

Plant Species and Terrestrial
Biodiversity Compliance Statement
for the proposed clearing of
vegetation on the Remainder of Erf
1489, Vermont, Western Cape

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PR.26.002

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04 March 2026

PREPARED FOR
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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 (threat status) |
| DD: | Data Deficient (threat status) |
| DDD: | Data Deficient – Insufficient Information (threat status) |
| DDT: | Data Deficient – Taxonomically Problematic (threat status) |
| 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 (threat status) |
| ESA: | Ecological Support Area |
| EW: | Extinct in the Wild (threat status) |
| EX: | Extinct (threat status) |
| FEPA: | Freshwater Ecosystem Priority Area |
| IAPs: | Invasive Alien Plant species |
| IUCN: | International Union for Conservation of Nature |
| LC: | Least Concern (threat status) |
| NE: | Not Evaluated (threat status) |
| NEM:BA A&IS: | NEM:BA Alien and Invasive Species Regulations, 2020 |
| NEM:BA | National Environmental Management: Biodiversity Act (Act No. 10 of 2004) |
| NEMA: | National Environmental Management Act (Act 107 of 1998) |
| NFA: | National Forest Act 1998 (No. 84 of 1998) |
| NFEPA: | National Freshwater Ecosystem Priority Areas; identified to meet national freshwater conservation targets (CSIR, 2011) |
| NT: | Near Threatened (threat status) |
| NWA: | National Water Act 36 of 1998 |
| ONA: | Other Natural Area |
| PA: | Protected Area |
| PAOI: | Project Areas of Influence |
| POSA: | Plants of southern Africa (online database) |
| RE: | Regionally Extinct (threat status) |
| 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 etc.) |
| VU: | Vulnerable (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 requirements for 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, 20 March 2020) are presented here, together with their fulfilments within this report.

Specifically, fulfilments are given in terms of the requirements for Terrestrial Biodiversity and Terrestrial Plant Species Compliance Statements. Protocol reference numbers represent the references as indicated in the published guidelines; those occurring in the Terrestrial Biodiversity protocol are numbered as “4.x.x”, while those occurring in the Terrestrial Plant Species protocol are numbered as “5.x.x”.

| Protocol Reference | Plant Species and Terrestrial Biodiversity Compliance Statement Content | Sections in this Report | Page |
|--------------------|--|-------------------------|----------------|
| 4.3.1/5.3.1 | Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae | 8 | 47 |
| 4.3.2/5.3.2 | A signed statement of independence by the specialist | vi | viii |
| 4.3.3/5.3.3 | 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 | 21 |
| 4.3.4 | A baseline profile description of biodiversity and ecosystems of the site | 2.1 and 2.2 | 9 and 18 |
| 4.3.5/5.3.4 | A description of the methodology used to undertake the site survey and to verify the sensitivities of the terrestrial biodiversity features on the site, and prepare the compliance statement, including equipment and modelling used where relevant | 6, 7 | 35, 41 |
| 4.3.6. | In the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase | Not Applicable | Not Applicable |
| 4.3.7/5.3.5 | Where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr | 3 | 31 |
| 4.3.8/5.3.6 | A description of the assumptions made and any uncertainties or gaps in knowledge or data | 1.5 | 6 |
| 5.3.7 | The mean density of observations / number of samples sites per unit area | 7 | 41 |
| 4.3.9/5.3.8 | Any conditions to which the compliance statement is subjected | 4 | 32 |

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.

REPORT AUTHOR:

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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**

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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 if the proposed activity(-ies) will impact on Species of Conservation Concern (SCC) beyond the boundary of the preferred site. The development footprint (or proposed development footprint) in the context of this document means the area that will be 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 APPLICANT (hereafter referred to as the “applicant”), approached EcoFloristix Specialist Botanical Surveys to conduct a Plant Species and Terrestrial Biodiversity Compliance Statement for the proposed clearing of vegetation on the Remainder of Erf 1489, Vermont, 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 activities that occurred within the study area. Specifically, this assessment intends to provide the relevant information for determining impacts that occurred 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 plant species that might have occurred 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 and around 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

1.3. Locality and Details of Activities

1.3.1. Locality and General Details

The proposed development site, or study area, entails the Remainder of Erf 1489, Vermont, Western Cape (Map 1 and Map 2).

1.3.2. Details of Proposed Activities

The proposed activities include a subdivision of the property to create several erven for a single residential development. The proposed development would consist of 18 single residential units, as well as open space and a private road. Additionally, the applicant proposes to subdivide the road access (Kolgans Close Road) portion off Erf 1490 and consolidate it with Erf 1489. This section of the road will be a public road, built to municipal standards, and transferred to the municipality.

The proposed activities will thus necessarily involve the clearing of indigenous vegetation.

1.3.3. Alternative Areas

Only one Alternative Area is assessed here.

1.3.4. Project Areas of Influence (PAOI)

The PAOI is considered the same as the study area boundary (Map 2).



Map 1: Locality 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.

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. 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.26.002. 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 6.3 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 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)

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)
- National Protected Areas Expansion Strategy (NPAES)
- Natural Scientific Professions Act (Act No. 27 of 2003)
- 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)
- Alien and Invasive Species Regulations and, Alien and Invasive Species Lists, published under NEM:BA (NEM:BA A&IS Regulations)
- 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) 2024

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2. Results

For all relevant methodology, see sections 6 and 7 at the end of this document.

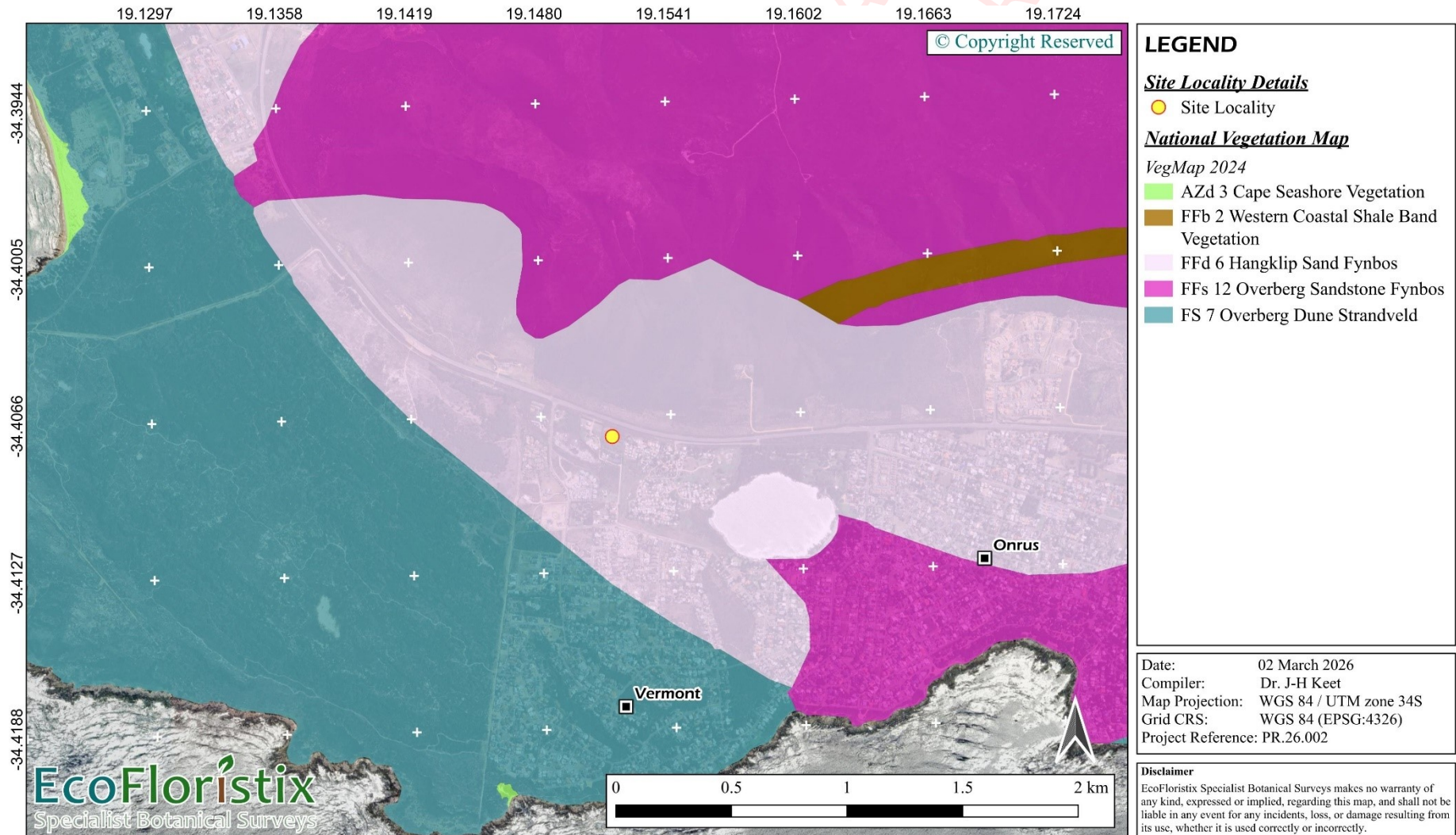
2.1. Desktop Analyses: Botanical Assessment

2.1.1. Vegetation Types of the Study Area and Surrounds

According to VegMap, the study area overlaps with only one vegetation type, namely Hangklip Sand Fynbos (FFd 6) (Map 3 and Map 4; Table 1). Only this vegetation type is therefore described 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 (%) | |
| Hangklip Sand Fynbos (FFd6) | 89 | 8 867 | 53 | 5 264 | 59.4 | CR |



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.

2.1.1.a) Hangklip Sand Fynbos (FFd 6)

Distributed in the Western Cape from the Cape Peninsula on old dune fields at Hout Bay, in the Fish Hoek gap (between Fish Hoek and Noordhoek) and on Smiths Farm (Cape Point Nature Reserve), and also occurs on the coastal flats from Rooiels and Cape Hangklip to Hermanus. It is characterized by sand dunes and sandy bottomlands supporting moderately tall, dense ericoid shrubland, with emergent, tall shrubs in places, and proteoid, ericaceous, and restioid fynbos are dominant, with some asteraceous fynbos also present. On the coastal fringe this unit borders on strand veld. The deep soils of the coastal plains are replaced by shallow soils on mountain slopes on the northern edge.

Pockets of *Sideroxylon* dominated thicket and small forests occur in firesafe hollows and dune edges, throughout the region. There are some limestone deposits associated with the old dunes, but these are localised and do not have a typical limestone fynbos community.

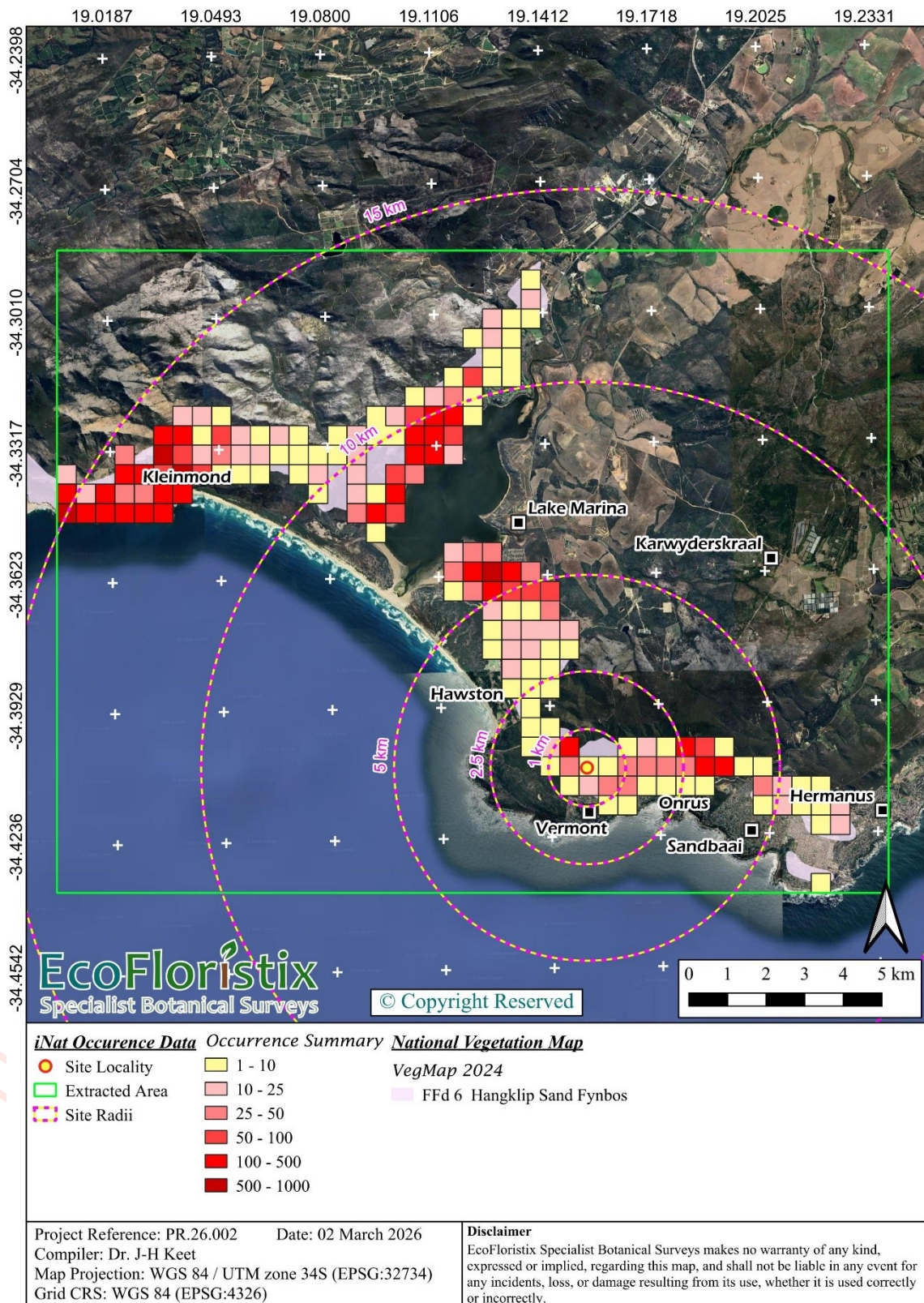
Conservation: CR according to RLE2021. Target: 30% according to NBA 2018. About 20% statutorily conserved in the Table Mountain National Park and Kogelberg Biosphere Reserve, with an additional 3% protected in private conservation areas such as Sea Farm and Hoek van die Berg. There are several reserves between Pringle Bay and Hermanus, but they are badly mismanaged with a continual attrition of reserves with sewerage farms, graveyards, golf courses, and squatters and overharvesting of flowers and plants for oils. Some 40% has been transformed, mostly by development of holiday home settlements (coastal platform between Pringle Bay and Hermanus), but also by cultivation and building of roads. Alien woody plants include *Pinus pinaster*, *Acacia cyclops*, *A. saligna*, various *Eucalyptus* species, and many other species in localised patches. Erosion very low.

Key species associated with Hangklip Sand Fynbos (FFd 6).

| IMPORTANT SPECIES | |
|-------------------|---|
| Growth Form | Key Species (d = "Dominant") |
| Tall Shrubs | <i>Euclea racemosa</i> subsp. <i>racemosa</i> (d), <i>Leucadendron coniferum</i> (d), <i>Metalasia densa</i> (d), <i>Passerina corymbosa</i> (d), <i>Psoralea pinnata</i> (d), <i>Searsia laevigata</i> (d), <i>Erica perspicua</i> var. <i>perspicua</i> , <i>E. tristis</i> , <i>Halleria lucida</i> , <i>Mimetes hirtus</i> , <i>Protea compacta</i> , <i>Pterocelastrus tricuspidatus</i> , <i>Searsia glauca</i> , <i>S. lucida</i> |
| Low Shrubs | <i>Aspalathus nigra</i> (d), <i>Berzelia abrotanoides</i> (d), <i>Brunia alopecuroides</i> (d), <i>Coleonema album</i> (d), <i>Erica mammosa</i> (d), <i>E. multumbellifera</i> (d), <i>E. muscosa</i> (d), <i>Eriocephalus africanus</i> var. <i>africanus</i> (d), <i>Osmitopsis asteriscoides</i> (d), <i>Protea scolymocephala</i> (d), <i>Serruria glomerata</i> (d), <i>Adenandra viscida</i> , <i>Agathosma imbricata</i> , <i>Aspalathus forbesii</i> , <i>Berzelia lanuginosa</i> , <i>B. squarrosa</i> , <i>Cassine peragua</i> subsp. <i>barbara</i> , <i>Cliffortia graminea</i> , <i>Diosma hirsuta</i> , <i>Erica coccinea</i> subsp. <i>coccinea</i> , <i>E. fastigiata</i> , <i>E. patersonii</i> , <i>E. pulchella</i> , <i>Eriocephalus racemosus</i> , <i>Indigofera brachystachya</i> , <i>Leucadendron gandogeri</i> , <i>L. laureolum</i> , <i>L. salignum</i> , <i>Leucospermum hypophyllocarpodendron</i> subsp. <i>hypophyllocarpodendron</i> , <i>Metalasia pulchella</i> , <i>Mimetes cucullatus</i> , <i>Morella quercifolia</i> , <i>Orphium frutescens</i> , <i>Passerina ericoides</i> , <i>Pelargonium betulinum</i> , <i>P. cucullatum</i> , <i>Phyllica</i> |

| | |
|--|---|
| | <i>ericoides</i> , <i>Polyarrhena reflexa</i> subsp. <i>reflexa</i> , <i>Protea cynaroides</i> , <i>Stilbe ericoides</i> , <i>Struthiola ciliata</i> subsp. <i>schlechteri</i> , <i>Trichocephalus stipularis</i> , <i>Trichogyne repens</i> |
| Succulent Shrub | <i>Tetragonia fruticosa</i> |
| Herbs | <i>Carpacoce spermacocea</i> , <i>Cineraria geifolia</i> |
| Geophytic Herbs | <i>Corycium bifidum</i> , <i>Geissorhiza humilis</i> , <i>Romulea triflora</i> , <i>Wachendorfia thyrsiflora</i> |
| Succulent Herbs | <i>Carpobrotus edulis</i> (d), <i>C. acinaciformis</i> |
| Herbaceous Climbers | <i>Cynanchum obtusifolium</i> |
| Graminoids | <i>Elegia filacea</i> (d), <i>E. nuda</i> (d), <i>Epischoenus gracilis</i> (d), <i>Imperata cylindrica</i> (d), <i>Ischyrolepis eleocharis</i> (d), <i>Thamnochortus erectus</i> (d), <i>T. obtusus</i> (d), <i>T. spicigerus</i> (d), <i>Capeochloa cincta</i> , <i>Staberoha cernua</i> , <i>Tetradia thermalis</i> |
| BIOGEOGRAPHICALLY IMPORTANT SPECIES | |
| Growth Form | Key Species (d = "Dominant") |
| Low Shrub | <i>Berkheya coriacea</i> |
| ENDEMIC SPECIES | |
| Growth Form | Key Species (d = "Dominant") |
| Low Shrub | <i>Muraltia minuta</i> |
| Succulent Shrub | <i>Lampranthus serpens</i> |
| Herb | <i>Hypertelis trachysperma</i> |
| Geophytic Herb | <i>Haemanthus canaliculatus</i> |
| Graminoid | <i>Ischyrolepis feminea</i> |

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 6.3 for more details on methodology.

Only SCC that might potentially occur in the study area and surrounds, as predicted by online databases (see section 6.3.1; 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.

Together, these records consisted of a combined total of 3 107 plant species that have been recorded within the extracted area (representing a total of 2 820 species at an inclusive level, i.e., without considering subspecies, varieties, etc.), with the top three representative families being Asteraceae (311 spp.), Ericaceae (255 spp.), and Fabaceae (243 spp.).

This list included a total of 413 SCC, including 218 threatened species (full summary: 18 CR, 95 EN, 105 VU, 100 NT, 1 Critically Rare, 33 DDT, 8 DDD, 1657 LC, and 180 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 be present within the study area or its immediate vicinity.

A total of 234 of these SCC are protected. Apart from these, a further 715 species are also protected (thus yielding a total of 949 protected plant species, consisting of 942 provincially protected species and 7 nationally protected trees).

Finally, the online screening report also revealed the potential presence of 19 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).

2.1.3. Alien and Invasive Plant Species

A total of 272 alien plant species have been recorded within the extracted area, with 79 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 baileyana* (Bailey’s wattle; Category 3)
- *Acacia cyclops* (Red eye; Category 1b)
- *Acacia dealbata* (Silver wattle; Category 2)
- *Acacia decurrens* (Green wattle; Category 2)
- *Acacia elata* (Pepper tree wattle; Category 1b)
- *Acacia implexa* (Screw pod wattle; Category 1a)
- *Acacia longifolia* (Long-leaved wattle; Category 1b)
- *Acacia mearnsii* (Black wattle; Category 2)
- *Acacia melanoxylon* (Australian blackwood; Category 2)
- *Acacia podalyriifolia* (Pearl acacia; Category 1b)
- *Acacia pycnantha* (Golden wattle; Category 1b)
- *Acacia saligna* (Port Jackson, Port Jackson willow; Category 1b)
- *Acacia stricta* (Hop wattle; Category 1a)
- *Acer buergerianum* (Chinese maple; Category Multi)

- *Acer negundo* (Ash-leaved maple, Box elder; Category Multi)
- *Ageratina adenophora* (Crofton weed; Category 1b)
- *Ailanthus altissima* (Tree-of-heaven; Category 1b)
- *Alisma plantago-aquatica* (Mud plantain, Water alisma; Category 1b)
- *Anredera cordifolia* (Madeira vine, Bridal wreath; Category 1b)
- *Araujia sericifera* (Moth catcher; Category 1b)
- *Argemone ochroleuca* (White-flowered Mexican poppy; Category 1b)
- *Arundo donax* (Giant reed, Spanish reed; Category 1b)
- *Azolla filiculoides* (Azolla, Red water fern; Category 1b)
- *Canna indica* (Indian shot; Category 1b)
- *Cardiospermum grandiflorum* (Balloon vine; Category 1b)
- *Casuarina cunninghamiana* (Beefwood; Category Multi)
- *Catharanthus roseus* (Madagascar periwinkle; Category Multi)
- *Centranthus ruber* (Red valerian, Devil's beard; Category Multi)
- *Cinnamomum camphora* (Camphor tree; Category Multi)
- *Cirsium vulgare* (Spear thistle, Scotch thistle; Category 1b)
- *Convolvulus arvensis* (Field bindweed, Wild morning-glory; Category 1b)
- *Cortaderia selloana* (Pampas grass; Category 1b)
- *Cotoneaster glaucophyllus* (Late cotoneaster; Category 1b)
- *Cotoneaster pannosus* (Silver leaf cotoneaster; Category 1b)
- *Cuscuta campestris* (Common dodder; Category 1b)
- *Cytisus scoparius* (Scotch broom; Category 1a)
- *Datura stramonium* (Common thorn apple; Category 1b)
- *Echium plantagineum* (Patterson's curse; Category 1b)
- *Elodea canadensis* (Canadian water weed; Category 1b)
- *Eriobotrya japonica* (Loquat; Category Multi)
- *Eucalyptus camaldulensis* (River red gum; Category Multi)
- *Eucalyptus cladocalyx* (Sugar gum; Category Multi)
- *Eucalyptus conferruminata* (Spider gum; Category Multi)
- *Eucalyptus grandis* (Saligna gum, Rose gum; Category Multi)
- *Eugenia uniflora* (Pitanga, Surinam cherry; Category 1b)
- *Genista monspessulana* (Montpellier broom; Category 1a)
- *Gleditsia triacanthos* (Honey locust; Category 1b)
- *Grevillea robusta* (Australian silky oak; Category 3)
- *Hakea drupacea* (Sweet hakea; Category 1b)
- *Hakea gibbosa* (Rock hakea; Category 1b)
- *Hakea salicifolia* (Willow hakea; Category Multi)
- *Hakea sericea* (Silky hakea; Category 1b)
- *Hypericum perforatum* (St. John's wort, Tipton weed; Category 2)
- *Ipomoea indica* (Blue morning glory; Category 1b)
- *Ipomoea purpurea* (Purple morning glory; Category 1b)
- *Jacaranda mimosifolia* (Jacaranda; Category Multi)
- *Lantana camara* (Lantana, Tickberry, Cherry pie; Category 1b)
- *Lythrum hyssopifolia* (Hyssop loosestrife; Category 1b)
- *Melia azedarach* (Syringa; Category Multi)
- *Metrosideros excelsa* (New Zealand Christmas tree; Category Multi)
- *Myoporum insulare* (Manatoka, Boobyalla; Category 3)
- *Myriophyllum aquaticum* (Parrot's feather; Category 1b)
- *Myriophyllum spicatum* (Spiked water-milfoil; Category 1b)
- *Nephrolepis cordifolia* (Erect sword fern, Ladder sword fern; Category Multi)
- *Nerium oleander* (Oleander; Category 1b)
- *Opuntia monacantha* (Cochineal prickly pear, Drooping prickly pear; Category 1b)
- *Opuntia tomentosa* (Velvet opuntia, Velvet tree-pear; Category 1b)
- *Orobanche minor* (Lesser broomrape, Clover broomrape; Category 1b)
- *Orobanche ramosa* (Blue broomrape, Branched broomrape; Category 1b)
- *Paraserianthes lophantha* (Australian albizia, Stink bean; Category 1b)

- *Pereskia aculeata* (Pereskia, Barbados gooseberry; Category 1b)
- *Persicaria capitata* (Knotweed; Category 1b)
- *Phytolacca americana* (American pokeweed; Category 1b)
- *Phytolacca dioica* (Belhambra; Category 3)
- *Phytolacca octandra* (Forest inkberry; Category 1b)
- *Pinus canariensis* (Canary pine; Category 3)
- *Pinus pinaster* (Cluster pine; Category Multi)
- *Pinus radiata* (Radiata pine, Monterey pine; Category Multi)
- *Pittosporum undulatum* (Australian cheesewood, Sweet pittosporum; Category 1b)
- *Poa pratensis* (Kentucky bluegrass; Category Multi)
- *Ricinus communis* (Castor-oil plant; Category 2)
- *Robinia pseudoacacia* (Black locust; Category 1b)
- *Rumex acetosella* (Sheep sorrel, Red sorrel; Category Multi)
- *Sagittaria platyphylla* (Delta arrowhead, Slender arrowhead; Category 1a)
- *Salsola kali* (Tumbleweed; Category 1b)
- *Salvinia molesta* (Kariba weed, Salvinia; Category 1b)
- *Sambucus nigra* (European elder; Category 1b)
- *Schinus terebinthifolius* (Brazilian pepper tree; Category Multi)
- *Senna didymobotrya* (Peanut butter cassia; Category Multi)
- *Senna septemtrionalis* (Arsenic bush, Smooth senna; Category 1b)
- *Sesbania punicea* (Red sesbania; Category 1b)
- *Solanum mauritianum* (Bugweed; Category 1b)
- *Spartium junceum* (Spanish broom; Category Multi)
- *Sphagneticola trilobata* (Singapore daisy; Category Multi)
- *Stellaria media* (Common chickweed; Category Multi)
- *Syzygium jambos* (Rose apple; Category 3)
- *Tamarix ramosissima* (Pink tamarisk; Category 1b)
- *Tecoma stans* (Yellow bells; Category 1b)
- *Tipuana tipu* (Tipu tree; Category 3)
- *Toxicodendron succedaneum* (Wax tree; Category 1b)
- *Tradescantia fluminensis* (Wandering Jew; Category 1b)
- *Verbena bonariensis* (Wild verbena, Tall verbena, Purple top; Category 1b)
- *Verbena rigida* (Veined verbena; Category 1b)
- *Vinca major* (Greater periwinkle; Category 1b)
- *Xanthium spinosum* (Spiny cocklebur; Category 1b)
- *Xanthium strumarium* (Large cocklebur; Category 1b)

The specific biology of some of these species, as well as the large size of the area extracted for background information, means that it is highly unlikely that some of these species will occur within the study area.

2.2. Desktop Analyses: Ecologically Important Landscape Features

2.2.1. Ecosystem Threat Status: RLE 2021 and NBA 2018



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 (2021) spatial dataset part of the study area is located within a Critically Endangered ecosystem, namely Hangklip Sand Fynbos (Map 6).

The Site Sensitivity Verification determined that the study area is degraded and transformed (specifically see section 2.3), with a virtual absence of species characteristic of, and dominant in, Hangklip Sand Fynbos. The study area thus bears no resemblance to the listed ecosystem type, and therefore should not be classified as Critically Endangered.

See section 6.2.1 for more details and notes on Ecosystem Threat Status categories.

2.2.2. Critical Biodiversity Areas and Ecological Support Areas



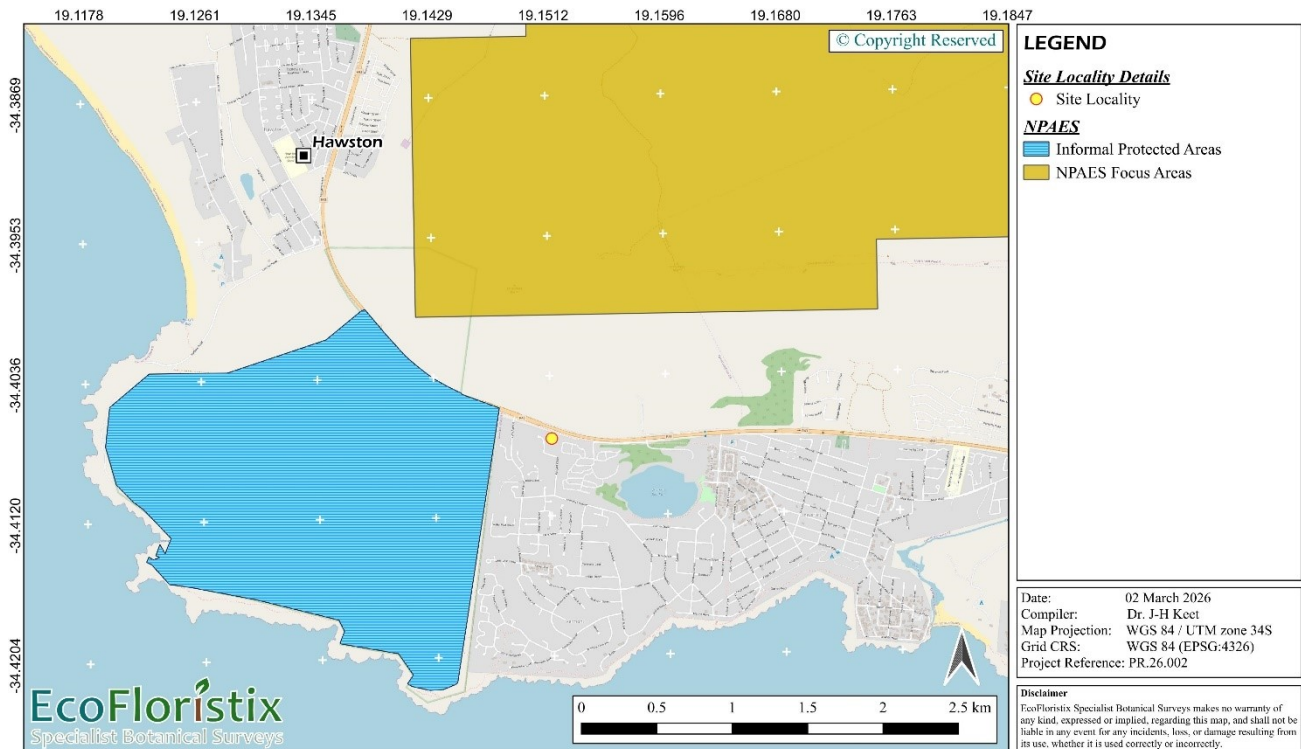
Map 7: Layout of Critical Biodiversity Areas within or near the study area and surrounds.

The study area is mapped to partially overlap a CBA1 (terrestrial) area (Map 7). Note that the online screening tool incorrectly states “ESA 2: Restore from other land use”.

As mentioned in the previous section, the Site Sensitivity Verification determined that the study area is degraded and transformed. It should thus not be classified as a CBA1, because it cannot be deemed as critical for meeting biodiversity targets and thresholds. It does not have species characteristic of, and dominant in, Hangklip Sand Fynbos, and thus is not required to ensure the persistence of viable populations of such species.

See section 6.2.3 for more details and notes on CBA and ESA categories

2.2.3. National Protected Area Expansion Strategy



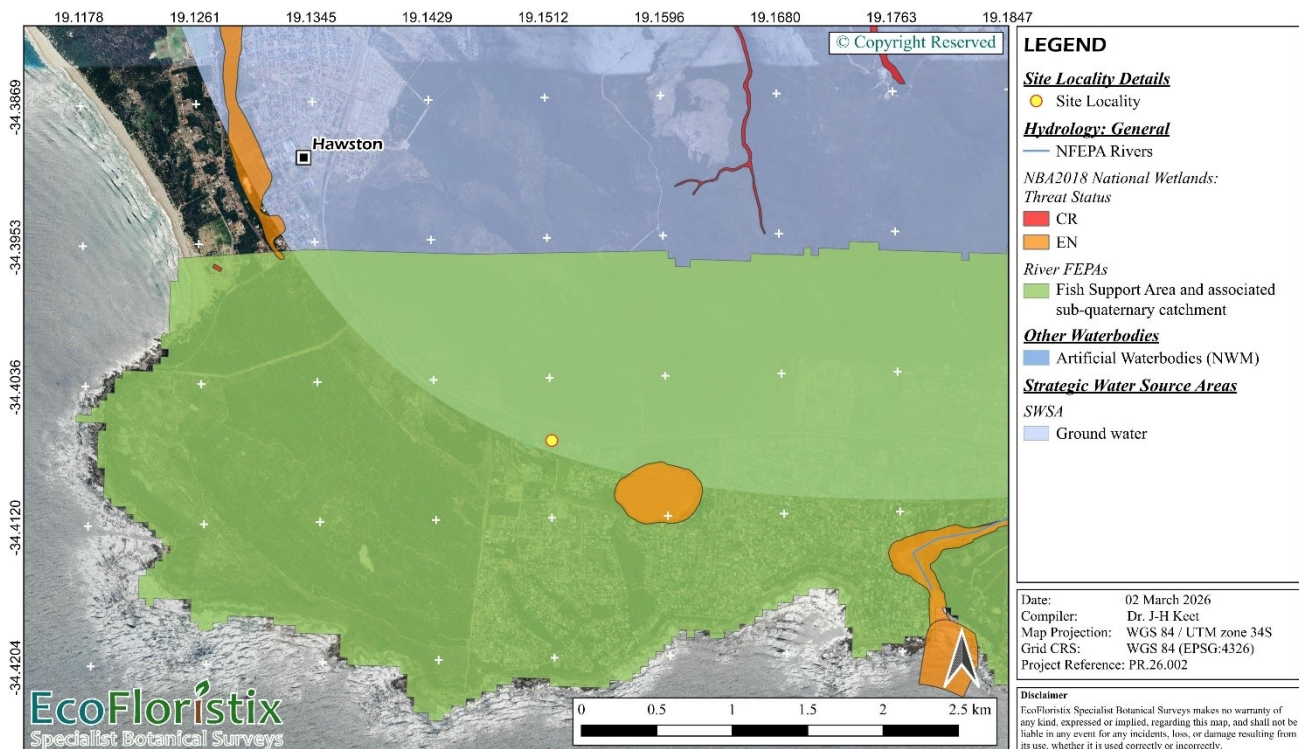
Map 8: Study area locality in relation to designated areas of the National Protected Area Expansion Strategy (NPAES).

The study area is not located within or near any NPAES Focus Areas.

The closest NPAES focus area (Agulhas) is 0.8 km north of the study area border, while the Hoek van de Berg Private Nature Reserve is 0.3 km west of the study area border (Map 8). Neither of these areas will be impacted to any significant extent by the proposed activities.

See section 6.2.2 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 National Freshwater Ecosystem Priority Areas and Strategic Water Source Areas (SWSA).

The study area is located within a SWSA (Overberg Region), occurs close to an Endangered wetland area (to the southeast), and is also located in a river FEPA (Map 9). However, given the small proposed development footprint, it is highly unlikely that the Project will have any major impacts on any of these areas.

Note that this section is intended to give a broad overview only. A dedicated Aquatic Specialist Report was prepared for the study area (Van Zyl, K., & Morton, R. 2025. *Aquatic Biodiversity Impact Assessment Erf 1489 Vermont V1.0*. Delta Ecology. RSA) and it is recommended that it be studied for specific details.

Also see sections 6.2.3 and 6.2.4 for more details and notes on the NFEPA, and SWSA.

2.3. Fieldwork and Site Inspection: Assessment of the Study area and Surrounds

2.3.1. Plant Community Types

This section describes the different habitats and vegetation patterns, as expressed in plant community types, observed in 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 12 February 2026. This timeframe falls outside the optimum surveying period (which is generally accepted to be during spring; also see section 1.5 for assumptions and potential limitations). However, most of the vegetation was in a good conditions for surveying and given the highly disturbed nature of the site it is unlikely that many species were missed.

A total distance of ± 1.05 km was surveyed on site. Together with this, drone reconnaissance trips (total of ± 0.9 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.

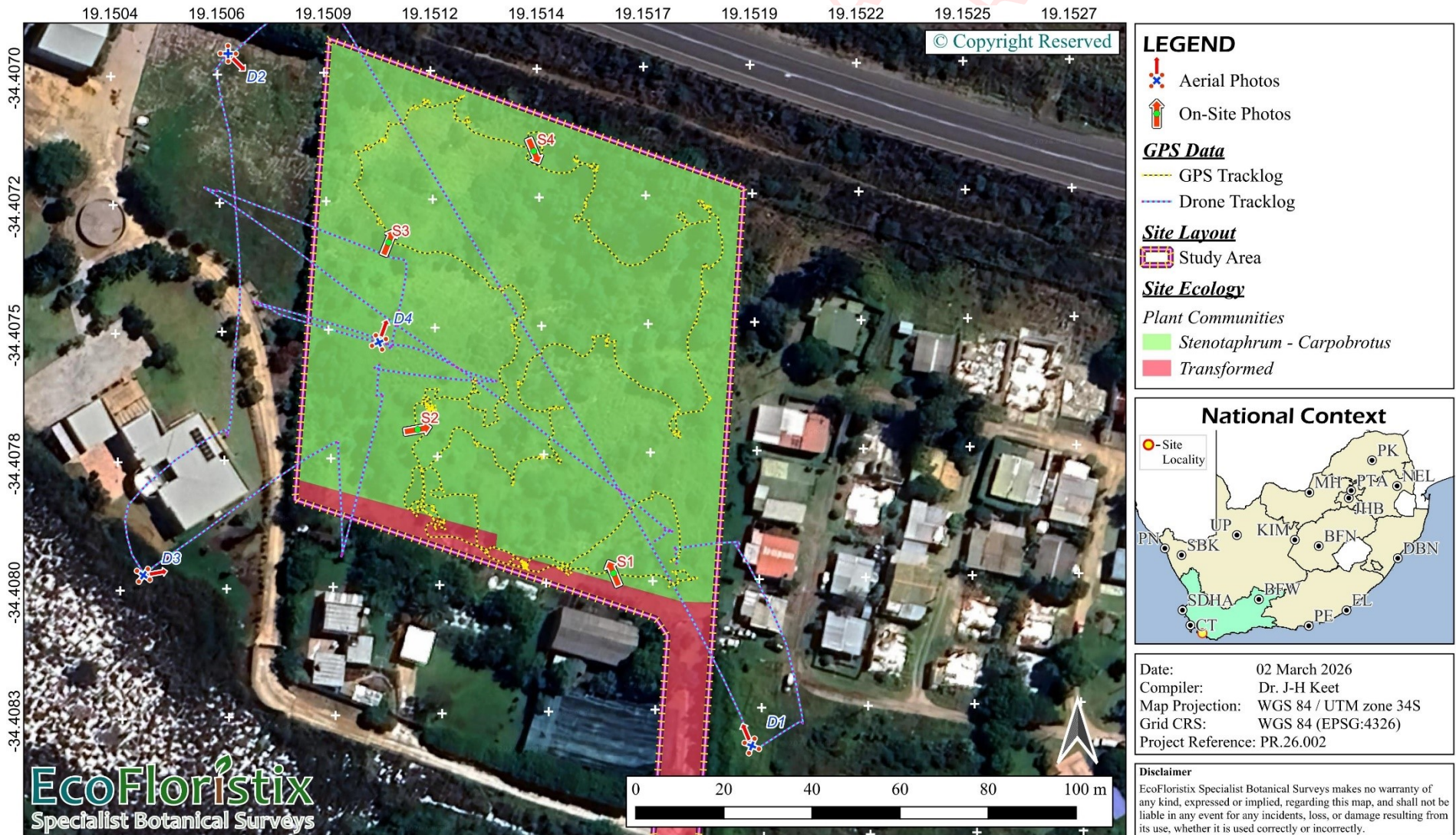
The study area was therefore adequately surveyed due to its small size (1.0512 ha).

The study area is degraded and transformed (Map 10; Figure 1 and Figure 2), being dominated by alien *Cenchrus clandestinus*, and native *Stenotaphrum secundatum* and *Carpobrotus edulis subsp. edulis*. Numerous other alien species are also present in varying abundances, such as *Acacia cyclops*, *A. saligna*, *Axonopus fissifolius*, *Briza maxima*, *Bromus diandrus*, *Erigeron bonariensis*, *Euphorbia terracina*, *Lactuca serriola*, *Lagurus ovatus*, *Leptospermum laevigatum*, *Pinus radiata*, *Schinus terebinthifolius*, *Yucca gloriosa*, and *Ulmus parvifolia*. While native species are also present, these are widespread and common, and not threatened (see Figure 3 for photos of selected species).

Historic satellite imagery, as well as the aquatic specialist report (Van Zyl, K., & Morton, R. 2025), show that the invasive alien plant species *Acacia saligna* was present in a high density on-site. This is a nitrogen fixing legume, and infestations are well known for having large impacts and alterations on soil conditions, such as elevating soil nitrogen levels. This is highly likely why the study area is dominated by the mentioned grasses given their nitrophilic (nitrogen-loving) nature. The degraded nature of the study area also means that there is a near complete absence of any species characteristic of Hangklip Sand Fynbos. These would include *Euclea racemosa subsp. racemosa*, *Leucadendron coniferum*, *Searsia laevigata*, numerous *Erica* spp, and other Proteaceae, Rutaceae, or Restionaceae (*Elegia filacea*, *E. nuda*, *Restio eleocharis*, and other *Thamnochortus* spp.). Only a single restio species was found on-site (*Thamnochortus insignis*) and only a few individuals were present. These occur in the northwestern corner of the study area, and is mostly associated with the road corridor, on the other side of the study area border, where this species dominates. The only native species found on-site that are associated with Hangklip Sand Fynbos are *Passerina corymbosa*, *Metalasia muricata*, and *Carpobrotus edulis*, but these are very widespread species and are also associated with numerous other vegetation types. Thus, they cannot be considered indicator species.

Finally, parts of the site have been altered completely, such as the southern area close to the vibracrete wall (see bottom-right in D3, Figure 1), the parking lot area, and driveway.

Thus, the study area cannot be considered a CBA and is not properly classified as Hangklip Sand Fynbos.



Map 10: Plant communities that were observed in the study area and surrounds, as well as general site ecology and other relevant information. See Figure 1 and Figure 2 for photos.

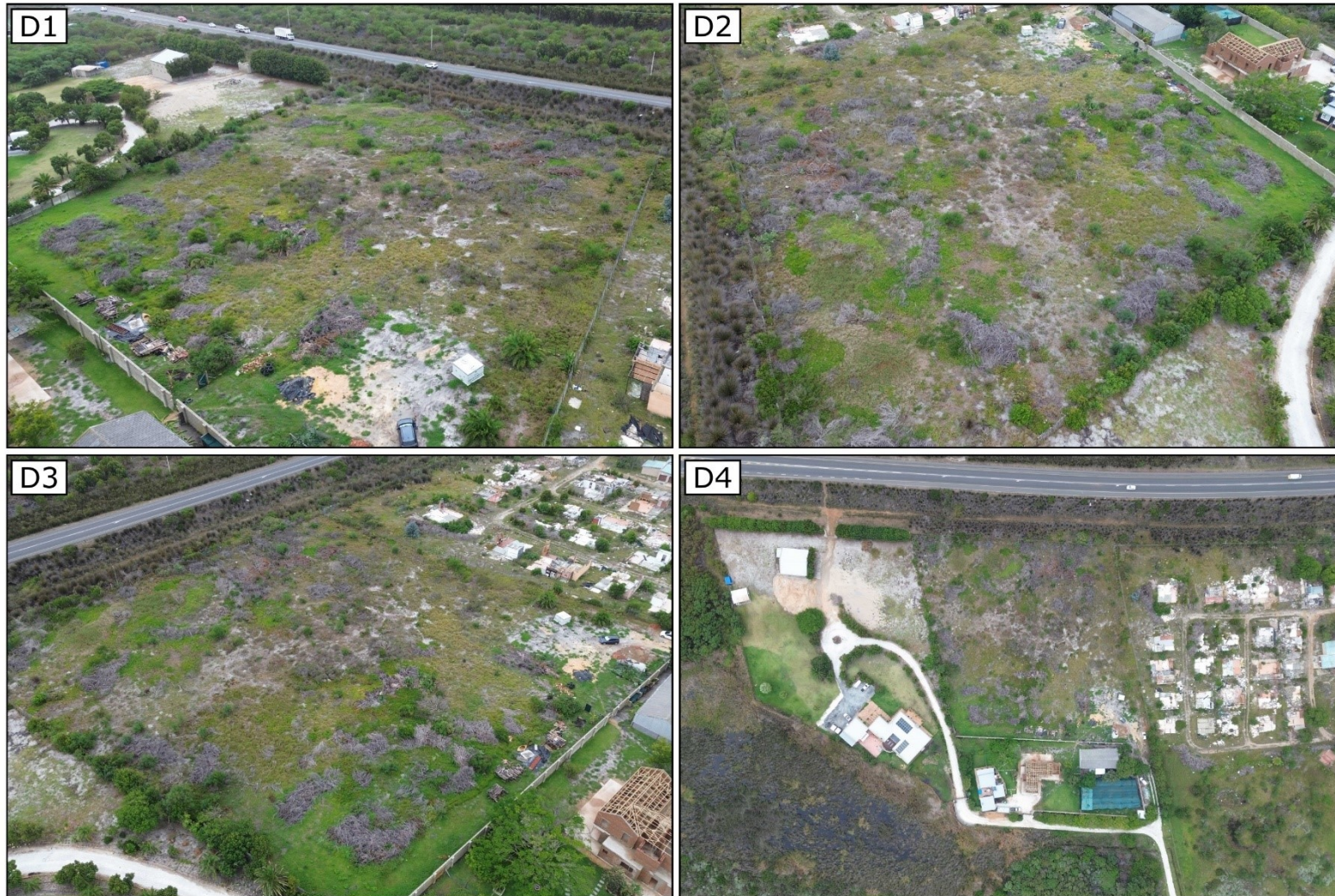


Figure 1: Aerial photos of the study area. Clearly visible is the degraded nature of the site and remnants of high densities of invasive alien plant species (mostly *Acacia saligna* in this case), as well as the high densities of grasses (a mixture of alien and native species). See Map 10 for photo localities and directions.

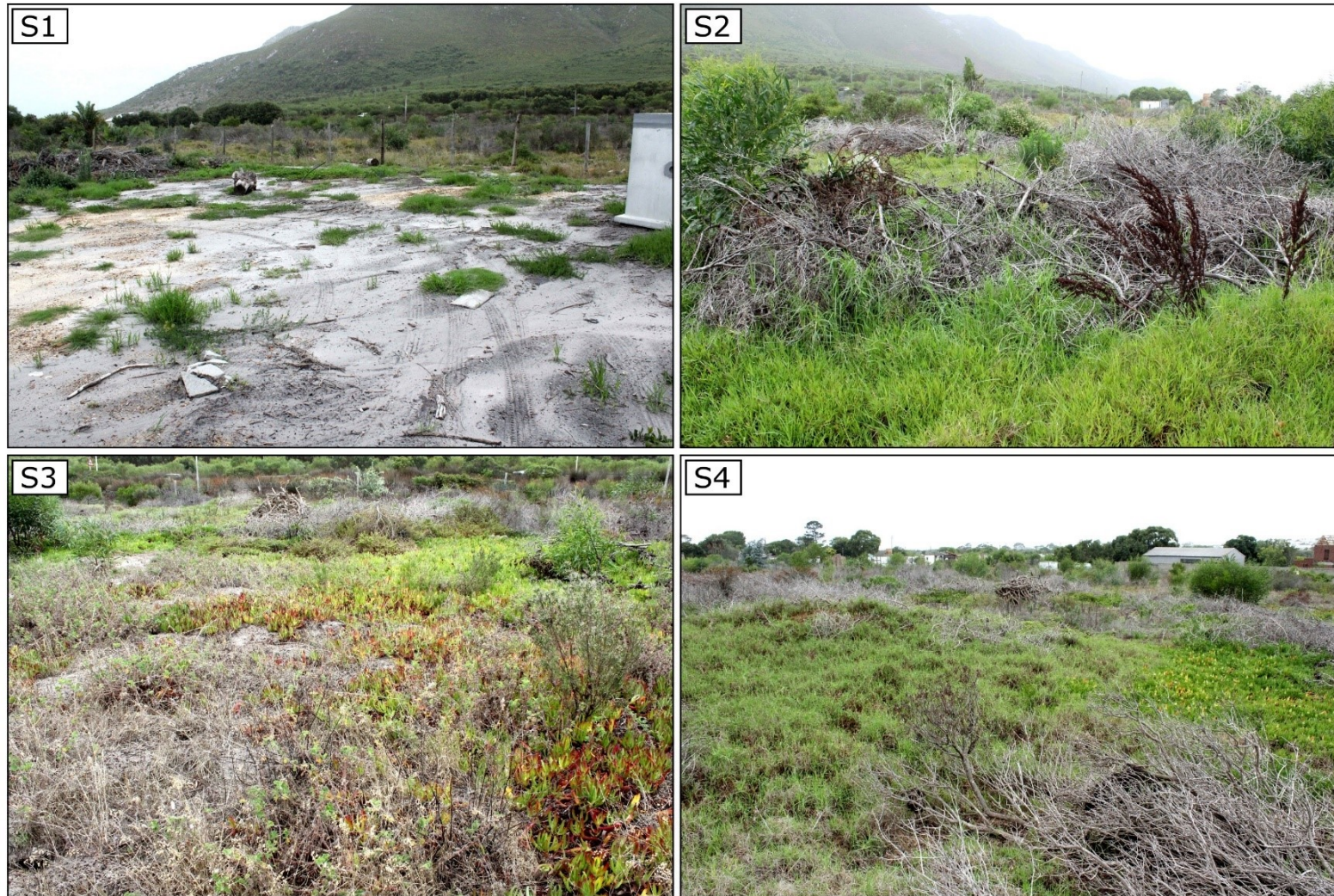


Figure 2: On-site photos of the study area. All of the photos showcase the degraded and transformed nature of the study area, which does not bear resemblance to Hangklip Sand Fynbos. S1 showcases a completely transformed parking area, while S2 - S4 show the high densities of grasses, *Carpobrotus edulis*, or stacks of invasive alien *Acacia saligna* (there are still many of these trees present). See Map 10 for photo localities and directions.

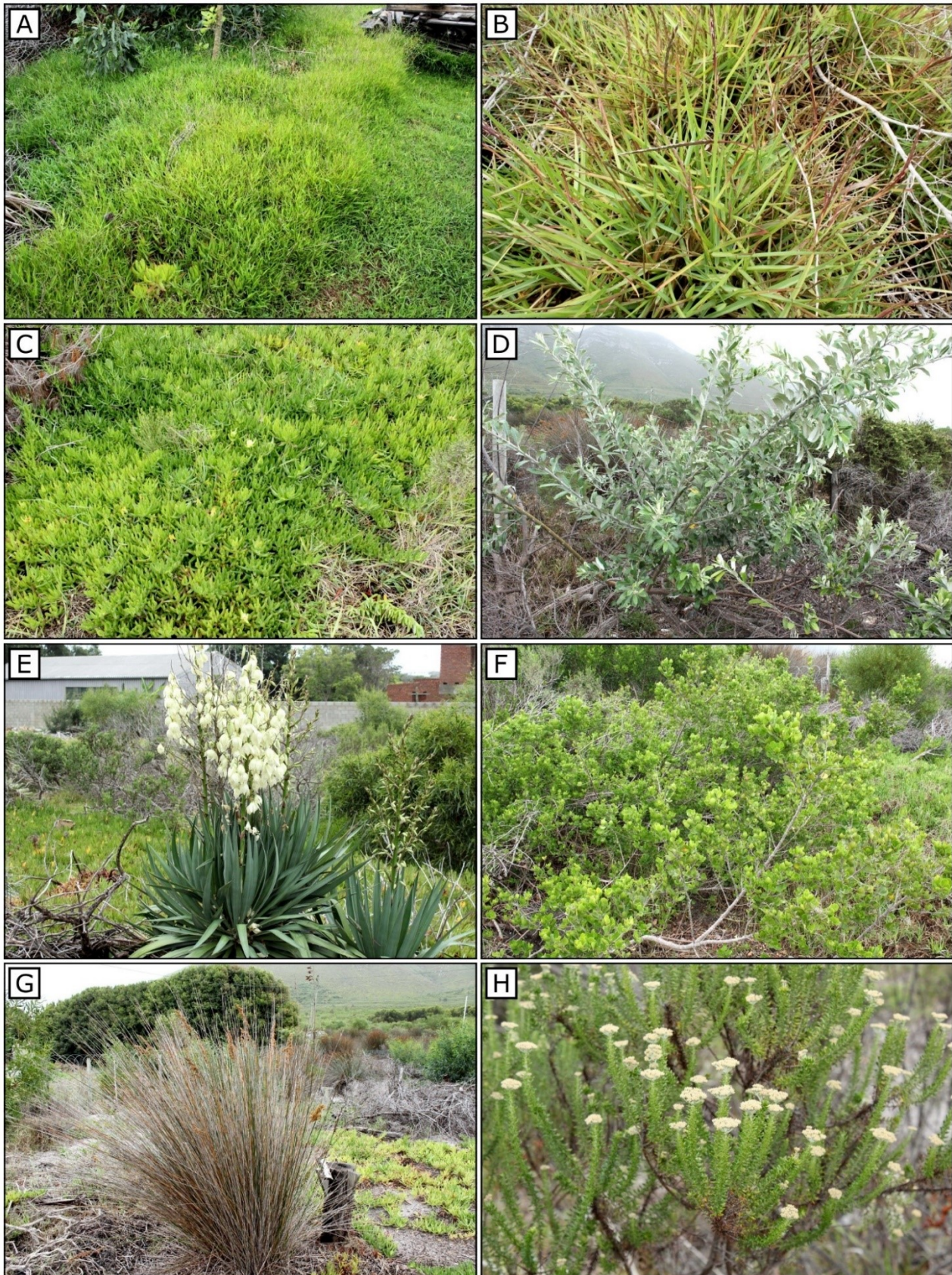


Figure 3: Selected photos of plant species found in the study area. A) *Axonopus fissifolius*, B) *Stenotaphrum secundatum*, C) *Carpobrotus edulis subsp. edulis*, D) *Brachylaena discolor*, E) *Yucca gloriosa*, F) *Searsia glauca*, G) *Thamnochortus insignis*, and H) *Metalasia muricata*.

2.3.2. Species of Conservation Concern

Ground truthing confirmed that no SCC occur within the study area. Given the highly disturbed and transformed nature of the study area (see section 2.3.1), it is unlikely that any plant SCC will occur in it.

2.3.3. Alien and Invasive Plant Species

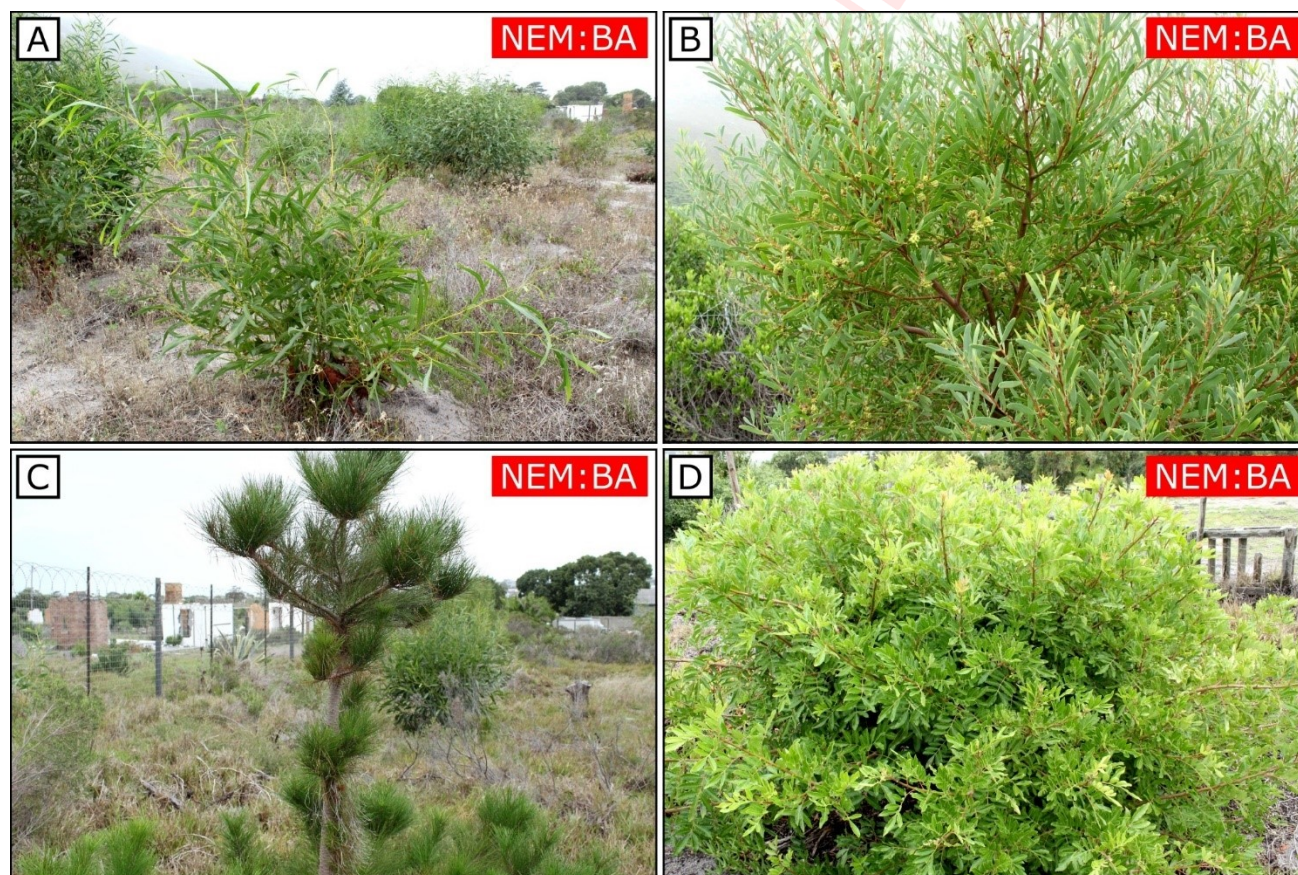


Figure 4: NEM:BA A&IS Regulations listed invasive plant species that were observed. A) *Acacia saligna*, B) *Acacia cyclops*, C) *Pinus radiata*, and D) *Schinus terebinthifolius*.

A total of 14 alien plant species were found within the study area, of which 5 are NEM:BA A&IS Regulations listed invasive species (Figure 4), namely:

- *Acacia cyclops* (Red eye; Category 1b)
- *Acacia saligna* (Port Jackson, Port Jackson willow; Category 1b)
- *Leptospermum laevigatum* (Australian myrtle; Category 1b)
- *Pinus radiata* (Radiata pine, Monterey pine; Category 1b)
- *Schinus terebinthifolius* (Brazilian pepper tree; Category 1b)

Of these *Acacia cyclops* and *A. saligna* are the most abundant on-site, with the other species occurring in varying abundances.

2.3.4. Site Ecological Importance (SEI) Assessment

The Relative Plant Species Theme Sensitivity for the study area and surrounds, according to the online screening tool, is scored as “Medium” (Figure 5). This is based on potential predicted presences of sensitive species in the area, as well as SCC (see sections 6.3.1 and 2.1.1.a). Ground truthing confirmed that no SCC or sensitive species occur within the study area. Also, given the highly disturbed nature of the site currently, the true Relative Plant Species Theme Sensitivity of the site can instead be considered as “Low” according to the criteria given by Government Notice 1150 of Government Gazette 43855 (October 2020; see section 1.6).

The Relative Biodiversity Theme Sensitivity for the study area and surrounds, according to the online screening tool, was scored as “Very High” (Figure 5). This is due to the study area being mapped to overlap a CBA1 (Terrestrial) area (note that the screening tool incorrectly states “ESA 2: Restore from other land use”), a SWSA (Boland), and a Critically Endangered ecosystem (Hangklip Sand Fynbos). Ground truthing confirmed that the site is degraded and transformed, and does not bear resemblances to the mentioned vegetation type (section 2.3.1). The true Relative Biodiversity Theme Sensitivity of the site can instead be considered as “Low” according to the criteria given by Government Notice 320 of Government Gazette 43110 (March 2020). However, given that only two categories [“Very High” and “Low”] are provided by the Gazetted Protocol, the Site Ecological Importance (SEI) 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.

Field observations, together with the SEI assessment (see section 7.2 for details), indicated that the study area should be classified as having a “Very Low” SEI (Table 2 and Map 11). The following specific reasons contributed towards this score:

- The study area has been transformed and degraded for quite some time, and is overrun by alien or weedy native species. This is considered a major negative impact occurring on site and lowers SEI scores.
- No SCC occur within the proposed development footprint, and it is unlikely that such would enter and establish, or persist, on site in the future given the current degraded conditions. This lowers SEI scores.
- The Receptor Resilience is scored as Very High (thus contributing to a Very Low SEI) because many of the species are by their nature either weedy and disturbance adapted, or common and widespread, thus having a large ecological plasticity. They will in all likelihood persist on site indefinitely.

Note that all infrastructure are by default scored as Very Low and are not specifically assessed using the SEI method.

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 8 and details given in section 7.2):

- “Very Low”: minimization mitigation.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

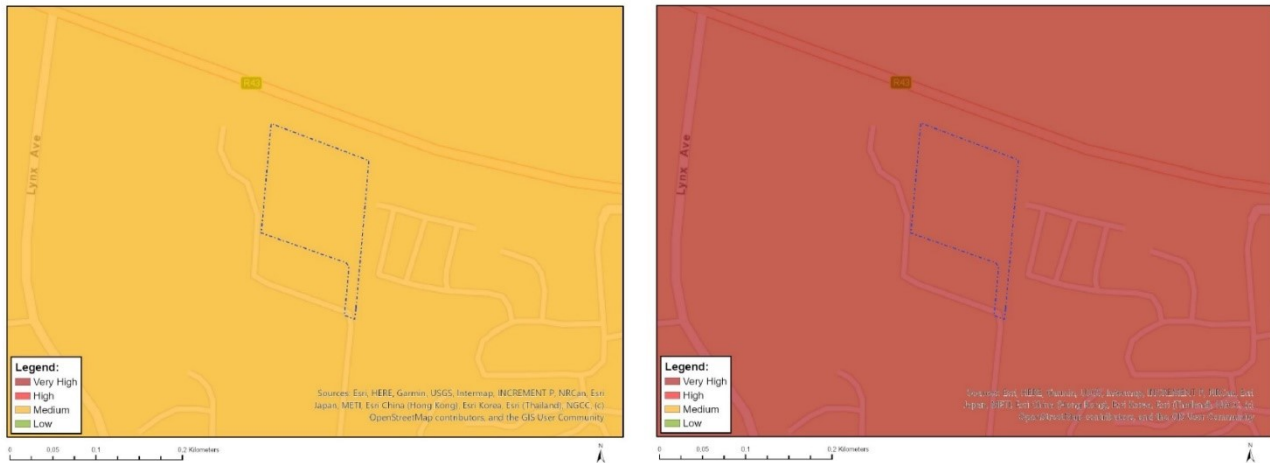


Figure 5: Relative Plant Species and Terrestrial Biodiversity Theme Sensitivities for the study area, as indicated by the National Web-based Environmental Screening Tool.

Table 2: Evaluation of Site Ecological Importance (SEI) for the plant community type(s) within the study area and surrounds. BI = Biodiversity Importance. See section 7.2 for more details.

| Plant Community Type / Habitat | Conservation Importance (CI) | Functional Integrity (FI) | Receptor Resilience (RR) | SEI |
|-----------------------------------|---|---|--|----------------------------|
| <i>Transformed</i> | Very Low: No confirmed and highly unlikely populations of SCC. | Low: Several minor and major current negative ecological impacts. Small (> 1 ha but < 5 ha) area. | 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>Stenotaphrum - Carpobrotus</i> | Very Low: No confirmed and highly unlikely populations of SCC. | Low: Several minor and major current negative ecological impacts. Small (> 1 ha but < 5 ha) area. | 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 11: Site Ecological Importance (SEI) for the study area (see Table 2 for more details).

3. Proposed Impact Management Actions

| Construction and Operational Phases | |
|--|--|
| Impact | Mitigation |
| General Terrestrial Biodiversity impacts. | <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>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.</p> <p>Areas of indigenous vegetation communities outside of the direct project footprint, if present, should under no circumstances be fragmented or disturbed further.</p> <p>All vehicles, if present on site, must remain on demarcated roads and no unnecessary driving in the veld outside these areas are allowed.</p> |
| Soil erosion and associated degradation of ecosystems. | <p>Minimize the number of disturbed areas.</p> <p>Any signs of erosion resulting from the project activities must be rectified immediately and monitored thereafter to ensure that they do not re-occur.</p> <p>Roads and other disturbed areas within the study area should be regularly monitored for erosion problems, and problem areas should receive follow-up monitoring to assess remediation success.</p> <p>Existing access routes and walking paths must be made use of wherever possible.</p> <p>Silt/sediment traps/barriers should be used where there is a danger of topsoil or material stockpiles eroding and entering downstream drainage lines and/or other sensitive areas. These sediment/silt barriers should be regularly maintained and cleared so as to ensure effective drainage of the areas</p> <p>Runoff water on exposed areas should be controlled.</p> |
| Spread and/or establishment of alien and/or invasive species. | <p>Invasive alien plant species must be removed from the site as per NEM:BA requirements.</p> <p>Regular monitoring for alien plants at the site should occur and could be conducted simultaneously with erosion monitoring.</p> <p>When alien plants are detected, these should be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels.</p> <p>Any area that is cleared of invasive alien plant species 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, especially when occurring in or close to hydrological features.</p> <p>No planting or importing of any alien species to the site for landscaping, rehabilitation, or any other purpose should be allowed.</p> |

4. Conclusion and Impact Statement

A comprehensive desktop study, together with field survey results, suggest a high confidence in the information provided. The surveys ensured that a suitable coverage was obtained for study area.

The entirety of the study area can be classified as being “Very Low” in Site Ecological Importance given the high density of alien or native weedy grasses present, the presence of numerous other alien species, including NEM:BA A&IS Regulations listed species, and the degraded and transformed nature of the study area. Furthermore, the true Relative Plant Species Theme Sensitivity of the site can instead be considered as “Low”. More specifically:

- No plant SCC occurs within the proposed development footprint, and are highly unlikely to enter and establish on site given the highly degraded nature of the site;
- No threatened ecosystems or CBA/ESA areas occurs within the proposed development footprint; and
- The study area does not conform to Hangklip Sand Fynbos and is not eligible for contributing to national ecosystem protection levels and/or conservation targets.

The only conditions to which this compliance statement is subjected to are those listed in section 3, and include general measures to minimize environmental impacts.

FINAL STATEMENT

Considering all the findings of this report, no fatal flaws are evident. The proposed activities may be favourably considered subject to reasonable measures for minimizing further environmental damage and/or degradation.

**PART 2: References, Methodology, and
Supplementary Information**

EcoFloristix
Specialist Botanical Surveys

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ENDORSED BY ECOFLORISTIX
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6. 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.

Finally, use of any maps within this report is entirely at the applicant and/or client's own risk. Acuity JRK (Pty) Ltd (trading as EcoFloristix Specialist Botanical Surveys) shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of or in connection with the use of or inability to use any or all maps within this report. By using any or all maps within this report, the client and/or applicant agrees to indemnify and hold Acuity JRK (Pty) Ltd (trading as EcoFloristix Specialist Botanical Surveys) harmless from any and all claims, liabilities, damages, and/or expenses, arising out of or in connection with usage of any or all maps within this report.

6.1. Ecologically Important Landscape Features: Custom GIS Mapping

The GIS was used together with the latest Google Earth 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.

6.2. 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:

6.2.1. 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 6.3.2).

6.2.2. 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.

6.2.3. 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).

6.2.4. 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.

6.2.5. Biodiversity Spatial Plan

Biodiversity Spatial Plans classify areas within a province 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.

6.3. Botanical Assessment

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

6.3.1. 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 6) (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 PAOI, then 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 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. Species records were then clipped with the relevant vegetation types (as indicated by VegMap; see section 6.3.2) that underlie the study area. This ensured that only relevant species that are most likely to occur within the study area and surrounds were extracted, since many specialist species might be included in a large extraction area, but are highly unlikely to occur on site given their specialist habitat requirements.
- **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 projects 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.

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.

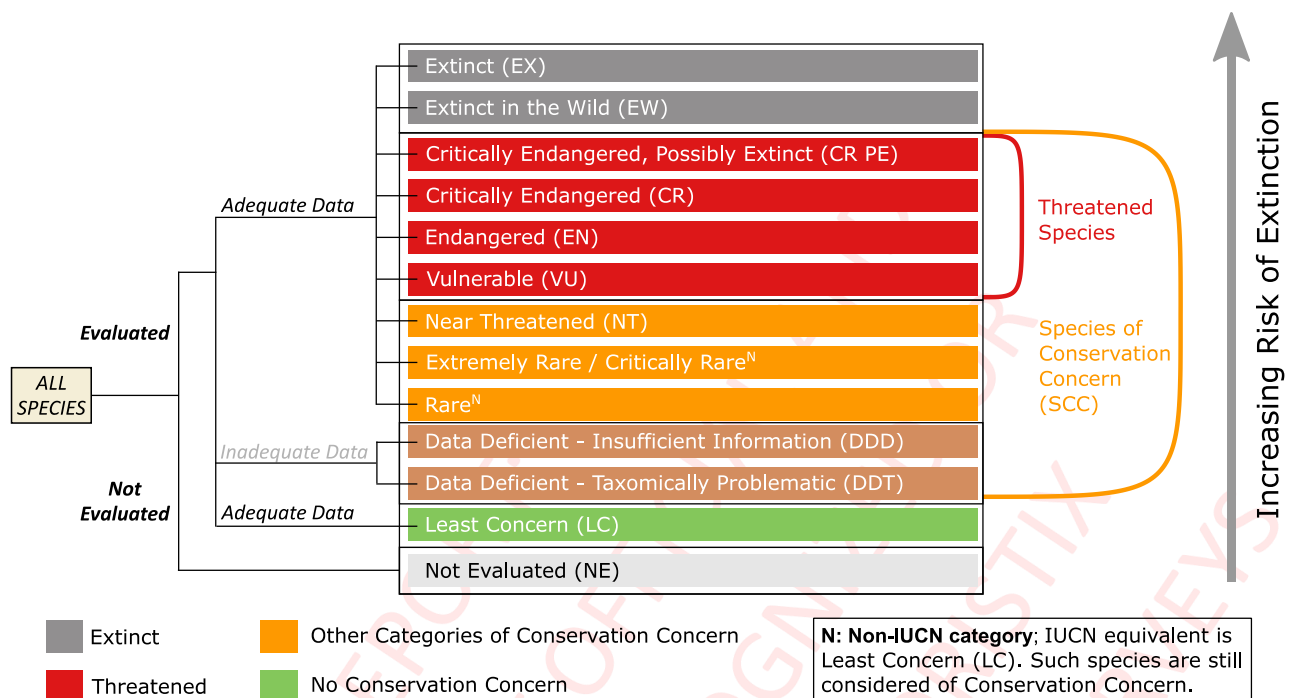


Figure 6: Red List and SCC categories used in this report as originally delineated according to SANBI's Red List of South African Plants (<http://redlist.sanbi.org/redcat.php>), and recently updated in the *Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa* (South African National Biodiversity Institute, 2020).

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).

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

The NEM:BA A&IS Regulations is the most current legislation regarding IAPs. The IAPs list of 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.

6.3.2. 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 6.2.1). 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.

7. Methodology Fieldwork Phase

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

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

7.1. 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 6.1 and 6.2). 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. The combination of single fixed-point plots, supplemented with timed random meanders, are 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 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) where applicable. Finally, any opportunistic observations were also made while surveying.

Various field guides and identification manuals were used for plant identification where applicable, as well as other relevant literature regarding the ecology of the region (Bromilow, 2010; Henderson, 2020; Manning, 2007; Manning & Goldblatt, 2012; Van Oudtshoorn, 2012), and are listed in section 5.

7.2. 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 study area were delineated and identified based on field observations and satellite imagery (also see section 6.1). 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 7): 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 8). BI, FI, and RR categories are all circumscribed by various criteria (see Table 3, Table 4, and Table 5). The various criteria per category may be applied in combination or in isolation. See Figure 8 for guidelines on interpreting the resulting SEI categories. SEI is usually evaluated per plant community type / vegetation type.

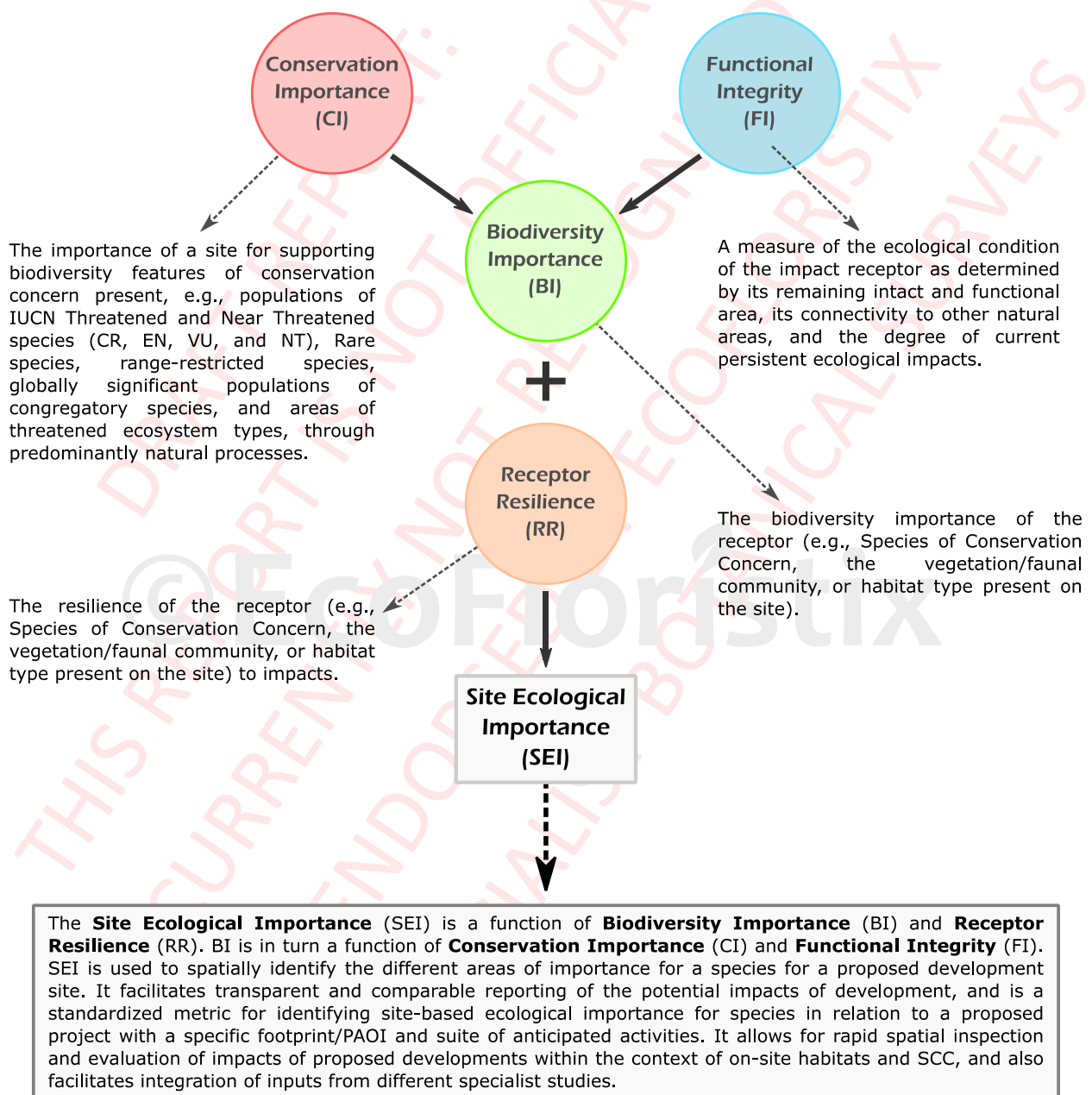


Figure 7: Details on the factors that contribute to the Site Ecological Importance value. Also see Figure 8.

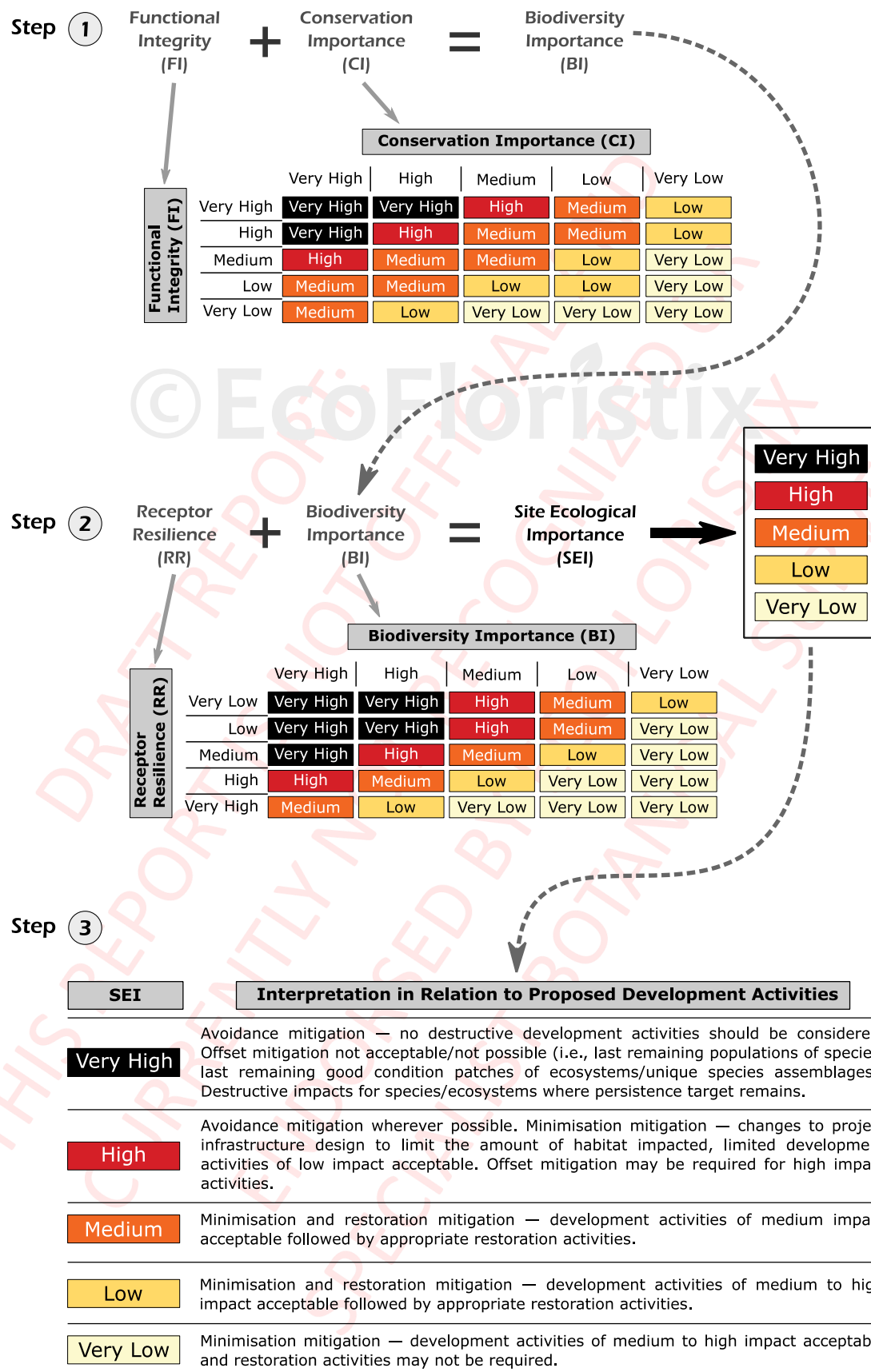


Figure 8: Calculations, scores, process, and guidelines for calculating and interpreting Site Ecological Importance (SEI) categories (South African National Biodiversity Institute, 2020).

Table 3: Details regarding Conservation importance (CI) categories (South African National Biodiversity Institute, 2020).

| 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 4: Details regarding Functional Integrity (FI) categories (South African National Biodiversity Institute, 2020).

| 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 5: Details regarding Receptor Resilience (RR) categories (South African National Biodiversity Institute, 2020).

| 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 functionality of the 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 functionality of the 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 functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed. |
| 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. |

8. Abbreviated Curriculum Vitae of the Specialist

Personal 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/>

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 [>650](#)
- Global Publication Reads [>9500](#)
- Scopus h-index [12](#)
- Google Scholar h-index [12](#)
- Google Scholar i10-index [13](#)

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, Kritzing-Klopper S, Le Roux JJ (2025) Legacy effects of an invasive legume more
- **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): fiaa106, <https://doi.org/10.1093/femsec/fiaa106>.

- 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 projects (a full list is available on request):

- Plant Species and Terrestrial Biodiversity Impact assessment for the proposed clearing of vegetation for road upgrades in the Groot Winterhoek Nature Reserve, Western Cape (February 2026). Report prepared for Doug Jeffrey Environmental. Reference: PR.26.004.
- Plant Species and Terrestrial Biodiversity Impact assessment for the proposed clearing of vegetation at various localities in the Hottentots-Holland and the Groenlandberg Natures Reserves, Western Cape (February 2026). Report prepared for Doug Jeffrey Environmental. Reference: PR.26.003.
- Plant Species and Terrestrial Biodiversity Impact assessment for a section 24G unlawful clearing of indigenous vegetation on Annex Klein Zout Rivier 39, Napier, Western (February 2026). Report prepared for Lornay Environmental Consulting. Reference: PR.25.046.
- 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.
- 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. 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.
- 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.
- N6 Galway City (Ireland) Ring Road Environmental Impact Assessment Report: Assistance with Data Analysis, Modelling, and Validation (July 2024 – December 2024). 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.
- Botanical Impact Assessment: Development of portion 223 of Farm 559, Betty's Bay, Western Cape. (July 2023). Report prepared for Ohana Environmental. Reference: IA.23.007.
- Botanical Study and Assessment for a Housing Development, 2023. Proposed development of the development of Erf 397, Suiderstrand, Western Cape. Report prepared for RMS Environmental.
- Botanical Study and Assessment for a Mining Permit Application, 2023. Proposed development of a dolerite mine near Beaufort West, Western Cape. Report prepared for Greenmined Environmental (Pty) Ltd.
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2022. Full Botanical Assessment for the proposed development of wind energy facilities south of Bethal, Mpumalanga Province.

- In collaboration with Nkurenkuru Ecology and Biodiversity, 2021. Application (Expansion of mining footprint), and Final Basic Assessment and Environmental Management Plan for the proposed sand mine expansion on Portion 4 of the Farm Zandberg Fontein 97, Western Cape Province.
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2021. Proposed development of wind energy facilities on the farms Brussels, Driepoort (664-1 and 664-2), Kameelfontein, Lisbon, Nazareth, and Zwartkrans, near Vryburg, Northwest Province.
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2021. Botanical Study and Assessment: Proposed development of wind energy facilities on the farm Kluitjieskraal, Loeriesfontein, Northern Cape Province.
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2021. Botanical Study and Assessment: Proposed development of an access road to the authorised Sutherland 1 and Rietrug wind energy facilities near Sutherland.
- Specialist Botanical Assessment Report: Assessment of Damage and Rehabilitation Costs for Unauthorised Driving of a 4x4 Vehicle in the Big Bay Open Space System, Cape Town. Prepared for Hannes, Pretorius, Bock & Bryant Attorneys.
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2019. Mining Permit, Final Basic Assessment & Environmental Management Plan for the proposed mining of Sillimanite, Aggregate and Stone Gravel on the Farm Koenabib 43, Northern Cape Province. Botanical Study and Assessment Report. Unpublished report prepared by Nkurenkuru Ecology and Biodiversity for GreenMined Environmental. Version 1.0, 30 January 2020
- In collaboration with Nkurenkuru Ecology and Biodiversity, 2019. Mining Permit, Final Basic Assessment & Environmental Management Plan for the proposed mining of Sillimanite on the Farm Wortel 42, Northern Cape Province. Botanical Study and Assessment Report. Unpublished report prepared by Nkurenkuru Ecology and Biodiversity for GreenMined Environmental. Version 1.0, 30 January 2020
- Specialist Invasive Alien Plant Species Report: Prepared for: Mpaact Corrugated, Kuils River (Western Cape), July 2019
- Proposed Township development, Country view, Gauteng: Biodiversity Impact Assessment (Flora) – Specialist Report prepared for Zone Land Solutions (PTY) Ltd, July 2015
- Colenso Anthracite Coal Mining and Power Station Project: Biodiversity Impact Assessment (Flora) – Specialist Report prepared for Zone Land Solutions (PTY) Ltd, July 2015

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