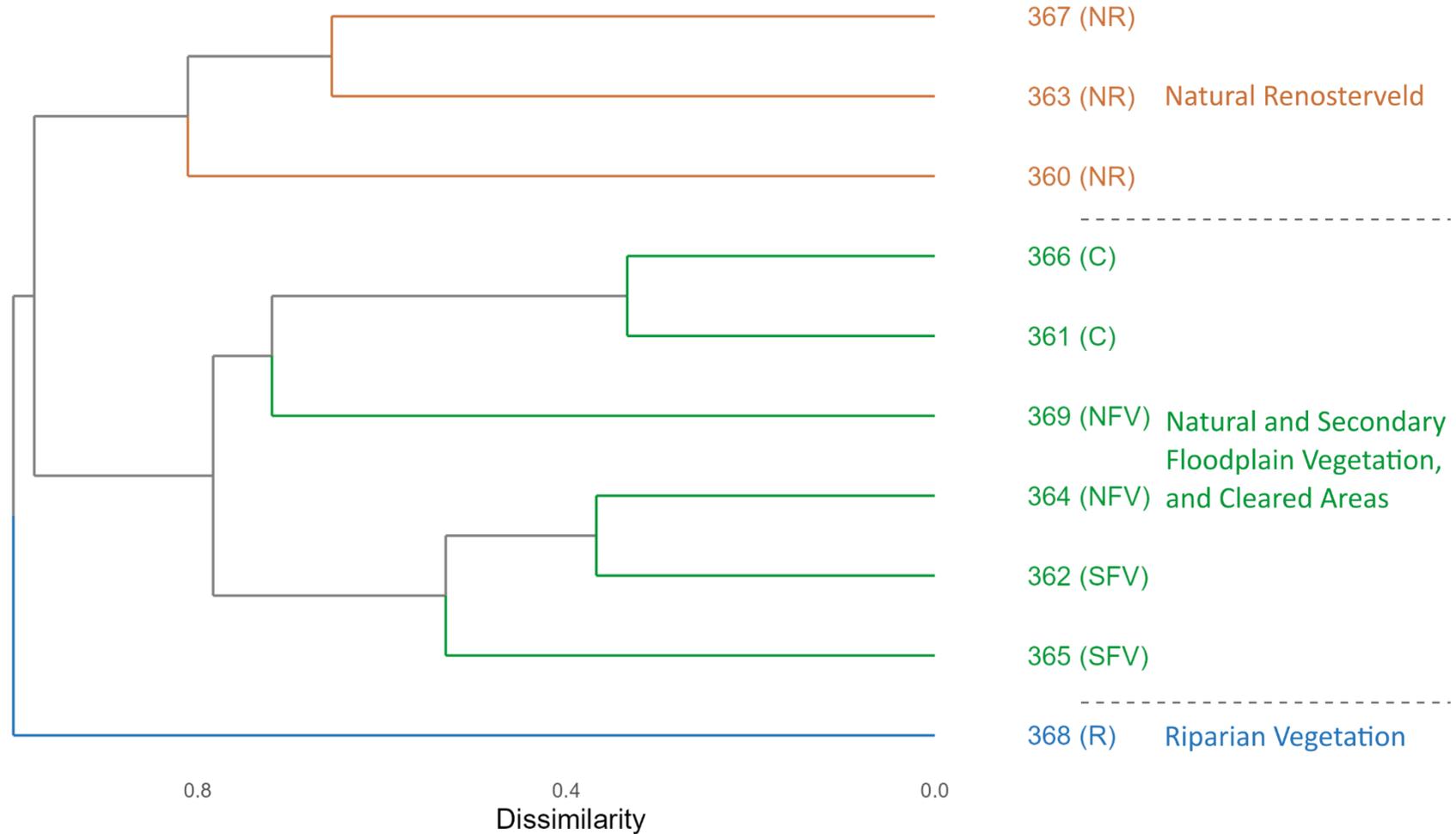
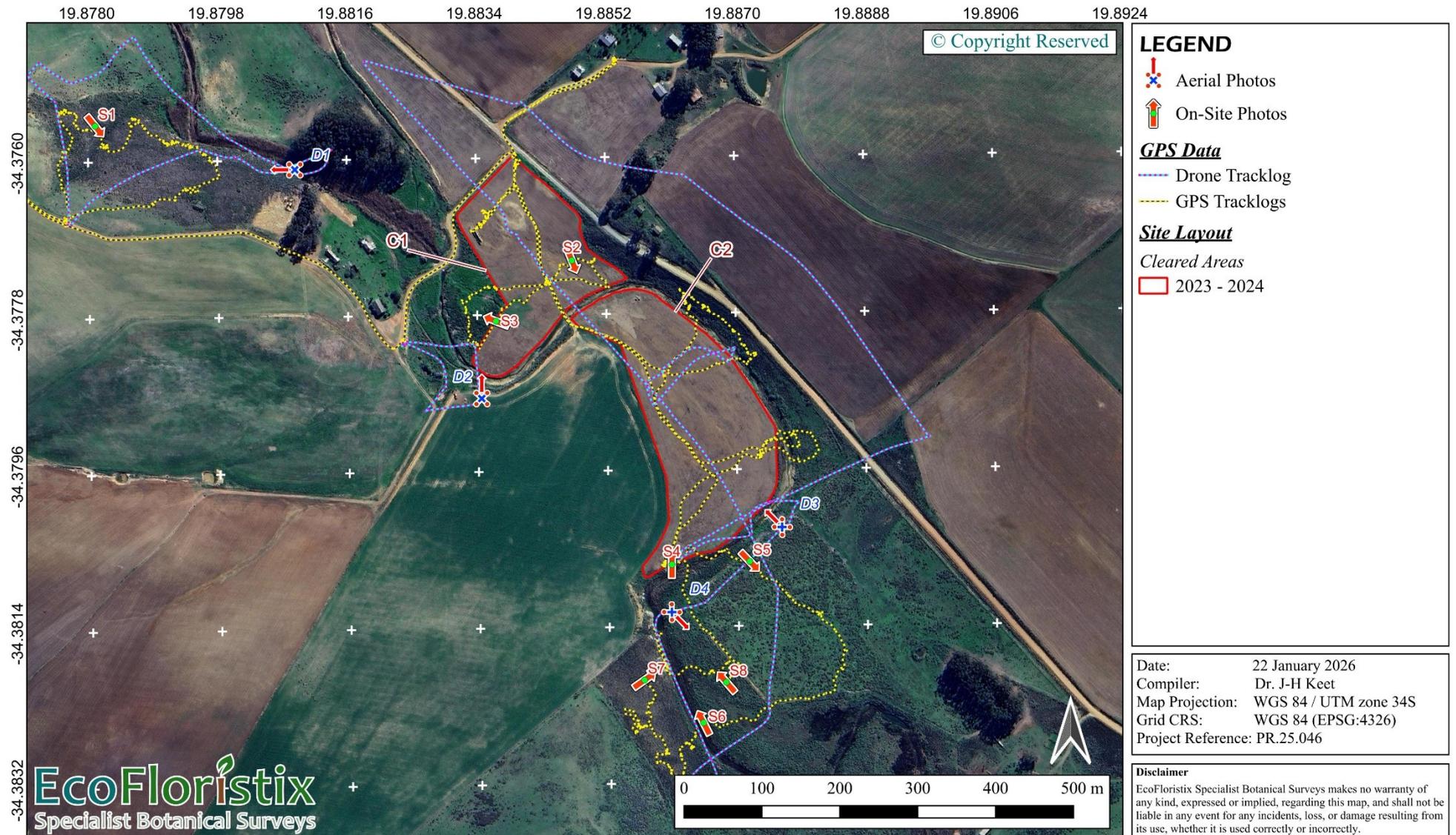


Figure 2: Dendrogram representing the similarity between the vegetation plots. The horizontal axis (“height”) indicates the level of dissimilarity – that is, either more (to the right) or less (to the left) similar. Plots that are highly similar in terms of species assemblages join at lower heights (closer to the righthand side). Distinct clusters therefore correspond to the same ecological community and thus differ from other communities within the study area. As to be expected, riparian vegetation is the most dissimilar compared to the other communities. True renosterveld vegetation also formed a distinct cluster, while the cleared areas and floodplain vegetation clustered together. Abbreviations: C – Cleared Areas; NFV – Natural Floodplain Vegetation; SFV – Secondary Floodplain Vegetation, R – Riparian Vegetation. Compare with Map 13 for numbers. See methods for details on clustering.



Map 14: Photo localities and survey tracklogs for the study area. See Figure 3 and Figure 5 for photos.

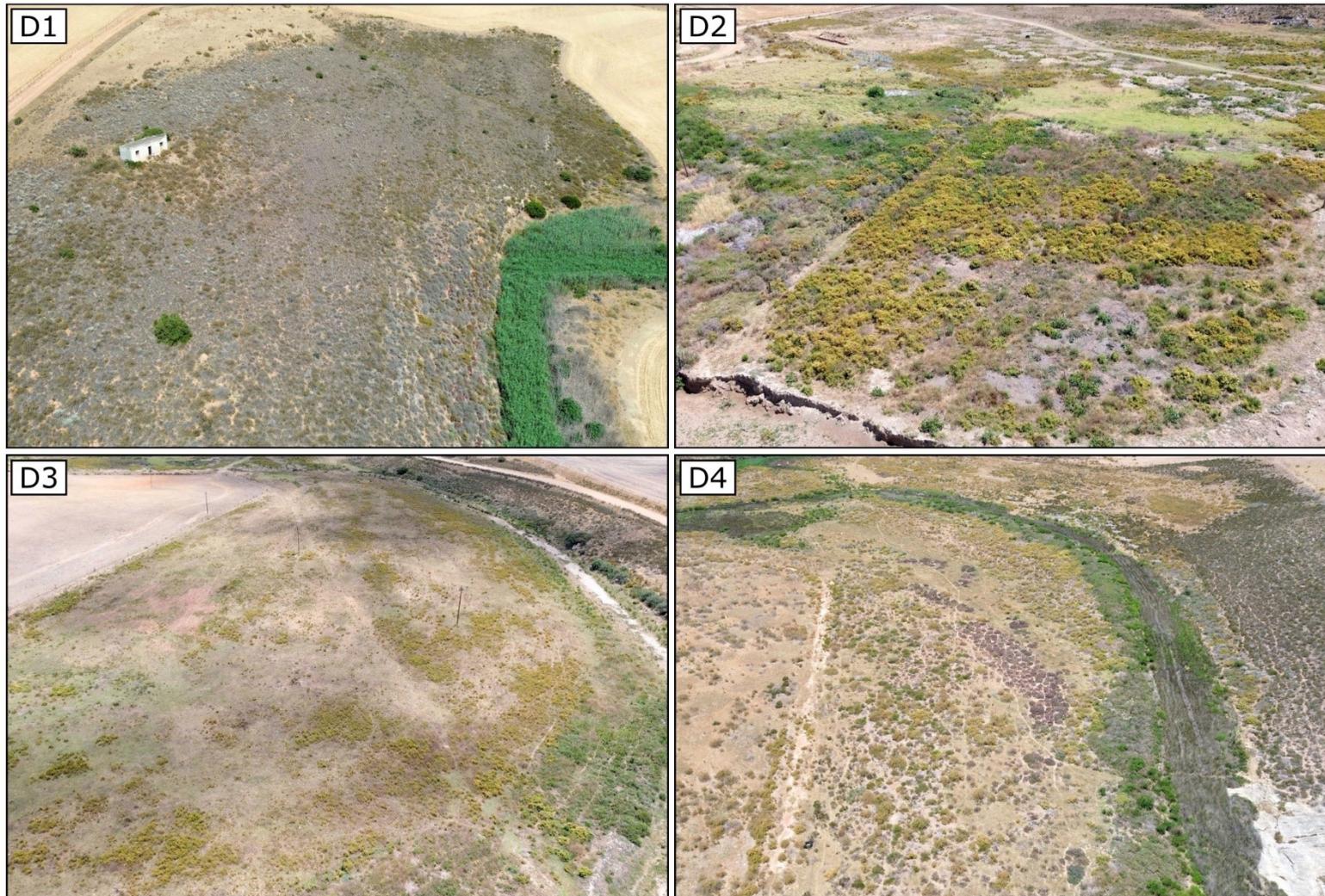


Figure 3: Representative aerial photos of the landscape and plant communities observed in the study area and surrounds; see Map 14 for photo localities and directions, and Figure 5 for on-site photos. D1) An invaluable patch of natural renosterveld. D2) View of part of cleared area C1 (to the right) and natural floodplain vegetation (to the left). D3) Cleared area C2. D4) View of secondary (far-left) and natural (middle-left) floodplain vegetation, as well as riparian (near-right), and natural renosterveld (far-right) vegetation



Figure 4: Broad overview of the majority of the study area and reference areas. Compare with Map 10 – Map 13 and Figure 5 – Figure 6.

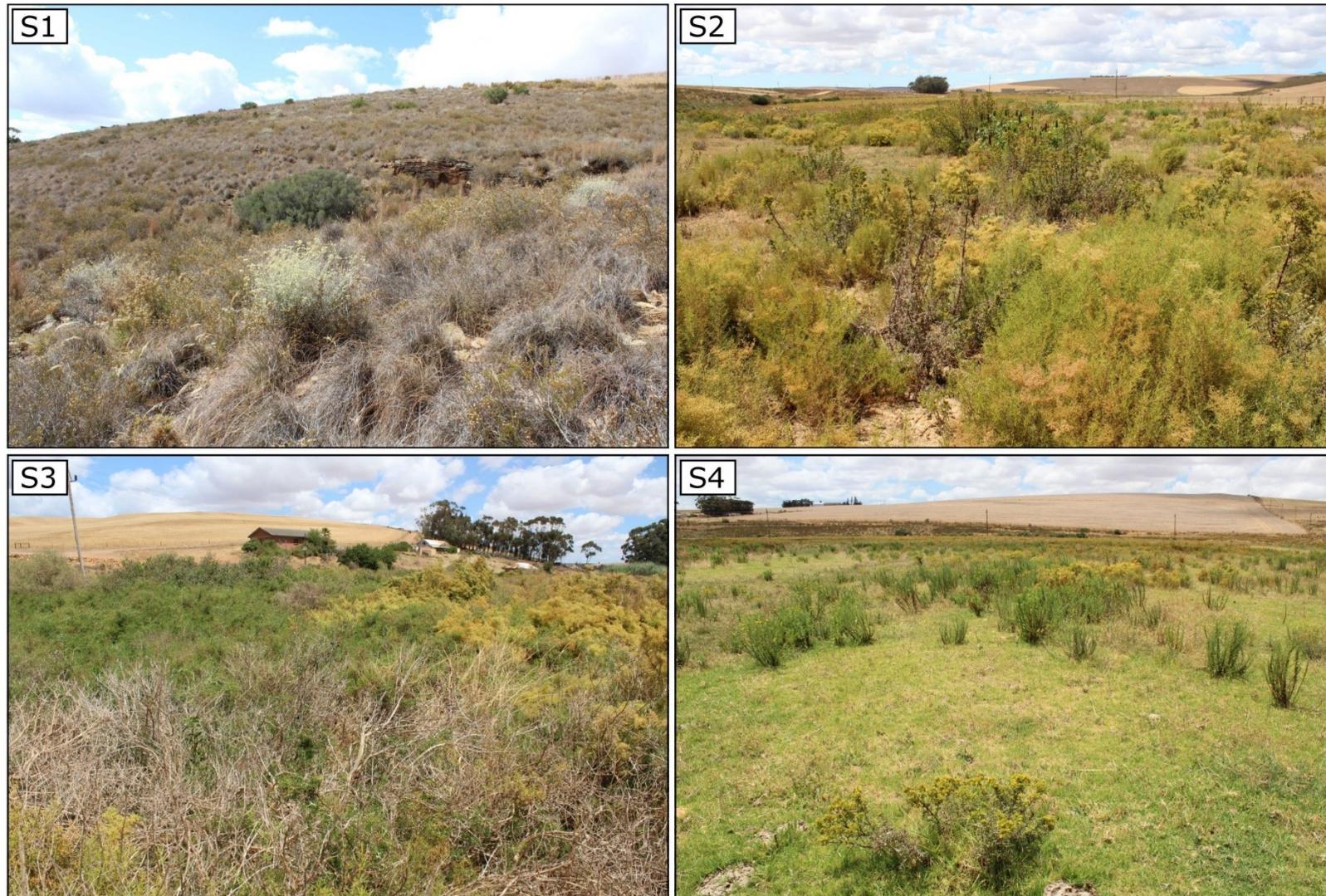


Figure 5. On-site photos of the various plant community types. S1) Natural renosterveld. S2) Cleared area C1. S3) Natural floodplain vegetation. S4) Cleared area C2. See Map 14 for photo localities.

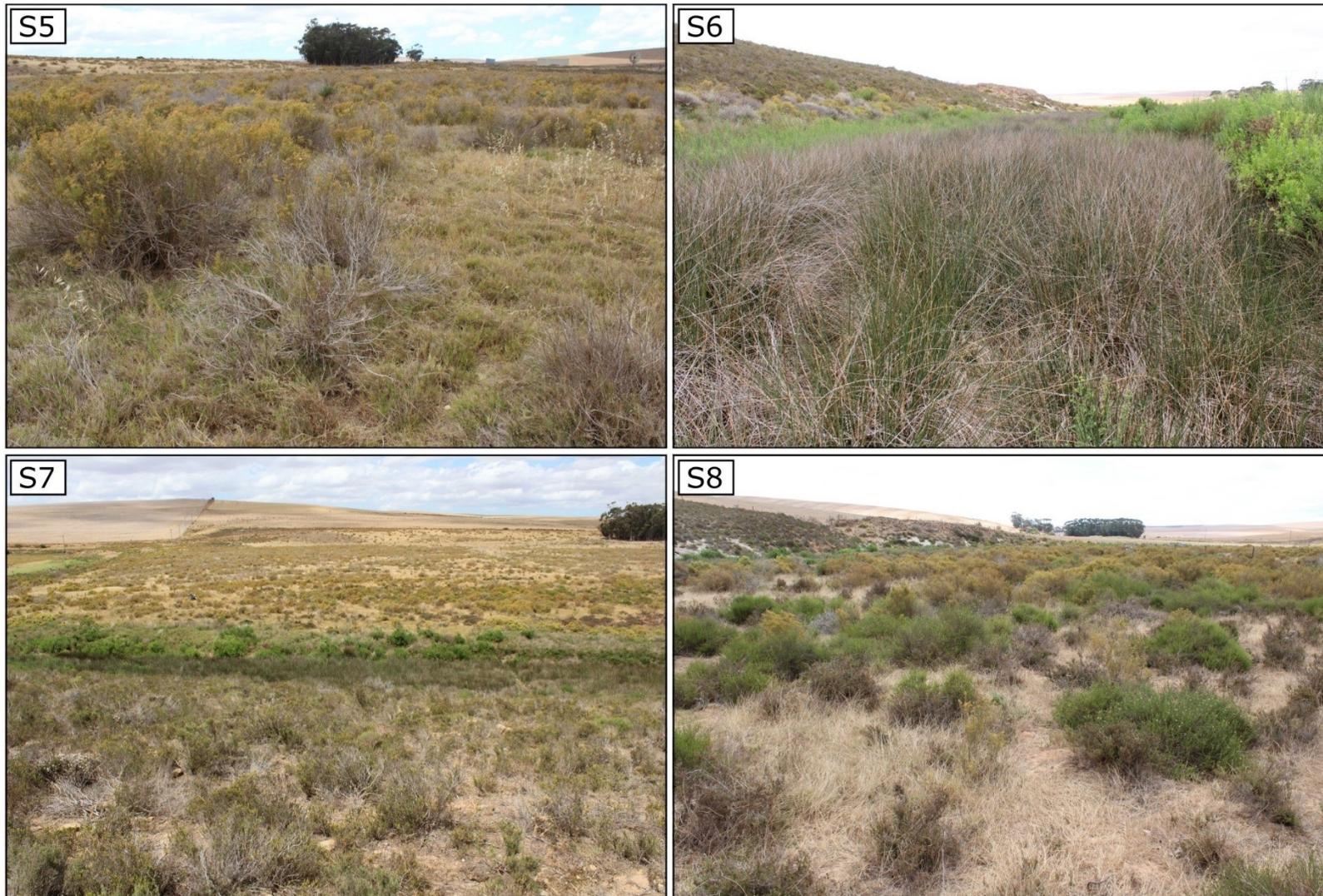


Figure 6: Continued from Figure 5. S5) Secondary floodplain vegetation. S6) Riparian vegetation (showing the dominance of *Juncus kraussii*, the grey-green shrub in the centre). S7) View from a natural renosterveld patch (visible in the foreground) looking toward the riparian, natural, and secondary floodplain vegetation. S8) Natural floodplain vegetation.

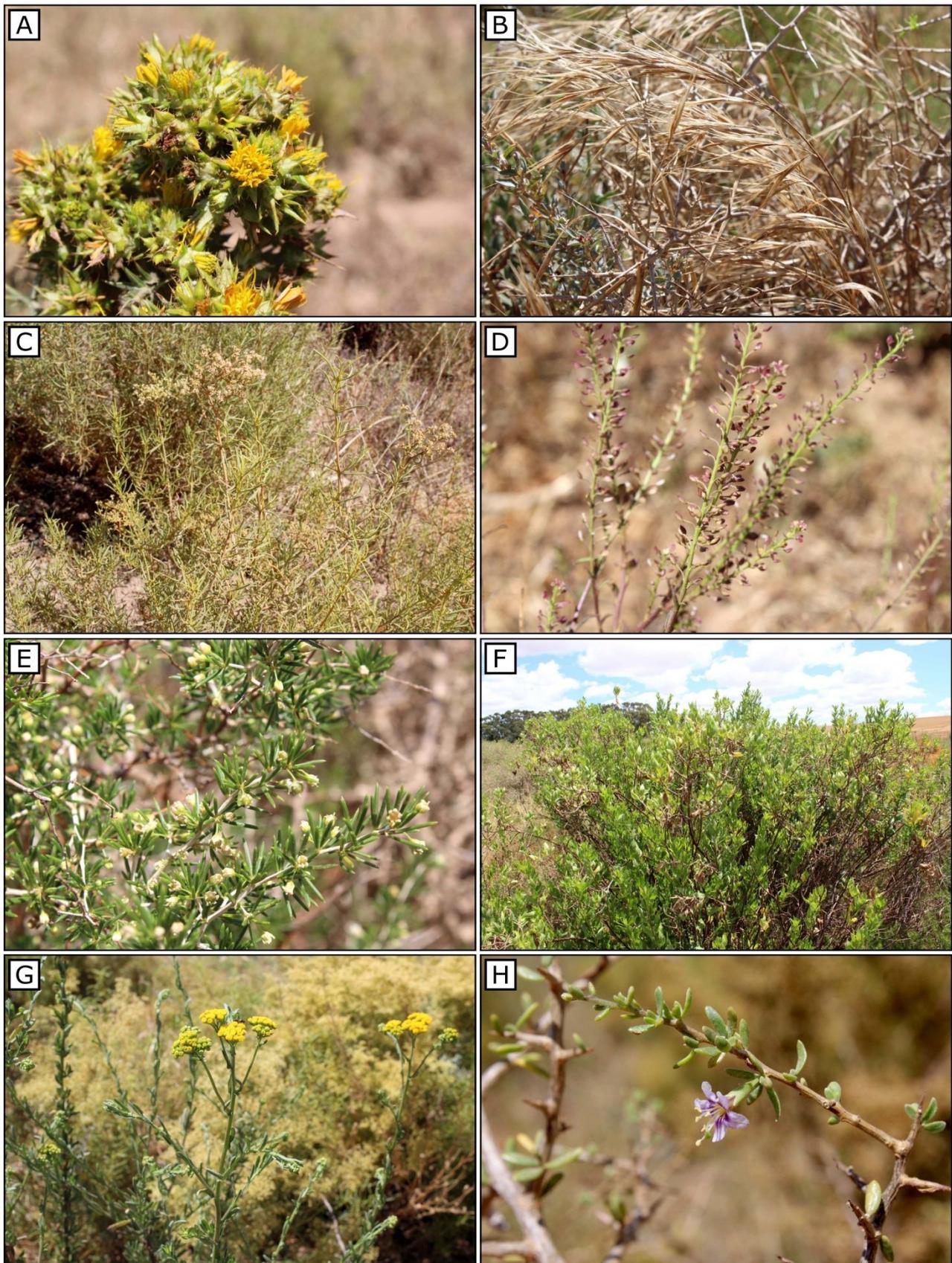


Figure 7: Selected representative plant species that were found within the study area and surrounds: A) *Berkheya rigida*, B) *Bromus diandrus*, C) *Galenia africana*, D) *Lepidium africanum* subsp. *africanum*, E) *Asparagus retrofractus*, F) *Nidorella ivifolia*, G) *N. foetida*, and H) *Lycium cinereum*.

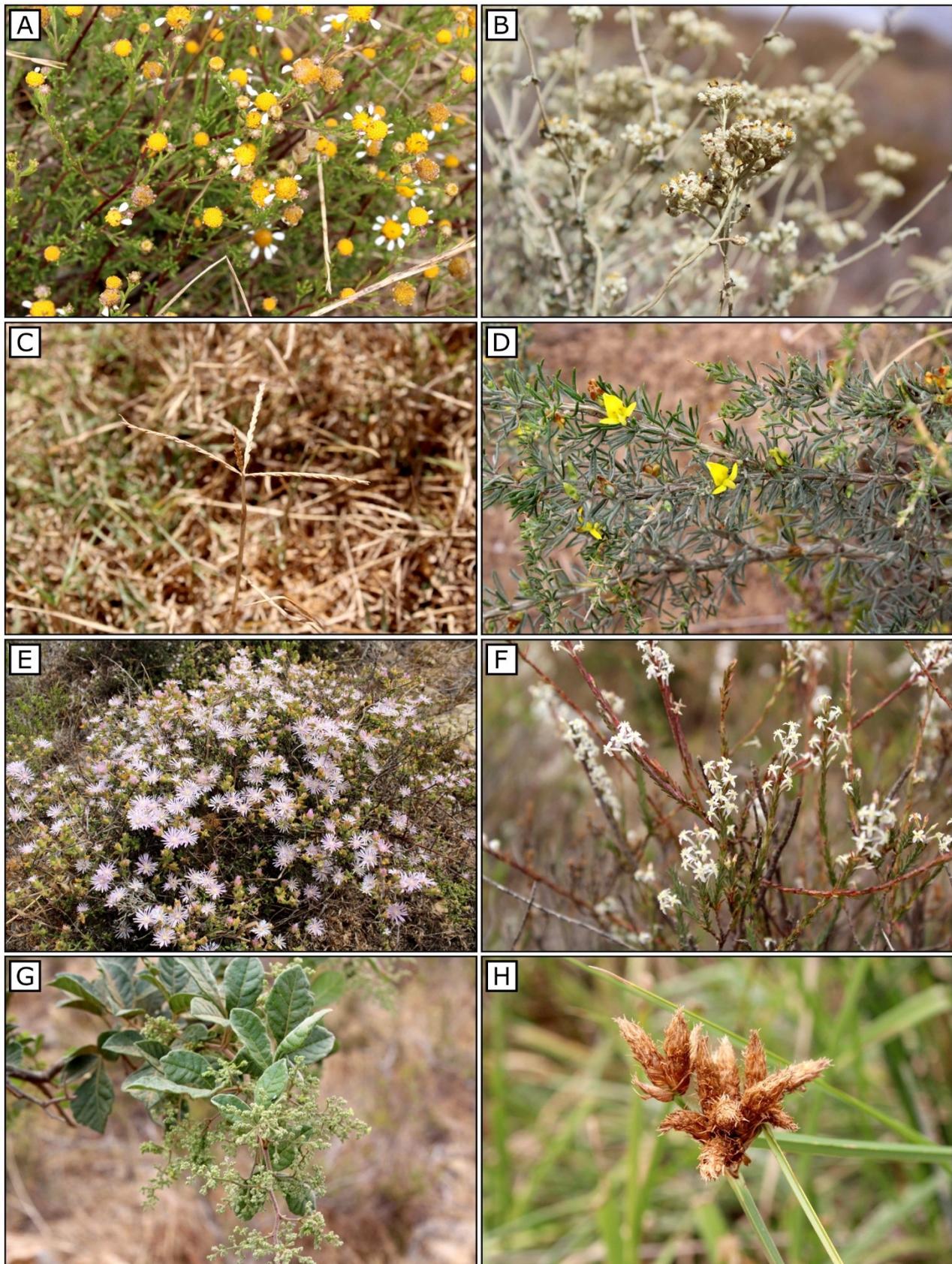


Figure 8: More selected representative plant species that were found within the study area and surrounds: A) *Cymbopappus adenosolen*, B) *Helichrysum patulum*, C) *Cynodon dactylon*, D) *Aspalathus spinosa* subsp. *spinosa*, E) *Drosanthemum parvifolium*, F) *Struthiola ciliata*, G) *Searsia rehmannii*, and H) *Bolboschoenus maritimus*.

The most significant distinction in the clustering was between riparian vegetation and all other communities, which is to be expected given the fundamental difference between this aquatic ecosystem and the surrounding terrestrial environment. The next most substantial split occurred between the renosterveld cluster and the remaining communities.

In contrast, there is a much smaller difference between secondary floodplain vegetation and natural floodplain vegetation. This is especially evident for plots 362 and 364, which shared more than 60% similarity. This indicates that while historic ploughing has indeed altered the floodplain community in the areas where it occurred, many of the characteristic and dominant species have successfully re-established. Another reason for their similarity might be attributable to the fact that floodplain communities are often prone to regular disturbances (that is, flooding). This means their characteristic and dominant species are often ones that are adapted to such events — hence the ease at which disturbance adapted species such as *Galenia africana* can proliferate in such areas.

The cleared areas clustered together as expected. However, their broader grouping with a natural floodplain vegetation plot, as well as subsequent grouping with the other natural and secondary floodplain vegetation plots, demonstrates that they are beginning to regain some of their original composition, and that this composition is indeed similar to the other floodplain plots. Ultimately, the cluster dendrogram conclusively shows two things:

- First, the unlawfully cleared areas were not composed of true renosterveld (*sensu* Central Rûens Shale Renosterveld). Therefore, no remnants of this Critically Endangered vegetation type and its related SCC were affected or lost.
- Secondly, while clearing affected both secondary and natural floodplain vegetation, the recovery currently taking place is on a trajectory toward re-attaining their former compositions.

Moreover, because the secondary and natural floodplain vegetation plots share so many species and structural similarities, the clearance of vegetation in the unlawfully cleared areas is unlikely to have a major long-term impact. This is especially and strongly supported by the fact that even historic ploughing failed to create a permanent, unrecognizable difference between these two communities. Thus, while the underlying method and its assumptions employed here are not absolute — i.e., the use of historic satellite imagery to retrospectively infer past conditions — there is a high degree of confidence in the conclusion especially given the availability of reference areas with which to infer past conditions (specifically also see section 2.3.1).

The following sections focus on the specific plant community types.

2.3.2.a) Cleared Areas

Species Summary Statistics:

Total:	15				
Shared:	12	SCC:	0	Native:	9
Unique:	3	Threatened:	0	Alien:	6
%Unique:	20	Protected:	1	NEM:BA:	1
		PEN:	0		

Note: This summary represents average values. Vegetation structure and composition can vary across the landscape, even within the same plant community. PEN — Provincial Endemic

This community is mapped by VegMap to occur in the vegetation type Central Rûens Shale Renosterveld (FRs 12), but this is not the case. Instead the area is characterized by a floodplain vegetation which lacks the characteristic species that occur in the nearby patches of Central Rûens Shale Renosterveld (specifically see Figure 2).

The topography is characterized by a very level slope. The vegetation of this plant community type is co-dominated by grasses and shrubs. It varies somewhat given that, in both cleared areas, parts overlap either with historically ploughed areas or natural areas (i.e. those that were never ploughed before; see Map 12). However, these variations do not seem to properly warrant different plant community type classification.

Vegetation cover is mostly moderate (50 – 75%) to high (> 75%). Dominant and/or subdominant species include *Cynodon dactylon*, *Galenia africana*, *Nidorella foetida*, and *Berkheya rigida*. No SCC or protected plant species were observed. Furthermore, 6 alien species were observed, including 1 NEM:BA A&IS Regulations listed species, namely *Ricinus communis* (Castor-oil plant; Category 2).

The present ecological state (PES) of the cleared areas include areas that are more or less overrun by alien or native weedy species. Vegetation regrowth is occurring quite rapidly in some areas especially given that the clearance occurred only slightly more than two years ago. The community composition of these cleared areas, in their current state, is comparable to the surrounding natural and secondary floodplain vegetation fragments.

Finally, the following is a summary list of all species that were observed in this plant community type:

- *Afroscirpoides dioeca* (LC)
- *Atriplex semibaccata* (LC)
- *Berkheya rigida* (LC)
- *Bromus diandrus* (Not Evaluated)
- *Cynodon dactylon* (LC)
- *Galenia africana* (LC)
- *Helminthotheca echioides* (Not Evaluated)
- *Juncus acutus subsp. leopoldii* (LC)
- *Lepidium africanum subsp. africanum* (LC)
- *Nidorella foetida* (LC)
- *Nidorella ivifolia* (LC)
- *Polypogon monspeliensis* (Not Evaluated)
- *Ricinus communis* (Not Evaluated)
- *Senecio rosmarinifolius* (LC)
- *Vulpia myuros* (Not Evaluated)

2.3.2.b) Natural Floodplain Vegetation

Species Summary Statistics:

Total:	20				
Shared:	19	SCC:	0	Native:	12
Unique:	1	Threatened:	0	Alien:	8
%Unique:	5	Protected:	1	NEM:BA:	1
		PEN:	2		

Note: This summary represents average values. Vegetation structure and composition can vary across the landscape, even within the same plant community. PEN — Provincial Endemic

This plant community type is located at two specific areas near the unlawfully cleared areas, name to west of area C1 and to the south of area C2. It also borders secondary floodplain vegetation in this latter area.

The community is mapped by VegMap to occur in the vegetation type Central Rûens Shale Renosterveld (FRs 12), but this is not the case. Instead the area is characterized by a floodplain vegetation which lacks the characteristic species that occur in the nearby patches of Central Rûens Shale Renosterveld (specifically see Figure 2). Furthermore, unlike the secondary floodplain vegetation (section 0, it has never been ploughed before (see section 2.3.1 and Map 12). Thus, it represents a key reference to elucidate the historic on-site conditions in the parts of areas C1 and C2 (the unlawfully cleared areas) that were never ploughed.

The topography is characterized by a very level slope. The vegetation of this plant community type is co-dominated by grasses and shrubs. Vegetation cover is mostly moderate (50 – 75%) to high (> 75%). Dominant and subdominant species include *Galenia africana*, *Cymbopappus adenosolen*, *Nidorella ivifolia*, *Asparagus retrofractus*, *Bromus diandrus*, *Cynodon dactylon*, and *Lolium multiflorum*.

No SCC were observed. However, one protected plant species was observed, namely the widespread *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4]). It must be noted that a permit must be obtained from relevant local competent authorities to damage, destroy, or relocate any SCC or protected plant species; any such actions are considered illegal without a permit, in which case such species must be avoided completely. Furthermore, 8 alien species were also observed, including one NEM:BA A&IS Regulations listed species, namely *Pennisetum clandestinum*.

Finally, the following is a summary list of all species that were observed in this plant community type:

- *Allium synnotii* (LC)
- *Asparagus retrofractus* (LC)
- *Avena barbata* (Not Evaluated)
- *Berkheya rigida* (LC)
- *Bromus diandrus* (Not Evaluated)
- *Cymbopappus adenosolen* (LC)
- *Cynodon dactylon* (LC)
- *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4])
- *Exomis microphylla* (LC)
- *Galenia africana* (LC)
- *Gymnosporia buxifolia* (LC)
- *Helminthotheca echioides* (Not Evaluated)
- *Lolium multiflorum* (Not Evaluated)
- *Lycium cinereum* (LC)

- *Nidorella ivifolia* (LC)
- *Pennisetum clandestinum* (Not Evaluated)
- *Pteronia incana* (LC)
- *Rapistrum rugosum* (Not Evaluated)
- *Trifolium angustifolium* var. *angustifolium* (Not Evaluated)
- *Vulpia myuros* (Not Evaluated)

2.3.2.c) Secondary Floodplain Vegetation

Species Summary Statistics:

Total:	27				
Shared:	24	SCC:	0	Native:	17
Unique:	3	Threatened:	0	Alien:	10
%Unique:	11	Protected:	1	NEM:BA:	2
		PEN:	3		

Note: This summary represents average values. Vegetation structure and composition can vary across the landscape, even within the same plant community. PEN — Provincial Endemic

This plant community type is located as two separate, though very close, patches. Together they occur directly east and southeast of the unlawfully cleared area C2.

This community essentially represents the same plant community type as the natural floodplain vegetation community, with a key difference: it was historically ploughed (section 2.3.1). Thus, while the vegetation of this plant community type is also co-dominated by grasses and shrubs, with a cover a similar to the natural floodplain vegetation units, it has a higher dominance of *Galenia africana*, which is to be expected given its pioneering nature and preponderance for multiplying in disturbed areas. The alien grass *Bromus diandrus* is also especially abundant in certain areas (this can clearly be seen in S5 of Figure 6).

No SCC were observed. However, one protected plant species was observed, namely the widespread *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4]). It must be noted that a permit must be obtained from relevant local competent authorities to damage, destroy, or relocate any SCC or protected plant species; any such actions are considered illegal without a permit, in which case such species must be avoided completely. Furthermore, 10 alien species were also observed, including two NEM:BA A&IS Regulations listed species, namely *Cirsium vulgare* (Spear thistle, Scotch thistle; Category 1b) and *Ricinus communis* (Castor-oil plant; Category 2).

Although some differences exist between the secondary and natural floodplain vegetation plant community types, they are remarkably similar, to the extent that one of the surveyed secondary floodplain vegetation plots was the most similar to one of the natural floodplain vegetation plots (362 and 364 in Figure 1). This shows that while its soil structure might have been altered significantly by historic ploughing, the secondary floodplain vegetation community is at least partly on a trajectory to attaining a composition that is similar to the natural floodplain vegetation fragments.

Finally, the following is a summary list of all species that were observed in this plant community type:

- *Allium synnotii* (LC)
- *Athanasia juncea* (LC)
- *Atriplex semibaccata* (LC)
- *Avena barbata* (Not Evaluated)
- *Berkheya rigida* (LC)
- *Bromus diandrus* (Not Evaluated)
- *Chrysocoma ciliata* (LC)
- *Cirsium vulgare* (Not Evaluated)
- *Cynodon dactylon* (LC)
- *Dicerotheramnus rhinocerotis* (LC)
- *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4])
- *Exomis microphylla* (LC)
- *Galenia africana* (LC; Protected [Provincial Schedule 4])
- *Helichrysum patulum* (LC)
- *Helminthotheca echioides* (Not Evaluated)
- *Lepidium africanum subsp. africanum* (LC)
- *Lolium multiflorum* (Not Evaluated)
- *Lycium cinereum* (LC)
- *Nidorella foetida* (LC)
- *Nidorella ivifolia* (LC)
- *Plantago lanceolata* (LC)
- *Pteronia incana* (LC)
- *Rapistrum rugosum* (Not Evaluated)
- *Ricinus communis* (Not Evaluated)
- *Senecio rosmarinifolius* (LC)
- *Trifolium angustifolium var. angustifolium* (Not Evaluated)
- *Vulpia myuros* (Not Evaluated)

2.3.2.d) Natural Renosterveld

Species Summary Statistics:

Total:	75				
Shared:	18	SCC:	5	Native:	72
Unique:	57	Threatened:	2	Alien:	3
%Unique:	76	Protected:	10	NEM:BA:	0
		PEN:	19		

Note: This summary represents average values. Vegetation structure and composition can vary across the landscape, even within the same plant community. PEN — Provincial Endemic

This plant community type occurs as three distinct but completely separate fragments surrounding the unlawfully cleared areas. Unlike the floodplain plant community types, this community does indeed conform to the VegMap vegetation type Central Rûens Shale Renosterveld.

The topography is characterized by moderate to steep slopes with various aspects. The vegetation of this plant community type is co-dominated by small shrubs and grasses. Vegetation cover is typically high (> 75%). Dominant species include *Oedera uniflora*, *Pteronia incana*, *Tenaxia stricta*, and *Pentameris eriostoma*, though various other species co-dominate across the area.

Despite the small sizes of the fragments, their large combined number of species (74) testify to the great diversity that characterizes true renosterveld. This is evident in the high number of species that were unique to these fragments (76%) compared to the other plant community types. The cluster dendrogram also clearly demonstrates this in that the three renosterveld fragments formed a very distinct cluster, separate from the other plant community types (Figure 2). This further means that very few species are shared between it and the floodplain communities.

A total of 5 SCC were found in this plant community type, as well as 9 protected plant species. They are:

- *Aspalathus barbiger* (VU)
- *Curio archeri* (DDT)
- *Cynanchum viminale subsp. viminale* (LC; Protected [Provincial Schedule 4])
- *Drosanthemum asperulum* (LC; Protected [Provincial Schedule 4])
- *Drosanthemum calycinum* (NT; Protected [Provincial Schedule 4])
- *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4])
- *Freesia caryophyllacea* (NT; Protected [Provincial Schedule 4])
- *Freesia refracta* (LC; Protected [Provincial Schedule 4])
- *Glottiphyllum depressum* (LC; Protected [Provincial Schedule 4])
- *Hermannia lavandulifolia* (VU)
- *Microlooma sagittatum* (LC; Protected [Provincial Schedule 4])
- *Tetragonia fruticosa* (LC; Protected [Provincial Schedule 4])

The renosterveld vegetation fragments are in a very good condition, though as is generally the case in this region, they would benefit from a fire since these remnants seem quite old given the abundance of climax species.

Given that this unit had the highest species richness of all the plant community types observed in the study area and surrounds, as well as its highly threatened nature, its fragments would have been considered as No-Go areas.

Finally, the following is a summary list of all species that were observed in this plant community type:

- *Albuca cooperi* (LC)
- *Allium synnotii* (LC)
- *Aspalathus acuminata subsp. acuminata* (LC)
- *Aspalathus alpestris* (LC)
- *Aspalathus barbiger* (VU)
- *Aspalathus hispida subsp. hispida* (LC)
- *Aspalathus nigra* (LC)
- *Aspalathus spinosa subsp. spinosa* (LC)
- *Asparagus retrofractus* (LC)
- *Asparagus suaveolens* (LC)
- *Athanasia juncea* (LC)
- *Atriplex semibaccata* (LC)
- *Cliffortia ramosissima* (LC)
- *Cotyledon orbiculata var. orbiculata* (LC)
- *Crassula atropurpurea var. atropurpurea* (LC)
- *Crassula muscosa* (LC)
- *Crassula perfoliata var. perfoliata* (LC)
- *Crassula subulata* (LC)
- *Crassula tetragona subsp. tetragona* (LC)
- *Curio archeri* (DDT)
- *Cyanella hyacinthoides* (LC)
- *Cymbopappus adenosolen* (LC)
- *Cymbopogon marginatus* (LC)
- *Cynanchum viminale subsp. viminale* (LC; Protected [Provincial Schedule 4])
- *Cynodon dactylon* (LC)
- *Dianthus albens* (LC)
- *Dicerothermus rhinocerotis* (LC)
- *Diospyros austro-africana var. austro-africana* (LC)
- *Drosanthemum asperulum* (LC; Protected [Provincial Schedule 4])
- *Drosanthemum calycinum* (NT; Protected [Provincial Schedule 4])
- *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4])
- *Ehrharta capensis* (LC)
- *Eragrostis curvula* (LC)
- *Eriocephalus africanus var. africanus* (LC)
- *Eucomis regia* (LC)
- *Exomis microphylla* (LC)
- *Felicia filifolia subsp. filifolia* (LC)
- *Ficinia nigrescens* (LC)
- *Freesia caryophyllacea* (NT; Protected [Provincial Schedule 4])
- *Freesia refracta* (LC; Protected [Provincial Schedule 4])
- *Galenia africana* (LC)
- *Gasteria carinata var. carinata* (LC)
- *Glottiphyllum depressum* (LC; Protected [Provincial Schedule 4])
- *Gymnosporia buxifolia* (LC)
- *Helichrysum patulum* (LC)
- *Hermannia alnifolia* (LC)
- *Hermannia diversistipula var. diversistipula* (LC)
- *Hermannia lavandulifolia* (VU)
- *Hibiscus pusillus* (LC)
- *Hyparrhenia hirta* (LC)
- *Jamesbrittenia atropurpurea subsp. atropurpurea* (LC)
- *Macleodium spinosum* (LC)

- *Metalasia acuta* (LC)
- *Microlooma sagittatum* (LC; Protected [Provincial Schedule 4])
- *Nidorella foetida* (LC)
- *Nidorella ivifolia* (LC)
- *Notobubon ferulaceum* (LC)
- *Oedera uniflora* (LC)
- *Pelargonium caucalifolium* subsp. *caucalifolium* (LC)
- *Pentameris eriostoma* (LC)
- *Polygala garcinii* (LC)
- *Pteronia incana* (LC)
- *Searsia pallens* (LC)
- *Searsia rehmanniana* var. *glabrata* (LC)
- *Searsia rosmarinifolia* (LC)
- *Senecio rosmarinifolius* (LC)
- *Struthiola ciliata* (LC)
- *Tenaxia stricta* (LC)
- *Tetragonia fruticosa* (LC; Protected [Provincial Schedule 4])
- *Themeda triandra* (LC)
- *Thesium nigroperianthum* (LC)
- *Tribolium uniolae* (LC)
- *Trifolium angustifolium* var. *angustifolium* (Not Evaluated)
- *Ursinia discolor* (LC)
- *Vulpia myuros* (Not Evaluated)

2.3.2.e) Riparian Vegetation

This plant community type was not surveyed extensively, and this section only briefly describes it. Since the community is inherently aquatic, it closely follows the route of the small river that traverses the study area and surrounds, and occurs as a narrow strip of vegetation in the river channel itself as well as on its banks.

The community does not conform to any of the VegMap vegetation types mapped for the region, but would likely be considered as an azonal vegetation type on a finer scale. It transitions quickly into the respective bordering plant community types, for example renosterveld to its west and natural floodplain vegetation to its east in the southernmost areas that were surveyed. Vegetation cover is typically very high (> 75%), especially in the centre of the river (specifically see S6 in Figure 6). Dominant species include *Juncus kraussii* subsp. *kraussii* or *Phragmites australis* in the channel centre, and *Bolboschoenus maritimus* and *Samolus porosus* on the banks.

No SCC, protected plant species, alien, or NEM:BA A&IS Regulations listed species were observed in this plant community type. Nevertheless, given the nature of this plant community type — i.e. its crucial functional role in the landscape — it would have been regarded as a No-Go area.

2.3.3. Species of Conservation Concern (SCC)



Figure 9: Plant SCC that were observed in the study area: A) *Aspalathus barbiger*, B) *Curio archeri*, C) *Drosanthemum calycinum*, and D) *Hermannia lavandulifolia*. These are all associated with the Central Rûens Shale Renosterveld fragments.

Ground truthing confirmed the occurrence of 5 SCC and 9 protected plant species. Note that overlap exists between SCC and protected species. Specifically, 2 of the SCC are also protected. The SCC and protected plant species are (Figure 9 and Map 15):

- *Aspalathus barbiger* (VU)
- *Curio archeri* (DDT)
- *Cynanchum viminale subsp. viminale* (LC; Protected [Provincial Schedule 4])
- *Drosanthemum asperulum* (LC; Protected [Provincial Schedule 4])
- *Drosanthemum calycinum* (NT; Protected [Provincial Schedule 4])
- *Drosanthemum parvifolium* (LC; Protected [Provincial Schedule 4])
- *Freesia caryophyllacea* (NT; Protected [Provincial Schedule 4])
- *Freesia refracta* (LC; Protected [Provincial Schedule 4])
- *Glottiphyllum depressum* (LC; Protected [Provincial Schedule 4])
- *Hermannia lavandulifolia* (VU)
- *Microlooma sagittatum* (LC; Protected [Provincial Schedule 4])

Note that although SCC and protected plant species are indicated as point localities in Map 15, these do not necessarily indicate individual occurrences. Instead, the points serve to indicate general localities.

All of the SCC observed on-site occurred in the Central Rûens Shale Renosterveld fragments. Thus, none of them would have occurred in the unlawfully cleared areas given the distinct difference between these plant community types (section 2.3.2) and no SCC losses would have occurred.



Map 15: Localities of plant Species of Conservation Concern (SCC) that were observed within the study areas.

2.3.4. Alien and Invasive Plant Species



Figure 10: NEM:BA A&IS Regulations listed plant species that were observed in the study area. A) *Ricinus communis* and B) *Cirsium vulgare*.

A total of 2 NEM:BA A&IS Regulations listed invasive species were observed in the study area, namely:

- *Cirsium vulgare* (Spear thistle, Scotch thistle; Category 1b)
- *Ricinus communis* (Castor-oil plant; Category 2)

Of these species *Cirsium vulgare* was only observed in a few instances, whereas *Ricinus communis* occurred in larger abundances across the study area. Given that they also occur outside the cleared areas (see Table 2), the activities would not have led to their establishment anew within the unlawfully cleared areas. In other words, these species would in all likelihood already have been on-site prior to the unlawful clearing. Nevertheless, these species must be controlled in accordance with NEM:BA A&IS Regulations.

2.3.4.a) *Cirsium vulgare*

A spiny, much-branched biennial herb up to 1.5 m high originating from Asia, Europe, and North Africa. It has spiny stems with pink to mauve flowers, in heads to 5 x 5 cm, surrounded by spiny bracts. The species is biennial, taking two years to flower, which takes place late in spring or early summer, when it produces an abundance of seeds. These seeds each have a silky plume for dispersal. Some seeds wash away during floods or cling to mud on vehicles, animals, and implements. Birds eat the seeds and also collect the silky plumes for their nests. The seeds are also spread around farms in bales of contaminated stock feed. Its sap is a skin irritant that causes dermatitis in humans; it can also cause physical injury to animals. It invades grassland, roadsides, old lands, vleis and dam margins, and riverbanks, often forming dense stands in overgrazed and highly disturbed sites. It is also often common in pastures, waste places, and along roadsides, preferring moist, rich soil. It does not thrive in regularly cultivated lands. It has spread to virtually all temperate zones of the world. It was first recorded at Van Reenen in KwaZulu-Natal and is thought to have been introduced with imported fodder during the Anglo-Boer War. It is now widespread in South Africa except in lowveld areas. An infestation of *C. vulgare* is an indication of poor veld management. A heavy infestation severely reduces the carrying capacity of the veld and can cause injury to man and animal alike. This species is easily controlled with regular cultivation and is susceptible to hormone and contact type herbicides. If possible, it should be controlled before flowering. Biocontrol agents have been introduced, but to date success is minimal.

2.3.4.b) *Ricinus communis*

Ricinus communis, commonly known as the Castor-oil plant, is indigenous to tropical Africa. Despite its native origins on the continent, it has become widely distributed and invasive in various regions globally. Within South Africa, *Ricinus communis* is a prevalent issue across all provinces, highlighting its adaptability and effective dispersal mechanisms.

Ricinus communis is an annual shrub or a small tree, typically reaching heights of up to 4 m. Its softly woody stems, along with leaf and flowering stalks, often exhibit a grey, powdery bloom. The leaves are distinctive: shiny, dark green or reddish, and noticeably paler on the underside. These star-shaped leaves feature serrated margins, contributing to the plant's unique appearance. Flowers are arranged with reddish blooms in the upper sections and cream-colored flowers below. The plant produces three-lobed capsules, which can be green, brown, or reddish, and are characteristically covered with soft spines. These spiky fruit capsules are often found protruding from the top of the plant. A critical characteristic of *Ricinus communis* is its high toxicity; the entire plant is poisonous.

Ricinus communis poses a significant ecological threat, primarily due to its competitive nature. It actively outcompetes indigenous pioneering species, particularly in riparian zones and watercourses where its rapid growth and establishment can displace native flora. Beyond its competitive advantage, the plant's extreme toxicity is a major concern. The presence of highly poisonous compounds throughout the plant, especially in the seeds, presents a risk to livestock, wildlife, and even humans if ingested, making it a hazardous species in agricultural and natural landscapes. Its prolific seed dispersal further exacerbates its spread, making eradication challenging.

Despite its invasive and toxic properties, *Ricinus communis* does possess some beneficial uses. Historically and currently, it is cultivated as an ornamental plant due to its distinctive foliage and fruit. More significantly, it is the primary source of castor oil, a versatile substance used in various industries. Castor oil is employed in lubricants, cosmetics, pharmaceuticals, and in the production of biodiesel, highlighting the plant's economic importance in specific sectors.

Effective management of *Ricinus communis* requires a combination of mechanical and chemical control methods due to its aggressive growth and prolific seed production.

2.3.5. Site Ecological Importance Assessment (SEI)

Note that in this section highly disturbed areas or any infrastructure are by default considered as having a Very Low Site Ecological Importance (SEI). However, this does not include the PAOI since it is assessed retrospectively (i.e. prior to commencement of the unlawful clearing activities).

The Relative Plant Species Theme Sensitivity for the study area and surrounds, according to the online screening tool, is scored as Medium (Figure 11). This is based on the fact that SCC and sensitive species are recorded or suspected to occur in the broad area in online databases (see sections 9.3.1 and 2.1.2). Although the Site Sensitivity Verification revealed that SCC indeed do occur in the Central Rûens Shale Renosterveld fragments surrounding the study area, no SCC or sensitive species were found in the study area itself (see section 2.3.3). Thus, the true Relative Plant Species Theme Sensitivity for the study area can be considered as Low according to the criteria given by Government Notice 1150 of Government Gazette 43855 (October 2020; see section 10.2).

The Relative Terrestrial Biodiversity Theme Sensitivity for the study area and surrounds, according to the online screening tool, was scored as “Very High” (Figure 11). This is due to the area being mapped as occurring in a Critically Endangered ecosystem (Central Rûens Shale Renosterveld) as well as partly overlapping a CBA2 (Terrestrial) area. Firstly, the vegetation type for the study area is not mapped correctly (section 2.3.2). While Central Rûens Shale Renosterveld does occur in the surrounding area, specifically on the hill slopes, the specific area affected by the activities forms part of a lowland floodplain which has distinctly different vegetation compared to the true Central Rûens Shale Renosterveld occurring nearby. Secondly, mapping as a CBA2 area is likewise not completely accurate because of the fact that the true vegetation of the study area is not a threatened ecosystem type, but also because the majority of the CBA2 mapping overlies a historically ploughed area (2.2.2 an Map 7). That is, the cleared areas consist of a mix of natural floodplain vegetation (never ploughed before) and secondary floodplain vegetation (historically ploughed and subsequently revegetated). The reason is while the study area would not have been essential for meeting biodiversity targets, it would nevertheless have been important for supporting the surrounding Central Rûens Shale Renosterveld (which indeed conforms to CBA1 conditions). ESAs are functional, but not necessarily pristine and natural.

Given that the study area could have been classified as an ESA, it is likely that the screening tool would have scored it as “Very High”. However, the Gazetted Protocol 43110 No. 32 does not explicitly define what constitutes “Very High” (unlike the Relative Plant Species Theme Sensitivity protocol). Moreover, given that only two categories (“Very High” and “Low”) are provided by Gazetted Protocol 43110 No. 32, the Site Ecological Importance score with more categories, as discussed below, is preferable. More categories are preferred because they allow for a more nuanced and accurate representation of the varying degrees of vulnerability across different ecosystems, species, or areas. Using only two categories risks oversimplifying complex ecological realities. Also, the SEI scoring system is transparent in its methodology.

Field observations, together with the SEI assessment presented here (see section 10.2 for details), indicate that the study area would have likely been classified as having a Very Low SEI score, with the surrounding Central Rûens Shale Renosterveld and riparian vegetation having scores of Very High and High, respectively (Table 3 and Map 16). The following specific reasons contributed towards this score:

- No SCC were observed specifically in the study area or reference areas. This decreases the SEI score. In contrast, SCC were observed in the surrounding Central Rûens Shale Renosterveld, which increases its SEI score.
- The study area is not a listed ecosystem, in contrast to Central Rûens Shale Renosterveld (which is Critically Endangered). This former decreases SEI scores while the latter increases it.
- Minor and major ecological impacts exists for the study area and its reference areas, specifically in the form of invasive alien plant species and historic ploughing. However, the secondary floodplain plant communities seem to have recovered quite despite the changes in soil structure caused by ploughing. This increases the SEI score.
- Finally, the study area has a high Receptor Resilience (RR) with the majority of species being able to return should the impact be removed. This is clearly demonstrated by its secondary floodplain vegetation references (section 2.3.2). This lowers the SEI score. In contrast, Central Rûens Shale Renosterveld has a lower RR, which increases SEI.

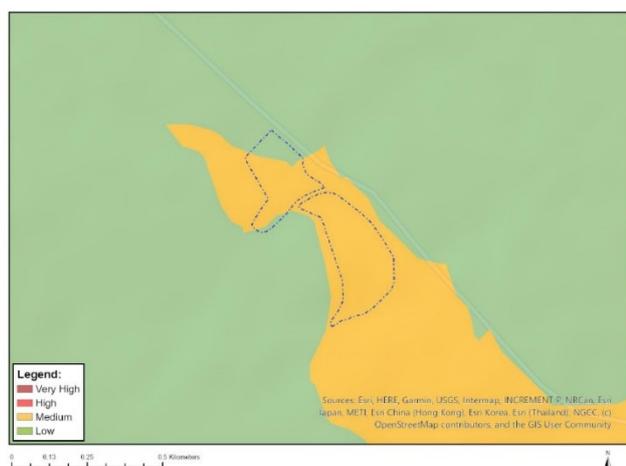
Strictly aquatic environments (such as the riparian vegetation) were not evaluated since they do not form part of terrestrial biodiversity. Nevertheless, they were still scored using the SEI methodology. It was scored as being “Very Low” due to

the absence of SCC and a high RR, but its score was elevated to High by the author given its important functional role in the landscape.

The SEI score interpretations according to the *Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa* (South African National Biodiversity Institute, 2020) are as follows (specifically see Figure 14 and details given in section 10.2):

- Very Low: Minimization mitigation.
- High: Avoidance mitigation wherever possible, and minimization.
- Very High: Avoidance mitigation — no destructive development activities should be considered.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



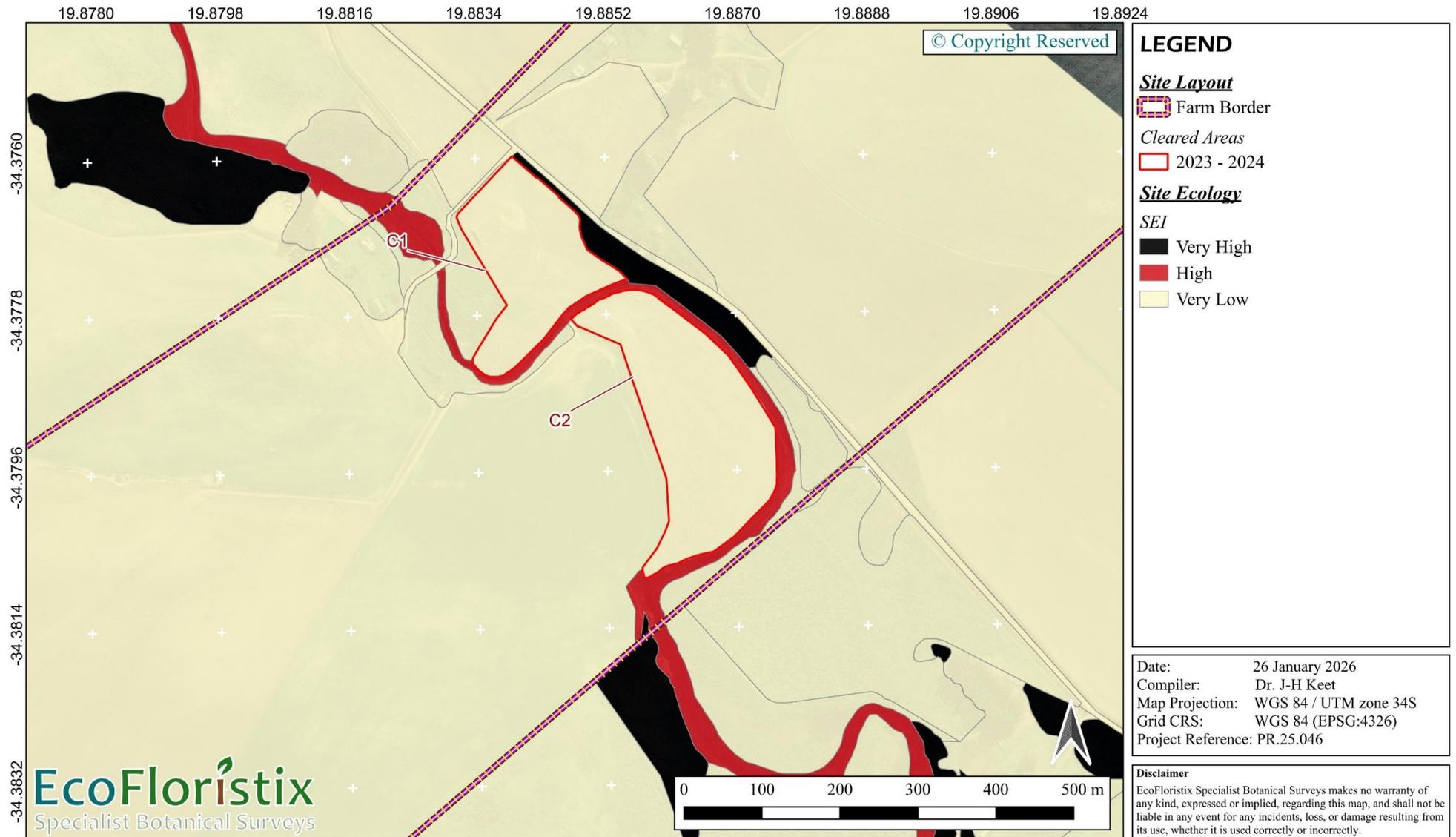
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Figure 11: Relative Plant Species and Terrestrial Biodiversity Theme Sensitivities for the study area and surrounds, as indicated by the National Web-based Environmental Screening Tool.

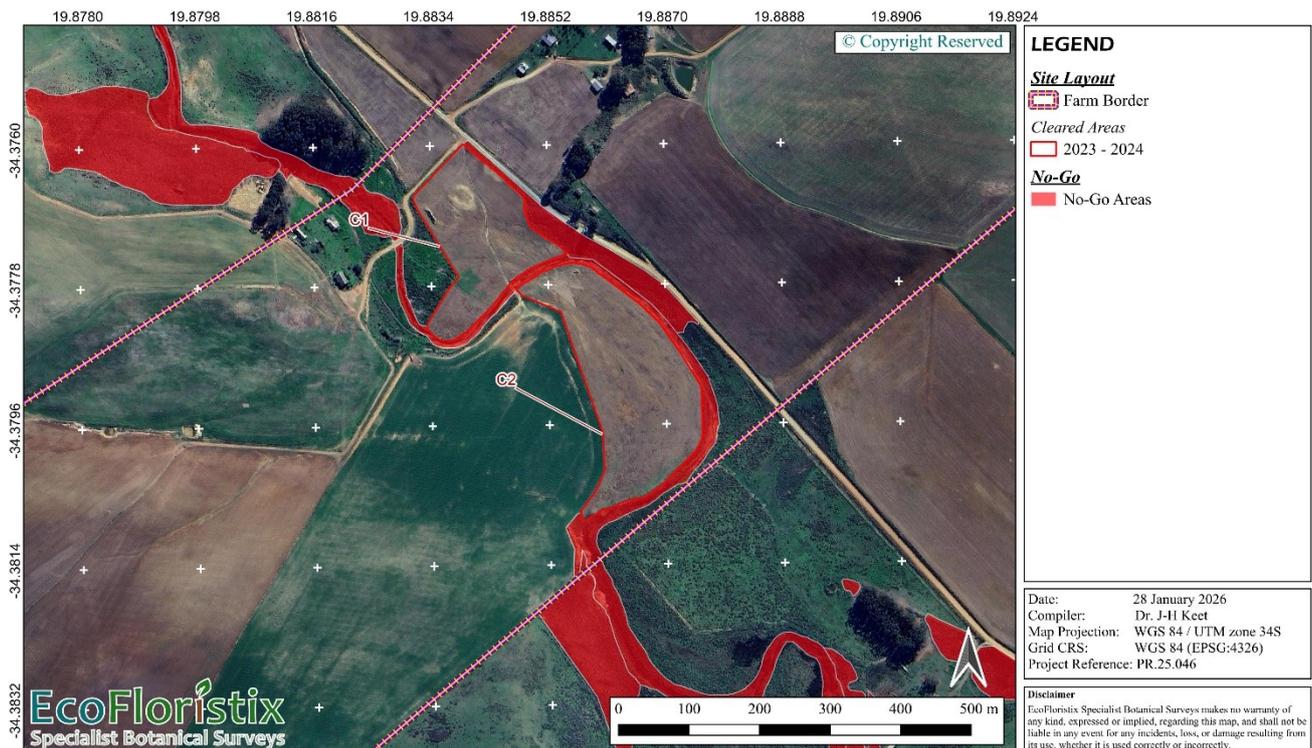
Table 3: Evaluation of Site Ecological Importance (SEI) for the plant community type(s) within the study area. BI = Biodiversity Importance. See section 10.2 for more details.

Plant Community Type / Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	SEI
<i>Cleared Areas</i>	Very Low: No confirmed and highly unlikely populations of SCC.	Low: Several minor and major current negative ecological impacts (invasive and weedy species abundant; parts of it historically ploughed).	High: Habitat that can recover relatively quickly (5–10 years) to restore > 75% of the original species composition and receptor functionality.	Very Low (BI: Very Low)
<i>Natural Floodplain Vegetation</i>	Very Low: No confirmed and highly unlikely populations of SCC.	Very High: No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).	High: Habitat that can recover relatively quickly (5–10 years) to restore > 75% of the original species composition and receptor functionality.	Very Low (BI: Low)
<i>Natural Renosterveld</i>	Very High: Any area of natural habitat of a CR ecosystem type. High: Confirmed or highly likely occurrence of VU species that have a global EOO of > 10 km ² .	Very High: No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).	Medium: Will recover slowly (more than 10 years) to restore > 75% of the original species composition and receptor functionality.	Very High (BI: Very High)
<i>Riparian Vegetation</i>	Very Low: No confirmed and highly unlikely populations of SCC.	Very High: No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).	High: Habitat that can recover relatively quickly (5–10 years) to restore > 75% of the original species composition and receptor functionality.	High (assigned by author) ORIGINAL SCORE: Very Low (BI: Low)
<i>Secondary Floodplain Vegetation</i>	Very Low: No confirmed and highly unlikely populations of SCC.	Medium: Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance (invasive and weedy species abundant; area historically ploughed established population of alien and invasive flora). Moderate rehabilitation potential.	High: Habitat that can recover relatively quickly (5–10 years) to restore > 75% of the original species composition and receptor functionality.	Very Low (BI: Very Low)



Map 16: Site Ecological Importance (SEI) for the study area (see Table 3 for more details) as it would have been scored prior to commencement of the unlawful activities.

2.3.6. No-Go Areas



Map 17: No-Go areas identified within the study area.

Given the information presented in the previous sections, the following No-Go areas would likely have been proposed (Map 17):

- All areas of Central Rûens Shale Renosterveld.
- All areas of riparian vegetation, including a 5 m buffer from its edge.

In contrast, the following areas would have been allowed (Map 17):

- Secondary floodplain vegetation
- A limited amount of natural floodplain vegetation.
- All existing access roads.

In light of this, no major issues are perceived regarding No-Go areas, except that the cleared areas would have slightly overlapped some of the riparian vegetation buffer zone.

3. Impact Risk Assessment

This section describes and summarizes the significance of perceived impacts on the terrestrial ecology of the study area. Potential impacts were evaluated based on desktop and field assessment data. The relevant impacts associated with the activities were then subjected to the impact assessment methodology as described in section 10.4. Finally, relevant maps should be consulted as presented in section 2.3.

As discussed in section 1.3, two Alternatives are assessed, namely the unlawful activities and associated areas (A1), as well as the so-called “Baseline” scenario.

More specifically, the Baseline scenario is where no development or proposed activities occur. It is also sometimes referred to as the “No Development Scenario”, “No-Go Option”, or the “Do Nothing Scenario” — that is, maintaining the present circumstances and not proceeding with the proposed Project (the term “Baseline” is preferred here to avoid confusion with No-Go areas). This can be seen as a baseline against which to measure impacts. Note that this is not always the best scenario, since development can actively mitigate against unwanted and negative on-site conditions (for example proliferation of invasive alien plant species). That is, existing environmental problems may remain unaddressed and can worsen over time due to a lack of innovation, investment in sustainable solutions, or adaptation to ongoing changes. Moreover, important opportunities to implement cleaner technologies and restore ecosystems might be missed.

3.1. Present Impacts to Biodiversity

Anthropogenic activities and influences occur within the landscape, and a few current negative impacts to biodiversity were observed within the study area and broader surrounds. It might reasonably be assumed that these were also present immediately prior to the commencement of clearing activities. They are:

- Weedy native and invasive alien plant species. *Ricinus communis* is the most common invader that was observed on-site, though never to an extreme degree. Also, both *Galenia africana* and *Berkheya rigida* dominated to some degree across the site, as well as alien grasses such as *Bromus diandrus* and *Lolium* spp. These species are usually indicators of disturbances. These might potentially have occurred in the study area prior to clearing, but mostly likely only to large degree in the historically ploughed areas. The respective reference sites also showed that *Galenia africana* can become dominant irrespective of whether a floodplain vegetation area was historically ploughed or not.
- Disturbances in various forms (agricultural activities and gravel roads near the study area) that could cause some negative impacts (for example dust deposition on plants).
- Habitat fragmentation around the study area — due to the roads and other agricultural fields in the broader surrounds — has resulted in the permanent loss of natural habitat. This potentially fragments the home ranges of smaller or less mobile species, and also creates barriers to movement for fauna (and to a lesser degree flora).

3.2. Identification and Assessment of Potential Impacts

The assessment of impact significance usually considers both pre- and post-mitigation scenarios. Moreover, it usually considers these scenarios for all the phases during the project lifecycle, namely:

- Construction: The construction phase refers to the period of construction when all proposed features of the project are constructed.
- Operational: The operational phase refers to the period when the construction phase has been completed, and the proposed activities of the project commences.
- Decommissioning (if applicable): The phase where regular daily activities have ceased, and the project has ended.

Also assessed is the scenario if no development occurs, termed “Baseline”, which is also sometimes referred to as the “No Development Scenario”, “No-Go Option”, or the “Do Nothing Scenario” — that is, maintaining the present circumstances and not proceeding with the proposed project (the term “Baseline” is preferred here to avoid confusion with No-Go areas). This can be seen as a baseline against which to measure impacts. Note that this is not always the best scenario, since development can actively mitigate against unwanted and negative on-site conditions (for example proliferation of invasive alien plant species, degrading infrastructure, pollution etc.). That is, existing environmental problems may remain unaddressed and can worsen over time due to a lack of innovation, investment in sustainable solutions, and adaptation to ongoing changes. Moreover, important opportunities to implement cleaner technologies and restore ecosystems might be missed.

Only construction phase and cumulative impacts are assessed here given that the listed activities addressed in this report entail the clearing of indigenous vegetation, which only occurs during the construction phase.

3.2.1. Construction Phase

3.2.1.a) Plant Communities

Specific Impact(s): Loss of specific plant community types.

Nature and Type of Impact: Negative, Direct.

Baseline Conditions: The unlawfully cleared areas would have consisted of either natural or secondary floodplain vegetation. The respective references sites used to infer historic conditions both showed that the indigenous and often weedy *Galenia africana* becomes dominant, especially in secondary floodplain vegetation. Alien grasses also dominate to some degree in the latter. Thus, it can be inferred that thus would have been the case prior to the commencement of clearing activities. Furthermore, various other indigenous and exotic/invasive weedy species (e.g., *Berkheya herbacea* and *Ricinus communis*) currently dominate, and it is likely that they would have also been present to some degree.

Mitigation Measures: Mitigation measures could have included creating a buffer zone around sensitive ecosystems (such as riparian vegetation), maintaining some form of corridor to facilitate movement, reducing the development footprint, and maximizing the use of secondary floodplain areas for clearing/ploughing while minimizing the usage area of primary floodplain vegetation.

Significance of Impacts:

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Extent	Site-specific	Site-specific	Site-specific
Duration	Short-term	Long-term	Long-term
Magnitude	Very Low	Medium	Low
Consequence	Very Low	Medium	Low
Probability	Improbable	Highly Probable	Highly Probable
Loss of Irreplaceable Resource	No loss	Marginal loss	Marginal loss
Reversibility	Moderately reversible	Moderately reversible	Moderately reversible
Confidence	High	High	High
Significance	Low	Medium	Medium-Low
Avoidance			Limited Avoidance
Management			Moderately Effective

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Mitigation			Moderately Effective
Residual Impact			Medium-Low

3.2.1.b) Potential Loss of plant SCC

Specific Impact(s): Potential Loss of plant SCC.

Nature and Type of Impact: Negative, Direct.

Baseline Conditions: No SCC were observed in the respective reference sites; these also have a distinctly different vegetation compared to nearby Central Rûens Shale Renosterveld which does harbour SCC (see sections 2.3.2 and 2.3.3). Furthermore, no SCC were observed in the study area itself. Thus, it can be inferred that no SCC occur in the study area during the commencement of the clearing activities

Mitigation Measures: Although no SCC were observed, and would not likely have occurred, mitigation measures would have included avoidance of or relocations (where possible) of SCC if any were found.

Significance of Impacts:

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Extent	Site-specific	Site-specific	Site-specific
Duration	Short-term	Short-term	Medium-term
Magnitude	Very Low	Very Low	Low
Consequence	Very Low	Very Low	Very Low
Probability	Improbable	Improbable	Improbable
Loss of Irreplaceable Resource	No loss	No loss	No loss
Reversibility	Not required	Fully reversible	Moderately reversible
Confidence	High	High	High
Significance	Low	Low	Low
Avoidance			Complete Avoidance
Management			Highly Effective
Mitigation			Highly Effective
Residual Impact			Low

3.2.1.c) Invasive Alien Species

Specific Impact(s): Spread and/or establishment of alien and/or invasive species.

Nature and Type of Impact: Negative, Direct.

Baseline Conditions: A total of 2 NEM:BA A&IS Regulations listed invasive species were observed in the study area, namely, *Cirsium vulgare* (Spear thistle, Scotch thistle; Category 1b) and *Ricinus communis* (Castor-oil plant; Category 2). Of these species *Cirsium vulgare* was only observed in a few instances, whereas *Ricinus communis* occurred in larger abundances across the study area. These occur outside the cleared areas in various abundances.

Mitigation Measures: The single most effective mitigation measure for this would have been — and still is — active clearing and management. This also brings about numerous benefits for SCC and threatened ecosystems alike, as mentioned in the previous subsections. Care must also be taken to prevent the further introduction and spread of any new IAPs. If any new IAPs establish on site, then they must be removed using approved clearing methods. Regular monitoring must follow any IAPs removal to prevent regrowth/reestablishment and ensure seedbanks become depleted.

Significance of Impacts:

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Extent	Site-specific	Site-specific	Site-specific
Duration	Long-term	Medium-term	Short-term
Magnitude	Medium	Medium	Low
Consequence	Medium	Low	Very Low
Probability	Highly Probable	Probable	Probable
Loss of Irreplaceable Resource	Marginal loss	Marginal loss	Marginal loss
Reversibility	Moderately reversible	Moderately reversible	Fully reversible
Confidence	High	High	High
Significance	Medium	Low	Low
Avoidance			Partial Avoidance
Management			Highly Effective
Mitigation			Highly Effective
Residual Impact			Low

3.2.2. Cumulative

3.2.2.a) Conservation Targets

Specific Impact(s): Reduced ability to meet conservation targets

Nature and Type of Impact: Negative, Direct.

Baseline Conditions: The study area is not a listed ecosystem and would also not qualify for CBA1 or CBA2 status. This, it would not have been eligible for contributing to conservation targets.

Mitigation Measures: Even though the study area would not have been a prime target for conservation, mitigation would still have included reducing the development footprint while maximizing the use of secondary floodplain areas for clearing/ploughing and minimizing the usage area of primary floodplain vegetation. Also, while the occurrence of SCC would have been highly unlikely, if such were found then mitigation would have included either their complete avoidance or relocation.

Significance of Impacts:

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Extent	Site-specific	Site-specific	Site-specific
Duration	Short-term	Long-term	Medium-term
Magnitude	Low	Low	Low
Consequence	Very Low	Low	Very Low

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Probability	Probable	Highly Probable	Probable
Loss of Irreplaceable Resource	Marginal loss	Marginal loss	Marginal loss
Reversibility	Fully reversible	Moderately reversible	Moderately reversible
Confidence	High	High	High
Significance	Low	Medium-Low	Low
Avoidance			Partial Avoidance
Management			Moderately Effective
Mitigation			Moderately Effective
Residual Impact			Low

3.2.2.b) Broad-Scale Ecological Processes

Specific Impact(s): Disruption of broad-scale ecological processes.

Habitat destruction and fragmentation can potentially disrupt the connectivity of the landscape for fauna and flora, and impair their ability to respond to environmental fluctuations. It can also eventually lead indirectly to the loss of local plant community types, SCC, protected plant species, and genetic diversity, among other things, if these occur on a cumulative basis in the surrounding areas

Nature and Type of Impact: Negative, Indirect.

Baseline Conditions: The study would not have been heavily fragmented prior to the activities. Thus, despite some transformation from historical ploughing in a large part of the study area, it would have been in a moderate to good present ecological state and capable of having fulfilled some ecological functioning within the broader landscape.

Mitigation Measures: Mitigation measures are similar to that previously mentioned, including clearing of IAPs (which restores ecosystem functionally), reducing the development footprint while maximizing the use of secondary floodplain areas for clearing/ploughing and minimizing the usage area of primary floodplain vegetation, and avoidance of SCC should they have been found. Despite the clearing, the development footprint would not have contributed to significant impacts on broad-scale ecological processes.

Significance of Impacts:

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Extent	Site-specific	Site-specific	Site-specific
Duration	Short-term	Long-term	Medium-term
Magnitude	Very Low	Medium	Medium
Consequence	Very Low	Medium	Low
Probability	Improbable	Highly Probable	Highly Probable
Loss of Irreplaceable Resource	No loss	Marginal loss	Marginal loss
Reversibility	Fully reversible	Moderately reversible	Moderately reversible
Confidence	high	High	High
Significance	Low	Medium	Medium-Low
Avoidance			Partial Avoidance
Management			Moderately Effective
Mitigation			Moderately Effective

	Baseline	A1	A1
		Before Mitigation	After Mitigation
Residual Impact			Medium-Low

3.3. Summary of Anticipated Impacts

The following table offers a brief overview of the anticipated impacts within the PAOI and respective significance values, and draws from the assessments presented in the previous section. It is only a concise summary, and the previous section should be consulted for details. Abbreviations: A1 – Alternative 1.

Phase	Impact	Baseline	A1	A1
			Before Mitigation	After Mitigation
Construction	Loss of plant community types	Low	Medium	Medium-Low
Construction	Loss of SCC and/or protected species	Low	Low	Low
Construction	Spread and/or establishment of alien and/or invasive species.	Medium	Low	Low
Cumulative	Reduced ability to meet conservation targets	Low	Medium-Low	Low
Cumulative	Disruption of broad-scale ecological processes	Low	Medium	Medium-Low

4. Proposed Impact Management Actions

4.1. Proposed Mitigation Measures for Consideration in the EMP

Construction Phase	
Impact	Mitigation
<p>Potential impacts on plant communities, and SCC and/or protected plant species.</p>	<p>Any landowners must adhere to their legal obligations to actively eradicate and manage alien vegetation infestations present on the applicable and surrounding properties.</p> <p>SCC and/or protected plant species should be avoided wherever possible. If individuals cannot be avoided, then a permit for their destruction must be obtained from the relevant local authority.</p> <p>No plant species, whether native or exotic, should be brought into, or removed from, the study area, to prevent the spread of exotic or invasive species or the illegal collection of plants.</p> <p>No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purposes without express permission from the Contractor's EO or without the relevant permits.</p> <p>Blanket clearing of vegetation must be limited to the proposed footprint, and only where necessary; no clearing outside of permitted areas may take place.</p> <p>Clearing of vegetation should be minimized and avoided where possible.</p> <p>Immediately rehabilitate all areas outside of the proposed development site that were disturbed and implement mitigation measures to prevent associated impacts from re-occurring.</p>
<p>Spread and/or establishment of alien and/or invasive species.</p>	<p>IAPs, wherever present, must be cleared as per NEM:BA requirements where applicable and must not be allowed to spread.</p> <p>Clearing methods should aim to keep disturbance to a minimum and must be undertaken in accordance with relevant guidelines.</p> <p>Any area that is cleared of IAPs must receive regular follow-up treatments (preferably at least three follow-ups) to ensure that populations do not re-establish after such initial clearing efforts.</p> <p>Any chemicals/herbicides used during clearing efforts must strictly be used only in accordance with the manufacturer's guidelines.</p> <p>Under no circumstances should unqualified persons be allowed to conduct IAPs clearing using chemicals/herbicides or dangerous equipment without supervision from a suitably qualified pest control officer. Such a qualified pest control officer must be present on site at all times during IAPs clearing.</p> <p>No planting or importing of any alien species to the site for landscaping, rehabilitation, or any other purpose should be allowed.</p>

Cumulative Impacts	
Impact	Mitigation
Reduced ability to meet conservation obligations and targets and Impacts on broad-scale ecological processes.	<p>Avoid unnecessary damage to vegetation wherever possible.</p> <p>Any signs of erosion resulting from the project activities must be rectified immediately and monitored thereafter to ensure that there is no re-occurrence.</p> <p>All affected areas resulting from the proposed activities, and that are not part of the proposed activities, should be re-vegetated with locally occurring native species to bind the soil and limit erosion potential.</p> <p>Avoid No-Go areas wherever possible.</p>

5. Conclusion and Impact Statement

5.1. Conclusion

EcoFloristix Specialist Botanical Surveys was appointed to conduct a Plant Species and Terrestrial Biodiversity Impact assessment for a Section 24G application for Retrospective Environmental Authorization (EA) following the unlawful clearing of indigenous vegetation between 2023 and 2024 on Annex Klein Zout Rivier 39, Napier, Western Cape.

The retrospective ecological assessment concludes that the unauthorized clearing of 7.4 hectares of vegetation within the study area resulted in a lower environmental impact than suggested by initial high-level screening tools. The discrepancy between the “Very High” sensitivity rating of the screening tool and the “Very Low” Site Ecological Importance (SEI) determined through ground-truthing is primarily due to localized mapping errors regarding ecosystem types and the failure of broad datasets to account for historic agricultural disturbance. The site is characterized as a lowland floodplain rather than the Critically Endangered Central Rûens Shale Renosterveld, and more than half of the cleared area consisted of secondary vegetation recovering from previous ploughing. While the land is legally recognized as consisting of indigenous vegetation due to the duration of its fallow period (exceeding 10 years), the ecological reality is that these areas remain secondary successional communities with altered soil structures and reduced biological complexity compared to truly natural fragments.

There is no evidence to suggest that any Species of Conservation Concern (SCC) were lost during the clearing activities, as these species are strictly associated with the intact renosterveld fragments that remain undisturbed on the adjacent hill slopes. SCC were absent in both natural and secondary floodplain vegetation, for all reference areas. The primary impacts are localized to the loss of natural and secondary floodplain vegetation and the potential for increased infestation by invasive alien species. These impacts are considered moderately reversible due to the high resilience of the local pioneer plant communities. While the clearing represents a negative direct impact, it does not fundamentally compromise the regional ability to meet biodiversity targets, nor does it significantly fragment the landscape in a way that impairs broad-scale ecological functioning.

Ultimately, the findings suggest that the most significant ecological value in the immediate vicinity lies not within the cleared footprint, but in the surrounding riparian zones and renosterveld fragments, which have remained unaltered and not impacted by the activities. To mitigate the residual impacts of the unauthorized clearing, future management should prioritize the protection of these high-sensitivity areas and implement an invasive alien plant control program. Such measures would ensure that the functional role of the study area as an Ecological Support Area is maintained, despite the reduction in indigenous vegetation cover. The study demonstrates that while the clearing occurred without authorization, the ecological sensitivity of the specific impacted hectares was relatively low, and the most critical components of the local biodiversity remains intact.

The mitigations, management, and associated monitoring regarding all the impacts identified in this report would have been the most important factors of this Project and must have been considered by the competent authority.

5.2. Impact Statement

FINAL STATEMENT

Considering all the findings of this report, it is highly unlikely that any fatal flaws would have been evident had the study been conducted prior to commencement of the unlawful activities, but only as far as the suggested mitigation measures would have been strictly implemented.

PART 2: References, Methodology, and Supplementary Information

EcoFloristix
Specialist Botanical Surveys

6. References

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7. Appendix A: Plant Species List

The plant species list presented here is a combination of online databases (e.g., POSA and iNaturalist) and site survey data, and is indented to provide a comprehensive overview of important species that could potentially occur in the study area and surrounds. However, note that while all species that were observed on site are listed, only SCC from online databases are included.

Descriptions of colours and symbols are given below:

Species in bold :	Species that were observed during the Site Sensitivity Verification.
Species marked with *:	Protected plant species.
Species marked with ~:	Plant Species of Conservation Concern (SCC).
Species highlighted in orange:	Threatened (CR, EN, VU) plant species.
Species highlighted in blue:	Alien plant species.
Species marked with NEM:BA:	Invasive Alien Plant species listed in the NEM:BA A&IS Regulations.
Species marked with PEN:	Provincial Endemic.
Small letters in []:	Vegetation/plant community type in which the species was found:
	<ul style="list-style-type: none"> a: Cleared Areas b: Natural Floodplain Vegetation c: Natural Renosterveld d: Riparian Vegetation e: Secondary Floodplain Vegetation

Family	Species	IUCN	Family	Species	IUCN	Family	Species	IUCN
Rutaceae	~* <i>Acmadenia densifolia</i> ^(PEN)	NT	Ericaceae	~* <i>Erica thomae</i> ^(PEN)	Rare	Orchidaceae	~* <i>Pachites bodkinii</i> ^(PEN)	Rare
Rutaceae	~* <i>Acmadenia macropetala</i> ^(PEN)	VU	Ericaceae	~* <i>Erica truncata</i> ^(PEN)	DDT	Proteaceae	~* <i>Paranomus abrotanifolius</i> ^(PEN)	NT
Aizoaceae	~* <i>Acrodon purpureostylus</i> ^(PEN)	EN	Ericaceae	~* <i>Erica williamsiorum</i> ^(PEN)	VU	Hypoxidaceae	~* <i>Pauridia aemulans</i> ^(PEN)	DDT
Aizoaceae	~* <i>Acrodon quarcicola</i> ^(PEN)	EN	Asteraceae	<i>Eriocephalus africanus</i> var. <i>africanus</i> ^{(PEN)[c]}	LC	Hypoxidaceae	~* <i>Pauridia minuta</i> <i>Pelargonium caucalifolium</i> subsp. <i>caucalifolium</i> ^[c]	NT
Aizoaceae	~* <i>Acrodon subulatus</i> ^(PEN)	EN	Ruscaceae	~* <i>Eriospermum bowianum</i> ^(PEN)	VU	Geraniaceae	<i>caucalifolium</i> ^[c]	LC
Rutaceae	~* <i>Adenandra lasiantha</i> ^(PEN)	VU	Ruscaceae	~* <i>Eriospermum ramosum</i>	Rare	Geraniaceae	~* <i>Pelargonium greytonense</i> ^(PEN)	VU
Rutaceae	~* <i>Adenandra rotundifolia</i> ^(PEN)	NT	Rutaceae	~* <i>Euchaetis diosmoides</i> ^(PEN)	NT	Poaceae	<i>Pennisetum clandestinum</i> ^{(NEM:BA)[b]}	NE
Molluginaceae	~* <i>Adenogramma littoralis</i> ^(PEN)	DDD	Rutaceae	~* <i>Euchaetis laevigata</i> ^(PEN)	VU	Poaceae	~* <i>Pentameris aspera</i>	NT
Rutaceae	~* <i>Agathosma foetidissima</i> ^(PEN)	NT	Rutaceae	~* <i>Euchaetis schlechteri</i> ^(PEN)	VU	Poaceae	~* <i>Pentameris elegans</i>	CR
Rutaceae	~* <i>Agathosma hookeri</i> ^(PEN)	VU	Hyacinthaceae	<i>Eucomis regia</i> ^[c]	LC	Poaceae	<i>Pentameris eriostoma</i> ^[c]	LC
Rutaceae	~* <i>Agathosma minuta</i> ^(PEN)	EN	Euphorbiaceae	~* <i>Euphorbia pseudoglobosa</i> ^(PEN)	EN	Poaceae	<i>Phragmites australis</i> ^[d]	LC
Hyacinthaceae	<i>Albuca cooperi</i> ^[c]	LC	Asteraceae	<i>Felicia filifolia</i> subsp. <i>filifolia</i> ^[c]	LC	Rhamnaceae	~* <i>Phyllica anomala</i> ^(PEN)	EN

Hyacinthaceae	~ <i>Albuca kirstenii</i> ^(PEN)	Rare	Cyperaceae	~ <i>Ficinia elatior</i> ^(PEN)	VU	Rhamnaceae	~ <i>Phyllica calcarata</i> ^(PEN)	VU
Alliaceae	<i>Allium synnotii</i> ^[bce]	LC	Cyperaceae	<i>Ficinia nigrescens</i> ^[c]	LC	Rhamnaceae	~ <i>Phyllica gracilis</i> ^(PEN)	NT
Fabaceae	~ <i>Amphithalea imbricata</i> ^(PEN)	Rare	Cyperaceae	~ <i>Ficinia overbergensis</i> ^(PEN)	NT	Rhamnaceae	~ <i>Phyllica incurvata</i> ^(PEN)	VU
Fabaceae	~ <i>Amphithalea oppositifolia</i> ^(PEN)	Rare	Cyperaceae	<i>Ficinia repens</i> ^[d]	LC	Plantaginaceae	<i>Plantago lanceolata</i> ^[e]	LC
Malvaceae	~ <i>Anisodonte dissecta</i> ^(PEN)	CR	Iridaceae	~ <i>Freesia caryophyllacea</i> ^{(PEN)[c]}	NT	Fabaceae	~ <i>Polhillia brevicalyx</i> ^(PEN)	CR
Rubiaceae	~ <i>Anthospermum ericifolium</i> ^(PEN)	EN	Iridaceae	<i>Freesia refracta</i> ^{(PEN)[c]}	LC	Fabaceae	~ <i>Polhillia connata</i>	CR
Aizoaceae	~ <i>Antimima peersii</i> ^(PEN)	VU	Aizoaceae	<i>Galenia africana</i> ^[abce]	LC	Fabaceae	~ <i>Polhillia pallens</i> ^(PEN)	VU
Fabaceae	~ <i>Argyrolobium pachyphyllum</i> ^(PEN)	EN	Asphodelaceae	<i>Gasteria carinata</i> ^{(PEN)[c]}	LC	Polygalaceae	<i>Polygala garcinii</i> ^[c]	LC
Iridaceae	~ <i>Aristea oligocephala</i> ^(PEN)	NT	Iridaceae	~ <i>Gasteria carinata</i> ^{(PEN)[c]}	LC	Poaceae	<i>Polypogon monspeliensis</i> ^[a]	NE
Iridaceae	~ <i>Aristea palustris</i> ^(PEN)	EN	Iridaceae	~ <i>Geissorhiza imbricata</i> ^(PEN)	NT	Proteaceae	~ <i>Protea acaulos</i> ^(PEN)	NT
Iridaceae	~ <i>Aristea teretifolia</i> ^(PEN)	EN	Aizoaceae	~ <i>Geissorhiza nana</i> ^(PEN)	NT	Proteaceae	~ <i>Protea caespitosa</i> ^(PEN)	VU
Fabaceae	<i>Aspalathus acuminata</i> ^{(PEN)[c]}	LC	Iridaceae	~ <i>Gibbaeum hartmannianum</i> ^(PEN)	VU	Proteaceae	~ <i>Protea caespitosa</i> ^(PEN)	VU
Fabaceae	<i>Aspalathus alpestris</i> ^{(PEN)[c]}	LC	Iridaceae	~ <i>Gladiolus pappi</i> ^(PEN)	Rare	Proteaceae	~ <i>Protea cordata</i> ^(PEN)	NT
Fabaceae	<i>Aspalathus barbiger</i> ^{(PEN)[c]}	VU	Iridaceae	~ <i>Gladiolus teretifolius</i> ^(PEN)	NT	Proteaceae	~ <i>Protea lepidocarpendron</i> ^(PEN)	NT
Fabaceae	~ <i>Aspalathus candidula</i> ^(PEN)	VU	Aizoaceae	<i>Glottiphyllum depressum</i> ^{(PEN)[c]}	LC	Proteaceae	~ <i>Protea obtusifolia</i> ^(PEN)	NT
Fabaceae	~ <i>Aspalathus concava</i> ^(PEN)	DDD	Thymelaeaceae	~ <i>Gnidia ericoides</i> ^(PEN)	EN	Fabaceae	~ <i>Psoralea alata</i> ^(PEN)	VU
Fabaceae	<i>Aspalathus hispida</i> ^[c]	LC	Thymelaeaceae	~ <i>Gnidia ornata</i> ^(PEN)	VU	Fabaceae	~ <i>Psoralea tenuissima</i> ^(PEN)	Rare
Fabaceae	~ <i>Aspalathus joubertiana</i> ^(PEN)	EN	Thymelaeaceae	~ <i>Gnidia strigillosa</i> ^(PEN)	DDT	Asteraceae	<i>Pteronia incana</i> ^[bce]	LC
Fabaceae	~ <i>Aspalathus millefolia</i> ^(PEN)	VU	Thymelaeaceae	~ <i>Gnidia subulata</i> ^(PEN)	DDT	Brassicaceae	<i>Rapistrum rugosum</i> ^[be]	NE
Fabaceae	<i>Aspalathus nigra</i> ^[c]	LC	Asteraceae	~ <i>Gorteria piloselloides</i>	NT	Restionaceae	~ <i>Restio dodii</i> ^(PEN)	VU
Fabaceae	~ <i>Aspalathus obtusifolia</i> ^(PEN)	VU	Celastraceae	<i>Gymnosporia buxifolia</i> ^[bc]	LC	Restionaceae	~ <i>Restio rigoratus</i> ^(PEN)	EN
Fabaceae	~ <i>Aspalathus pycnantha</i> ^(PEN)	VU	Asphodelaceae	~ <i>Haworthia mutica</i> ^(PEN)	DDT	Campanulaceae	~ <i>Rhigiophyllum squarrosus</i> ^(PEN)	VU
Fabaceae	~ <i>Aspalathus quartzicola</i> ^(PEN)	VU	Asteraceae	<i>Helichrysum patulum</i> ^{(PEN)[ce]}	LC	Euphorbiaceae	<i>Ricinus communis</i> ^{(NEM:BA)[ae]}	NE
Fabaceae	~ <i>Aspalathus rosea</i> ^(PEN)	EN	Asteraceae	<i>Helminthotheca echinoides</i> ^[abe]	NE	Campanulaceae	~ <i>Roella arenaria</i> ^(PEN)	VU
Fabaceae	~ <i>Aspalathus salteri</i> ^(PEN)	NT	Malvaceae	<i>Hermannia alnifolia</i> ^[c]	LC	Campanulaceae	~ <i>Roella bryoides</i> ^(PEN)	DDT
Fabaceae	~ <i>Aspalathus smithii</i> ^(PEN)	EN	Malvaceae	<i>Hermannia diversistipula</i> ^[c]	LC	Iridaceae	~ <i>Romulea pilosa</i>	CR
Fabaceae	<i>Aspalathus spinosa</i> ^[c]	LC	Malvaceae	<i>Hermannia lavandulifolia</i> ^{(PEN)[c]}	VU	Theophrastaceae	<i>Samolus porosus</i> ^[d]	LC
Fabaceae	~ <i>Asparagus steudeliana</i> ^(PEN)	VU	Iridaceae	~ <i>Hesperantha fibrosa</i> ^(PEN)	VU	Anacardiaceae	<i>Searsia pallens</i> ^[c]	LC
Asparagaceae	~ <i>Asparagus lignosus</i> ^(PEN)	NT	Iridaceae	~ <i>Hesperantha muirii</i> ^(PEN)	EN	Anacardiaceae	<i>Searsia rosmarinifolia</i> ^[c]	LC
Asparagaceae	<i>Asparagus retrofractus</i> ^[bc]	LC	Iridaceae	~ <i>Hesperantha radiata</i>	NT	Anacardiaceae	~ <i>Searsia stenophylla</i> ^(PEN)	NT
Malvaceae	<i>Hibiscus pusillus</i> ^[c]	LC	Malvaceae	<i>Hibiscus pusillus</i> ^[c]	LC	Gentianaceae	~ <i>Sebaea scabra</i>	NT

Asparagaceae	<i>Asparagus suaveolens</i> [c]	LC	Poaceae	<i>Hypparrhenia hirta</i> [c]	LC	Scrophulariaceae	~ <i>Selago impectita</i> (PEN)	DDT
Asteraceae	<i>Athanasia juncea</i> (PEN)[ce]	LC	Restionaceae	~ <i>Hypodiscus rugosus</i> (PEN)	EN	Scrophulariaceae	~ <i>Selago pinea</i>	EN
Asteraceae	~ <i>Athanasia ocephala</i>	Rare	Restionaceae	~ <i>Hypodiscus squamosus</i> (PEN)	VU	Asteraceae	~ <i>Senecio pillansii</i> (PEN)	NT
Asteraceae	~ <i>Athanasia pectinata</i> (PEN)	VU	Iridaceae	~* <i>Ixia bellendenii</i> (PEN)	Rare	Asteraceae	<i>Senecio rosmarinifolius</i> [ace]	LC
Amaranthaceae	<i>Atriplex semibaccata</i> [ace]	LC	Iridaceae	~* <i>Ixia capillaris</i>	NT	Asphodelaceae	~* <i>Sensitive Species</i> (PEN)	EN
Poaceae	<i>Avena barbata</i> [be]	NE	Iridaceae	~* <i>Ixia erubescens</i> (PEN)	EN	Asphodelaceae	<i>X10</i> (PEN)	VU
Asteraceae	<i>Berkheya rigida</i> [abe]	LC	Iridaceae	~* <i>Ixia longituba</i> subsp. (PEN)	EN	Iridaceae	<i>X11</i> (PEN)	EN
Iridaceae	~* <i>Bobartia longicyma</i> (PEN)	NT	Iridaceae	~* <i>Ixia micrandra</i> (PEN)	NT	Iridaceae	~* <i>Sensitive Species</i> (PEN)	EN
Cyperaceae	<i>Bolboschoenus maritimus</i> [d]	LC	Iridaceae	~* <i>Ixia stricta</i> (PEN)	NT	Iridaceae	<i>X12</i> (PEN)	EN
Poaceae	<i>Bromus diandrus</i> [abe]	NE	Scrophulariaceae	<i>Jamesbrittenia atropurpurea</i> subsp. atropurpurea [e]	LC	Iridaceae	~* <i>Sensitive Species</i> (PEN)	EN
Bruniaceae	~* <i>Brunia laevis</i> (PEN)	NT	Juncaceae	<i>Juncus acutus</i> subsp. leopoldii [a]	LC	Hyacinthaceae	~* <i>Sensitive Species</i> (PEN)	EN
Apiaceae	~* <i>Centella dolichocharpa</i> (PEN)	Rare	Juncaceae	<i>Juncus kraussii</i> subsp. kraussii [d]	LC	Iridaceae	~* <i>Sensitive Species</i> (PEN)	VU
Asteraceae	<i>Chrysocoma ciliata</i> [e]	LC	Thymelaeaceae	~* <i>Lachnaea aurea</i> (PEN)	VU	Geraniaceae	~* <i>Sensitive Species</i> (PEN)	CR
Asteraceae	~* <i>Chrysocoma strigosa</i> (PEN)	VU	Aizoaceae	~* <i>Lampranthus debilis</i> (PEN)	EN	Geraniaceae	~* <i>Sensitive Species</i> (PEN)	VU
Asteraceae	<i>Cirsium vulgare</i> (NEM:BA)[e]	NE	Brassicaceae	<i>Lepidium africanum</i> subsp. africanum [ae]	LC	Iridaceae	~* <i>Sensitive Species</i> (PEN)	EN
Rosaceae	~* <i>Cliffortia heterophylla</i> (PEN)	Rare	Proteaceae	~* <i>Leucadendron coriaceum</i> (PEN)	EN	Iridaceae	~* <i>Sensitive Species</i> (PEN)	EN
Rosaceae	~* <i>Cliffortia monophylla</i> (PEN)	VU	Proteaceae	~* <i>Leucadendron elimense</i> (PEN)	EN	Geraniaceae	~* <i>Sensitive Species</i> (PEN)	EN
Rosaceae	<i>Cliffortia ramosissima</i> [c]	LC	Proteaceae	~* <i>Leucadendron laxum</i> (PEN)	EN	Iridaceae	~* <i>Sensitive Species</i> (PEN)	EN
Rosaceae	~* <i>Cliffortia viridis</i> (PEN)	VU	Proteaceae	~* <i>Leucadendron meridianum</i> (PEN)	NT	Iridaceae	~* <i>Sensitive Species</i> (PEN)	VU
Asteraceae	~* <i>Cotula pusilla</i> (PEN)	VU	Proteaceae	~* <i>Leucadendron modestum</i> (PEN)	NT	Proteaceae	~* <i>Serruria ascendens</i> (PEN)	NT
Crassulaceae	<i>Cotyledon orbiculata</i> var. orbiculata [c]	LC	Proteaceae	~* <i>Leucadendron muiirii</i> (PEN)	NT	Proteaceae	~* <i>Serruria bolusii</i> (PEN)	NT
Crassulaceae	<i>Crassula atropurpurea</i> var. atropurpurea [c]	LC	Proteaceae	~* <i>Leucospermum catherinae</i> (PEN)	VU	Proteaceae	~* <i>Serruria elongata</i> (PEN)	NT
Crassulaceae	~* <i>Crassula bergioides</i> (PEN)	NT	Proteaceae	~* <i>Leucospermum cordifolium</i> (PEN)	NT	Proteaceae	~* <i>Serruria gremialis</i> (PEN)	NT
Crassulaceae	<i>Crassula perfoliata</i> var. perfoliata [c]	LC	Proteaceae	~* <i>Leucospermum gracile</i> (PEN)	NT	Proteaceae	~* <i>Serruria inconspicua</i> (PEN)	NT
Crassulaceae	<i>Crassula subulata</i> [c]	LC	Proteaceae	~* <i>Leucospermum heterophyllum</i> (PEN)	VU	Proteaceae	~* <i>Serruria nervosa</i> (PEN)	NT
Crassulaceae	<i>Crassula tetragona</i> subsp. tetragona [c]	LC	Proteaceae	~* <i>Leucospermum hypophyllocarpodendron</i> subsp. (PEN)	EN	Proteaceae	~* <i>Serruria rebeloi</i> (PEN)	EN
Asteraceae	~* <i>Curio archeri</i> (PEN)[c]	DDT	Proteaceae	~* <i>Leucospermum oleifolium</i> (PEN)	NT	Proteaceae	~* <i>Serruria williamsii</i> (PEN)	EN
Tecophilaeaceae	<i>Cyanella hyacinthoides</i> [c]	LC	Proteaceae	~* <i>Leucospermum truncatulum</i> (PEN)	NT	Iridaceae	~* <i>Sparaxis fragrans</i> (PEN)	EN
Fabaceae	~* <i>Cyclopia genistoides</i>	NT	Proteaceae	~* <i>Leucospermum truncatum</i> (PEN)	NT	Proteaceae	~* <i>Spatalla curvifolia</i> (PEN)	NT

Asteraceae	<i>Cymbopappus adenosolen</i> ^{(PEN)[bc]}	LC	Plumbaginaceae	<i>Limonium kraussianum</i> ^{(PEN)[d]}	LC	Proteaceae	~* <i>Spatalla racemosa</i> ^(PEN)	NT
Poaceae	<i>Cymbopogon marginatus</i> ^[c]	LC	Fabaceae	~ <i>Liparia calycina</i> ^(PEN)	Rare	Proteaceae	~* <i>Spatalla squamata</i> ^(PEN)	NT
Apocynaceae	* <i>Cynanchum viminale</i> ^[c] subsp. <i>viminale</i> ^[c]	LC	Lobeliaceae	~ <i>Lobelia ardisiandroides</i>	VU	Aizoaceae	~* <i>Stayneria neilii</i> ^(PEN)	VU
Poaceae	<i>Cynodon dactylon</i> ^[abce]	LC	Boraginaceae	~ <i>Lobostemon capitatus</i> ^(PEN)	VU	Asteraceae	~ <i>Stoebe rugulosa</i> ^(PEN)	EN
Lobeliaceae	~ <i>Cyphia campestris</i> ~* <i>Cyrtanthus carneus</i> ^(PEN)	VU	Boraginaceae	~ <i>Lobostemon lucidus</i> ^(PEN)	VU	Thymelaeaceae	<i>Struthiola ciliata</i> ^[c] ~* <i>Syringodea longituba</i> ^(PEN)	LC
Amaryllidaceae	~* <i>Cyrtanthus guthrieae</i> ^(PEN)	CR	Poaceae	<i>Lolium multiflorum</i> ^[be]	NE	Iridaceae	subsp. <i>violacea</i> ^(PEN)	NT
Amaryllidaceae	~* <i>Delosperma neethlingiae</i> ^(PEN)	DDT	Fabaceae	~ <i>Lotononis viborgioides</i> ^(PEN)	EN	Poaceae	<i>Tenaxia stricta</i> ^[c]	LC
Aizoaceae	~* <i>Delosperma neethlingiae</i> ^(PEN)	DDT	Fabaceae	~ <i>Lotononis villosa</i> ^(PEN)	EN	Aizoaceae	~* <i>Tetragonia caesia</i> ^(PEN)	EN
Caryophyllaceae	<i>Dianthus albens</i> ^[c]	LC	Solanaceae	<i>Lycium cinereum</i> ^[be]	LC	Aizoaceae	* <i>Tetragonia fruticosa</i> ^[c] ~ <i>Thamnochortus paniculatus</i> ^(PEN)	LC
Rutaceae	~* <i>Diosma passerinoides</i> <i>Diospyros austro-africana</i> var. <i>austro-africana</i> ^[c]	VU	Asteraceae	<i>Macledium spinosum</i> ^[c]	LC	Restionaceae	~ <i>Thamnochortus paniculatus</i> ^(PEN)	NT
Ebenaceae	~* <i>Disphyma dunsdonii</i> ^(PEN)	VU	Rutaceae	~* <i>Macrostylis cauliflora</i> ^(PEN)	EN	Poaceae	<i>Themeda triandra</i> ^[c] ~ <i>Themisium bathyschistum</i> ^(PEN)	LC
Aizoaceae	~* <i>Disphyma dunsdonii</i> ^(PEN)	VU	Hyacinthaceae	~ <i>Massonia setulosa</i>	NT	Santalaceae	~ <i>Themisium bathyschistum</i> ^(PEN)	DDT
Aizoaceae	* <i>Drosanthemum asperulum</i> ^{(PEN)[c]} ~* <i>Drosanthemum calycinum</i> ^{(PEN)[c]}	LC	Campanulaceae	~ <i>Merciera azurea</i> ^(PEN)	EN	Santalaceae	~ <i>Themisium ecklonianum</i> ^(PEN)	EN
Aizoaceae	~* <i>Drosanthemum calycinum</i> ^(PEN) ~* <i>Drosanthemum cereale</i> ^(PEN)	NT	Campanulaceae	~ <i>Merciera leptoloba</i> ^(PEN) ~* <i>Mesembryanthemum napierense</i> ^(PEN)	NT	Santalaceae	~* <i>Themisium fallax</i> ^(PEN)	DDD
Aizoaceae	~* <i>Drosanthemum cereale</i> ^(PEN) ~* <i>Drosanthemum lavisii</i> ^(PEN)	DDT	Aizoaceae	~* <i>Mesembryanthemum vanrensburgii</i> ^(PEN)	EN	Santalaceae	~* <i>Themisium fragile</i>	DDT
Aizoaceae	~* <i>Drosanthemum lavisii</i> ^(PEN) ~* <i>Drosanthemum papillatum</i> ^(PEN)	EN	Aizoaceae	~* <i>Mesembryanthemum vanrensburgii</i> ^(PEN)	NT	Santalaceae	~* <i>Themisium frisea</i> var. <i>frisea</i>	DDT
Aizoaceae	~* <i>Drosanthemum papillatum</i> ^(PEN) ~* <i>Drosanthemum parvifolium</i> ^{(PEN)[bce]}	DDT	Asteraceae	<i>Metalasia acuta</i> ^{(PEN)[c]}	LC	Santalaceae	~* <i>Themisium microcarpum</i>	DDT
Aizoaceae	~* <i>Drosanthemum parvifolium</i> ^{(PEN)[bce]} ~* <i>Drosanthemum striatum</i> ^(PEN)	LC	Asteraceae	~* <i>Metalasia calcicola</i> ^(PEN) ~* <i>Metalasia erectifolia</i> ^(PEN)	NT	Campanulaceae	~* <i>Treichelia dodii</i>	EN
Aizoaceae	~* <i>Drosanthemum striatum</i> ^(PEN) ~* <i>Echiostachys incanus</i> ^(PEN)	VU	Asteraceae	~* <i>Metalasia erectifolia</i> ^(PEN)	NT	Poaceae	<i>Tribolium uniolae</i> ^[c] ~* <i>Trichodiadema occidentale</i> ^(PEN)	LC
Boraginaceae	~* <i>Echiostachys incanus</i> ^(PEN)	VU	Apocynaceae	* <i>Microloma sagittatum</i> ^[c]	LC	Aizoaceae	~* <i>Trichodiadema occidentale</i> ^(PEN) ~* <i>Trichodiadema pygmaeum</i> ^(PEN)	VU
Poaceae	<i>Ehrharta capensis</i> ^[c]	LC	Iridaceae	~* <i>Moraea elsiae</i> ^(PEN) ~* <i>Moraea fergusoniae</i> ^(PEN)	NT	Aizoaceae	~* <i>Trichodiadema pygmaeum</i> ^(PEN)	EN
Restionaceae	~* <i>Elegia recta</i> ^(PEN)	NT	Iridaceae	~* <i>Moraea elsiae</i> ^(PEN) ~* <i>Moraea fergusoniae</i> ^(PEN)	NT	Fabaceae	<i>Trifolium angustifolium</i> ^[bce] var. <i>angustifolium</i> ^[bce]	NE
Restionaceae	~* <i>Elegia squamosa</i> ^(PEN)	EN	Polygalaceae	~* <i>Muraltia barkerae</i> ^(PEN) ~* <i>Muraltia concava</i> ^(PEN)	EN	Iridaceae	~* <i>Tritonia flabellifolia</i> ~* <i>Tritoniopsis bicolor</i> ^(PEN)	NT
Poaceae	<i>Eragrostis curvula</i> ^[c] ~* <i>Erica agglutinans</i> ^(PEN)	LC	Polygalaceae	~* <i>Muraltia barkerae</i> ^(PEN) ~* <i>Muraltia concava</i> ^(PEN)	NT	Iridaceae	~* <i>Tritonia flabellifolia</i> ~* <i>Tritoniopsis bicolor</i> ^(PEN) ~* <i>Tritoniopsis flexuosa</i> ^(PEN)	VU
Ericaceae	~* <i>Erica agglutinans</i> ^(PEN)	EN	Scrophulariaceae	~* <i>Nemesia lucida</i> ^(PEN)	DDT	Iridaceae	~* <i>Tritoniopsis flexuosa</i> ^(PEN)	EN
Ericaceae	~* <i>Erica cineta</i> ^(PEN)	Critically Rare	Asteraceae	<i>Nidorella foetida</i> ^[ace]	LC	Asphodelaceae	~* <i>Tulista marginata</i> ^(PEN)	EN
Ericaceae	~* <i>Erica cineta</i> ^(PEN) ~* <i>Erica colorans</i> ^(PEN) ~* <i>Erica canoniensis</i> ^(PEN)	VU	Asteraceae	~* <i>Nidorella foetida</i> ^[ace] ~* <i>Nidorella ivifolia</i> ^[abce]	LC	Asteraceae	<i>Ursinia discolor</i> ^[c]	LC
Ericaceae	~* <i>Erica cineta</i> ^(PEN) ~* <i>Erica colorans</i> ^(PEN) ~* <i>Erica canoniensis</i> ^(PEN) ~* <i>Erica filiformis</i> var. <i>filiformis</i> ^(PEN)	EN	Apiaceae	<i>Notobubon ferulaceum</i> ^[c] ~* <i>Notobubon striatum</i> ^(PEN)	LC	Poaceae	<i>Vulpia myuros</i> ^[abce] ~* <i>Wahlenbergia debilis</i> ^(PEN)	NE
Ericaceae	~* <i>Erica cineta</i> ^(PEN) ~* <i>Erica colorans</i> ^(PEN) ~* <i>Erica canoniensis</i> ^(PEN) ~* <i>Erica filiformis</i> var. <i>filiformis</i> ^(PEN)	VU	Apiaceae	~* <i>Notobubon ferulaceum</i> ^[c] ~* <i>Notobubon striatum</i> ^(PEN)	NT	Campanulaceae	~* <i>Wahlenbergia debilis</i> ^(PEN)	DDT

Ericaceae	~* <i>Erica</i> <i>irregularis</i> ^(PEN)	EN	Asteraceae	~* <i>Oedera gamotii</i> ^(PEN)	VU	Iridaceae	~* <i>Watsonia</i> <i>aletroides</i> ^(PEN)	NT
Ericaceae	~* <i>Erica</i> <i>lageniformis</i> ^(PEN)	EN	Asteraceae	<i>Oedera uniflora</i> ^{(PEN)[c]}	LC	Fabaceae	~* <i>Wiborgia tenuifolia</i> ^(PEN)	NT
Ericaceae	~* <i>Erica</i> <i>penduliflora</i> ^(PEN)	EN	Asteraceae	~* <i>Osmitopsis parvifolia</i> ^(PEN)	Rare	Fabaceae	~* <i>Wiborgia</i> <i>bowicana</i> ^(PEN)	CR
Ericaceae	~* <i>Erica</i> <i>pulchelliflora</i> ^(PEN)	DDD	Asteraceae	~* <i>Osteospermum</i> <i>hafstroemii</i> ^(PEN)	VU	Colchicaceae	~* <i>Wurmbea inusta</i> ^(PEN)	VU
Ericaceae	~* <i>Erica recurvata</i> ~* <i>Erica regia</i> subsp. <i>regia</i> ^(PEN)	CR	Oxalidaceae	~* <i>Oxalis confertifolia</i> ^(PEN)	DDT	Fabaceae	~* <i>Xiphotheca guthriei</i> ^(PEN)	EN
Ericaceae	~* <i>Erica</i> <i>regia</i> ^(PEN)	EN	Oxalidaceae	~* <i>Oxalis duriuscula</i> ^(PEN)	EN	Asteraceae	~* <i>Zyphelis</i> <i>corymbosa</i> ^(PEN)	EN
Ericaceae	~* <i>Erica squarrosa</i> ^(PEN)	VU	Oxalidaceae	~* <i>Oxalis pardalis</i> ^(PEN)	DDT			

8. Appendix B: Disseminated Evidence of Observed SCC

This section contains information regarding the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area as required by the Protocol for the Specialist Assessment and Minimum Report Content Requirements For Environmental Impacts on Terrestrial Plant Species (GN 1150, 43855, 30 October 2020). Observations were uploaded to iNaturalist (<https://www.inaturalist.org/home>).

Only selected species were uploaded and the list is not intended to be comprehensive. Sensitive species, as determined by the National Web Based Environmental Screening Tool, were not disseminated, and are not listed here since their identities will not be made public.

Taxon ID	Species	Common Name	Hyperlink
579198	<i>Afrosicipoides dioeca</i>		https://www.inaturalist.org/observations/329322900
1038374	<i>Aizoon africanum</i>	Kraalbrush	https://www.inaturalist.org/observations/329322843
1038398	<i>Aizoon pubescens</i>	Coastal Galenia	https://www.inaturalist.org/observations/329322842
579574	<i>Allium synnotii</i>	Cape Onion	https://www.inaturalist.org/observations/329322872
373844	<i>Anthemideae</i>	Chamomiles, Yarrows, And Allies	https://www.inaturalist.org/observations/329322859
580397	<i>Aspalathus acuminata</i>	Longtip Capegorse	https://www.inaturalist.org/observations/329322892
580397	<i>Aspalathus acuminata</i>	Longtip Capegorse	https://www.inaturalist.org/observations/329322917
580402	<i>Aspalathus alpestris</i>	Longneck Capegorse	https://www.inaturalist.org/observations/329322891
580417	<i>Aspalathus barbiger</i>		https://www.inaturalist.org/observations/329322887
580489	<i>Aspalathus hispida</i>	Bristle Capegorse	https://www.inaturalist.org/observations/329322898
580530	<i>Aspalathus nigra</i>	Black Capegorse	https://www.inaturalist.org/observations/329322834
580530	<i>Aspalathus nigra</i>	Black Capegorse	https://www.inaturalist.org/observations/329322920
580530	<i>Aspalathus nigra</i>	Black Capegorse	https://www.inaturalist.org/observations/329322936
524607	<i>Aspalathus spinosa</i>	Spiny Capegorse	https://www.inaturalist.org/observations/329322894
524607	<i>Aspalathus spinosa</i>	Spiny Capegorse	https://www.inaturalist.org/observations/329322912
524607	<i>Aspalathus spinosa</i>	Spiny Capegorse	https://www.inaturalist.org/observations/329322914
495846	<i>Asparagus retrofractus</i>	Zigzag Asparagus	https://www.inaturalist.org/observations/329322857
495846	<i>Asparagus retrofractus</i>	Zigzag Asparagus	https://www.inaturalist.org/observations/329322861
580804	<i>Athanasia juncea</i>	Rush Kanniedood	https://www.inaturalist.org/observations/329322869
580804	<i>Athanasia juncea</i>	Rush Kanniedood	https://www.inaturalist.org/observations/329322870
41919	<i>Atilax paludinosus</i>	Marsh Mongoose	https://www.inaturalist.org/observations/329322943
60177	<i>Atriplex semibaccata</i>	Creeping Saltbush	https://www.inaturalist.org/observations/329322822
60177	<i>Atriplex semibaccata</i>	Creeping Saltbush	https://www.inaturalist.org/observations/329322851
482821	<i>Berkheya rigida</i>	Weed African Thistle	https://www.inaturalist.org/observations/329322841
58345	<i>Bolboschoenus maritimus</i>	Sea Clubbrush	https://www.inaturalist.org/observations/329322903
574731	<i>Brassicaceae</i>		https://www.inaturalist.org/observations/329322846
52702	<i>Bromus diandrus</i>	Great Brome	https://www.inaturalist.org/observations/329322849
582431	<i>Cliffortia ramosissima</i>	Common Caperose	https://www.inaturalist.org/observations/329322896
131587	<i>Colchicum</i>	Men-In-A-Boat	https://www.inaturalist.org/observations/329322941
76462	<i>Cotyledon orbiculata</i>	Varkoor	https://www.inaturalist.org/observations/329322821
525550	<i>Crassula atropurpurea</i>	Purple Stonecrop	https://www.inaturalist.org/observations/329322827
525550	<i>Crassula atropurpurea</i>	Purple Stonecrop	https://www.inaturalist.org/observations/329322830
524336	<i>Crassula perforata</i>	Concertina Plant	https://www.inaturalist.org/observations/329322828
524336	<i>Crassula perforata</i>	Concertina Plant	https://www.inaturalist.org/observations/329322832
582972	<i>Crassula subulata</i>	Bihair Stonecrop	https://www.inaturalist.org/observations/329322922

76467	<i>Crassula tetragona</i>	Kerkei	https://www.inaturalist.org/observations/329322838
913202	<i>Curio archeri</i>	Toxic Beads	https://www.inaturalist.org/observations/329322811
913202	<i>Curio archeri</i>	Toxic Beads	https://www.inaturalist.org/observations/329322825
583190	<i>Cymbopappus adenosolen</i>		https://www.inaturalist.org/observations/329322868
583190	<i>Cymbopappus adenosolen</i>		https://www.inaturalist.org/observations/329322933
583190	<i>Cymbopappus adenosolen</i>		https://www.inaturalist.org/observations/329322944
515686	<i>Cynanchum viminalis</i>	Caustic Vine	https://www.inaturalist.org/observations/329322829
583618	<i>Dianthus albens</i>	Pale Pink	https://www.inaturalist.org/observations/329322839
583618	<i>Dianthus albens</i>	Pale Pink	https://www.inaturalist.org/observations/329322895
583880	<i>Diospyros austro-africana</i>	Firestick Starapple	https://www.inaturalist.org/observations/329322816
475002	<i>Disa bracteata</i>	Bract Disa	https://www.inaturalist.org/observations/329322884
60108	<i>Drosanthemum</i>	Dewfigs	https://www.inaturalist.org/observations/329322818
60108	<i>Drosanthemum</i>	Dewfigs	https://www.inaturalist.org/observations/329322911
60108	<i>Drosanthemum</i>	Dewfigs	https://www.inaturalist.org/observations/329322921
584196	<i>Drosanthemum asperulum</i>	Weedy Dewfig	https://www.inaturalist.org/observations/329322875
569498	<i>Drosanthemum calycinum</i>	Shiny Dewfig	https://www.inaturalist.org/observations/329322820
569498	<i>Drosanthemum calycinum</i>	Shiny Dewfig	https://www.inaturalist.org/observations/329322925
584262	<i>Drosanthemum parvifolium</i>	Minileaf Dewfig	https://www.inaturalist.org/observations/329322840
584262	<i>Drosanthemum parvifolium</i>	Minileaf Dewfig	https://www.inaturalist.org/observations/329322908
64143	<i>Ehrharta</i>	Veldtgrasses	https://www.inaturalist.org/observations/329322873
584424	<i>Elegia microcarpa</i>	Minihead Deckreed	https://www.inaturalist.org/observations/329322939
120244	<i>Eucomis regia</i>	King Pineapple Lily	https://www.inaturalist.org/observations/329322886
585772	<i>Exomis microphylla</i>	Brakbos	https://www.inaturalist.org/observations/329322880
528743	<i>Felicia filifolia</i>	Fine Felicia	https://www.inaturalist.org/observations/329322806
585945	<i>Ficinia repens</i>		https://www.inaturalist.org/observations/329322942
599427	<i>Gasteria carinata carinata</i>		https://www.inaturalist.org/observations/329322831
599427	<i>Gasteria carinata carinata</i>		https://www.inaturalist.org/observations/329322833
599427	<i>Gasteria carinata carinata</i>		https://www.inaturalist.org/observations/329322835
524318	<i>Glottiphyllum depressum</i>	Shade Tonguefig	https://www.inaturalist.org/observations/329322923
524318	<i>Glottiphyllum depressum</i>	Shade Tonguefig	https://www.inaturalist.org/observations/329322937
586670	<i>Gymnosporia buxifolia</i>	Common Spikethorn	https://www.inaturalist.org/observations/329322805
578243	<i>Helichrysum patulum</i>	Honey Everlasting	https://www.inaturalist.org/observations/329322815
587192	<i>Hermannia alnifolia</i>	Fanleaf Dollsrose	https://www.inaturalist.org/observations/329322807
587226	<i>Hermannia diversistipula</i>		https://www.inaturalist.org/observations/329322888
587257	<i>Hermannia lavandulifolia</i>	Lavender Dollsrose	https://www.inaturalist.org/observations/329328906
587493	<i>Hibiscus pusillus</i>	Bladderweed	https://www.inaturalist.org/observations/329322826
52643	<i>Juncus</i>	Rushes	https://www.inaturalist.org/observations/329322865
323423	<i>Juncus kraussii</i>	Brak Rush	https://www.inaturalist.org/observations/329322901
323423	<i>Juncus kraussii</i>	Brak Rush	https://www.inaturalist.org/observations/329322907
164507	<i>Lepidium africanum</i>	African Pepperwort	https://www.inaturalist.org/observations/329322844
589185	<i>Limonium kraussianum</i>	Overberg Sea-Lavendar	https://www.inaturalist.org/observations/329322938
58333	<i>Lycium</i>	Honeythorns	https://www.inaturalist.org/observations/329322862
532043	<i>Lycium cinereum</i>	Brownstem Honeythorn	https://www.inaturalist.org/observations/329322852
532043	<i>Lycium cinereum</i>	Brownstem Honeythorn	https://www.inaturalist.org/observations/329322910
589516	<i>Macleodium spinosum</i>	Spiny Dollprotea	https://www.inaturalist.org/observations/329322810
589904	<i>Metalasia acuta</i>	Pointy Blombush	https://www.inaturalist.org/observations/329322918
467690	<i>Microlooma sagittatum</i>	Rockcandy Minimouth	https://www.inaturalist.org/observations/329322804
467690	<i>Microlooma sagittatum</i>	Rockcandy Minimouth	https://www.inaturalist.org/observations/329322930

82937	<i>Moraea</i>	Tulps	https://www.inaturalist.org/observations/329322883
590626	<i>Nidorella foetida</i>	Stink Vleiweed	https://www.inaturalist.org/observations/329322847
847544	<i>Nidorella ivifolia</i>	Ovenbush	https://www.inaturalist.org/observations/329322855
590660	<i>Notobubon ferulaceum</i>	Wild Blisterbush	https://www.inaturalist.org/observations/329322906
590660	<i>Notobubon ferulaceum</i>	Wild Blisterbush	https://www.inaturalist.org/observations/329322913
590723	<i>Oedera uniflora</i>	Limestone Perdekaroo	https://www.inaturalist.org/observations/329322874
600603	<i>Pelargonium caucalifolium</i> <i>caucalifolium</i>		https://www.inaturalist.org/observations/329322927
436796	<i>Pentameris</i>		https://www.inaturalist.org/observations/329322877
64237	<i>Phragmites australis</i>	Common Reed	https://www.inaturalist.org/observations/329322836
141717	<i>Phymateus leprosus</i>	Leprous Milkweed Locust	https://www.inaturalist.org/observations/329322817
570659	<i>Polygala garcini</i>	Slender Falsepea	https://www.inaturalist.org/observations/329322926
524304	<i>Pteronia incana</i>	Ash Gumbush	https://www.inaturalist.org/observations/329322812
56739	<i>Ricinus communis</i>	Castor Bean	https://www.inaturalist.org/observations/329322856
443243	<i>Samolus porosus</i>	Water Pimpernel	https://www.inaturalist.org/observations/329322904
593892	<i>Searsia longispina</i>	Thorn Curranthrus	https://www.inaturalist.org/observations/329322945
593905	<i>Searsia pallens</i>	Ribbed Kunirhus	https://www.inaturalist.org/observations/329322813
593914	<i>Searsia rehmanniana</i>	Blunt-Leaved Currant-Rhus	https://www.inaturalist.org/observations/329322897
528462	<i>Searsia rosmarinifolia</i>	Rosemary Curranthrus	https://www.inaturalist.org/observations/329322808
569496	<i>Senecio burchellii</i>	Kill Ragwort	https://www.inaturalist.org/observations/329322854
320592	<i>Struthiola ciliata</i>	Rope Capespray	https://www.inaturalist.org/observations/329322890
528778	<i>Tetragonia fruticosa</i>	Sprawling Seacoral	https://www.inaturalist.org/observations/329322864
528778	<i>Tetragonia fruticosa</i>	Sprawling Seacoral	https://www.inaturalist.org/observations/329322871
1273011	<i>Thesium nigroperianthum</i>		https://www.inaturalist.org/observations/329322928
595897	<i>Ursinia discolor</i>		https://www.inaturalist.org/observations/329322932

9. Appendix C: Methodology Desktop Phase

This assessment was conducted according to the 2014 EIA Regulations, as amended on 7 April 2017, as well as according to the most up to date *Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa* (South African National Biodiversity Institute, 2020) and the *Ecosystem Environmental Assessment Guideline: Draft* (<http://opus.sanbi.org/jspui/handle/20.500.12143/7624>).

A desktop assessment was undertaken using an appropriate Geographic Information System (GIS) and the latest available spatial datasets, as well as relevant online biodiversity databases and/or literature (these are listed where applicable). The aim of this was to develop local digital cartographs and species lists/databases. The various subsections that follow expand upon this desktop assessment.

It must be noted that during the entirety of this project it was assumed that all third-party information used — e.g., GIS software and data, satellite imagery, mapping algorithms, etc. — was correct and accurate at the time of their use. The author of this report accepts no liability for any erroneous data or algorithms produced by any third-parties, or any subsequent products derived from such data.

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9.1. Ecologically Important Landscape Features: Custom GIS Mapping

The GIS was used together with the latest satellite imagery to delineate and map observable landscape features in the study area and surrounds. Specifically, attention was given to homogenous units that could easily be recognized. Some examples of such features include watercourses, plains and floodplains, hill- and mountain tops, and hill- and mountains slopes (if present and if sufficiently large and distinct from surrounding features), as well as areas that have distinctly recognizable vegetation features, such as the presence/absence of large trees and/or shrubs, and vegetation patches of differing colours — these likely represent distinct plant community types. However, while satellite imagery is highly useful, it nevertheless suffers from several issues. For example, these include the generation of areas where image stitching has resulted in different colours for the same features, or imagery that might not have a high enough resolution, among other things. For this reason ground truthing is required to validate and refine the results of such desktop analyses.

9.2. Ecologically Important Landscape Features: Existing Data

Existing ecologically relevant data layers were incorporated into the GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

9.2.1. Red List of Ecosystems for South Africa

The Red List of Ecosystems (RLE; <http://bgis.sanbi.org/Projects/Detail/1233/>) for South Africa is a dataset containing the historical/potential extent, as well as the remaining remnants, of each ecosystem type. This represents a revision of the “List of terrestrial ecosystems that are threatened or in need of protection” published in December 2011. Ecosystems are categorised into one of four classes representing their risk of collapse, namely Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC). The units of assessment for the RLE are the vegetation types of VegMap (see section 9.3.2).

9.2.2. National Biodiversity Assessment 2018

The National Biodiversity Assessment 2018 (NBA) (Skowno et al., 2019) assessed the state of South Africa’s biodiversity based on the best available science to understand temporal trends, and informs policy and decision-making across a range of sectors. The NBA deals with three biodiversity components: 1) genetics, 2) species, and 3) ecosystems. The NBA also assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine, and marine environments. The two headline indicators assessed in the NBA are:

- ▶ **Ecosystem Threat Status:** An indicator of ecosystem wellbeing. This concerns the amount of change regarding ecosystem structure, function, and/or composition, based on the proportion of the original extent of each ecosystem type still currently in good ecological condition. Specifically, ecosystem threat levels are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), or Least Concern (LC).
- ▶ **Ecosystem Protection Level:** An indicator of how well ecosystems are adequately protected or under-protected. Specifically, ecosystems protection levels are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on biodiversity targets for each ecosystem type included within one or more protected areas. So-called “under-protected ecosystems” include NP, PP, or MP ecosystem types.

9.2.3. Protected Areas

National Protected Areas Expansion Strategy (NPAES; SANBI, 2010): NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These present the best opportunities for meeting ecosystem-specific protected area targets set out in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. NPAES focus areas are large, intact, and unfragmented, and are therefore highly important for biodiversity, climate resilience, and freshwater protection. Note that these areas are not necessarily future protected area boundaries — often times only a portion of a particular focus area would be required to meet protected area targets. Moreover, they do not replace fine scale planning. Such planning might identify many different priority sites based on local requirements, constraints, and opportunities.

9.2.4. Hydrological Features: Strategic Water Source Areas

Strategic Water Source Areas (SWSAs) represent 10% of South Africa’s land area that provides a disproportionate 50% of the country’s water runoff. The localities of SWSAs are crucial for planning and managing water resources, including the ecosystems that support water quality and quantity (SWSAs extend into Lesotho and eSwatini).

9.2.5. Hydrological Features: National Freshwater Ecosystem Priority Area Status

South African river systems are categorised based on ecological criteria (such as ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to better conserve aquatic ecosystems, and are represented by Freshwater Ecosystem Priority Areas (FEPAs) (Nel et al., 2011). FEPAs are intended to support conservation and are intended to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals.

9.2.6. Biodiversity Spatial Plan

Biodiversity Spatial Plans classify areas based on their contribution towards provincial conservation targets. Various land use types are classified according to their biodiversity and environmental importance as follows:

- ▶ **Critical Biodiversity Areas (CBAs):** areas that are required to meet biodiversity targets for species, ecosystems, or ecological processes and infrastructure. CBAs are of high biodiversity and ecological value and must be kept in a natural or near-natural state, with no further loss of habitat or species. Moreover, degraded areas should be rehabilitated to natural or near-natural conditions, and only low-impact, biodiversity-sensitive land uses are appropriate. Examples are areas required to meet biodiversity pattern (e.g. species and ecosystems) targets, Critically Endangered (CR) ecosystems, all areas required to meet ecological infrastructure targets, and critical corridors that maintain landscape connectivity. Two subtypes are distinguished:
 - CBA Irreplaceable (CBA 1): Areas that are critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable species populations and ecosystem functionality.
 - CBA Optimal (CBA 2): Areas which represent the best localities, from a potentially larger selection of available planning units, that are optimally located to meet conservation targets, as well as other criteria.
- ▶ **Ecological Support Areas (ESAs):** the ecological functioning and sustainability of CBAs require support from additional areas, namely ESAs. Although ESAs are not essential for meeting biodiversity targets, they are nevertheless important for supporting PAs or CBAs. ESAs are often crucial for delivering ecosystem services. For terrestrial and aquatic environments, such areas are functional, but not necessarily pristine and natural. However, they are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within CBAs, and also contribute significantly to the maintenance of ecological infrastructure. Two subtypes are distinguished:
 - ESA 1: Areas that might still be functional, and could be natural, near-natural, or moderately degraded.
 - ESA 2: Areas that are severely degraded or have no natural cover remaining and therefore require restoration.
- ▶ **Other Natural Areas (ONAs):** Some areas have not been identified as a priority in the current biodiversity spatial plan. However, they retain most of their natural character, and still perform many biodiversity and ecological infrastructure functions. Therefore, they are an important part of the natural ecosystem. It is desirable that ONAs, where possible, are managed or utilized to minimize habitat and species loss, and that ecosystem functionality through strategic landscape planning is ensured.
- ▶ **Severely Modified to No Natural Remaining (NNR):** These areas have been severely modified by human activity. They are no longer natural and do not contribute to biodiversity targets. However, these areas may still provide

limited biodiversity and ecological infrastructure functions (and could potentially be useful for restoration/rehabilitation endeavours).

- ▶ **Protected Areas (PAs):** Areas that are formally protected by law in terms of the NEM:PAA. This includes gazetted private Nature Reserves and Protected Environments.

9.3. Botanical Assessment

The flora of the region was assessed both floristically (species identity) and compositionally (community assembly patterns).

9.3.1. Species Identities

Various reasons exist why the flora of a region cannot be fully catalogued within a limited timeframe (or even an extended timeframe; specifically see section 1.5). Therefore, the following data sources were used to obtain historical distribution records to develop a comprehensive list of plant species potentially occurring within the study area and broader region:

- **Botanical Database of Southern Africa (BODATSA; also often referred to as POSA [Plants of southern Africa]):** this is an electronic database hosted by the South African National Biodiversity Institute (SANBI) that provides herbarium records collected in the region (<http://posa.sanbi.org/>). Records were specifically extracted from a very large area surrounding the actual study area.
- **The Red List of South African Plants** (Raimondo et al., 2009): this online database (<http://redlist.sanbi.org/>) provides the most current national status of South Africa's vascular plant species. This was used to assess SCC¹, which are taxa (in this case plant species) that have a significant conservation importance for preserving South Africa's high biological diversity. SCC have a high conservation importance in terms of preserving South Africa's high floristic diversity, and include threatened species (CR, EN, and VU), as well as NT or DD, and also includes range-restricted species which are not declining and are nationally listed as "Rare" or "Extremely Rare" (also referred to in some Red Lists as Critically Rare; see Figure 12) (South African National Biodiversity Institute, 2020). Note that SANBI divides the IUCN category DD into "Data Deficient: Insufficient Information (DDD)", and "Data Deficient: Taxonomically Problematic (DDT)". When SCC occur in a study area or PAOI, the proposed activities could impact them and result in significant biodiversity loss — the loss of SCC populations might either increase the extinction risk of the respective species, or might even contribute toward their extinction. As such, it is very important to note that a permit must be obtained from the relevant local authorities to destroy or relocate any SCC (or even protected species).
- **iNaturalist:** this is a comprehensive online platform (<https://www.inaturalist.org/>) to which numerous citizen scientists contribute distribution records of biodiversity, mostly in the form of photos. Although many of the users are not professional botanists, various recognized botanical experts from across the globe assist in accurate species

¹ Note that all South African plants have been assessed (i.e., assigned a red list category, or "redlisted") by the Red List of South African Plants. Therefore, using the terms "redlist" or "red list" specifically for Threatened or other conservation concern species is not accurate (even though it remains popular). The term "Species of Conservation Concern" (or SCC) is preferable, or "Threatened" where applicable.

identification, and the platform is therefore an invaluable source of information regarding biodiversity. Nevertheless, to ensure a higher data reliability (i.e., only relevant/accurate records), the following parameters were used to extract records for this project: Quality Grade = “Research”; Identifications = “most agree”; Captive / Cultivated = “no”. Records were specifically extracted from a very large area surrounding the actual study area. However, to minimize redundancy, and to provide the most likely set of plant species that might occur on site, the retrieved geospatial records were filtered by the vegetation types underlying the study area (as mapped by VegMap; see section 9.3.2).

- National Web Based Environmental Screening Tool:** a geographically based, web-enabled governmental application (<https://screening.environment.gov.za/screeningtool/#/pages/welcome>) which allows a proponent intending on submitting an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended, to screen their study area for environmental sensitivity. Of specific interest for this report are the potential presences of so-called “sensitive plant species” that might occur in the study area and surrounds, as well as any terrestrial biodiversity features listed as having a “Very High” sensitivity rating.

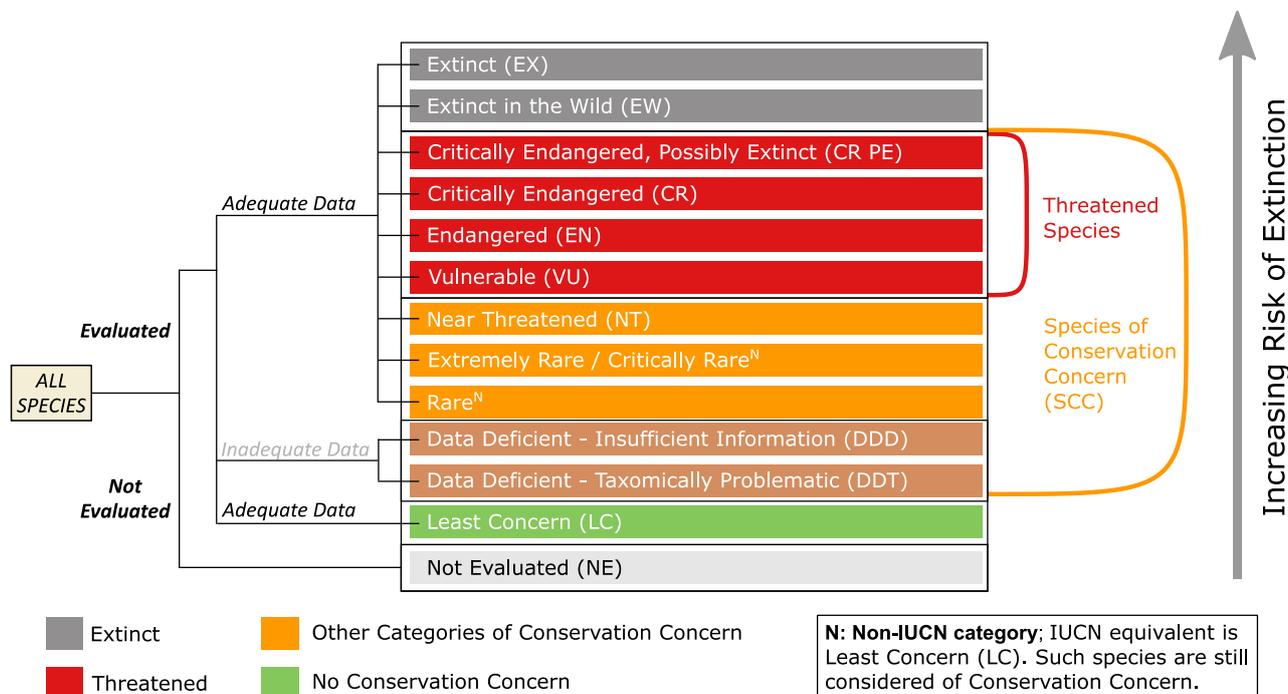


Figure 12: Red List and SCC categories used in this report as originally delineated according to SANBI’s Red List of South African Plants (<http://redlist.sanbi.org/redcat.php>), and recently updated in the *Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa* (South African National Biodiversity Institute, 2020).

Although not explicitly required by the relevant gazetted protocols, protected plant species were also surveyed for and included in this project. The lists obtained from the aforementioned databases were used to identify such protected plant species. These species are protected by NEM:BA, as well as other provincial legislation (see section 1.6). Briefly, no person may sell, buy, transport, destroy, or harvest a protected plant without a permit from the relevant authority.

Finally, the lists obtained from these databases were used to identify invasive alien plant species (IAPs) that are listed in the NEM:BA A&IS Regulations. IAPs can dominate, and even replace, native flora. Therefore, they have the ability to completely transform the structure, composition, and functioning of ecosystems. IAPs must be controlled, and preferably eradicated, by means of an eradication and monitoring program (see below for details).

9.3.1.a) NEM:BA Alien and Invasive Species Regulations

The NEM:BA A&IS Regulations is the most current legislation regarding IAPs. The list of Alien Invasive Species was first published in August 2014 in terms of NEM:BA, with subsequent updates. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation requires the removal and/or control of Category 1a and 1b IAPs. In addition, unless authorised in terms of the National Water Act, no land user may allow Category 2 IAPs to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam, or wetland. Category 3 IAPs are also prohibited from occurring close to a watercourse.

The NEM:BA A&IS Regulations categories are, briefly, as follows:

- **Category 1a:** Invasive species requiring compulsory control. All specimens must be removed and destroyed, and the species must be eradicated from the environment. No permits will be issued.
- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control program. All specimens must be removed and destroyed. Since these IAPs can have a high invasive potential, infestations may qualify for a government sponsored invasive species management program. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy, or accept as a gift any Category 2 IAPs. No permits will be issued for Category 2 plants to exist in riparian zones.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake restricted activities such as importing, possessing, growing, breeding, moving, selling, buying, or accepting as a gift any Category 3 IAPs. No permits will be issued for Category 3 plants to exist in riparian zones.

According to the NEM:BA A&IS Regulations, any person in control of a Category 1b IAPs must immediately:

- Notify the competent authority in writing; and
- Take steps to manage the listed invasive species in compliance with:
 - Section 75 of NEM:BA;
 - The relevant invasive species management program developed in terms of regulation 4; and
- Any directive issued in terms of section 73(3) of NEM:BA.

9.3.2. Community Composition: Vegetation Types

The vegetation types (and their conservation statuses) of the study area, as well as the broader regions surrounding the study area, were verified using the South African National Vegetation Map, or simply “VegMap” (Dayaram et al., 2018; Mucina & Rutherford, 2006; South African National Biodiversity Institute, 2018) and the Red List of Ecosystems (see section 9.2.1). The latest version of VegMap was consulted for any updates of the respective regions. Vegetation

descriptions given are as per VegMap 2006 except where new vegetation types have been added by subsequent updates — in such cases the latest descriptions have been used. All of the units were also cross-validated with VegMap 2024 to inspect their respective extents.

10. Appendix D: Methodology Fieldwork Phase

Briefly, the field surveys aimed to investigate the following on-site aspects:

- The occurrence of SCC and protected plant species;
- The specific vegetation types (identification, classification, and delineation); and
- The specific habitat/community types (classification and delineation).

10.1. Botanical Assessment Details

Surveying was done within specifically targeted areas that were perceived as ecologically distinct and/or sensitive based on the results obtained from the desktop assessment of plant community types (sections 9.1 and 9.2). This was to optimize coverage and to perform a rapid, but efficient, vegetation and ecological assessment at each survey area.

The botanical assessment was conducted by surveying fixed-point plots of sufficient size within each community type, which were also supplemented with timed meanders (South African National Biodiversity Institute, 2020) within the respective community types. This combination is highly efficient for conducting floristic analyses. This allows plant species coverages and SCC occurrences to be rapidly estimated, as well as the compilation of adequate plant species lists, thereby giving a prompt indication of botanical diversity. Other useful observations were also recorded where applicable within each community type, examples of which include ecological condition and current impacts (examples of which could include the presence of invasive alien plant species, livestock grazing, degree of erosion, etc.), general vegetation density and physiognomic characteristics, habitat notes, and the presence of any sensitive features (e.g., wetlands, seepages, and drainage lines). Finally, any opportunistic observations were also made while surveying.

Various field guides and identification manuals were used for plant identification, as well as other relevant literature regarding the ecology of the region (Bromilow, 2010; Curtis-Scott et al., 2020; Dorrat-Haaksma & Linder, 2012; Esler et al., 2014; Henderson, 2020; Johnson et al., 2015; Manning, 2007; Manning & Goldblatt, 2012; Manning & Helme, 2024; van Ginkel & Cilliers, 2020), and are listed in section 6.

10.2. Sensitivities: Terrestrial Plant Species Sensitivity Criteria

The protocol for the *Specialist Assessment And Minimum Report Content Requirements For Environmental Impacts On Terrestrial Plant Species* (Gazette 43855 No. 1150) provides various criteria that define the plant species sensitivity categories Very High, High, Medium, and Low. These are provided below, together with relevant notes where applicable.

Sensitivity	Criteria	Notes
Very High	<ul style="list-style-type: none"> Critical Habitat for range restricted species of conservation concern that have a global range of less than 10 km². SCC listed on the IUCN Red List of Threatened Species or on South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. 	These areas are irreplaceable in terms of SCC.
High	<ul style="list-style-type: none"> Confirmed habitat for SCC. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria. 	These areas are unsuitable for development due to a very likely impact on SCC.
Medium	<ul style="list-style-type: none"> Suspected habitat for SCC based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. 	(None given)
Low	<ul style="list-style-type: none"> Areas where no natural habitat remains. Natural areas where there is no suspected occurrence of SCC. 	(None given)

10.3. Sensitivities: Terrestrial Site Ecological Importance (SEI)

The most current site sensitivity methodology, namely the Site Ecological Importance (SEI), was followed here, as proposed by the *Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa* (South African National Biodiversity Institute, 2020).

The different plant community types within the Project Area were delineated and identified based on field observations and satellite imagery (also see section 9.1). These plant community types were assigned SEI categories based on various factors, such as ecological integrity, conservation value, functionality, ecosystem processes, and the presence/absence of SCC, among other things.

Specifically, SEI is a function of two factors (Figure 13): 1) The Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community, or habitat type) and Receptor Resilience (RR; the resilience of the receptor to impacts). BI is in turn a function of Conservation Importance (CI; the importance of a site for supporting biodiversity features of conservation concern that are present) and the Functional Integrity (FI; the receptors' current ability to maintain its structure and functions, compared to its known or predicted state under ideal conditions) of the receptor.

BI and SEI are both calculated using respective risk matrices (Figure 14). BI, FI, and RR categories are all circumscribed by various criteria (see Table 4, Table 5, and Table 6). The various criteria per category may be applied in combination or in isolation. See Figure 14 for guidelines on interpreting the resulting SEI categories. SEI is usually evaluated per plant community type / vegetation type.

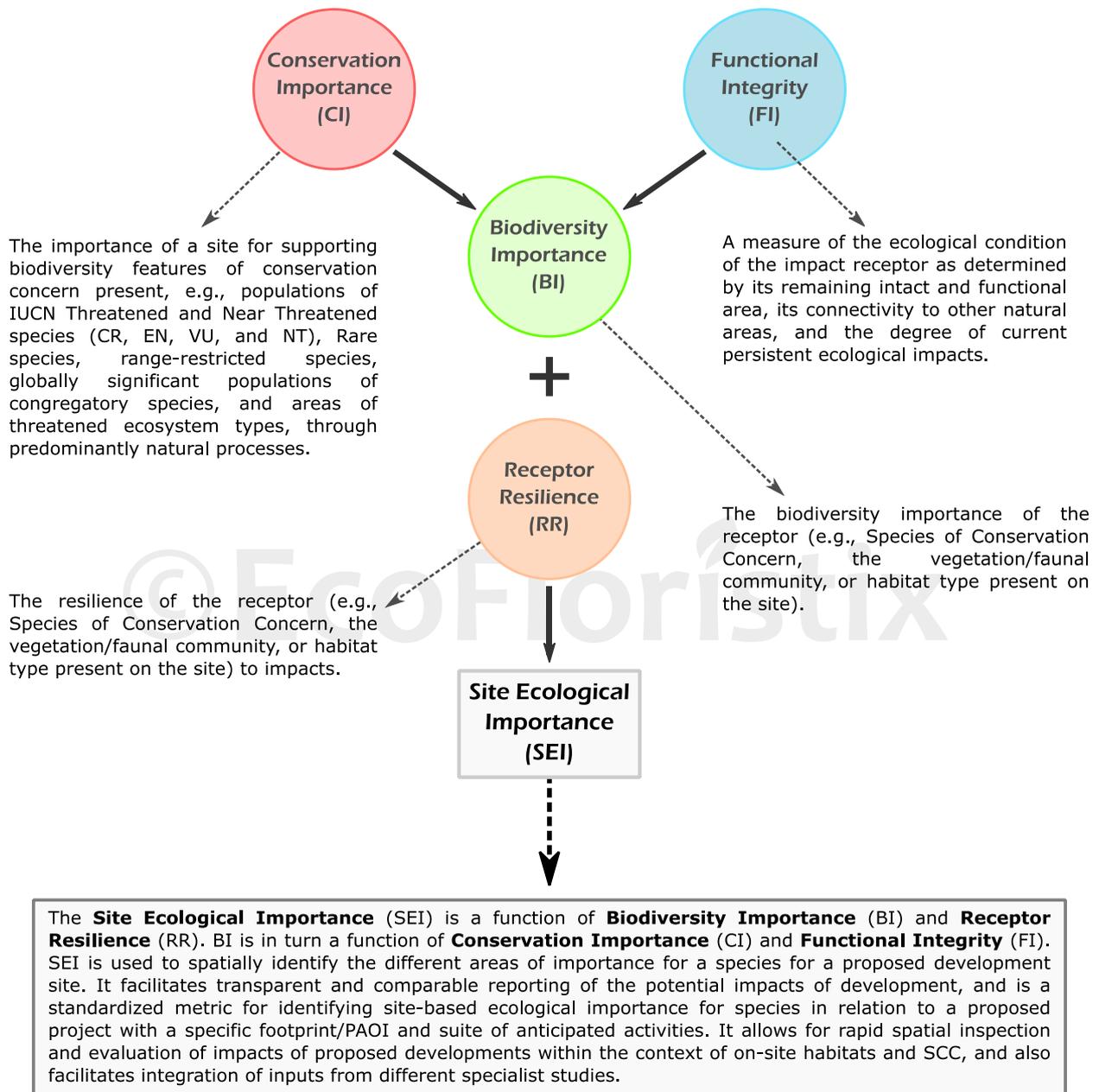


Figure 13: Details on the factors that contribute to the Site Ecological Importance value. Also see Figure 14.

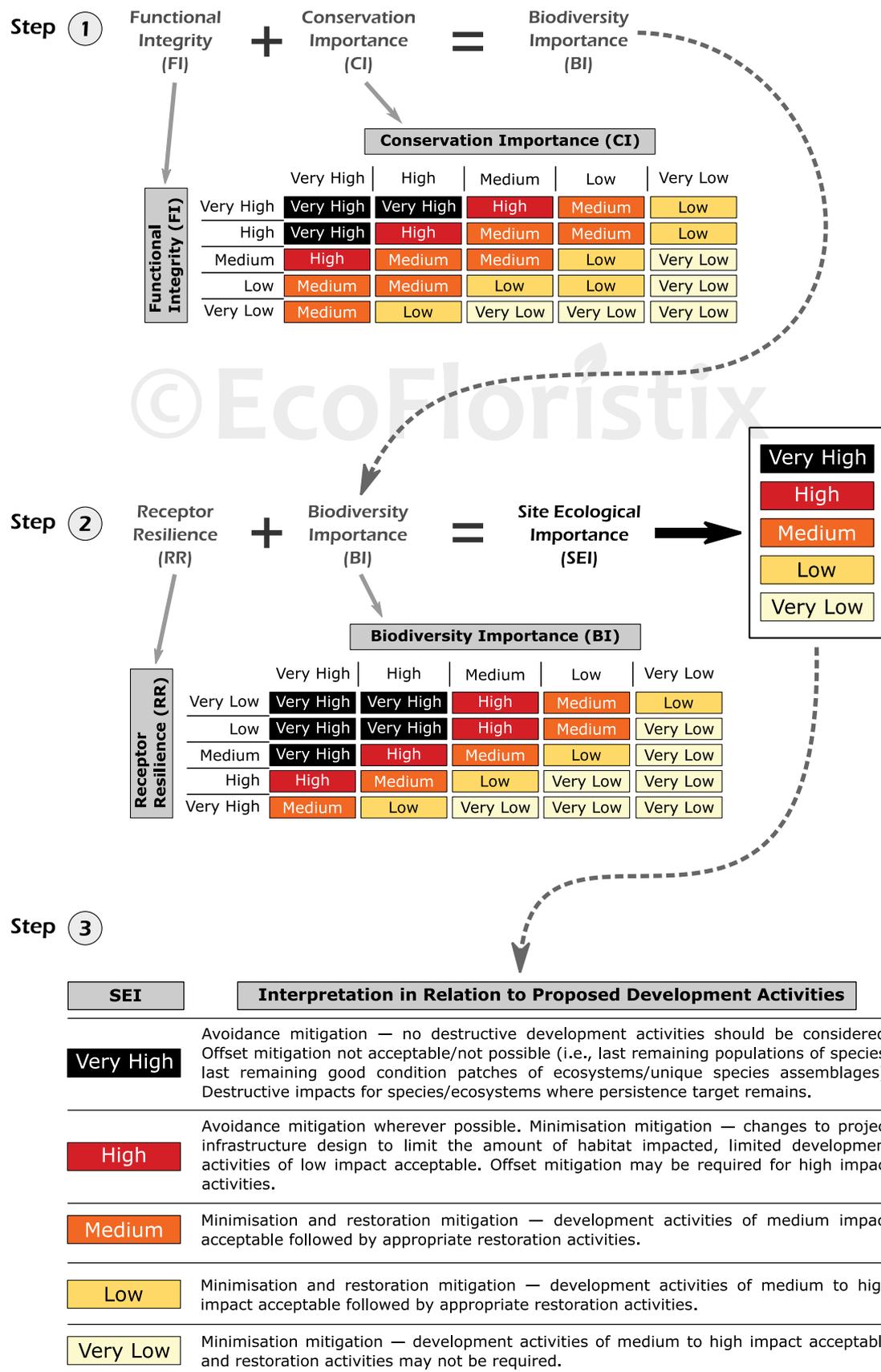


Figure 14: Calculations, scores, process, and guidelines for calculating and interpreting Site Ecological Importance (SEI) categories.

Table 4: Details regarding Conservation importance (CI) categories.

Conservation Importance	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 or > 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, or 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.

Table 5: Details regarding Functional Integrity (FI) categories.

Functional Integrity	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.

Table 6: Details regarding Receptor Resilience (RR) categories.

Receptor Resilience	Fulfilling criteria
Very high	<ul style="list-style-type: none"> Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	<ul style="list-style-type: none"> Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	<ul style="list-style-type: none"> Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	<ul style="list-style-type: none"> Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	<ul style="list-style-type: none"> Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

10.4. Impact Assessment Methodology

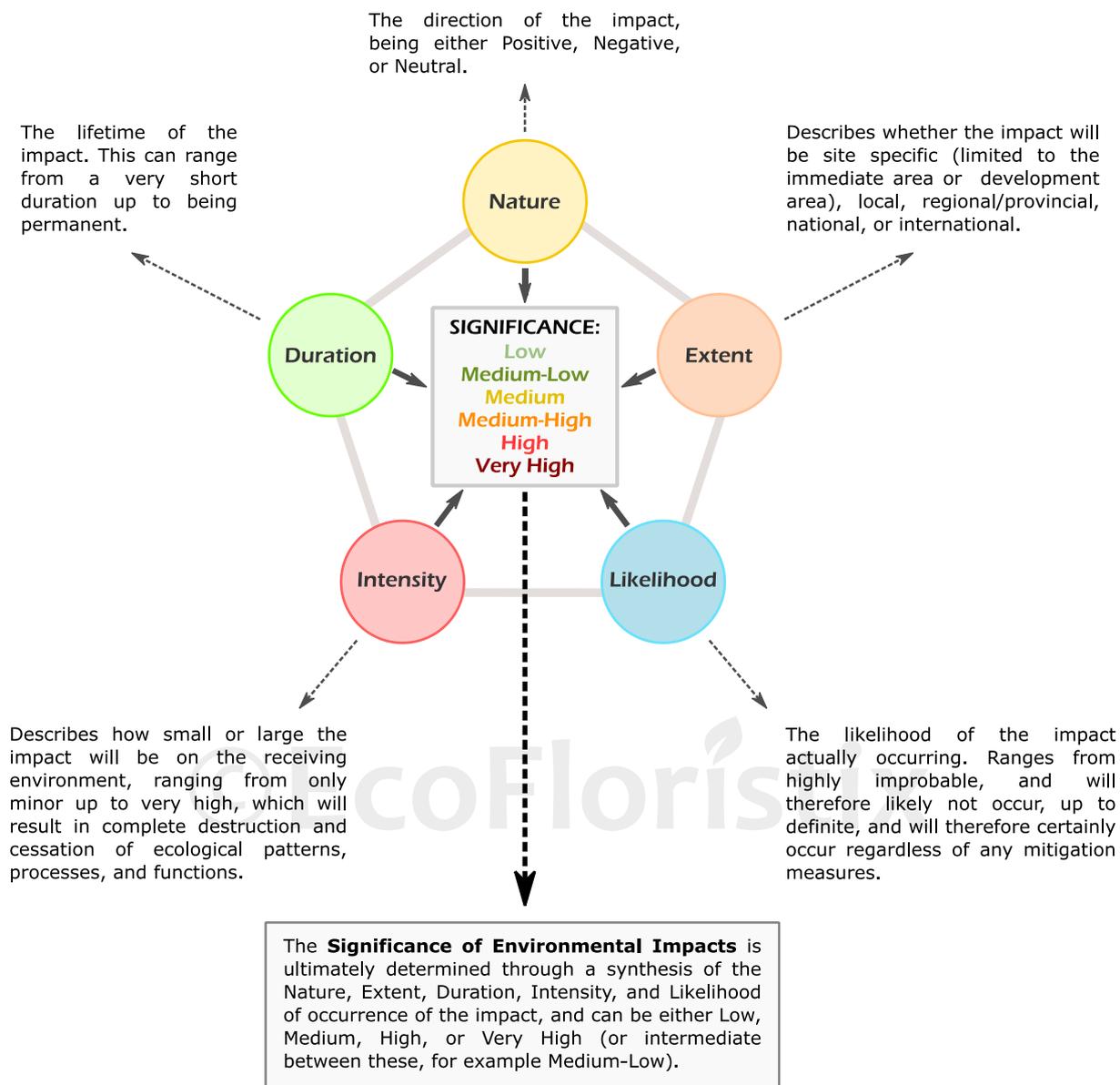


Figure 15: Details on the factors that contribute to Significance of Environmental Impacts values.

The Significance of Environmental Impacts was used to assess the impacts and risks associated with the proposed activities. The “Significance” of an environmental impact is a combination of the consequence and likelihood of an impact occurring (DFFE, 2023). The following factors must at least be considered as part of the process of assessing the significance of a negative impact on biodiversity (Figure 15):

- **Consequence** of an impact: a combination of the intensity, extent, and duration of the impact.
 - **Intensity** (severity) of the impact: the intensity of an ecological impact is given at a defined (usually spatial) scale.

- **Extent** of the impact: the scale of expected impacts as a proportion or range of a given biodiversity feature. The greater the extent, the greater the consequence, and the more significant the impact.
- **Duration** of the impact: how long the impact will last, from short-term to permanent, where permanent is a period of thirty years and above (unless the receiving environment justifies a shorter consideration of permanent). The longer the duration, the greater the consequence, and the more significant the impact.
- **Likelihood** (or probability) of the occurrence of the impact: The more likely the impact, the greater the certainty of the impact significance.

Thus, the Significance of Environmental Impacts is primarily a function of 1) the present environmental aspects that are to be impacted on, 2) the likelihood of an impact occurring, and 3) the consequence of such an impact occurring before, and after, implementation of proposed mitigation measures.

In addition, the “nature” of the impact can be negative, neutral, or positive; this adds additional context to the significance values.

Implicitly considered is the degree to which impacts can be managed/mitigated, reversed, and/or may cause irreplaceable loss of resources.

10.5. The Mitigation Hierarchy

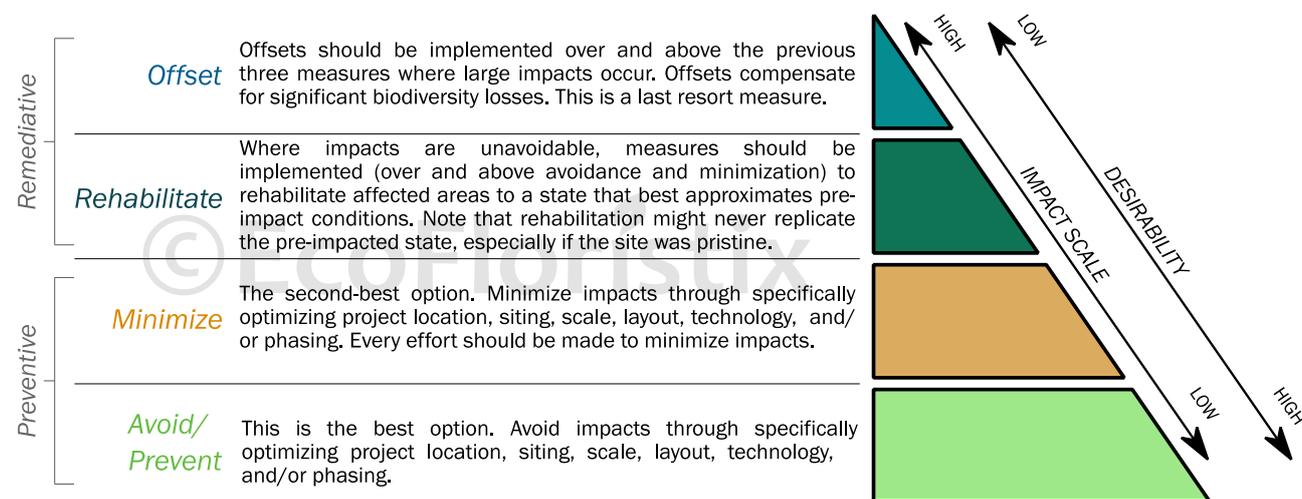


Figure 16: The Mitigation Hierarchy.

The mitigation hierarchy (Figure 16) is a fundamental and internationally recognized framework in environmental management, designed to systematically address and limit the negative impacts of human activities on biodiversity and ecosystems. It is a guiding principle that ensures a strategic and proactive approach to environmental impact assessment and management. The hierarchy prioritizes actions, starting with those that offer the greatest environmental benefit and least risk, and progressively moves towards less desirable options when the preferred ones are not entirely achievable. In essence, it encourages the consideration of alternatives that avoid significant impacts. The best-case scenario (most desirable) is thus the one with the lowest impacts.

The hierarchy consists of four sequential steps:

1. **Avoidance/Prevention:** This is the most crucial and preferred step. It focuses on preventing impacts from occurring in the first place. This can be achieved through careful project planning, strategic site selection to bypass sensitive areas, or by redesigning project components to eliminate potential harm entirely. Effective avoidance at the earliest stages of a project's lifecycle, often during feasibility and conceptual design, can significantly reduce the need for subsequent, more costly, and often less effective mitigation measures.
2. **Minimization/Reduction:** Where complete avoidance is not feasible, the next step involves minimizing or reducing the intensity, duration, timing, and/or extent of unavoidable impacts. This requires implementing measures to lessen the severity of the anticipated harm. Examples include adopting less impactful construction methods, restricting the operational footprint of a development, or implementing seasonal restrictions on activities to avoid sensitive periods for wildlife (e.g., breeding seasons). Minimization often involves adaptive management, where the effectiveness of measures is monitored, and adjustments are made as needed to further reduce impacts.
3. **Restoration/Rehabilitation:** This comes into play after impacts have occurred, and is the start of remediative processes. It focuses on actively restoring or rehabilitating degraded ecosystems and habitats to a former or desired state. Rehabilitation typically aims to re-establish basic ecological functions and productivity, while restoration strives to achieve a fully functioning ecosystem comparable to the original, pre-impact condition. This can involve measures such as re-vegetating disturbed areas with indigenous species, restoring hydrological flows in altered wetlands, or remediating contaminated soils. The goal is to repair the damage as much as possible on-site, bringing the affected area back to an ecologically viable state.
4. **Offsetting/Compensation:** As the last resort, when significant residual impacts remain after all reasonable avoidance, minimization, and restoration measures have been implemented, offsetting (also known as compensation) is considered. This involves providing measurable conservation gains elsewhere to compensate for the unavoidable loss of biodiversity or ecosystem services. Offsets should ideally target the same type of biodiversity or ecosystem services that have been impacted. Examples include the establishment of new protected areas, the restoration of degraded habitats off-site, or funding long-term conservation programmes that directly benefit the impacted species or ecosystems. In South Africa, the concept of biodiversity offsets aims to ensure that they genuinely contribute to “no net loss” or even a “net positive gain” for biodiversity, recognizing that offsets are complex and require robust monitoring and long-term commitment.

The effective application of the mitigation hierarchy is crucial for achieving sustainable development outcomes. It promotes a transparent and accountable approach to environmental management. It guides decision-making towards minimizing ecological footprints and ensures that biodiversity considerations are integrated throughout a project's lifecycle.

11. Appendix E: Notes on SCC and Protected Plant Species

This section includes relevant definitions and regulations pertaining to SCC and protected plant species as determined by national legislation. Briefly, a permit is required to perform any restricted activity, as defined by NEM:BA, on specimens of any SCC or protected plant species, whether such specimens are living or dead. Note: this is NOT an exhaustive account of NEM:BA.

11.1. National Environmental Management: Biodiversity Act, 2004 (Act No. 10, 2004, Vol. 467, No. 26436)

NEM:BA Definition of “specimen” (Chapter 1, Definitions):

- a) any living or dead animal, plant or other organism;
- b) a seed, egg, gamete or propagule or part of an animal, plant or other organism capable of propagation or reproduction or in any way transferring genetic traits;
- c) any derivative of any animal, plant or other organism; or any goods which-
 - i. contain a derivative of an animal, plant or other organism; or
 - ii. from an accompanying document, from the packaging or mark or label, or from any other indications, appear to be or to contain any derivative of an animal, plant or other organism.

NEM:BA Definition of “restricted activity” (Chapter 1, Definitions):

- (a) in relation to a specimen of a listed threatened or protected species, means-
- i. hunting, catching, capturing or killing any living specimen of a listed threatened or protected species by any means, method or device whatsoever, including searching, pursuing, driving, lying in wait, luring, alluring, discharging a missile or injuring with intent to hunt, catch, capture or kill any such specimen;
 - ii. gathering, collecting or plucking any specimen of a listed threatened or protected species;
 - iii. picking parts of, or cutting, chopping off, uprooting, damaging or destroying, any specimen of a listed threatened or protected species;
 - iv. importing into the Republic, including introducing from the sea, any specimen of a listed threatened or protected species;
 - v. exporting from the Republic, including re-exporting from the Republic, any specimen of a listed threatened or protected species;
 - vi. having in possession or exercising physical control over any specimen of a listed threatened or protected species;
 - vii. growing, breeding or in any other way propagating any specimen of a listed threatened or protected species, or causing it to multiply;
 - viii. conveying, moving or otherwise translocating any specimen of a listed threatened or protected species;
 - ix. selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of any specimen of a listed threatened or protected species; or
 - x. any other prescribed activity which involves a specimen of a listed threatened or protected species

Restricted activities involving listed threatened or protected species, Part 2, 57:

(1) A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 (Permits).

11.2. National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Threatened or Protected Species Regulations

“**Biodiversity Act**” means the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), including any amendment thereof;

“**protected species**” means any species listed as protected in terms of section 56(1)(d) of the Biodiversity Act;

“**threatened species**” means an indigenous species listed as critically endangered, endangered or vulnerable species in terms of section 56(1)(a), (b) and (c) of the Biodiversity Act;

Chapter 2 (Permit System for Listed Threatened or Protected Species), Part 1 Application for permits: Carrying out a restricted activity

4. (1) A person may carry out a restricted activity involving a specimen of a listed threatened or protected species, only if he or she is the holder of a permit issued-

- a) in terms of section 57(1) of the Biodiversity Act;
- b) in accordance with Chapter 7 of the Biodiversity Act, and
- c) in accordance with these Regulations;

unless the Minister has exempted the carrying out of such restricted activity involving such specimen in terms of section 57(4) of the Biodiversity Act.

12. Appendix F: Abbreviated Curriculum Vitae of the Specialist

Personal and Company Details:

- Name: Dr. Jan-Hendrik Keet
- Address: Somerset West, Western Cape, 7130
- Cell: 071 451 4853
- Email: info@ecofloristix.co.za
- Date of Birth: 07 November 1988
- Website: <https://ecofloristix.co.za/>
- LinkedIn: <https://za.linkedin.com/company/ecofloristix>
- Instagram: @ecofloristix

Expertise and Experience:

- Current: Botanical & Terrestrial Biodiversity Specialist Consultant (EcoFloristix Specialist Botanical Surveys)
- Current: Freelance Academic/Technical Editor, Proof-reader, and Dissertation Specialist
- Previous: Post-Doctoral Researcher — Mathematical Biosciences Hub (Department of Mathematics), Stellenbosch University
- Previous: Post-Doctoral Researcher — DST NRF Centre of Excellence for Invasion Biology (Department of Botany and Zoology), Stellenbosch University
- Specialization: Botany, Ecology, Biogeography, Invasive Plant Species, and Invasion Biology
- Years of experience: > 10 years
- Published in various, high-impact, national and international scientific journals

Skills and Competencies:

- Botany and Ecology
- Invasive Species Biology (PhD in Botany [Stellenbosch University] with a focus on Invasive Alien Plant Species and their environmental impacts)
- Plant Biogeography
- Plant Identification and Taxonomy
- Vegetation Surveys and Mapping
- Biodiversity Informatics
- Biological Sciences
- Soil Microbiome Composition, Function, and Chemistry
- Geographic Information Systems (*GISB1500S, NQF level 5*)
- Research Data Management and Data Visualization
- Statistical Computing Methods (*R Statistical Computing Expert*)
- Experimental Design and Analysis

Global Scientific Influence:

- Citations [>700](#)
- Global Publication Reads [>9000](#)
- Scopus h-index [11](#)
- Google Scholar h-index [11](#)
- Google Scholar i10-index [12](#)

Tertiary Education:

- 2015 – 2019: Stellenbosch University, Stellenbosch, South Africa. Doctor of Philosophy (Botany)
- 2013 – 2014: University of the Free State, Bloemfontein, South Africa. Magister Scientiae (Botany)

- 2012: University of the Free State, Bloemfontein, South Africa. Bachelor of Science Honours (Botany) - *cum laude*
- 2009 – 2011: University of the Free State, Bloemfontein, South Africa. Bachelor of Science (Chemistry with Physics and Biology) - *cum laude*

Employment History:

- 2015 – present: Botanical Specialist
- 2021 – present: Freelance Academic/Technical Editor, Proof-reader, and Dissertation Specialist
- 2019 – 2021: Post-Doctoral Researcher – Centre for Invasion Biology (Department of Botany and Zoology), Stellenbosch University
- 2011: Part-time demonstrator. Department of Plant Sciences, University of the Free State, Bloemfontein, South Africa
- 2010: Part-time lab assistant. Department of Chemistry, University of the Free State, Bloemfontein, South Africa
- 2007 – 2009: Shop Manager. Christian Tees, Brandwag Centre, Bloemfontein

Memberships, Certifications, and Short Courses:

- SACNASP: Professional Natural Scientist (No.: 121678)
- South African Association of Botanists (SAAB) Ordinary Member (No.: 821)
- SAGIC Invasive Species Consultant (Cape Town, South Africa), March 2016
- GIS Intermediate (NQF level 5): Hydrological modelling and terrain analysis using digital elevation models (University of the Free State, South Africa), 2014
- Project Management (Stellenbosch University), 2023
- Good Laboratory Practice seminar presented by Merck Millipore South Africa, 2012
- Laboratory Safety seminar presented by Merck Millipore South Africa, 2012
- Golden Key International Honour Society (Membership No.: 7564025), 2012

Selected Peer-reviewed Scientific Publications and Book Chapters (a full list is available on request):

- Keet J-H & Hui C (2025) One-hectare fine-scale dataset of a fynbos plant community in the Cape Floristic Region. *Data in Brief*, <https://doi.org/10.1016/j.dib.2025.111334>
- Yannelli F, Keet J-H, Kritzinger-Klopper S, Le Roux JJ (2025) Legacy effects of an invasive legume more strongly impact bacterial than plant communities in a Mediterranean-type ecosystem. *Journal of Environmental Management* 373:123802, <https://doi.org/10.1016/j.jenvman.2024.123802>
- Keet J-H, Ellis AG, Hui C, Le Roux (2023) Responses of soil bacterial communities to invasive Australian *Acacia* species over large spatial scales. In: Richardson DM, Le Roux JJ, & Marchante E (Eds.) *Wattles: Australian Acacia Species Around the World*, CAB International, <https://www.cabidigitallibrary.org/doi/10.1079/9781800622197.0000>.
- Keet J-H, Datta A, Foxcroft LC, Kumschick S, Wilson JRU, Nichols GR, Richardson DM (2022) Assessing the level of compliance with alien plant regulations in a large African protected area. *Biological Invasions* 24: 3831 – 3844, <https://doi.org/10.1007/s10530-022-02883-7>.
- Warrington S, Ellis AG, Keet J-H, Le Roux JJ (2022) How does familiarity in rhizobial interactions impact the performance of invasive and native legumes? *Neobiota* 72: 129 – 156, <https://neobiota.pensoft.net/article/79620/>.
- Keet J-H & Richardson, DM (2022) A rapid survey of naturalized and invasive eucalypt species in southwestern Limpopo, South Africa. *South African Journal of Botany* 144: 339 – 346, <https://doi.org/10.1016/j.sajb.2021.09.008>.
- Novoa A, Foxcroft LC, Keet J-H, Pyšek P, Le Roux JJ (2021) The invasive cactus *Opuntia stricta* creates fertility islands in African savannas and benefits from those created by native trees. *Scientific Reports* 11: 20748, <https://www.nature.com/articles/s41598-021-99857-x>.
- Keet J-H, Ellis AG, Hui C, Novoa A, Le Roux JJ (2021) Impacts of invasive Australian acacias on soil bacterial community composition, microbial enzymatic activities, and nutrient availability in fynbos soils. *Microbial Ecology* 82: 704 – 721, <http://dx.doi.org/10.1007/s00248-021-01683-1>.
- Keet J-H, Robertson MP, Richardson DM (2020) *Alnus glutinosa* (Betulaceae) in South Africa: invasive potential and management options. *South African Journal of Botany* 135: 280 – 293, <https://doi.org/10.1016/j.sajb.2020.09.009>.

- Wilson JRU, Datta A, Hirsch H, **Keet J-H**, Mbobo T, Nkuna KV, Nsikani MM, Pyšek P, Richardson DM, Zengeya TA, Kumschick S (2020) Is invasion science moving towards agreed standards? The influence of selected frameworks. *NeoBiota*, 62: 569 – 590, <https://doi.org/10.3897/neobiota.62.53243>.
- Novoa A, **Keet J-H**, Lechuga-Lago Y, Pyšek P, Le Roux JJ (2020) Urbanization and *Carpobrotus edulis* invasion alter the diversity and composition of soil bacterial communities in coastal areas. *FEMS Microbiology Ecology* 96(7): faa106, <https://doi.org/10.1093/femsec/faa106>.
- Le Roux JJ, Leishman MR, Cinantya AP, Gufu GD, Hirsch H, **Keet J-H**, Manea A, Saul W-C, Tabassum S, Warrington S, Yannelli FA, Ossola A (2020) Plant biodiversity in the face of global change. *Current Biology* 30: R371 – R392, <https://doi.org/10.1016/j.cub.2020.02.066>.
- Hirsch H, Allsopp MH, Canavan S, Cheek M, Geerts S, Geldenhuys CJ, Harding G, Hurley BP, Jones W, **Keet J-H**, Klein H, Ruwanza S, van Wilgen BW, Wingfield MJ, Richardson DM (2019) *Eucalyptus camaldulensis* in South Africa – past, present, future. *Transactions of the Royal Society of South Africa* 75(1): 1 – 22, <https://doi.org/10.1080/0035919X.2019.1669732>.
- Le Roux JJ, Hui C, Castillo ML, Iriondo, JM, **Keet J-H**, Khapugin, AA, Médail F, Rejmánek M, Theron G, Yannelli FA, Hirsch H (2019) Recent anthropogenic plant extinctions differ in biodiversity hotspots and coldspots. *Current Biology* 29(17): 2912 – 2918, <https://doi.org/10.1016/j.cub.2019.07.063>.
- **Keet J-H**, Ellis AG, Hui C, Le Roux JJ (2019) Strong spatial and temporal turnover of soil bacterial communities in South Africa's hyperdiverse fynbos biome. *Soil Biology and Biochemistry* 136: 107541, <https://doi.org/10.1016/j.soilbio.2019.107541>.
- Le Roux JJ, Ellis AG, Van Zyl L-M, Hosking ND, **Keet J-H**, Yannelli F (2018) Importance of soil legacy effects and successful mutualistic interactions during Australian acacia invasions in nutrient-poor environments. *Journal of Ecology* 106(5): 2071 – 2081, <https://doi.org/10.1111/1365-2745.1296>.
- **Keet J-H**, Ellis AG, Hui C, Le Roux JJ (2017) Legume–rhizobium symbiotic promiscuity and effectiveness do not affect plant invasiveness. *Annals of Botany* 119(8): 1319 – 1331, <https://doi.org/10.1093/aob/mcx028>.
- Le Roux JJ, **Keet J-H**, Mutiti B, Ellis AG (2017) Cultivation may not dramatically alter rhizobial community diversity or structure associated with rooibos tea (*Aspalathus linearis* Burm.f.) in South Africa. *South African Journal of Botany* 110: 87-96, <https://doi.org/10.1016/j.sajb.2017.01.014>.
- Le Roux JJ, Hui C, **Keet J-H**, Ellis AG (2017) Co-introduction vs ecological fitting as pathways to the establishment of effective mutualisms during biological invasions. *New Phytologist* 215(4): 1354 – 1360, <https://doi.org/10.1111/nph.14593>.
- Nsikani M, Novoa A, Van Wilgen B, **Keet J-H**, Gaertner M (2017) *Acacia saligna*'s soil legacy effects persist up to ten years after clearing: Implications for ecological restoration. *Austral Ecology* 42(8): 880 – 889, <https://doi.org/10.1111/aec.12515>.
- **Keet J-H**, Cindi D, Du Preez PJ (2016) Assessing the invasiveness of *Berberis aristata* and *B. julianae* (Berberidaceae) in South Africa: management options and legal recommendations. *South African Journal of Botany* 105: 288 – 298, <https://doi.org/10.1016/j.sajb.2016.04.012>.

Selected Conferences (a full list is available on request):

- 46th South African Association of Botanists conference (Qwa-Qwa, South Africa), January 2020, ***Alnus glutinosa* (L.) Gaertn. [Black Alder]: an emerging invader in South Africa**
- International Association for Food Protection (IAFP; Louisville, Kentucky, USA), July 2019.
- Ecological Society of America Conference, (New Orleans, Louisiana, USA), August 2018 **Invasive legumes dramatically impact soil bacterial community structures but not function**
- Legumes for Life Workshop (Stellenbosch, South Africa), May 2018 **Legume-rhizobium symbiotic promiscuity and effectiveness do not affect plant invasiveness**
- Fynbos Forum Conference (Swellendam, South Africa), July 2017 **Assessing the impacts of invasive legumes on soil conditions and microbial community composition in a biodiversity hotspot**
- 43rd South African Association of Botanists Conference (Cape Town, South Africa), January 2017, **Legume-rhizobium symbiotic promiscuity and effectiveness do not affect plant invasiveness Best PhD presentation**
- 43rd Annual Research Symposium on the Management of Biological Invasions Conference (Worcester, South Africa), May 2016, **Legume-rhizobium symbiotic promiscuity does not determine plant invasiveness**
- Evolutionary dynamics of tree invasions: drivers, dimensions, and implications for management (Stellenbosch, South Africa), November 2015
- Neobiota: 8th International Conference on Biological Invasions (Antalya, Turkey), November 2014, **Assessing the threat and potential for management of *Berberis* spp. (Berberidaceae) in South Africa**

- 42nd Annual Symposium on the Management of Invasive Alien Plants (Karridene Beach Hotel, Durban, South Africa)
- XXth Association for the Taxonomic Study of the Flora of Tropical Africa International Conference (Stellenbosch, South Africa), January 2014
- 41st Annual Symposium on the Management of Invasive Alien Plants (Cape St. Francis, South Africa), May 2013

Selected EIAs and other works (a full list is available on request):

- Plant Species and Terrestrial Biodiversity Impact assessment for the proposed clearing of vegetation on Portion 1 of 723 (Coot Club), Wortelgat, Hermanus, Western Cape (February 2026). Report prepared for Lornay Environmental Consulting. Reference: PR.25.042.
- Plant Species and Terrestrial Biodiversity Impact assessment for a section 24G unlawful construction of five boathouse units on Portion 1 of 723 Coot Club, Wortelgat, Western Cape (January 2026). Report prepared for Lornay Environmental Consulting. Reference: PR.25.044.
- Plant Species and Terrestrial Biodiversity Impact assessment for vegetation clearing on farm Schalkenbosch 229, Tulbagh, Western Cape (November 2025). Report prepared for Enviro EAP. Reference: PR.25.038.
- Plant Species, Terrestrial Biodiversity, and Faunal Impact Assessment for the East London Industrial Development Zone (ELIDZ), Zones 1A, 1B, and 1C, Eastern Cape. In collaboration with Nkurenkuru Ecology and Biodiversity (October 2025). Report prepared for AGES Omega. Reference: PR.25.017B.
- Plant Species and Terrestrial Biodiversity Compliance Statement for an industrial development on Farm RE/37/168, Fisantekraal, Western Cape (September 2025). Report prepared for Doug Jeffrey Environmental. Reference: PR.25.002.
- Terrestrial Biodiversity Impact Assessment / Plant Species Impact Assessment for the clearing of vegetation on Portion 20 of Farm 323, Ceres (Koelefontein), Western Cape Province (August 2025). Report prepared for Doug Jeffrey Environmental. Reference: PR.25.010.
- Plant Species and Terrestrial Biodiversity Impact assessment for the proposed clearing of vegetation for a proposed access road and house on Portion 124 of Farm 559 Hangklip, Betty's Bay, Western Cape (August 2025). Report prepared for Ohana Environmental. Reference: PR.25.011.
- Botanical survey to identify Saldanha Limestone Strandveld on farms Yzerfontein 560 (partly), Tygerfontein 564, Coffee Fontein 563, Plot 2717, and the green corridors within Yzerfontein, Western Cape (August 2025). Report prepared for Jos de Villiers Belleggings Trust. Reference: PR.25.030.
- Terrestrial Biodiversity Impact Assessment / Plant Species Impact Assessment for a Proposed Green Technology and Industrial Development on the remainder of Erf 277, Atlantis, Cape Town, Western Cape Province (June 2025). Report prepared for Ohana Environmental. Reference: IA.25.012.
- Invasive Alien Plant Species Management Framework for the East London Industrial Development Zone (IDZ), East London, Eastern Cape Province, South Africa (June 2025). Report prepared for AGES Omega. Reference: PR.25.017.
- Terrestrial Desktop Sensitivity for a Prospecting Right Application on Farm 622 for Uranium ore in the Namaqualand Magisterial District in the Northern Cape Province, South Africa (May 2025). Report prepared for Greenmined Environmental. Reference: PR.24.016.
- Terrestrial Desktop Sensitivity for a Proposed Prospecting Right On Farm Kamaggas no. 200, Drie Rivier No. 268, Polly's Kloof No. 267, Sannagas No. 269, and Klipfontein no. 266, for Uranium Ore in the Northern Cape Province, South Africa (May 2025). Report prepared for Greenmined Environmental. Reference: PR.24.018.
- Terrestrial Desktop Sensitivity for a Prospecting Right Application for Targeted Blocks on Farms Tusschen In 143, Aardvark 164, Steenbok 165, and Gifkop 166 near Steinkopf, Northern Cape Province, South Africa (May 2025). Report prepared for Greenmined Environmental. Reference: IA.25.006.
- Terrestrial Biodiversity Impact Assessment / Plant Species Impact Assessment for an industrial development on the proposed expansion of the bulk water pipeline on Portion 1 of Farm La Parisa No. 888, Paarl, Western Cape Province (May 2025). Report prepared for Doug Jeffrey Environmental. Reference: IA.25.003.
- Plant Species and Terrestrial Biodiversity Compliance Statement for illegal repairs to an old road through a watercourse and the removal of material from a water impoundment dam near Infanta, Western Cape (April 2025). Report prepared for EarthGrace. Reference: IA.25.016.
- Invasive Alien Species Risk Analysis Review of the Canetsfontein Wine Farm I&AS Risk Assessment Report (November 2024). Report prepared for Earthguard Consulting.

- Terrestrial Biodiversity and Plant Species Compliance Statement for a mining permit application project on Bonne Esperance Farm 83 near Tulbagh in the Western Cape Province (November 2024). Report prepared for Greenmined Environmental. Reference: IA.24.023.
- Section 24G Botanical Assessment for the construction of two unlawful dams on Farm 497 Portion 3 Weltevreden, Western Cape Province. Report prepared for Doug Jeffery Environmental (November 2024). Report prepared for Doug Jeffery Environmental. Reference: IA.24.021.
- Invasive Alien Species Risk Analysis Review of the Canetsfontein Wine Farm I&AS Risk Assessment Report (November 2024). Report prepared for Earthguard Consulting.
- N6 Galway City (Ireland) Ring Road Environmental Impact Assessment Report: Assistance with Data Analysis, Modelling, and Validation (July 2024 – January 2025). In collaboration with Scott Cawley, Ireland.
- Plant and Terrestrial Biodiversity Assessment for a Mining Permit Extension application for the mining site Norrabees near Henkries, Northern Cape Province (May 2024). Report prepared for Site Plan Consulting. Reference: IA.24.010A.
- Plant and Terrestrial Biodiversity Assessment for a Mining Permit Application for the mining site Spodumene Kop near Henkries, Northern Cape Province (May 2024). Report prepared for Site Plan Consulting. Reference: IA.24.010B
- Terrestrial Biodiversity (Fauna, Flora and Terrestrial Biodiversity) study and impact Report for the Grid Connection Solution for the Proposed Onderstepoort Solar 1 and 2 Facilities Near Boshhoek in the North West Province. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (April 2024). Report prepared for Atlantic Energy Partners.
- Specialist Invasive Alien Plant Species Assessment. (March 2024). Report prepared for Mpaact Corrugated. Reference: IA.24.006.
- Terrestrial Biodiversity (Fauna, Flora, and Ecological EIA Phase Assessment) Report for the Proposed Kingston Solar PV Energy Facility Near Bothaville, Free State Province. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (March 2024). Report prepared for Atlantic Energy Partners.
- Terrestrial Biodiversity (Fauna, Flora, and Ecological EIA Phase Assessment) Report for the Proposed Crecy Photovoltaic Solar 4 Energy Facility and Associated Infrastructure near Mookgopong, Limpopo Province. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (February 2024). Report prepared for Atlantic Energy Partners.
- Plant and Terrestrial Biodiversity Assessment for a Solar Photovoltaic Facility near Northam, Limpopo. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (November 2023). Report prepared for Atlantic Energy Partners.
- Botanical Impact Assessment for a proposed rerouting of a sewer pipeline on Erf 5076, Khayaletu, Knysna, Western Cape. In collaboration with Keep Rooted (PTY) Ltd. (October 2023). Report prepared for Ohana Environmental. Reference: IA.23.015.
- Screening report for a proposed Solar PV plant near Boshhoek, Northwest Province. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (September 2023). Report prepared for Atlantic Energy Partners.
- Plant and Terrestrial Biodiversity Assessment for a Powerline Corridor near Boshhoek, Northwest Province. In collaboration with Nkurenkuru Ecology and Biodiversity (PTY) Ltd. (September 2023). Report prepared for Atlantic Energy Partners.
- Botanical Assessment and Motivation for a Mining Stockpile Area within a non-CBA zone on Farm Steinkopf no. 22 near Steinkopf, Northern Cape. (August 2023). Report prepared for Greenmined Environmental. Reference: IA.23.010.
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