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Terrestrial Plant Species Assessment

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

Camden I Solar Energy Facility near Ermelo in Mpumalanga Province

Prepared by: Dr David Hoare
Pr.Sci.Nat. (Botany, Ecology) 400221/05

For: Camden I Solar Energy Facility (RF) Pty Ltd

25 June 2022

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SPECIALIST DETAILS & DECLARATION

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

The details of the specialist is as follows:

Specialist	Qualification and accreditation
Dr David Hoare	PhD Botany SACNASP (Pr.Sc.Nat.) Reg. no. 400221/05 (Ecology, Botany)

Statement of independence:

I, David Hoare, as the appointed plant species specialist, hereby declare/affirm the correctness of the information provided in this compliance statement, and that I:

1. meet the general requirements to be independent and
2. have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and
3. am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014).

_____ 25/06/2022

Dr David Hoare Date

TERMS OF REFERENCE

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

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

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

General information

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

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

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

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

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

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

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

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

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

Terrestrial Plant Species Specialist Assessment

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

2.2 The assessment must be undertaken within the study area.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Terrestrial Plant Species Specialist Assessment Report

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

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

3.1.2 a signed statement of independence by the specialist;

3.1.3 a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

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

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

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

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

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

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

3.1.10 a discussion on the cumulative impacts;

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

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

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

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

Terrestrial plant species compliance statement

Where the sensitivity in the Screening Report from the web-based Online Screening Tool has been confirmed to be LOW, a Plant Species Compliance Statement is required, either (1) for areas where no natural habitat remains, or (2) in natural areas where there is no suspected occurrence of SCC.

The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).

The compliance statement must:
1. be applicable within the study area
2. confirm that the study area is of "low" sensitivity for terrestrial plant species; and
3. indicate whether or not the proposed development will have any impact on SCC.

The compliance statement must contain, as a minimum, the following information:
1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;
2. a signed statement of independence by the specialist;
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;
4. a baseline profile description of biodiversity and ecosystems of the site;
5. the methodology used to verify the sensitivities of the terrestrial biodiversity and plant species features on the site including the equipment and modelling used where relevant;
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;

7. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;
8. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data; and
9. any conditions to which this statement is subjected.

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

INTRODUCTION

Project Background

Camden I Solar Energy Facility (RF) Propriety Limited, a subsidiary of ENERTRAG AG, the German-based renewable energy company, is proposing to develop a Solar Energy Facility of up to 100 MW near Camden Power Station in the Mpumalanga Province. This will be part of the Camden Renewable Energy Complex that will include:

1. Camden I Wind Energy Facility (up to 200MW).
2. Camden I Wind Grid Connection (up to 132kV).
3. Camden up to 400kV Grid Connection and Collector substation.
4. **Camden I Solar up to 100MW.**
5. Camden I Solar up to 132kV Grid Connection.
6. Camden Green Hydrogen and Ammonia Facility, including grid connection infrastructure and water pipeline.
7. Camden II Wind Energy Facility (up to 200MW).
8. Camden II Wind Energy Facility up to 132kV Grid Connection.

Camden I Solar Energy Facility (RF) Propriety Limited has appointed WSP as the independent Environmental Assessment Practitioner (EAP) to facilitate the Environmental Impact Assessment (EIA) Process.

This report relates specifically to the **Camden I Solar Energy Facility (up to 100 MW)** (the Project). ENERTRAG appointed David Hoare Consulting (Pty) Ltd to undertake this specialist assessment for the Project.

Project description

Camden I Solar will consist of an up to 100MW Solar PV facility, to complement the energy production from the Camden I WEF. The solar PV array will cover an area of 297ha, subject to finalization based on technical and environmental requirements.

Camden I Solar PV Facility details

Facility Name	Camden I Solar Energy Facility
Applicant	Camden I Solar Energy Facility (RF) Propriety Limited
Municipalities	Msukaligwa Local Municipality of the Gert Sibande District Municipality
Affected Farms	Portion 1 of Welgelegen Farm No. 322
Extent	~ 297 ha
Buildable area	Approximately 280 ha, subject to finalization based on technical and environmental requirements

Capacity	Up to 100MW
Power system technology	Solar PV
Operations and Maintenance (O&M) building footprint:	Located near the substation. Septic tanks with portable toilets Typical areas include: - Operations building – 20m x 10m = 200m^2 - Workshop – 15m x 10m = 150m^2 Stores - 15m x 10m = 150m^2
Construction camp and laydown area	Typical construction camp area 100m x 50m = 5,000m^2. Typical laydown area 100m x 200m = 20,000m^2. Sewage: Septic tanks and portable toilets
Cement batching plant (temporary):	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo.
Internal Roads:	Width of internal road – Between 4m and 5m. Where required for turning circle/bypass areas, access or internal roads may be up to 20m to allow for larger component transport. Length of internal road – Approximately 8km.
Cables:	Communication, AC and DC cables.
Independent Power Producer (IPP) site substation and battery energy storage system (BESS):	Total footprint will be up to 6.5ha in extent (5ha for the BESS and 1.5ha for the IPP portion of the substation). The substation will consist of a high voltage substation yard to allow for multiple (up to) 132kV feeder bays and transformers, control building, telecommunication infrastructure, access roads, etc. The associated BESS storage capacity will be up to 100MW/400MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology. The main components of the BESS include the batteries, power conversion system and

	transformer which will all be stored in various rows of containers.

The Project is located about 8 km south to south-east of Ermelo in Mpumalanga Provinces, South Africa (Figure 1). The site is halfway between the N11 (Ermelo to Amersfoort) and the N2 (Ermelo to Piet Retief). Camden Power Station (Eskom) is on the north-eastern border of the site. The roads on site are all gravel farm access roads.

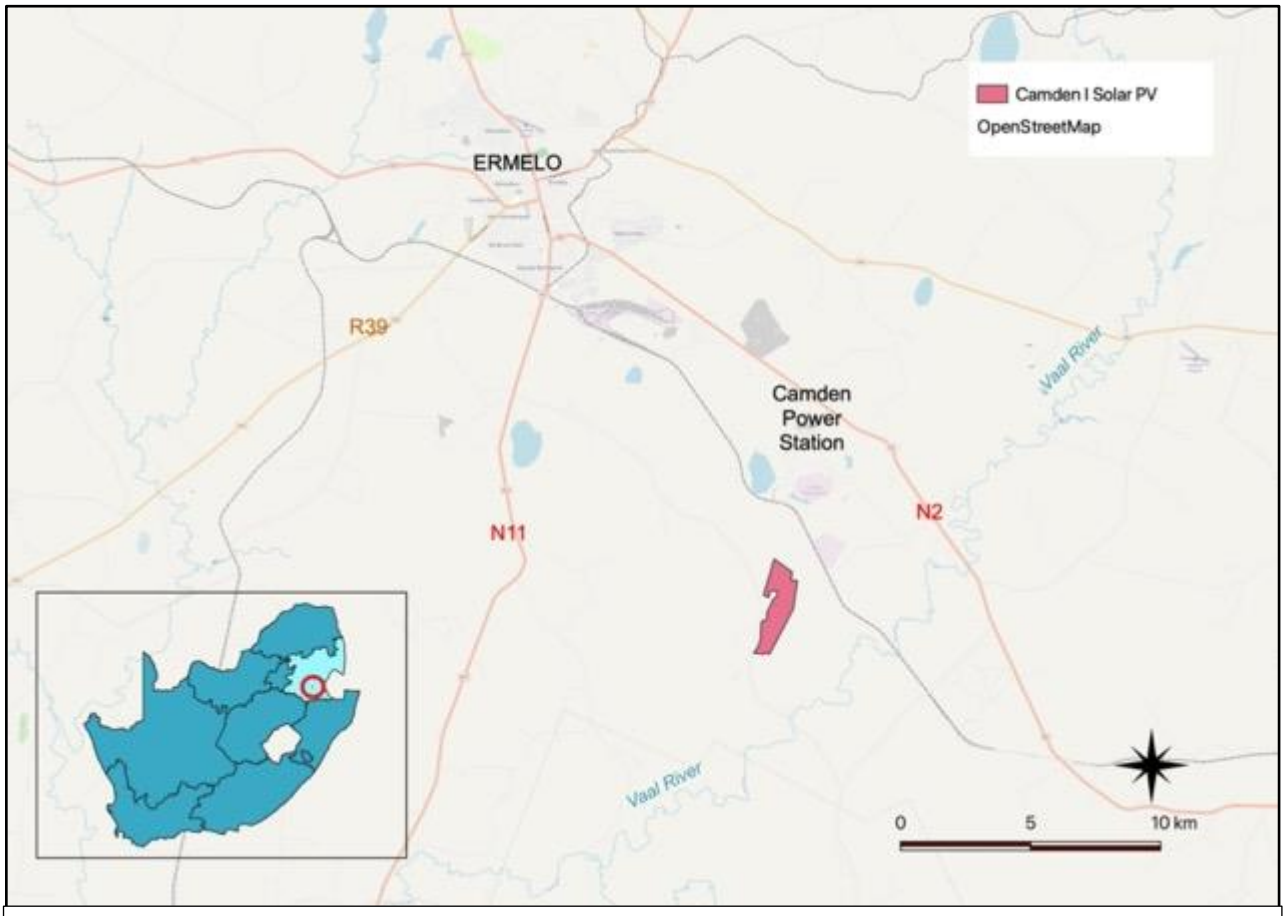

Figure 1: Location of the proposed Project.

Identified Theme Sensitivities

A sensitivity screening report from the Department of Forestry, Fisheries and the Environment (DFFE) Online Screening Tool was requested in the application category:

Utilities Infrastructure | Electricity | Generation | Renewable | Solar | PV

The DFFE Screening Tool report for the area (Figure 2) indicates the following ecological sensitivities:

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

Plant Species theme
The plant species theme was highlighted as being of Medium sensitivity due the potential presence of the following species:

Sensitivity	Feature(s)
Low	Low sensitivity
Medium	Khadia carolinensis
Medium	Sensitive species 1201
Medium	Aspidoglossum xanthosphaerum
Medium	Sensitive species 41
Medium	Sensitive species 691
Medium	Pachycarpus suaveolens
Medium	Sensitive species 851

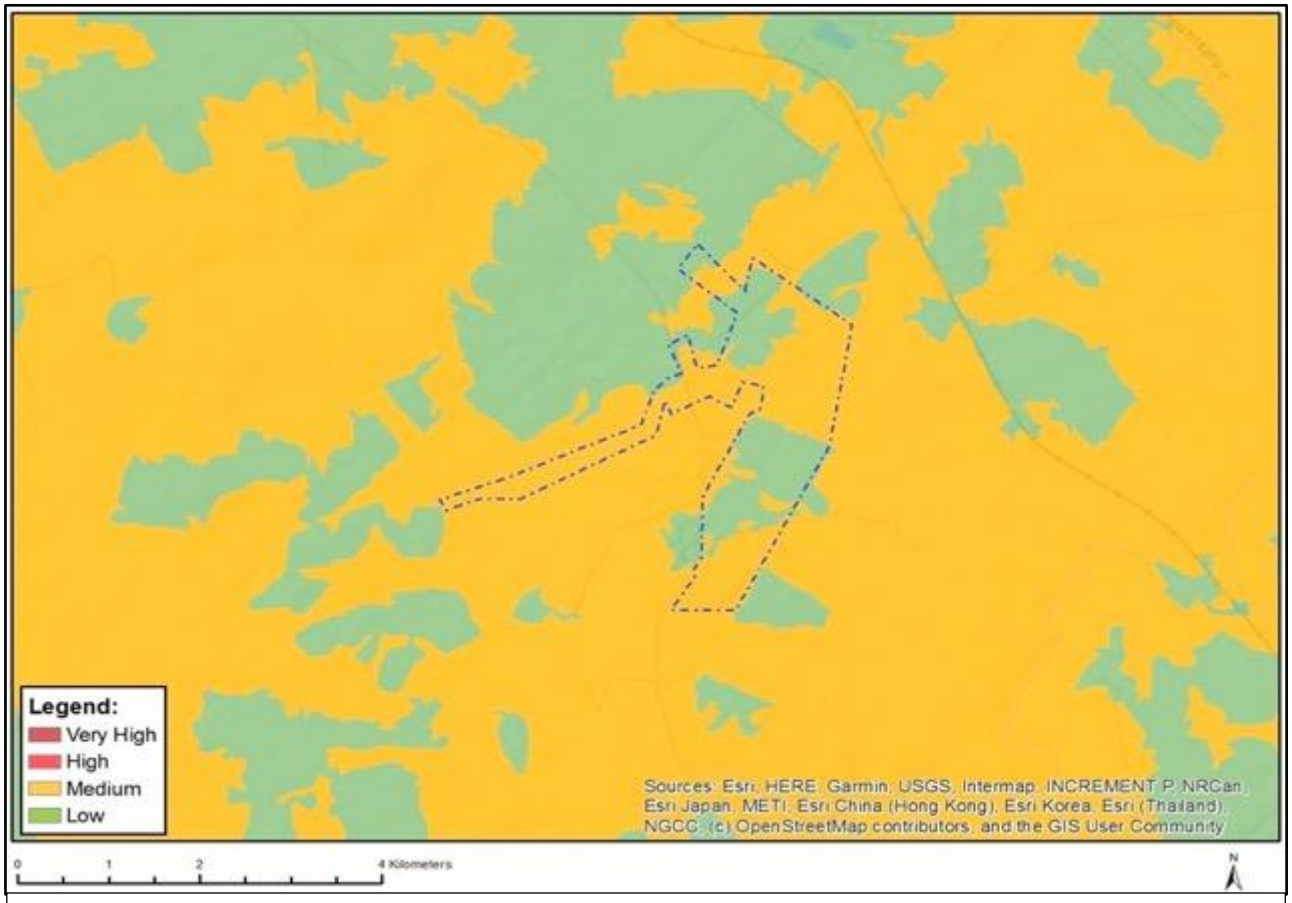

Figure 2: DFFE Screening Tool extract for Plant Species Theme.

METHODOLOGY

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

Survey timing

The study commenced as a desktop-study followed by a site-specific field study on 3–7 February 2020. The site is within the grassland biome with a peak rainfall season in summer, which occurs from October to March (Figure 3). There is, however, a delay between rainfall and vegetation growth, which means the peak growing season is from November to April, with most perennial species characteristic of the vegetation being easily identifiable from January to March. The timing of the field survey was therefore ideal in terms of assessing the vegetation condition and flora composition of the site.

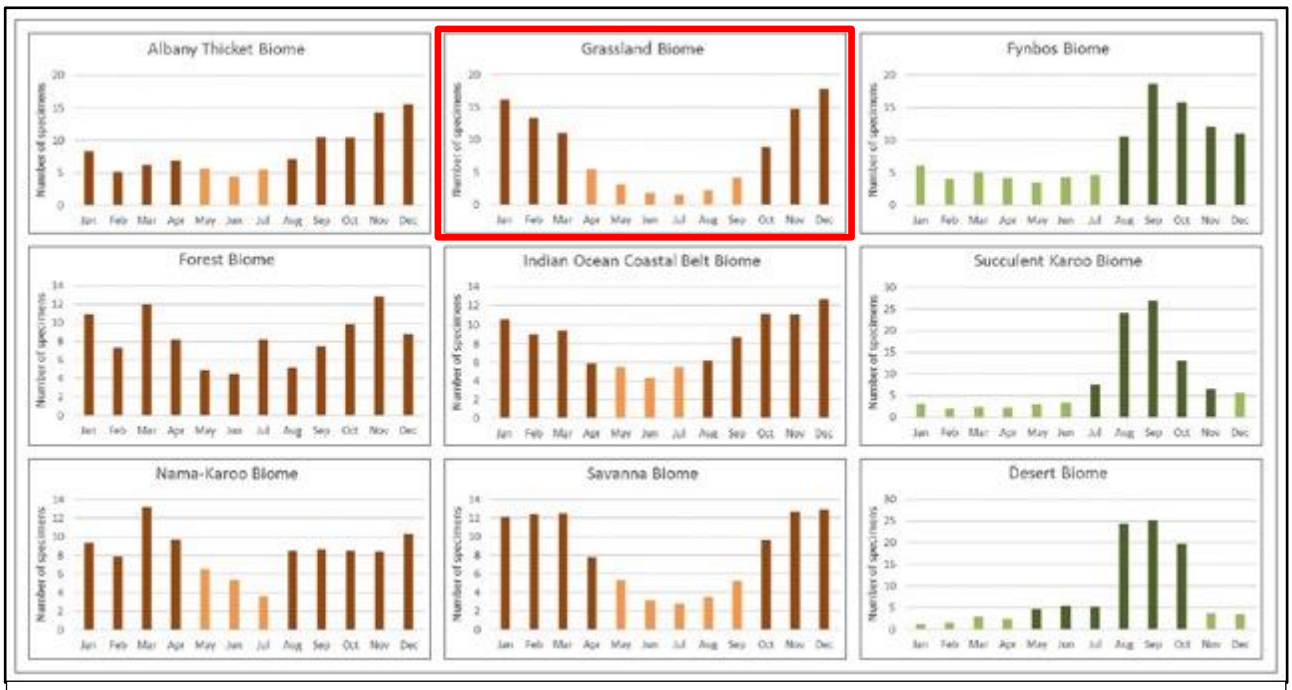

Figure 3: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines).

Field survey approach

During the field survey, all major natural variation on site was assessed and select locations were traversed on foot. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made.

Aerial imagery from Google Earth was used to identify and assess habitats on site. Patterns identified from satellite imagery were verified on the ground. During the field survey, particular attention was paid to ensuring that all habitat variability was covered physically on the ground during the search for plant species. From this ground survey, as well as ad hoc observations on site, a checklist of plant species occurring on site was compiled.

Digital photographs were taken of all plant species that were seen on site. All plant species recorded were uploaded to the iNaturalist website.

Sources of information

Plant species

1. Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates according to the SANBI BGIS website (http://bgis.sanbi.org). The description of each vegetation type includes a list of plant species that may be expected to occur within the particular vegetation type.
2. Plant species that could potentially occur on in the general area was extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grids in which the site is located.
3. The IUCN Red List status for plant species, as well as supplementary information on habitats and distribution, was obtained from the SANBI Threatened Species Programme (Red List of South African Plants, http://redlist.sanbi.org).
4. Lists were compiled specifically for any species at risk of extinction (Red List species) previously recorded in the area. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute (http://newposa.sanbi.org) for the quarter degree grids within which the study area is situated. Habitat information for each species was obtained from various published sources. The probability of finding any of these species was then assessed by comparing the habitat requirements with those habitats that were found, during the field survey of the site, to occur there.
5. Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distribution of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI database (www.newposa.sanbi.org) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 50 km), or where it is considered possible that they could occur there, were listed and were considered as being at risk of occurring there.

Limitations

The purpose of the fieldwork undertaken for this Project to characterize the habitat of the study area, compile species checklists from as diverse a variety of habitats as possible, and to map habitats within the entire collection of farms within which the Project is situated. The proposed project layout was provided during the EIA process, therefore no development footprint areas were assessed for the Project, only the general area in which the project is located. A final walk-through to survey conducted in Spring or Summer, where possible, is therefore recommended to check for potential species of conservation concern within footprints of the development.

RESULTS

Regional vegetation patterns

There is one regional vegetation type occurring in the study area, namely Eastern Highveld Grassland (Figure 4). The vegetation type description below is from Mucina & Rutherford (2006), extracted from the SANBI BGIS website (http://bgis.sanbi.org/vegmap).

Eastern Highveld Grassland

Distribution

Found in Mpumalanga and Gauteng Provinces, on the plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief. The vegetation type occurs at an altitude of between 1 520–1 780 m.

Vegetation & Landscape Features

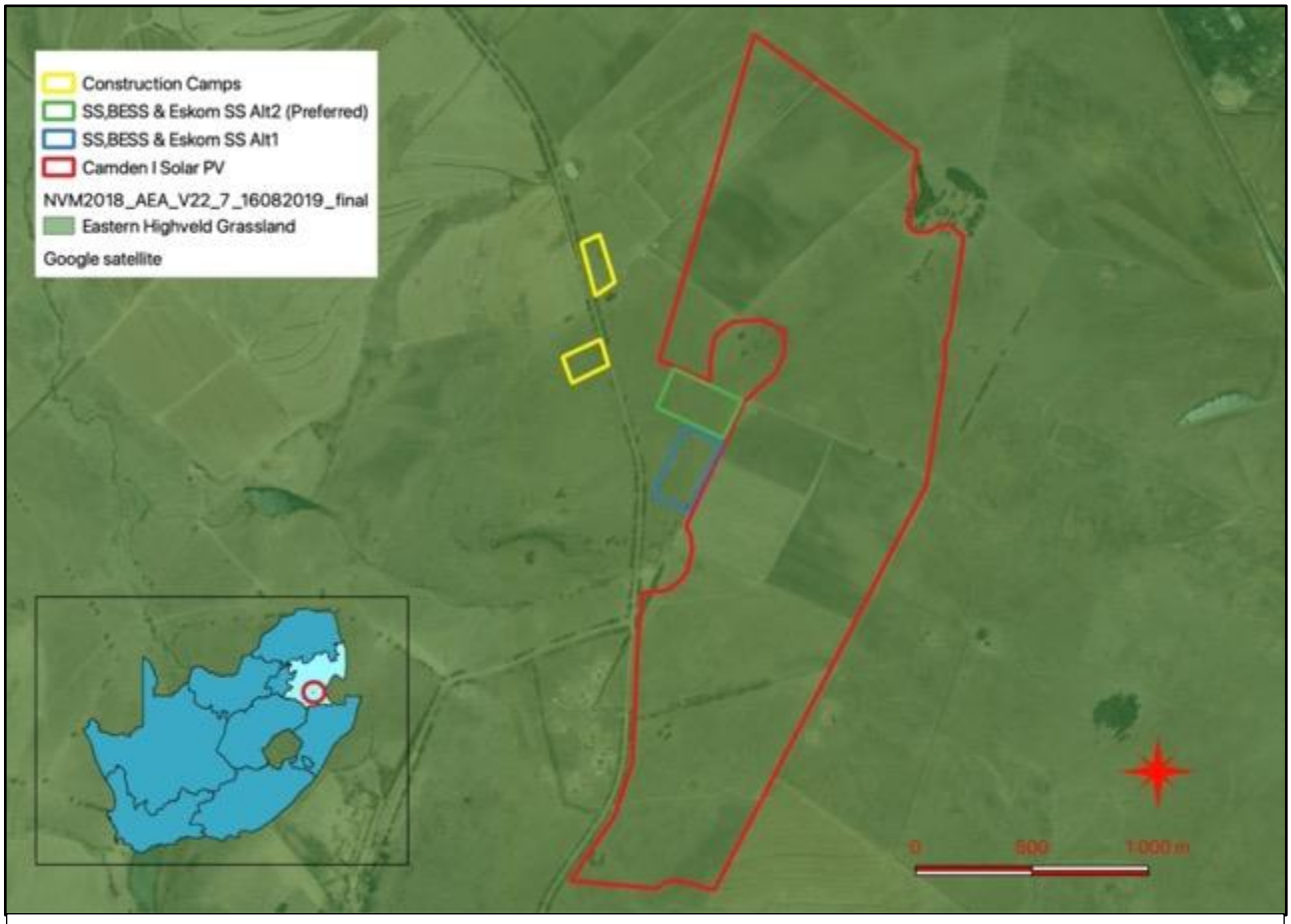

Figure 4: Regional vegetation types of the study area.

The vegetation occurs on slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya*, etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia*

caffra, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Searsia magalismontanum*).

Geology & Soils

Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types Bb (65%) and Ba (30%).

Climate

Strongly seasonal summer rainfall, with very dry winters. MAP 650–900 mm (overall average: 726 mm), MAP relatively uniform across most of this unit, but increases significantly in the extreme southeast. The coefficient of variation in MAP is 25% across most of the unit, but drops to 21% in the east and southeast. Incidence of frost from 13–42 days, but higher at higher elevations.

Important Taxa

Low Shrubs	*Anthospermum rigidum* subsp. *pumilum*, *Stoebe plumosa*..
Herbs	*Berkheya setifera* (d), *Haplocarpha scaposa* (d), *Justicia anagalloides* (d), *Pelargonium luridum* (d), *Acalypha angustata*, *Chamaecrista mimosoides*, *Dicoma anomala*, *Euryops gilfillanii, E. transvaalensis* subsp. *setilobus, Helichrysum aureonitens*, *H. caespititium*, *H. callicomum*, *H. oreophilum*, *H. rugulosum*, *Ipomoea crassipes*, *Pentanisia prunelloides* subsp. *latifolia*, *Selago densiflora*, *Senecio coronatus*, *Vernonia oligocephala*, *Wahlenbergia undulata*.
Geophytic Herbs	*Gladiolus crassifolius*, *Haemanthus humilis* subsp. *hirsutus*, *Hypoxis rigidula* var. *pilosissima*, *Ledebouria ovatifolia*.
Succulent Herbs	*Aloe ecklonis*
Graminoids	*Aristida aequiglumis* (d), *A. congesta* (d), *A. junciformis* subsp. *galpinii* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *D. tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. racemosa* (d), *E. sclerantha* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Microchloa caffra* (d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *S. pectinatus* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya leucothrix* (d), *T. rehmannii* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Andropogon appendiculatus*, *A. schirensis*, *Bewsia biflora*, *Ctenium concinnum*, *Diheteropogon amplectens*, *Eragrostis capensis*, *E. gummiflua*, *E. patentissima*, *Harpochloa falx*, *Panicum natalense*, *Rendlia altera*, *Schizachyrium sanguineum*, *Setaria nigrirostris*, *Urelytrum agropyroides*.

Habitats on site

A map of habitats within the study area is provided in Figure 5. The site is within an area of natural grassland but degraded (from heavily to light). The grassland contains variation due to changes in topography, slope inclination, surface rockiness and the influence of water-flow and water retention in the landscape. A broad classification of the habitat units on site, which also reflects relatively uniform plant species compositional units, is as follows:

Natural habitats:

1. **Natural grassland** (open grassland on undulating plains – the condition is not indicated in the habitat map although there is a gradient from heavily grazed poor condition to moderate condition);
2. **Wetlands** (permanent and seasonal wetlands in drainage valleys, including channels, where they occur);

The total amount of natural habitat on site potentially within the project footprint is 125 hectares. There is also approximately 190 ha of transformed or degraded habitat.

Transformed and degraded areas:

3. **Old lands** (secondary grasslands on previously cultivated areas);
4. **Exotic trees** (stands of exotic trees);
5. **Degraded areas** (disturbed areas with bare ground, weeds or waste ground).
6. **Current cultivation** (areas currently cultivated and fallow lands);
7. **Transformed** (areas such as roads and buildings where there is no vegetation).

NATURAL VERSUS SECONDARY GRASSLAND	
Natural grassland	Areas of original vegetation in which the soil has not been mechanically disturbed, including areas that are in poor condition due to **overgrazing**, **trampling**, **invasion** by weeds or alien invasive species, **inappropriate fire regimes**, or any other factor that drives natural change in species composition or vegetation structure. The key factor is that the original plants continue to exist, often resprouting after defoliation from sub-surface stems or other storage organs.
Secondary grassland	Areas of vegetation where the original grassland vegetation has been lost through direct **disturbance of the soil** that results in physical removal of the original plants, the most common cause of which is ploughing, but could be other mechanical factors. The vegetation that then develops is a result of recolonisation of the area through propagation.

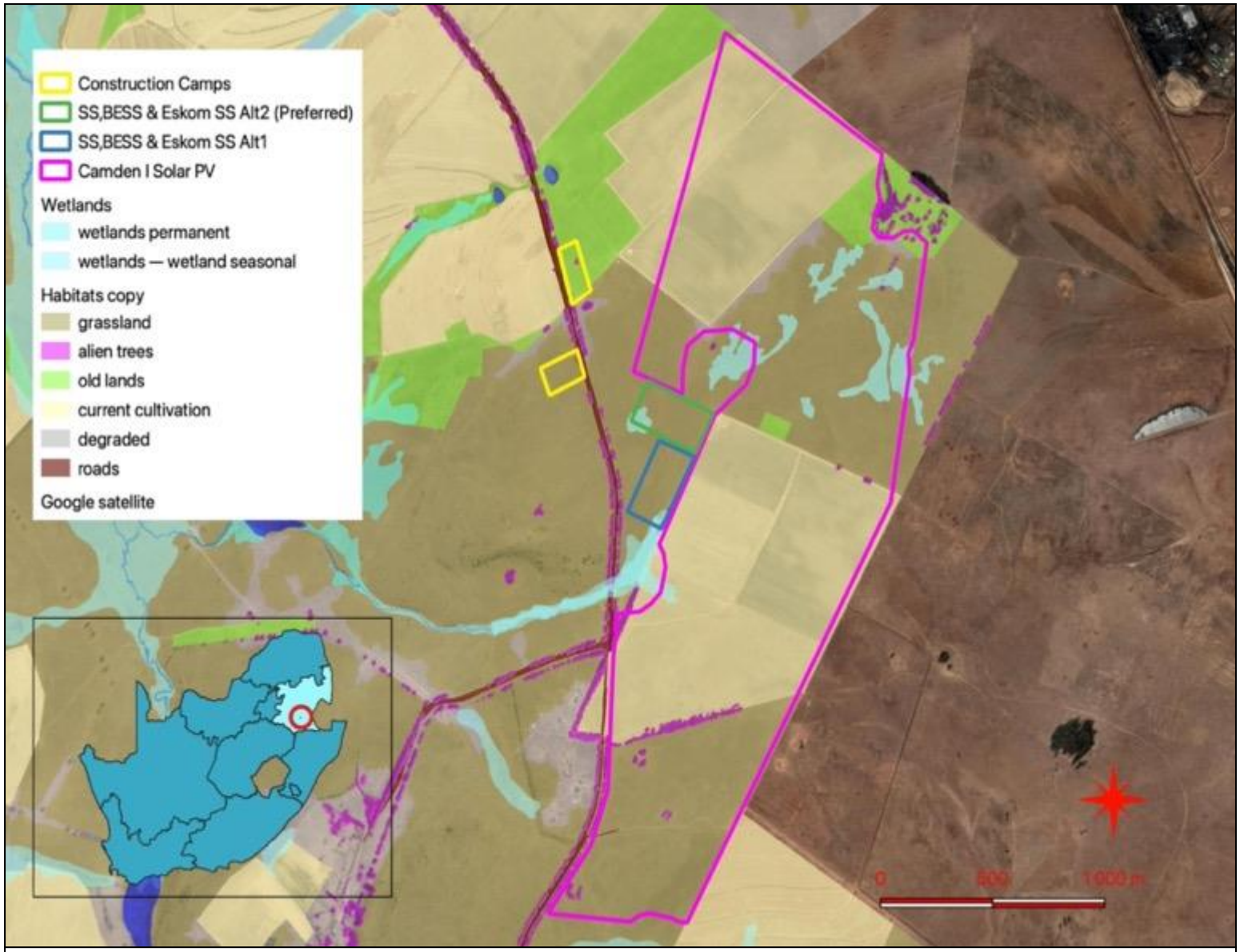

Figure 5: Main habitats of the study area.

Grassland
The general study area is characterised by an open grassland on the undulating hills and plains. It is generally a short to moderate height tussock grassland with closed canopy cover. The soil depth varies, as does the amount of surface rock cover, but tends to have shallow soil.

The general floristic character of this vegetation on site is fairly uniform across wide areas, often dominated by the same suite of species, including the grasses, *Alloteropsis semialata, Aristida diffusa, Aristida junciformis, Bewsia biflora, Brachiaria serrata, Diheteropogon amplectens, Elionurus muticus, Eragrostis capensis, Eragrostis chloromelas, Eragrostis plana, Eragrostis racemosa, Harpochloa falx, Heteropogon contortus, Microchloa caffra, Panicum natalense, Setaria sphacelata var. torta, Themeda triandra,* and *Tristachya leucothrix*, and the forbs, *Acalypha angustata, Anthospermum rigidum subsp. rigidum, Berkheya setifera, Chaetacanthus costatus, Commelina africana, Crabbea acaulis, Cucumis hirsutus, Cucumis zeyheri, Cyanotis speciosa, Gerbera viridifolia, Haplocarpha scaposa, Helichrysum rugulosum, Hemizygia pretoriae, Hermannia transvaalensis, Hibiscus aethiopicus, Hypoxis obtusa, Hypoxis rigidula, Indigofera comosa, Ipomoea ommaneyi, Justicia anagalloides, Kohautia amatymbica, Ledebouria ovatifolia, Monsonia attenuata, Nidorella hottentotta, Pentanisia angustifolia, Pollichia campestris, Scabiosa columbaria, Selago densiflora, Seriphium plumosum, Vernonia galpinii, Vernonia oligocephala,* and *Zornia milneana*. Overall diversity in this unit was high and included a full list of over 100 species. Local species richness was also high at 56 species per 400m^2 sampling area. This rivals the local richness of some of the most species-rich grasslands anywhere in the country.

Wetlands
Wetlands were mapped from Google Earth imagery dated 28/03/2019, a date which shows the wetness signal very well as darker green areas. This also corresponds well to black and white historical aerial photographs from 1955, where wetlands appear as darker areas.

There is one small wetland system on site that consists of patches of wetland linked by lower-lying areas through which water-flow probably occurs. These connected areas consist either of hygrophilous grassland, or temporary to seasonal wetlands, depending on local hydrological conditions.

Valley bottom wetlands in this general area around Ermelo, such as this one, are generally dominated by a variety of grasses, sedges and herbaceous plants, including the graminoids, *Kyllinga erecta*, *Leersia hexandra*, *Agrostis lachnantha*, *Andropogon appendiculatus*, *Helictotrichon turgidulum*, *Scirpoides burkei*, *Cyperus teneristolon*, *Cyperus macranthus*, *Typha capensis*, *Agrostis erianthe*, *Hemarthria altissima*, *Panicum schinzii*, *Cyperus rigidifolius* and *Arundinella nepalensis*, the herbs, *Centella asiatica*, *Senecio polyodon*, *Senecio erubescens*, *Haplocarpha scaposa*, *Pelargonium luridum*, *Commelina africana*, *Lobelia flaccida*, *Monopsis decipiens*, and *Helichrysum aureonitens*. The species composition depends entirely on the hydrological characteristics of the site, with a greater number of obligate wetland species occurring in more permanently damp areas, whereas dryer areas more closely resembling terrestrial grassland in species composition.

Current cultivation
These are areas that, according to recent satellite imagery, are currently being cultivated, or were recently cultivated (within the last 5 years). If not under crops, they would be a ploughed land, or a fallow land with either weeds or a cover crop. From an ecological or biodiversity perspective, these areas have no natural habitat and have no plant or

vegetation biodiversity value. The soil profile has been completely disturbed, removing all original vegetation, including geophytic and resprouting plant species. In the Grassland Biome of South Africa, a large proportion of the indigenous biodiversity consists of herbaceous and low shrubby species that re-sprout seasonally, after fire, or after defoliation from grazing animals, and can persist under these conditions. In cultivated areas, it is possible through natural succession, or through active rehabilitation, to restore a perennial cover of grasses, but the original biodiversity is permanently lost. They also have little value for animal biodiversity, except for species that forage in cultivated areas.

Old lands
These are areas that were previously ploughed for cultivation but have been left for an extended period without ploughing. Through natural succession processes, they generally develop a perennial cover of grasses, but these secondary grasslands are species poor and the original diversity of resprouting species is usually entirely absent. Non-grass species diversity usually consists of re-seeding and weedy species, and sometimes animal- and/or bird-dispersed woody species.

On aerial photographs and satellite images with adequate resolution, these areas are often recognisable by the presence of residual plough lines and other structural features often present in cultivated fields.

Exotic trees
There are planted windrows on the roadsides in various parts of the site, as well as within homestead complex areas. These are mostly deliberately planted some decades ago and are not alien invasive species. There are, however, various places on site where alien invasive species have become established in previously disturbed areas. In both cases, the underlying natural grassland is lost.

Degraded areas
Any areas where the original vegetation is lost due to continuous degradation, such as trampling, severe overgrazing, or some other factor, it is mapped as degraded. These areas are unlikely to restore to natural grassland, even with removal of the drivers of the degradation.

Transformed areas
Areas where natural habitat no longer exists due to development of infrastructure, such as roads, buildings, and other hard surfaces. Current cultivation is also transformed, but has not been replaced by built infrastructure, therefore the soil surface can be colonized by plants, if cultivation is stopped.

Plant species flagged for the study area

According to the DFFE online environmental screening tool, seven plant species have been flagged as of concern for the area the current project is in. A description of each species is provided.

Khadia carolinensis
Vulnerable
Occurs at Carolina and Belfast in Eastern Highveld Grassland, Lydenburg Montane Grassland, and Rand Highveld Grassland. It is found in well-drained, sandy loam soils among rocky outcrops, or at the edges of sandstone sheets, at around 1700 m elevation. It has been recently recorded just to the south of the site in grasslands close to the Vaal River. Based on the known distribution and habitat requirements, as well as known nearby populations, there is a HIGH chance of it occurring in the general area where the project is located.

Sensitive species 1201
Occurs on dolerite outcrops in grasslands at about 2000m altitude, from Dullstroom in the north to Vryheid in the south. This geophyte is fairly restricted and threatened by alien invasive plants, and is therefore listed as Vulnerable on the national Red List. This species is conspicuous when flowering, with attractive pale white flowers in summer. The closest locality at which this species has been observed is Hartebeespruit due south of Camden. It therefore has a MODERATE chance of occurring on the site.

Aspidoglossum xanthosphaerum
Vulnerable
Occurs in Mpumalanga, around Groenvlei and Ermelo. Closest known record is from Breyten and just to the west of Ermelo. It is found in montane grassland, marshy sites, at around 1800 m elevation. Based on the known distribution and habitat requirements, as well as known nearby populations, there is a HIGH chance of it occurring in the general area where the project is located.

Sensitive species 41
A common and widespread geophyte that is very similar to *Gladiolus crassifolius*, also a widespread and common species with a similar distribution. The main distribution area is Witbank to Lydenburg, and southwards to Piet Retief and Wakkerstroom. It occurs in wetlands or marshes in high altitude grassland that remain wet throughout the year or dry out for only a short period. This species is listed on the South African Red List with a national assessment of Vulnerable, but is currently not recognized by the IUCN as it is regarded as a synonym of *G. crassifolius*. Whereas this species is confined more to wetland habitats, *G. crassofolius* has larger leaves, longer spikes and smaller flowers, and is found in drier, more stony habitats. It flowers from October to January and has a high probability of occurring in wetland areas on the study site. Without flowers, the plant can be recognized as a *Gladiolus*. The closest historical record is approximately 30km from the study site. This species has a MODERATE chance of occurring on the site.

Sensitive species 691
A widespread geophyte distributed in Free State, North West, Gauteng, and in Mpumalanga from Belfast and Ermelo to Wolmaransstad. It is found in wetlands in undulating grasslands. The species is currently listed as Vulnerable. It flowers from January to March but its peak flowering month is February. It could feasibly be found in wet areas

on the site but is quite conspicuous in February when if flowers. The closest historical record is approximately 40km from the site. It has a MODERATE chance of occurring on the site.

Pachycarpus suaveolens
Vulnerable
Occurs in Gauteng and Mpumalanga to Eswatini, where it is found in Lydenburg Montane Grassland, Eastern Highveld Grassland, and Soweto Highveld Grassland in short or annually burnt grasslands, at elevations of 1400-2000 m. Based on the known distribution and habitat requirements, as well as known nearby populations, there is a HIGH chance of it occurring in the general area where the project is located.

Sensitive species 851
A small succulent perennial herb with white flowers, growing in marshy areas or shallow vleis. This species is listed as Vulnerable but the confidence in this assessment is low (according to the Red List). Its distribution is uncertain because of its taxonomic confusion with the very similar *Crassula inanis*, but it appears to be restricted to the area between Ermelo and Maseru. The closest known record to the site of the Project is in the Bethal area. It has a MODERATE chance of occurring on the site.

Additional listed plant species for the study area
A database search identified a number of additional plant species of conservation concern that could also occur on site that are not flagged in the Screening Tool output. These include the following:

Taxon	Red List status	Habitat and distribution	Flowering Time	Probability of occurrence
Alepidea cordifolia APIACEAE	Endangered (SA)	Widespread and extremely common across the eastern highveld of Mpumalanga, the eastern Free State, and north-western KwaZulu-Natal. It occurs along the north and north-eastern borders of Lesotho and is also found in Eswatini, on the Eastern Highlands of Zimbabwe and the Chimanimani Mountains of Mozambique. Forest margins, west and south facing mountain slopes and near drainage lines or islands within wetlands. Open grassland or on forest margins, often amongst rocks and/or along streams.	Summer, mostly February to March	**MODERATE** (within known overall distribution)
Alepidea longeciliata APIACEAE	Endangered	Between Breyten, Lothair, Middelburg and Stoffberg. Recorded from 2 neighbouring grids. Eastern Highveld Grassland. Grassland, Karoo Sandstone, above 1600 m.	Summer	**MODERATE** (within known overall distribution)

		Possibly associated with edges of pans.		
Bowiea volubilis subsp. volubilis HYACINTHACEAE	Vulnerable (national)	Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Occurs in bushy kloofs at the coast and inland in KwaZulu-Natal. In Gauteng, Mpumalanga and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm.		LOW (site within gap in distribution, habitat not suitable)
Brachystelma gerrardii APOCYNACEAE	Endangered	KwaZulu-Natal, Waterberg, Wolkberg and Eswatini. Open grassland, 400-1800 m. Site is within overall distribution range, but plant absent from Mpumalanga highveld.		LOW
Eucomis pallidiflora subsp. polevansii HYACINTHACEAE	Near Threatened	Pilgrim's Rest and Lydenburg to Eswatini to southern Mpumalanga. Wetlands in grassland, often in standing water up to 300 mm deep. Recorded at Ermelo in similar habitat as that found on site.		**HIGH** (wetlands)
Gladiolus robertsoniae IRIDACEAE	Near Threatened	South-eastern Gauteng, northern Free State and south-western Mpumalanga. Moist highveld grasslands, found in wet, rocky sites, mostly dolerite outcrops, wedged in rock crevices.		**HIGH**
Habenaria barbertonii ORCHIDACEAE	Near Threatened	Gauteng and Mpumalanga. Rocky hillsides, in bushveld in association with acacias, 1000-1500 m.	February to March	**MODERATE** (habitat may not be suitable)

Kniphofia typhoides ASPHODELACEAE	Near Threatened	Gauteng, Limpopo, Mpumalanga, North West, Parys to Lydenburg to Paulpietersburg to Newcastle. Low lying wetlands and seasonally wet areas in climax Themeda triandra grasslands on heavy black clay soils, tends to disappear from degraded grasslands.		**MODERATE** (habitat may not be suitable)
Merwilla plumbea HYACINTHACEAE	Near Threatened	Widespread in eastern half of South Africa. Also in Eswatini and Lesotho. Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m.		**HIGH**
Miraglossum davyi APOCYNACEAE	Vulnerable	Dullstroom, Middelburg and Standerton. Grassland (Lydenburg Montane Grassland, Soweto Highveld Grassland, Eastern Highveld Grassland).		**HIGH**
Riocreuxia aberrans APOCYNACEAE	Near Threatened	Dullstroom to Ermelo. Grassland. Wedged in cracks among rocks on exposed quartzite ridges.		LOW (habitat not suitable)

Protected species recorded in the study area

None of the tree species protected under the National Forests Act (Appendix 1) have been previously recorded in the area in which the site is located. A full list of plants that could occur on site, as well as those actually recorded, is given in Appendix 2.

There are a number of species recorded on site that are protected under the Mpumalanga Nature Conservation Act No. 10 of 1998 (Appendix 3). It is a legal requirement to obtain a permit from the provincial authorities for the destruction of any of these species. A comprehensive walk-through survey of the final footprint is required to compile a complete list of these protected species.

POSSIBLE IMPACTS

Proposed infrastructure in relation to sensitivities

Infrastructure locations relative to mapped Plant Theme sensitivities are shown in Figure 6. The proposed infrastructure includes the following:

Solar array
This is the largest component of the project. The assessed area is 297 ha in size, of which approximately 280 ha is planned to be developed. The total amount of habitat within each landcover class is given in the table below. This shows that more than half of the assessed area is currently cultivated, about 37% is natural grassland, and about 10% is degraded.

Amount of each type of habitat in the footprinty of the solar array:

Habitat	Status	Area in hectares	Proportion of total area
Grassland	Natural	109.46	36.81
Exotic trees	Degraded	10.65	3.58
Degraded areas	Degraded	10.60	3.56
Old lands	Secondary	9.13	3.07
Current cultivation	Transformed	157.56	52.98
TOTAL		**297.40**	**100.0%**

Construction camp and batching plants
There are two construction camp locations, the southern one in grassland and the northern one in an old land. The areas of habitat are as given in the table below.

Amount of each habitat affected by construction camps.

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	1.99	49.0
Exotic trees	Degraded	0.23	5.7
Degraded areas	Degraded	0.04	1.0
Old lands	Secondary	1.80	44.3
TOTAL		**4.06**	**100.0**

SS & BESS (2 alternative sites)
Both alternatives are in grassland (HIGH sensitivity).

Amount of habitat affected by SS & BESS Alternative 1.

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	5.51	99.6
Exotic trees	Degraded	0.02	0.4
TOTAL		**5.53**	**100.0**

Amount of habitat affected by SS & BESS Alternative 2 (preferred).

Habitat	Status	Area in hectares	Proportion
Grassland	Natural	5.76	100.0
TOTAL		**5.76**	**100.0**

Anticipated impacts

For all infrastructure components located within natural habitat there is the possibility that individuals or populations of plant species of conservation concern may be lost due to construction impacts. Based on known information, and data collected on site, the probability of encountering species of conservation concern at any particular location is dependent on local habitat conditions. Both substation alternatives and the southern construction camp are located within natural habitat (see Figure 6). The assessed area for the solar PV panels is almost 300 ha in size, of which 280 ha is proposed to be developed. There is therefore minor potential to locate the PV panels to avoid natural habitat.

The best mitigation to address uncertainty issues related to SCC is to do a walk-through survey of all final infrastructure positions to check for SCC, and to collect the necessary data for any flora permits that may be required.

Construction Phase Impacts

The only impact is potential loss of individuals of SCC.

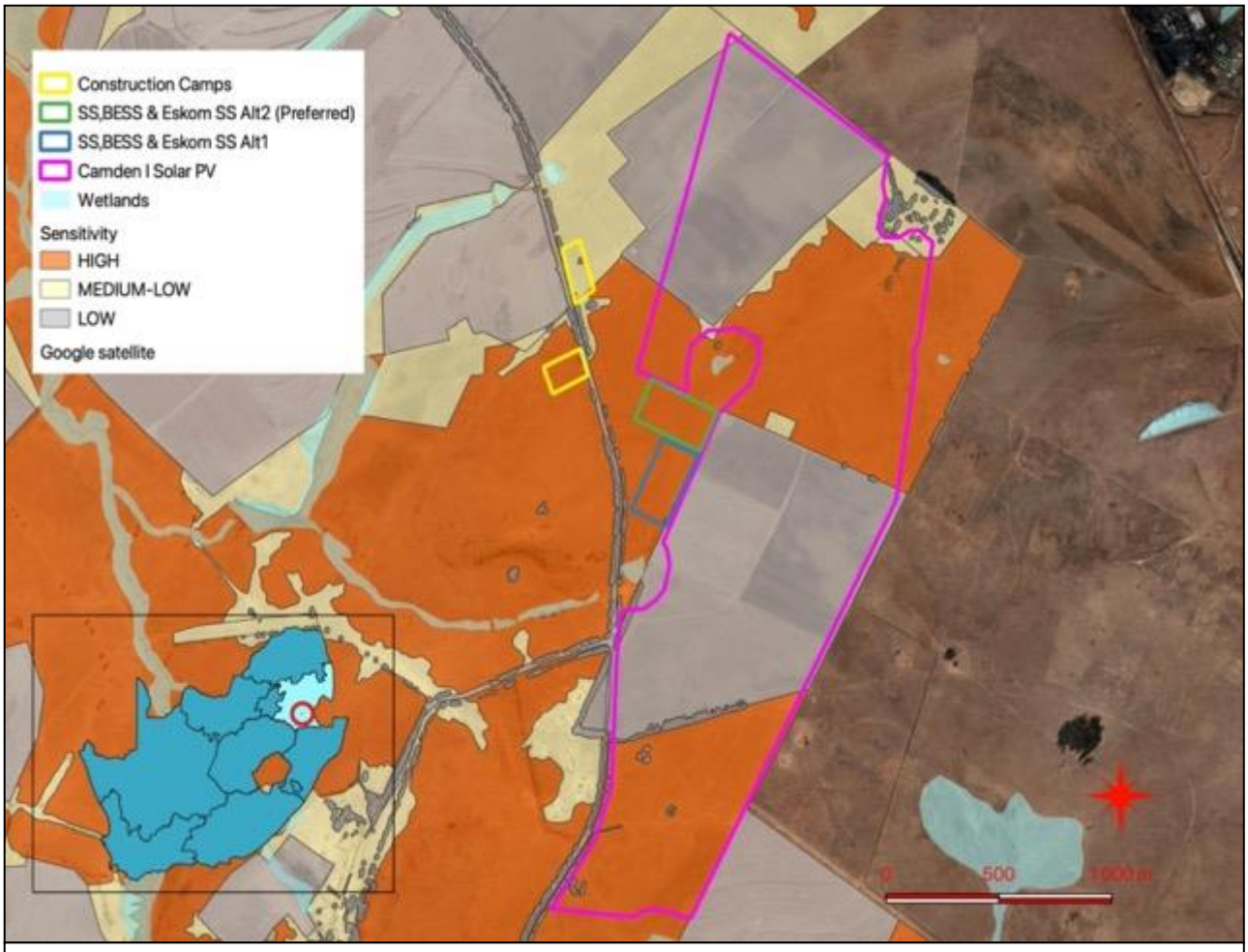

Figure 6: Location of proposed infrastructure relative to plant species sensitivity of the study area.

ASSESSMENT OF IMPACTS

A detailed assessment, as per the requirements the protocol for the specialist assessment and minimum report content requirements of environmental impacts on terrestrial plant species for activities requiring environmental authorisation, (20 March 2020), of the significance of all impacts during all phases of the project is provided below. This also includes all proposed mitigation measures and provides assessment before and after the implementation of proposed mitigation measures.

Construction Phase Impacts

Impact 1	Loss of individuals of Species of Conservation Concern due to clearing for construction	
Issue	Clearing of natural habitat for construction	
Description of Impact		
The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Extent	2	2
Duration	5	5
Reversibility	5	5
Magnitude (severity of impact)	2	2
Probability	3	1
Significance	42 (MODERATE)	14 (VERY LOW)
Mitigation actions		
The following measures are recommended:	1. Prior to construction commencing, undertake a detailed walk-through survey of footprint areas that are within habitats where SCC are likely to occur. 2. Where significant populations of SCC are found, collect the data for any flora permits or micro-siting of infrastructure that may be required. 3. Prior to construction commencing, compile a Plant Rescue Plan, including monitoring specifications (timeframe, frequency etc). 4. Undertake monitoring (as per the Plant Rescue Plan specifications) to evaluate whether further measures would be required to manage impacts.	
Monitoring		
The following monitoring is recommended:	As per management plans.	

Cumulative Impacts

Impact 2	Cumulative impacts on SCC from construction clearing due to a number of projects	
Issue	Loss of individuals of Species of Conservation Concern	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible loss of populations of SCC.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	2	3
Duration	5	5
Reversibility	5	5
Magnitude (severity of impact)	2	3
Probability	1	3
Significance	14 (VERY LOW)	48 (MEDIUM)

Summary of mitigation measures

The following mitigation measures are recommended to address known potential impacts:

1. It is a legal requirement to obtain permits for specimens or protected species that will be lost due to construction of the project.
2. A detailed pre-construction walk-through survey will be required during a favourable season where possible, to locate any individuals of protected plants, as well as for any populations of threatened plant species. This survey must cover the footprint of all approved infrastructure, including internal service roads (final infrastructure layout). The best season is early to late Summer if possible, taking administrative processes into account, but will be influenced by recent rainfall and vegetation growth.
3. It is possible that some plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas, but the description and appropriateness of such measures must be included in a Plant Rescue Plan. Any such measures will reduce the irreplaceable loss of resources as well as the cumulative effect. Note that Search and Rescue is only appropriate for some species and that a high mortality rate can be expected from individuals of species that are not appropriate to transplant.
4. Prior to construction commencing, a Plant Rescue Plan must be compiled to be approved by the appropriate authorities as part of the EMPr approval.
5. For any plants that are transplanted, annual monitoring should take place to assess survival. This should be undertaken as per the frequency specified in the management plan and be undertaken by a qualified botanist. The monitoring programme must be designed prior to translocation of plants (where applicable) and should include control sites (areas not disturbed by the project) to evaluate mortality relative to wild populations.
6. Prohibit collecting or poaching of any plant species.

Summary of monitoring recommendations

Specific monitoring recommendations should be provided in the Plant Rescue Plan, the Alien Invasive Management Plan, and the Rehabilitation Plan. The following are broad recommendations:

Rescued plants

1. The location of all transplanted rescued plants must be recorded, along with the identity of the plant.
2. The health / vigour of each transplanted individual should be monitored as per the frequency and duration specified in the management plan.
3. As a scientific control, an equal number of non-transplanted individuals of the same species, within similar habitats, should be monitored in the same way as the transplanted specimens. This will provide comparative data on the survival of wild populations relative to transplanted plants.

Threatened species

1. If populations of threatened plant species are found to occur on site, annual monitoring of population health should take place as per the specifications of the Rehabilitation Plan. This should be appropriate to the species concerned.

CONCLUSIONS

There are seven plant species of conservation concern flagged by the screening tool that could possibly occur on site, as well as additional species from historical records from SANBI databases, but none were seen during general field surveys. A targeted walk-through survey of footprint of construction areas is required prior to the commencement of construction, to determine whether or not any occur in the footprint of the development. This survey can take place at the same time as the required walk-through surveys for permitting purposes, or it can be undertaken as a separate targeted survey. It is recommended that this is undertaken in optimum growing season where possible.

Required pre-construction survey

For permitting purposes, the following flora survey is required prior to construction activities taking place:

Detailed floristic walk-through survey of all footprint areas in order to document composition, especially of protected species. It is suggested this be undertaken after an appropriate time-period after rainfall, where possible, to allow emergence of any species of potential concern. The survey must also cover all footprint areas, including final road alignments. Renewable energy projects similar to the one assessed here tend to have high fluidity in terms of layout and technology, due to the current rapid evolution of the technology, which allows more efficient deployment of infrastructure. However, this means that "final" layouts regularly change. The walk-through survey:

1. MUST ASSESS THE FOOTPRINT THAT WILL BE CONSTRUCTED – if this changes then the new footprint areas must be subject to a walk-through survey in full.
2. MUST BE UNDERTAKEN IN THE CORRECT SEASON, if possible, taking administrative processes into account.
3. MUST BE ADEQUATELY RESOURCED TO ENSURE IT IS DONE PROPERLY.
4. MUST BE UNDERTAKEN BY A COMPETENT BOTANIST WITH KNOWLEDGE OF THE AREA.

REFERENCES

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APPENDICES

Appendix 1: List of protected tree species (National Forests Act, 1998).

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

Botanical name	**English common names**	**Other common names Afrikaans (A), Sepedi (P), Sesotho (S), Setswana (T), Tshivenda (V), isiXhosa (X), isiZulu (Z), Xitsonga (XT)**	**National tree number**
Acacia erioloba	Camel thorn	Kameeldoring (A)/Mogohlo (NS)/Mogo̭tlho̭ (T)/	168
Acacia haematoxylon	Grey camel thorn	Vaalkameeldoring (A)/Mokholo (T))	169
Adansonia digitata	Baobab	Kremetart (A)/Seboi (NS)/Mowana (T)/Ximuwu (XT	467
Afzelia quanzensis	Pod mahogany	Peulmahonie (A)/Mutokota (V)/Inkehli (Z)	207
Balanites subsp. maughamii	Torchwood	Groendoring (A)/Ugobandlovu (Z)	251
Barringtonia racemosa	Powder-puff tree	Poeierkwasboom (A)/Iboqo (Z)	524
Boscia albitrunca	Shepherd's tree	Witgat (A)/Mohlo̭pi (NS)/Motlho̭pi (T)/ Muvhombwe (V)/Umgqomogqomo (X)/Umvithi (Z)	122
Brachystegia spiciformis	Msasa	Msasa (A)	198.1
Breonadia salicina	Matumi	Mingerhout (A)/Mohlomḙ (NS)/Mutu-lume (V)/Umfomfo (Z)	684
Bruguiera gymnorrhiza	Black mangrove	Swartwortelboom (A)/isiKhangati (X)/IsiHlobane (Z)	527
Cassipourea swaziensis	Swazi onionwood	Swazi-uiehout (A)	531.1
Catha edulis	Bushman's tea	Boesmanstee (A)/Mohlatse (NS)/Igqwaka (X)/Umhlwazi (Z)	404

Ceriops tagal	Indian mangrove	Indiese wortelboom (A)/isinkaha (Z)	525
Cleistanthus schlechteri var. schlechteri	False tamboti	Bastertambotie (A)/Umzithi (Z)	320
Colubrina nicholsonii	Pondo weeping thorn	Pondo-treurdoring (A)	453.8
Combretum imberbe	Leadwood	Hardekool (A)/Mohwelere-tšhipi (NS)/Motswiri (T)/Impondondlovu (Z)	539
Curtisia dentata	Assegai	Assegaai (A)/Umgxina (X)/Umagunda (Z)	570
Elaeodendron transvaalensis	Bushveld saffron	Bosveld-saffraan (A)/Monomane (T)/Ingwavuma (Z)	416
Erythrophysa transvaalensis	Bushveld red balloon	Bosveld-rooiklapperbos (A)/Mofalatsane (T)	436.2
Euclea pseudebenus	Ebony guarri	Ebbeboom-ghwarrie (A)	598
Ficus trichopoda	Swamp fig	Moerasvy (A)/Umvubu (Z)	54
Leucadendron argenteum	Silver tree	Silwerboom (A)	77
Lumnitzera racemosa var. racemosa	Tonga mangrove	Tonga-wortelboom (A)/isiKhaha-esibomvu (Z)	552
Lydenburgia abbottii	Pondo bushman's tea	Pondo-boesmanstee (A)	407
Lydenburgia cassinoides	Sekhukhuni bushman's tea	Sekhukhuni-boesmanstee (A)	406
Mimusops caffra	Coastal red milkwood	Kusrooimelkhout (A)/Umthunzi (X)/Umkhakhayi (Z)	583
Newtonia hildebrandtii var. hildebrandtii	Lebombo wattle	Lebombo-wattel (A)/Umfomothi (Z)	191
Ocotea bullata	Stinkwood	Stinkhout (A)/Umhlungulu (X)/Umnukane (Z)	118
Ozoroa namaquensis	Gariep resin tree	Gariep-harpuisboom (A)	373.2
Philenoptera violacea	Apple-leaf	Appelblaar (A)/Mphata (NS)/Mohata (T)/isiHomohomo (Z)	238
Pittosporum viridiflorum	Cheesewood	Kasuur (A)/Kgalagangwe (NS)/Umkhwenkwe (X)/Umfusamvu (Z)	139
Podocarpus elongatus	Breede River yellowwood	Breërivier geelhout (A)	15
Podocarpus falcatus (Afrocarpus falcatus)	Outeniqua yellowwood	Outniekwageelhout (A)/Mogo̍bago̍ba (NS)/Umkhoba (X)/Umsonti (Z)	16
Podocarpus henkelii	Henkel's yellowwood	Henkel se geelhout (A)/Umsonti (X)/Umsonti (Z)	17
Podocarpus latifolius	Real yellowwood	Regte-geelhout (A)/Mogo̍bago̍ba (NS)/Umcheya (X)/Umkhoba (Z)	18

Protea comptonii	Saddleback sugarbush	Barberton-suikerbos (A)	88
Protea curvata	Serpentine sugarbush	Serpentynsuikerbos (A)	88.1
Prunus africana	Red stinkwood	Rooistinkhout (A)/Umkhakhase (X)/Umdumezulu (Z)	147
Pterocarpus angolensis	Wild teak	Kiaat (A)/Moroto (NS)/Mokwa (T)/Mutondo (V)/Umvangazi (Z)	236
Rhizophora mucronata	Red mangrove	Rooiwortelboom (A)/isiKhangathi (X)/Umhlume (Z)	526
Sclerocarya birrea subsp. caffra	Marula	Maroela (A)/Morula (NS)/Morula (T)/Umganu (Z) /Nkanyi (XT)	360
Securidaca longepedunculata	Violet tree	Krinkhout (A)/Mmaba (T)	303
Sideroxylon inerme subsp. inerme	White milkwood	Witmelkhout (A)/Ximafana (X)/Umakhwelafingqane (Z)	579
Tephrosia pondoensis	Pondo poison pea	Pondo-gifertjie (A)	226.1
Warburgia salutaris	Pepper-bark tree	Peperbasboom (A)/Molaka (NS)/Mulanga (V)/isiBaha (Z)	488
Widdringtonia cedarbergensis	Clanwilliam cedar	Clanwilliamseder (A)	19
Widdringtonia schwarzii	Willowmore cedar	Baviaanskloofseder (A)	21
Berchemia zeyheri (RHAMNACEAE) LC	Red ivory Pink ivory	Rooi-ivoor (A) / Rooihout (A) / Monee (S) / umNeyi (SW) / umNini (Z, X) / Xiniyani (TS) / Moye (T) / Munia-niane (V)	450
Diospyros mespiliformis (EBENACEAE) LC	Jackal berry	Jakkalsbessie (A) / Musuma (V) / Muntoma (TS) / Mgula (TS)	606
Schinziophyton rautanenii	Manketti / Mongongo	Mankettiboom (A) / Monghongho (T) / Makongwa (T)	337
Umtiza listeriana	Umtiza	Umtiza (X) / Omtisa (A)	205

Appendix 2: Plant species recorded on site and nearby.

This list was compiled by extracting a list of species that have been recorded within a rectangular area that includes the study area as well as similar habitats in surrounding areas, as obtained from SANBI (www.newposa.sanbi.org) accessed on 12 September 2021. It is probable that it includes some species that occur in habitats that do not occur on site. The list was supplemented from field observations, as well as observations from the online iNaturalist tool and database (https://www.inaturalist.org), which are photographic observations verified by an online community.

The list is arranged by family in alphabetical order. Species listed in green are those that were found on site.

Acanthaceae
Blepharis innocua
Blepharis stainbankiae
Blepharis subvolubilis
Crabbea acaulis
Dyschoriste burchellii
Justicia anagalloides
Ruellia cordata
Thunbergia atriplicifolia
Thunbergia pondoensis

Achariaceae
Ceratiosicyos laevis
Kiggelaria africana

Agapanthaceae
Agapanthus inapertus. subsp. *intermedius*

Agavaceae
Chlorophytum comosum
Chlorophytum cooperi
Chlorophytum fasciculatum
Chlorophytum galpinii

Aizoaceae
Delosperma sutherlandii
Khadia carolinensis
Mossia intervallaris
Ruschia sp.

Alliaceae
Tulbaghia acutiloba
Tulbaghia cernua
Tulbaghia leucantha
Tulbaghia ludwigiana

Amaranthaceae
Amaranthus hybridus subsp. cruentus; Naturalised
Amaranthus hybridus subsp. hybridusvar. hybridus; Naturalised
Amaranthus thunbergii
Chenopodium album; Naturalised
Cyathula cylindrica var. cylindrica
Cyathula uncinulata
Gomphrena celosioides; Naturalised
Guilleminea densa; Naturalised; Invasive

Amaryllidaceae
Boophone disticha
Brunsvigia natalensis
Brunsvigia radulosa
Crinum bulbispermum
Cyrtanthus breviflorus
Cyrtanthus stenanthus var. major
Cyrtanthus tuckii var. transvaalensis
Cyrtanthus tuckii var. tuckii
Haemanthus humilis. subsp. hirsutus
Haemanthus montanus
Nerine angustifolia
Nerine gracilis
Nerine krigei
Nerine rehmannii
Scadoxus puniceus

Anacardiaceae
Ozoroa engleri
Searsia dentata
Searsia discolor
Searsia magalismontana subsp. magalismontana
Searsia rigida var. rigida
Searsia tumulicola var. tumulicola

Apiaceae
Afrosciadium magalismontanum
Alepidea peduncularis
Centella asiatica
Heteromorpha arborescens var. abyssinica

Apocynaceae
Anisotoma pedunculata
Asclepias albens
Asclepias aurea
Asclepias brevicuspis
Asclepias crassinervis
Asclepias cucullata subsp. cucullata
Asclepias cultriformis
Asclepias eminens

Asclepias fulva
Asclepias gibba var. gibba
Asclepias gibba var. media
Asclepias macropus
Asclepias multicaulis
Asclepias stellifera
Aspidoglossum araneiferum
Aspidoglossum biflorum
Aspidoglossum glanduliferum
Aspidoglossum lamellatum
Aspidoglossum ovalifolium
Aspidoglossum xanthosphaerum
Brachystelma foetidum
Brachystelma pygmaeum subsp. pygmaeum
Cordylogyne globosa
Gomphocarpus fruticosus
Gomphocarpus rivularis
Miraglossum pulchellum
Pachycarpus campanulatus var. sutherlandii
Pachycarpus grandiflorus subsp. grandiflorus
Pachycarpus macrochilus
Pachycarpus plicatus
Pachycarpus scaber
Pachycarpus suaveolens
Parapodium costatum
Raphionacme hirsuta
Riocreuxia picta
Riocreuxia polyantha
Schizoglossum atropurpureum atropurpureum
Schizoglossum nitidum. Indigenous
Schizoglossum peglerae
Sisyranthus huttoniae
Sisyranthus imberbis
Stenostelma periglossoides
Woodia sp.
Xysmalobium asperum
Xysmalobium parviflorum
Xysmalobium stockenstromense
Xysmalobium undulatum var. undulatum

Aponogetonaceae
Aponogeton junceus

Araceae
Zantedeschia albomaculata subsp. macrocarpa
Zantedeschia rehmannii

Asparagaceae
Asparagus bechuanicus
Asparagus cooperi
Asparagus devenishii

Asparagus fractiflexus
Asparagus laricinus
Asparagus ramosissimus
Asparagus virgatus

Asphodelaceae
Aloe bergeriana
Aloe boylei
Aloe davyana
Aloe ecklonis
Aloe graciliflora
Aloe hlangapies
Aloe jeppeae
Aloe maculata subsp. maculata
Bulbine abyssinica
Bulbine capitata
Kniphofia albescens
Kniphofia porphyrantha
Kniphofia typhoides
Trachyandra asperata var. carolinensis
Trachyandra asperata var. macowanii
Trachyandra asperata var. nataglencoensis
Trachyandra asperata var. swaziensis
Trachyandra gerrardii
Trachyandra saltii var. saltii

Aspleniaceae
Asplenium aethiopicum
Asplenium capense

Asteraceae
Adenanthellum osmitoides
Afroaster hispidus
Afroaster serrulatus
Artemisia afra
Athrixia elata
Berkheya echinacea subsp. echinacea
Berkheya insignis
Berkheya pinnatifida subsp. ingrata
Berkheya radula
Berkheya setifera
Berkheya speciosa. subsp. lanceolata
Berkheya zeyheri subsp. zeyheri
Bidens pilosa; Naturalised
Callilepis salicifolia
Campuloclinium macrocephalum; Naturalised; Invasive
Cineraria lyratiformis
Cirsium vulgare; Naturalised; Invasive, NEMBA Category 1b
Conyza gouanii
Conyza pinnata
Conyza podocephala

Cosmos bipinnatus; Naturalised
Cotula anthemoides
Denekia capensis
Dichrocephala integrifolia subsp. integrifolia
Dicoma anomala
Didelta carnosa var. carnosa
Dimorphotheca caulescens
Dimorphotheca jucunda E
Dimorphotheca spectabilis
Dimorphotheca zeyheri
Erigeron bonariensis; Naturalised; Invasive
Erigeron canadensis; Naturalised; Invasive
Euryops gilfillanii
Euryops laxus (
Euryops transvaalensis subsp. setilobus
Felicia filifolia subsp. filifolia
Felicia muricata subsp. muricata
Felicia muricata subsp. strictifolia
Gamochaeta antillana; Naturalised; Invasive
Gamochaeta pensylvanica; Naturalised
Gazania krebsiana. subsp. serrulata
Geigeria aspera var. aspera
Geigeria burkei subsp. burkei var. burkei
Geigeria burkei subsp. burkei var. intermedia
Geigeria burkei subsp. valida
Geigeria filifolia
Gerbera ambigua
Gerbera natalensis
Gerbera piloselloides
Gerbera viridifolia
Gnaphalium filagopsis
Haplocarpha scaposa
Helichrysum adenocarpum subsp. adenocarpum
Helichrysum albilanatum
Helichrysum aureonitens
Helichrysum aureum var. monocephalum
Helichrysum caespititium
Helichrysum callicomum
Helichrysum cephaloideum
Helichrysum griseum
Helichrysum miconiifolium
Helichrysum molestum
Helichrysum mundtii
Helichrysum nudifolium var. nudifolium
Helichrysum nudifolium var. pilosellum
Helichrysum opacum
Helichrysum oreophilum
Helichrysum rugulosum
Helichrysum splendidum
Helichrysum subglomeratum
Hilliardiella aristata

Hilliardiella elaeagnoides
Hilliardiella hirsuta
Hilliardiella nudicaulis
Hypochaeris radicata; Naturalised
Lactuca inermis
Lasiospermum pedunculare
Lopholaena segmentata
Macledium zeyheri subsp. zeyheri
Nidorella anomala
Nidorella auriculata
Nidorella resedifolia subsp. resedifolia
Osteospermum moniliferum subsp. canescens
Osteospermum scariosum var. scariosum
Othonna natalensis
Parapolydora fastigiata
Polydora angustifolia
Pseudognaphalium luteoalbum cryptogenic
Pseudognaphalium oligandrum
Pseudopegolettia tenella
Pulicaria scabra
Schistostephium crataegifolium
Schkuhria pinnata; Naturalised
Senecio affinis
Senecio albanensis var. albanensis
Senecio bupleuroides
Senecio coronatus
Senecio erubescens var. erubescens
Senecio harveianus
Senecio hieracioides
Senecio isatideus
Senecio laevigatus var. integrifolius
Senecio laevigatus var. laevigatus
Senecio latifolius
Senecio madagascariensis
Senecio othonniflorus
Senecio oxyriifolius subsp. oxyriifolius
Senecio pentactinus
Senecio polyodon
Senecio rhomboideus
Senecio scitus
Senecio speciosus
Senecio subcoriaceus
Senecio venosus
Seriphium plumosum
Sonchus asper subsp. asper; Naturalised; Invasive
Sonchus nanus
Sonchus oleraceus; Naturalised; Invasive
Tagetes minuta; Naturalised; Invasive
Tolpis capensis
Ursinia montana subsp. montana
Ursinia nana subsp. leptophylla

Ursinia nana subsp. nana
Ursinia paleacea
Ursinia tenuiloba

Bartramiaceae
Philonotis falcata
Philonotis hastata

Begoniaceae
Begonia sutherlandii subsp. *sutherlandii*

Blechnaceae
Blechnum attenuatum
Blechnum australe subsp. *australe*

Boraginaceae
Cynoglossum austroafricanum
Cynoglossum hispidum
Cynoglossum lanceolatum
Lithospermum cinereum
Myosotis graminifolia
Myosotis sylvatica; Naturalised

Brassicaceae
Erucastrum austroafricanum
Heliophila carnosa
Lepidium schinzii
Lepidium transvaalense
Nasturtium officinale; Naturalised; Invasive
Rorippa fluviatilis var. fluviatilis
Rorippa nudiuscula
Sisymbrium turczaninowii
Turritis glabra; Naturalised

Bruchiaceae
Cladophascum gymnomitrioides

Bryaceae
Anomobryum julaceum
Bryum apiculatum
Bryum argenteum
Bryum cellulare
Bryum dichotomum

Cactaceae
Opuntia ficus-indica; Naturalised; Invasive, NEMBA Category 1b

Campanulaceae
Wahlenbergia undulata
Wahlenbergia virgata

Caryophyllaceae
Cerastium arabidis
Cerastium capense
Dianthus transvaalensis
Dianthus sp.
Herniaria erckertii subsp. erckertii
Pollichia campestris
Silene burchellii subsp. modesta
Silene burchellii subsp. pilosellifolia
Silene undulata
Spergularia media; Naturalised

Celastraceae
Gymnosporia buxifolia
Maytenus undata

Cleomaceae
Cleome monophylla

Colchicaceae
Colchicum longipes
Colchicum striatum
Gloriosa modesta

Commelinaceae
Commelina africana var. africana
Commelina africana var. krebsiana
Commelina africana var. lancispatha
Commelina benghalensis
Commelina subulata
Cyanotis speciosa

Convolvulaceae
Convolvulus arvensis; Naturalised; Invasive
Convolvulus natalensis
Convolvulus sagittatus
Convolvulus thunbergii
Falkia oblonga
Ipomoea bathycolpos
Ipomoea crassipes var. crassipes
Ipomoea oblongata
Ipomoea ommanneyi
Ipomoea simplex
Merremia verecunda
Xenostegia tridentata subsp. angustifolia

Crassulaceae
Crassula alba var. alba
Crassula barbata subsp. barbata
Crassula capitella subsp. nodulosa
Crassula compacta

Crassula lanceolata subsp. transvaalensis
Crassula natans var. minus
Crassula natans var. natans
Crassula setulosa var. setulosa forma setulosa
Crassula tuberella
Crassula vaginata subsp. vaginata

Cucurbitaceae
Coccinia adoensis
Cucumis anguria var. longaculeatus
Cucumis hirsutus
Cucumis myriocarpus subsp. myriocarpus
Cucumis zeyheri

Cyperaceae
Ascolepis capensis
Bulbostylis densa subsp. afromontana
Bulbostylis humilis
Bulbostylis oritrephes
Bulbostylis schoenoides
Bulbostylis scleropus
Carex ludwigii
Carex rhodesiaca
Cyperus congestus
Cyperus denudatus
Cyperus difformis
Cyperus esculentus var. esculentus
Cyperus fastigiatus
Cyperus laevigatus
Cyperus longus var. longus
Cyperus longus var. tenuiflorus
Cyperus margaritaceus var. margaritaceus
Cyperus marginatus
Cyperus obtusiflorus var. flavissimus
Cyperus parvinux
Cyperus rigidifolius
Cyperus rupestris var. rupestris
Cyperus schlechteri
Cyperus sphaerospermus
Cyperus squarrosus
Cyperus uitenhagensis
Cyperus teneristolon
Cyperus usitatus
Dracoscirpoides surculosa
Eleocharis dregeana
Eleocharis limosa
Fimbristylis complanata
Fuirena coerulescens
Isolepis cernua var. cernua
Isolepis costata
Isolepis fluitans var. fluitans

Isolepis sepulcralis
Isolepis setacea
Kyllinga alata
Kyllinga erecta var. erecta
Kyllinga pulchella
Lipocarpha nana
Lipocarpha rehmannii
Pycreus betschuanus
Pycreus chrysanthus
Pycreus cooperi
Pycreus macranthus
Pycreus nitidus
Pycreus pumilus
Pycreus rehmannianus
Rhynchospora brownii
Schoenoplectus corymbosus
Schoenoplectus decipiens
Schoenoplectus muriculatus
Schoenoplectus tabernaemontani; Naturalised
Schoenoxiphium sp.
Scirpoides burkei

Dioscoreaceae
Dioscorea dregeana

Dipsacaceae
Scabiosa columbaria

Droseraceae
Drosera burkeana

Dryopteridaceae
Dryopteris athamantica

Ebenaceae
Diospyros austro-africana var. microphylla
Diospyros lycioides subsp. guerkei
Euclea sp.

Ericaceae
Erica alopecurus var. alopecurus
Erica cerinthoides var. cerinthoides
Erica drakensbergensis
Erica oatesii

Eriocaulaceae
Eriocaulon abyssinicum
Eriocaulon sonderianum

Euphorbiaceae
Acalypha angustata

Acalypha caperonioides var. caperonioides
Acalypha wilmsii
Euphorbia gueinzii
Euphorbia inaequilatera
Euphorbia natalensis
Euphorbia striata

Exormothecaceae (Liverworts)
Exormotheca holstii

Fabaceae
Acacia dealbata; Naturalised; Invasive
Aeschynomene rehmannii var. leptobotrya
Aeschynomene rehmannii var. rehmannii
Alysicarpus zeyheri
Argyrolobium harveyanum
Argyrolobium humile
Argyrolobium lotoides
Argyrolobium pauciflorum
Argyrolobium rupestre subsp. rupestre
Argyrolobium speciosum
Argyrolobium transvaalense
Argyrolobium tuberosum
Aspalathus callosa Indigenous
Chamaecrista capensis var. capensis
Chamaecrista capensis var. flavescens
Chamaecrista comosa
Crotalaria distans subsp. distans
Crotalaria eremicola subsp. eremicola
Crotalaria globifera
Crotalaria magaliesbergensis
Crotalaria sphaerocarpa subsp. sphaerocarpa
Dichilus strictus
Dolichos angustifolius
Dolichos falciformis
Elephantorrhiza elephantina
Elephantorrhiza praetermissa
Eriosema cordatum
Eriosema kraussianum
Eriosema salignum
Eriosema simulans
Erythrina zeyheri
Indigastrum fastigiatum
Indigofera buchananii
Indigofera comosa
Indigofera dimidiata
Indigofera dregeana
Indigofera evansiana
Indigofera frondosa
Indigofera hedyantha
Indigofera hilaris var. hilaris

Indigofera longibarbata
Indigofera melanadenia
Indigofera placida
Indigofera rostrata
Indigofera sanguinea
Indigofera tristoides
Lablab purpureus subsp. uncinatus
Leobordea adpressa subsp. adpressa
Leobordea eriantha
Leobordea foliosa
Lespedeza cuneata; Naturalised
Lessertia frutescens subsp. microphylla
Listia heterophylla
Lotus discolor subsp. discolor
Medicago laciniata var. laciniata; Naturalised
Melolobium alpinum
Melolobium calycinum
Melolobium microphyllum
Melolobium obcordatum
Melolobium wilmsii
Mucuna coriacea
Pearsonia cajanifolia subsp. cryptantha
Pearsonia sessilifolia subsp. filifolia
Pearsonia sessilifolia subsp. sessilifolia
Rhynchosia adenodes
Rhynchosia nervosa var. nervosa
Rhynchosia pauciflora
Rhynchosia pedunculata
Rhynchosia reptabunda
Rhynchosia totta var. totta
Tephrosia capensis var. acutifolia
Tephrosia capensis var. capensis
Tephrosia natalensis subsp. natalensis
Tephrosia semiglabra
Trifolium africanum var. africanum
Trifolium africanum var. lydenburgense
Vigna luteola var. luteola
Vigna oblongifolia var. oblongifolia
Vigna unguiculata subsp. unguiculata var. unguiculata
Zornia capensis subsp. capensis
Zornia linearis
Zornia milneana

Fagaceae
Quercus robur; Naturalised

Gentianaceae
Chironia krebsii
Chironia palustris subsp. *transvaalensis*
Chironia purpurascens subsp. *humilis*
Exochaenium grande

Sebaea leiostyla
Sebaea repens
Sebaea sedoides var. sedoides

Geraniaceae
Geranium multisectum
Geranium robustum
Geranium wakkerstroomianum
Monsonia angustifolia
Monsonia attenuata
Monsonia brevirostrata
Pelargonium alchemilloides
Pelargonium luridum
Pelargonium minimum
Pelargonium pseudofumarioides
Pelargonium sidoides

Gesneriaceae
Streptocarpus dunnii
Streptocarpus galpinii
Streptocarpus pentherianus

Haloragaceae
Laurembergia repens subsp. *brachypoda*

Hyacinthaceae
Albuca baurii
Albuca setosa
Albuca shawii
Albuca virens subsp. virens
Dipcadi brevifolium
Dipcadi marlothii
Dipcadi viride
Drimia calcarata
Drimia depressa
Drimia elata
Drimia multisetosa
Drimia pauciflora
Drimia sphaerocephala
Eucomis autumnalis subsp. clavata
Eucomis montana
Eucomis pallidiflora subsp. pallidiflora
Ledebouria cooperi
Ledebouria humifusa
Ledebouria leptophylla
Ledebouria marginata
Ledebouria ovatifolia
Ledebouria revoluta
Merwilla plumbea
Ornithogalum candicans
Ornithogalum capillare

Ornithogalum esterhuyseniae
Ornithogalum flexuosum
Ornithogalum juncifolium var. juncifolium
Schizocarphus nervosus

Hydrocharitaceae
Lagarosiphon muscoides

Hypericaceae
Hypericum aethiopicum subsp. *sonderi*
Hypericum lalandii

Hypoxidaceae
Empodium elongatum
Hypoxis acuminata
Hypoxis argentea var. *argentea*
Hypoxis filiformis
Hypoxis hemerocallidea
Hypoxis iridifolia
Hypoxis multiceps
Hypoxis obtusa
Hypoxis rigidula var. *rigidula*

Iridaceae
Aristea torulosa
Babiana bainesii
Crocosmia paniculata
Dierama insigne
Dierama mossii
Dierama tyrium
Gladiolus crassifolius
Gladiolus dalenii subsp. dalenii
Gladiolus ecklonii
Gladiolus elliotii
Gladiolus longicollis subsp. platypetalus
Gladiolus paludosus
Gladiolus papilio
Gladiolus robertsoniae
Gladiolus sericeovillosus subsp. calvatus
Gladiolus sericeovillosus subsp. sericeovillosus
Gladiolus vinosomaculatus
Gladiolus woodii
Hesperantha coccinea
Hesperantha longicollis
Hesperantha rupestris
Moraea elliotii
Moraea filicaulis
Moraea pallida
Moraea pubiflora
Watsonia bella
Watsonia pulchra

Juncaceae
Juncus dregeanus subsp. dregeanus
Juncus exsertus
Juncus oxycarpus
Juncus punctorius

Lamiaceae
Acrotome hispida
Acrotome inflata
Aeollanthus buchnerianus
Ajuga ophrydis
Leonotis ocymifolia var. raineriana
Mentha aquatica
Ocimum obovatum subsp. obovatum var. obovatum
Platostoma rotundifolium
Pycnostachys reticulata
Rotheca hirsuta
Salvia aurita var. galpinii
Salvia repens var. repens
Salvia runcinata
Stachys hyssopoides
Stachys kuntzei
Stachys natalensis var. natalensis
Stachys nigricans
Syncolostemon albiflorus
Syncolostemon concinnus
Syncolostemon pretoriae
Teucrium trifidum

Lentibulariaceae
Utricularia prehensilis

Limeaceae
Limeum sulcatum var. *sulcatum*

Linaceae
Linum thunbergii

Linderniaceae
Linderniella nana

Lobeliaceae
Cyphia elata
Lobelia erinus
Lobelia flaccida subsp. *flaccida*
Lobelia sonderiana
Monopsis decipiens

Lythraceae
Nesaea sagittifolia var. *sagittifolia*

Nesaea schinzii

Malvaceae
Grewia flava
Grewia occidentalis var. *occidentalis*
Hermannia cordata
Hermannia cristata
Hermannia depressa
Hermannia transvaalensis
Hibiscus aethiopicus var. *ovatus*
Hibiscus microcarpus
Hibiscus trionum; Naturalised
Malva parviflora var. *parviflora*; Naturalised
Pavonia columella
Sida chrysantha
Sida rhombifolia subsp. *rhombifolia*

Melianthaceae
Melianthus dregeanus subsp. *insignis*

Menispermaceae
Stephania abyssinica var. *tomentella*

Menyanthaceae
Nymphoides thunbergiana

Molluginaceae
Psammotropha myriantha

Myrsinaceae
Rapanea melanophloeos

Myrtaceae
Eucalyptus camaldulensis; Naturalised; Invasive, NEMBA Category 1b in riparian areas

Ochnaceae
Ochna natalitia

Onagraceae
Epilobium capense
Ludwigia palustris; Naturalised
Oenothera stricta subsp. *stricta*; Naturalised; Invasive
Oenothera tetraptera; Naturalised; Invasive

Orchidaceae
Brachycorythis ovata subsp. *ovata*
Brachycorythis pubescens
Brownleea parviflora
Disa aconitoides subsp. *aconitoides*
Disa cooperi
Disa nervosa

Disa patula var. *transvaalensis*
Disa stachyoides
Disa versicolor
Disperis cooperi
Disperis fanniniae
Eulophia cooperi
Eulophia hians var. *hians*
Eulophia hians var. *inaequalis*
Eulophia hians var. *nutans*
Eulophia ovalis var. *bainesii*
Eulophia ovalis var. *ovalis*
Eulophia parvilabris
Habenaria barbertoni
Habenaria clavata
Habenaria dives
Habenaria epipactidea
Habenaria falcicornis subsp. *caffra*
Habenaria lithophila
Neobolusia tysonii
Orthochilus foliosus
Orthochilus leontoglossus
Orthochilus vinosus
Orthochilus welwitschii
Pterygodium nigrescens
Satyrium hallackii subsp. *ocellatum*
Satyrium longicauda var. *longicauda*
Satyrium neglectum subsp. *neglectum var. neglectum*
Satyrium parviflorum
Satyrium trinerve
Schizochilus zeyheri

Orobanchaceae
Alectra capensis
Buchnera reducta
Cycnium adonense
Cycnium tubulosum subsp. tubulosum
Harveya speciosa
Melasma scabrum var. scabrum
Sopubia cana var. cana
Sopubia simplex
Striga asiatica
Striga bilabiata subsp. bilabiata
Striga elegans
Striga gesnerioides

Orthotrichaceae
Orthotrichum diaphanum

Oxalidaceae
Oxalis convexula
Oxalis corniculata; Naturalised; Invasive

Oxalis obliquifolia
Oxalis smithiana

Papaveraceae
Argemone ochroleuca; Naturalised; Invasive, NEMBA Category 1b
Papaver aculeatum

Peraceae
Clutia hirsuta var. hirsuta
Clutia monticola var. *monticola*
Clutia natalensis
Clutia virgata

Phrymaceae
Mimulus gracilis

Phyllanthaceae
Phyllanthus glaucophyllus

Phytolaccaceae
Phytolacca octandra; Naturalized; Invasive

Plantaginaceae
Linaria vulgaris; Naturalised; Invasive
Plantago lanceolata
Veronica anagallis-aquatica

Poaceae
Agrostis continuata
Agrostis eriantha var. eriantha
Agrostis gigantea; Naturalised
Agrostis lachnantha var. lachnantha
Alloteropsis semialata subsp. eckloniana
Alloteropsis semialata subsp. semialata
Andropogon appendiculatus
Andropogon eucomus
Andropogon lacunosus
Andropogon schirensis
Anthoxanthum odoratum var. odoratum; Naturalised
Aristida adscensionis
Aristida bipartita
Aristida canescens subsp. canescens
Aristida congesta subsp. barbicollis
Aristida congesta subsp. congesta
Aristida diffusa subsp. burkei
Aristida junciformis subsp. junciformis
Aristida recta
Aristida scabrivalvis subsp. scabrivalvis
Aristida vestita
Arundinella nepalensis
Avena sativa; Naturalised; Invasive

Bothriochloa insculpta
Brachiaria eruciformis
Brachiaria humidicola
Brachiaria serrata
Briza minor; Naturalised; Invasive
Bromus catharticus; Naturalised; Invasive
Bromus leptoclados
Calamagrostis epigejos var. capensis
Catalepis gracilis
Chloris virgata
Ctenium concinnum
Cymbopogon caesius
Cymbopogon dieterlenii
Cymbopogon pospischilii
Cynodon dactylon
Cynodon hirsutus
Cynodon transvaalensis
Dactylis glomerata; Naturalised; Invasive
Digitaria ciliaris; Naturalised
Digitaria diagonalis var. diagonalis
Digitaria diversinervis
Digitaria eriantha
Digitaria flaccida
Digitaria sanguinalis; Naturalised
Digitaria ternata
Digitaria tricholaenoides
Diheteropogon amplectens var. amplectens
Echinochloa crus-galli
Ehrharta erecta var. natalensis
Eleusine coracana subsp. africana
Elionurus muticus
Enneapogon scoparius
Eragrostis caesia
Eragrostis capensis
Eragrostis chloromelas
Eragrostis cilianensis
Eragrostis curvula
Eragrostis gummiflua
Eragrostis lappula
Eragrostis lehmanniana var. chaunantha
Eragrostis lehmanniana var. lehmanniana
Eragrostis mexicana subsp. virescens; Naturalised
Eragrostis obtusa
Eragrostis patentissima
Eragrostis plana
Eragrostis planiculmis
Eragrostis racemosa
Eragrostis remotiflora
Eragrostis sclerantha subsp. sclerantha
Eragrostis tef; Naturalised
Eriochrysis brachypogon

Festuca caprina
Festuca scabra
Fingerhuthia africana
Fingerhuthia sesleriiformis
Harpochloa falx
Helictotrichon turgidulum
Hemarthria altissima
Heteropogon contortus
Holcus lanatus; Naturalised; Invasive
Hyparrhenia anamesa
Hyparrhenia dregeana
Hyparrhenia hirta
Imperata cylindrica
Koeleria capensis
Leersia hexandra
Lolium multiflorum; Naturalised; Invasive
Lolium temulentum; Naturalised; Invasive
Lophacme digitata
Loudetia densispica
Loudetia simplex
Melinis nerviglumis
Microchloa caffra
Monocymbium ceresiiforme
Panicum ecklonii
Panicum natalense
Panicum schinzii
Paspalum dilatatum; Naturalised; Invasive
Paspalum distichum; Naturalised; Invasive
Paspalum urvillei; Naturalised; Invasive
Pennisetum clandestinum; Naturalized; Invasive
Pennisetum macrourum
Pennisetum sphacelatum
Pennisetum thunbergii
Pennisetum unisetum
Perotis sp.
Phalaris arundinacea; Naturalised
Phalaris canariensis; Naturalised
Phalaris minor; Naturalised
Poa annua; Naturalised
Poa binata
Pogonarthria squarrosa
Rendlia altera
Sacciolepis chevalieri
Sacciolepis typhura
Schizachyrium sanguineum
Setaria incrassata
Setaria nigrirostris
Setaria pumila
Setaria sphacelata var. sphacelata
Setaria sphacelata var. torta
Sorghum bicolor subsp. arundinaceum

Sporobolus albicans
Sporobolus centrifugus
Sporobolus discosporus
Sporobolus fimbriatus
Stiburus alopecuroides
Stiburus conrathii
Themeda triandra
Trachypogon spicatus
Tragus berteronianus
Tragus racemosus
Triraphis andropogonoides
Tristachya leucothrix
Tristachya rehmannii
Urochloa panicoides

Polygalaceae
Polygala africana
Polygala albida subsp. albida
Polygala gerrardii
Polygala gracilenta
Polygala hottentotta
Polygala krumanina
Polygala ohlendorfiana
Polygala transvaalensis
Polygala transvaalensis subsp. transvaalensis
Polygala uncinata
Polygala virgata var. decora

Polygonaceae
Oxygonum dregeanum subsp. *canescens* var. *canescens*
Oxygonum dregeanum subsp. *swazicum*
Persicaria amphibia; Naturalised
Persicaria decipiens
Persicaria hystricula
Persicaria lapathifolia; Naturalised; Invasive
Persicaria madagascariensis
Rumex acetosella subsp. *angiocarpus*; Naturalised; Invasive, NEMBA Category 1b
Rumex crispus; Naturalised; Invasive
Rumex lanceolatus
Rumex sagittatus
Rumex woodii

Pontederiaceae
Pontederia cordata; Naturalised

Portulacaceae
Portulaca oleracea; Naturalised

Pottiaceae
Didymodon tophaceus
Trichostomum brachydontium

Proteaceae
Protea roupelliae subsp. *roupelliae*

Pteridaceae
Cheilanthes eckloniana
Cheilanthes hirta var. *brevipilosa*
Cheilanthes hirta var. *hirta*
Cheilanthes hirta var. *nemorosa*
Cheilanthes multifida subsp. *lacerata*
Cheilanthes quadripinnata
Cheilanthes viridis var. *viridis*
Pellaea calomelanos var. *calomelanos*
Pityrogramma argentea

Ranunculaceae
Clematis brachiata
Peltocalathos baurii
Ranunculus dregei
Ranunculus multifidus
Ranunculus trichophyllus

Rhamnaceae
Ziziphus zeyheriana

Rosaceae
Agrimonia procera; Naturalised; Invasive
Alchemilla capensis
Alchemilla woodii
Rubus ludwigii subsp. ludwigii
Sanguisorba minor subsp. muricata; Naturalised

Rubiaceae
Anthospermum herbaceum
Anthospermum rigidum subsp. rigidum
Canthium inerme
Cephalanthus natalensis
Galium capense subsp. capense
Galium capense subsp. garipense var. garipense
Kohautia amatymbica
Kohautia caespitosa subsp. brachyloba
Pachystigma pygmaeum
Pachystigma thamnus
Pentanisia angustifolia
Pentanisia prunelloides subsp. prunelloides
Pentanisia prunelloides subsp. latifolia
Richardia brasiliensis; Naturalised
Spermacoce natalensis

Ruscaceae
Eriospermum cooperi var. *cooperi*

Eriospermum corymbosum
Eriospermum flagelliforme
Eriospermum porphyrium
Eriospermum porphyrovalve

Rutaceae
Ruta graveolens; Naturalised

Salicaceae
Salix babylonica var. *babylonica*; Naturalised

Santalaceae
Thesium asterias
Thesium costatum var. costatum
Thesium costatum var. juniperinum
Thesium goetzeanum
Thesium pallidum
Thesium scirpioides

Scrophulariaceae
Chaenostoma neglectum
Chaenostoma patrioticum
Diclis rotundifolia
Gomphostigma virgatum
Hebenstretia angolensis
Hebenstretia comosa Indigenous
Hebenstretia oatesii subsp. oatesii
Hebenstretia rehmannii
Jamesbrittenia aurantiaca
Jamesbrittenia montana
Jamesbrittenia stricta
Limosella longiflora
Limosella maior
Manulea bellidifolia
Manulea rhodantha subsp. *aurantiaca*
Melanospermum rupestre
Melanospermum transvaalense
Nemesia fruticans
Selago capitellata
Selago densiflora
Selago galpinii
Teedia lucida
Tetraselago longituba
Zaluzianskya elongata
Zaluzianskya rubrostellata
Zaluzianskya spathacea

Solanaceae
Cestrum parqui; Naturalised; Invasive
Datura stramonium; Naturalised; Invasive, NEMBA Category 1b
Physalis angulata; Naturalised; Invasive

Solanum aculeatissimum; Naturalised
Solanum campylacanthum
Solanum capense
Solanum elaegnifolium; Naturalised; Invasive, NEMBA Category 1b
Solanum humile
Solanum lichtensteinii
Solanum panduriforme
Solanum retroflexum
Solanum sisymbriifolium; Naturalised; Invasive, NEMBA Category 1b

Thymelaeaceae
Gnidia fastigiata
Gnidia gymnostachya
Gnidia nodiflora
Lasiosiphon burchellii
Lasiosiphon caffer
Lasiosiphon kraussianus
Lasiosiphon microcephalus

Typhaceae
Typha capensis

Valerianaceae
Valeriana capensis var. *capensis*

Verbenaceae
Chascanum latifolium var. *transvaalense*
Lantana rugosa
Verbena bonariensis; Naturalised; Invasive, NEMBA Category 1b
Verbena rigida; Naturalised; Invasive

Vitaceae
Cissus diversilobata

Xyridaceae
Xyris capensis
Xyris gerrardii

Zygophyllaceae
Tribulus terrestris

Appendix 3: Flora protected under the Mpumalanga Nature Conservation Act No. 10 of 1998.

SCHEDULE 11: PROTECTED PLANT SPECIES (SECTION 69 (1) (a))

Common name	**Scientific name**
All species of tree ferns, excluding the bracken fern	All species of the Genus: Cyathea capensis and Cyathea dregei
All species of cycads in Republic of South Africa and the seedlings of the species of cycads referred to in Schedule 12	All species of the family Zamiaceae occurring in the Republic of South Africa and the seedlings of the species of Encephalartos referred to in Schedule 12
All species of yellow wood	Podocarpus spp.
All species of arum lilies	Zantedeschia spp.
"volstruiskos"	Schizobasis intricata
"knolklimop"	Bowiea volubilis
All species of red-hot pokers	Kniphofia spp.
All species of aloes, excluding: (a) all species not occurring in Mpumalanga and (b) the following species: all species of haworthias all species of agapanthus all species of squill	Aloe spp., excluding: (a) all species not occurring in Mpumalanga and (b) the following species: Haworthia spp. Agapanthus spp. Scilla spp.
All species of pineapple flower	Eucomis spp.
All species of dracaena	Dracaena spp.
All species of paintbrush	Haemanthus spp. and Scadoxus spp.
Cape poison bulb	Boophone disticha
All species of clivia	Clivia spp.
All species of brunsvigia	Brunsvigia spp.
All species of crinum	Crinum spp.
Ground lily	Ammocharis coranica
All species of fire lily	Cyrtanthus spp.
All species of elephantsfoot	Dioscorea spp.
River lily	Hesperantha coccinea
All species of gladioli	Gladiolus spp.
All species of watsonia	Watsonia spp.
Wild ginger	Siphonochilus aethiopicus
All species of orchids	All species of the family Orchidaceae
All species of the family proteaceae	All species of the family Proteaceae
All species of black stinkwood	Ocotea spp.
kiaat	Pterocarpus angolensis
tamboti	Spirostachys africana
The following species of euphorbias: Euphorbia bernardii and Euphorbia grandialata	The following species of euphorbias: Euphorbia bernardii and Euphorbia grandialata
Common bersama	Bersama tysoniana
Red ivory	Berchema zeyheri
Pepperbark tree	Warburgia salutaris
All species of ardenia	Adenia spp.
Bastard onion wood	Cassipourea gerrardii
Assegai tree	Curtisia dentata
All species of olive trees	All species of the Genus Olea
All species of impala lilies	All species of the Genus Adenium

Kudu lily	Pachypodium saundersii
All species of brachystelma	Brachystelma spp.
All species of ceropegia	Ceropegia spp.
All species of huerniopsis and huernia	Huerniopsis and Huernia spp.
All species of duvalia	Duvalia spp.
All species of stapeliads	Stapelia spp.
All species of orbeanthus	Orbeanthus spp.
All species of orbeas	Orbea spp.
All species of orbeopsis	Orbeopsis spp.

SCHEDULE 12: SPECIALLY PROTECTED PLANT SPECIES (SECTION 69 (1) (b))
In this schedule "seedling" means a plant of which the diameter of the trunk or bulb, either above or below the ground, does not exceed 150 mm.

Common name	**Scientific name**
All plants, excluding seedlings, of the following species of cycads: dolomiticus, dyer, middelburg, eugene marais, heenan, inopinus, laevifolius, lanatus, lebombo, ngoyanus, paucidentatus, modjadje and villosus	All plants, excluding seedlings, of the following species of the Genus Encephalartos: E. dolomiticus, E. dyerianus, E. middelburgensis, E. eugene maraisii, E. heenanii, E. inopinus, E. laevifolius, E. lanatus, E. lebomboensis, E. ngoyanus, E. paucidentatus, E. transvenosus and E. villosus and any species derived from the above species
All plants of the following species of cycads: cupidus and humilus	All plants of the following species of the Genus Encephalartos: E. cupidus and E. humilus
All species of cycads in their natural habitat	All plants of the Genus Encephalartos in their natural habitat

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

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

CRITICALLY ENDANGERED SPECIES

Flora

Adenium swazicum
Aloe pillansii
Diaphananthe millarii
Dioscorea ebutsniorum
Encephalartos aemulans
Encephalartos brevifoliolatus
Encephalartos cerinus
Encephalartos dolomiticus
Encephalartos heenanii
Encephalartos hirsutus
Encephalartos inopinus
Encephalartos latifrons
Encephalartos middelburgensis
Encephalartos nubimontanus
Encephalartos woodii

ENDANGERED SPECIES

Flora

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

VULNERABLE SPECIES

Flora

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

PROTECTED SPECIES

Flora

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

Appendix 5: Curriculum vitae: Dr David Hoare

Education
Matric - Graeme College, Grahamstown, 1984
B.Sc (majors: Botany, Zoology) - Rhodes University, 1991-1993
B.Sc (Hons) (Botany) - Rhodes University, 1994 with distinction
M.Sc (Botany) - University of Pretoria, 1995-1997 with distinction
PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth

Main areas of specialisation
- Vegetation ecology, primarily in grasslands, thicket, coastal systems, wetlands.
- Plant biodiversity and threatened plant species specialist.
- Alien plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

Membership
Professional Natural Scientist, South African Council for Natural Scientific Professions, 16 August 2005 – present. Reg. no. 400221/05 (Ecology, Botany)
Member, International Association of Vegetation Scientists (IAVS)
Member, Ecological Society of America (ESA)
Member, International Association for Impact Assessment (IAIA)
Member, Herpetological Association of Africa (HAA)

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

Experience as consultant
Ecological consultant since 1995. Author of over 800 specialist ecological consulting reports. Wide experience in ecological studies within grassland, savanna and fynbos, as well as riparian, coastal and wetland vegetation.

Publication record:
Refereed scientific articles (in chronological order):
Journal articles:

HOARE, D.B. & BREDENKAMP, G.J. 1999. Grassland communities of the Amatola / Winterberg mountain region of the Eastern Cape, South Africa. *South African Journal of Botany* 64: 44-61.

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HOARE, D.B. 2002. Biodiversity and performance of grassland ecosystems in communal and commercial farming systems in South Africa. Proceedings of the FAO's Biodiversity and Ecosystem Approach in Agriculture, Forestry and Fisheries Event: 12–13 October, 2002. Food and Agriculture Organisation of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. pp. 10 - 27.

STEENKAMP, Y., VAN WYK, A.E., VICTOR, J.E., **HOARE, D.B.**, DOLD, A.P., SMITH, G.F. & COWLING, R.M. 2005. Maputaland-Pondoland-Albany Hotspot. In: Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & Fonseca, G.A.B. da (eds.) *Hotspots revisited.* CEMEX, pp.218–229. ISBN 968-6397-77-9

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HOARE, D.B., MUCINA, L., RUTHERFORD, M.C., VLOK, J., EUSTON-BROWN, D., PALMER, A.R., POWRIE, L.W., LECHMERE-OERTEL, R.G., PROCHES, S.M., DOLD, T. and WARD, R.A. *Albany Thickets.* in Mucina, L. and Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.

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Conference Presentations:

HOARE, D.B. & LUBKE, R.A. *Management effects on diversity at Goukamma Nature Reserve, Southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994

HOARE, D.B., VICTOR, J.E. & LUBKE, R.A. *Description of the coastal fynbos south of George, southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994

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HOARE, D.B. & BOTHA, C.E.J. *Anatomy and ecophysiology of the dunegrass Ehrharta villosa var. maxima*; Poster presentation, South African Association of Botanists Annual Congress, Bloemfontein, January 1995

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