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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 Green Hydrogen and Ammonia Facility near Ermelo in Mpumalanga Province

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For: Camden Green Energy (RF) Pty Ltd

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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).



Dr David Hoare

26/06/2022

Date

TERMS OF REFERENCE

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

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

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

General information

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

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

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

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

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

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

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

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

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

Terrestrial Plant Species Specialist Assessment

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

2.2 The assessment must be undertaken within the study area.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Terrestrial Plant Species Specialist Assessment Report

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

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

3.1.2 a signed statement of independence by the specialist;

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

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

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

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

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

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

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

3.1.10 a discussion on the cumulative impacts;

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

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

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

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

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 Green Energy (RF) Pty Ltd, a subsidiary of ENERTRAG AG, the German-based renewable energy company, is proposing to develop a green hydrogen and ammonia facility including grid connection infrastructure and water p 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 Green Hydrogen and Ammonia Plant (RF) Pty Ltd Specialist Purpose Vehicle (SPV) 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 Green Hydrogen and Ammonia Facility** (the Project). ENERTRAG appointed David Hoare Consulting (Pty) Ltd to undertake this specialist assessment for the Project.

Project description

The facility comprises the following components, where the footprint and capacities are presented. These parameters on based on the assumption that an up to 150MW electrolyser is installed (maximum). These components are detailed further below, but comprise the following general components:

- Water treatment.
- Electrolyser.
- Air separator.
- Ammonia processing unit.
- Liquid air energy system (LAES) for nitrogen storage.
- Feedstock and product storage.
- Utilities.
- Gantry and loading bay.

Associated infrastructure further include:

- Electrical infrastructure required for power supply to the facility.
- Temporary and permanent laydown areas required for temporary storage and assembly of components and materials.
- Access road/s to the site and internal roads between project components, with a width of up to up to 6m wide respectively.
- A temporary concrete batching plant (if necessary).
- Temporary staff accommodation.
- Fencing and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines.
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse / workshop.
- Ablution facilities.
- A gate house.
- Control centre, offices, warehouses.
- Security building.

Access to the site is possible primarily via an unnamed gravel road immediately off the N11 (south of Ermelo town). Existing roads will be used where feasible and practical.

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.

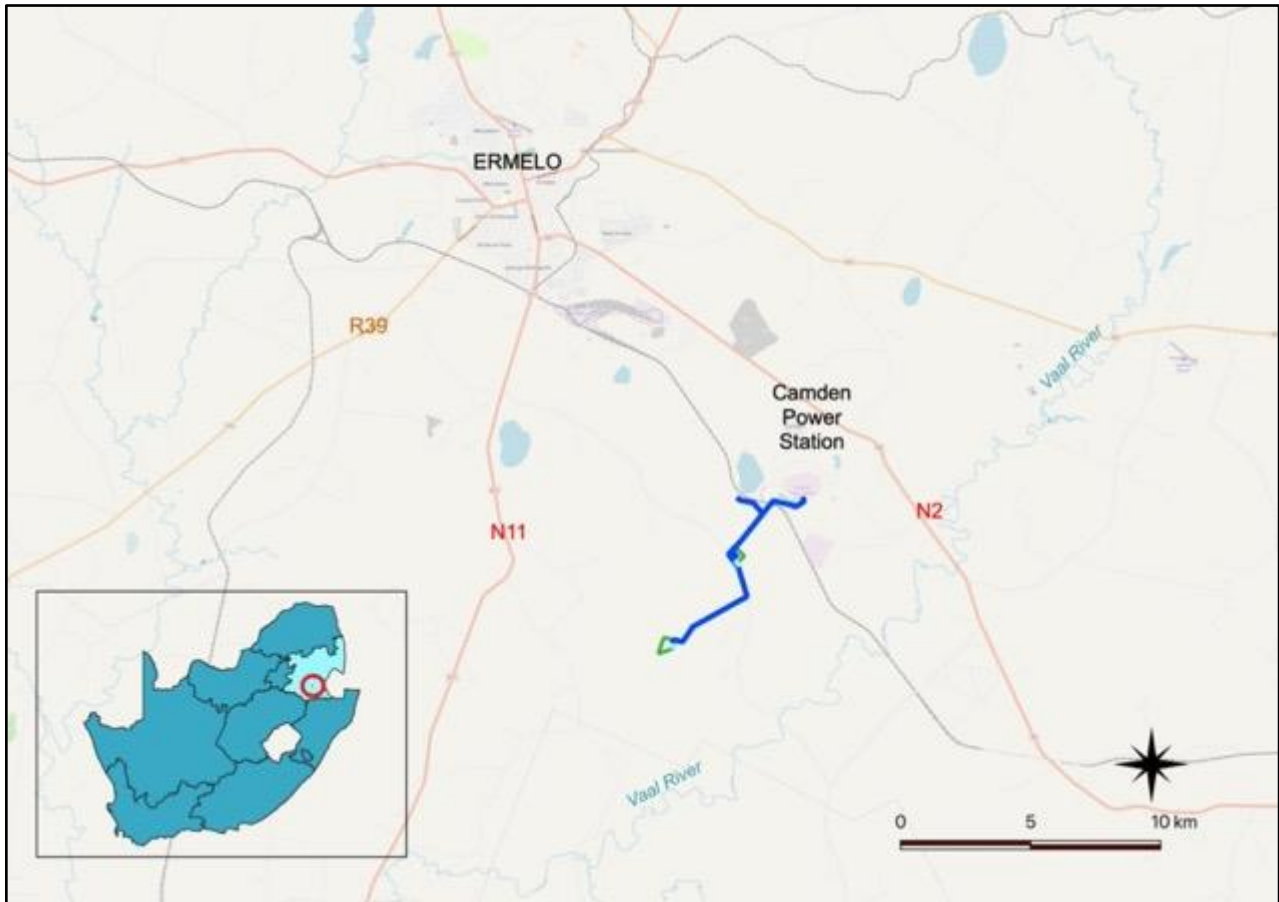


Figure 1: Location of the proposed Project.

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 | Hydro

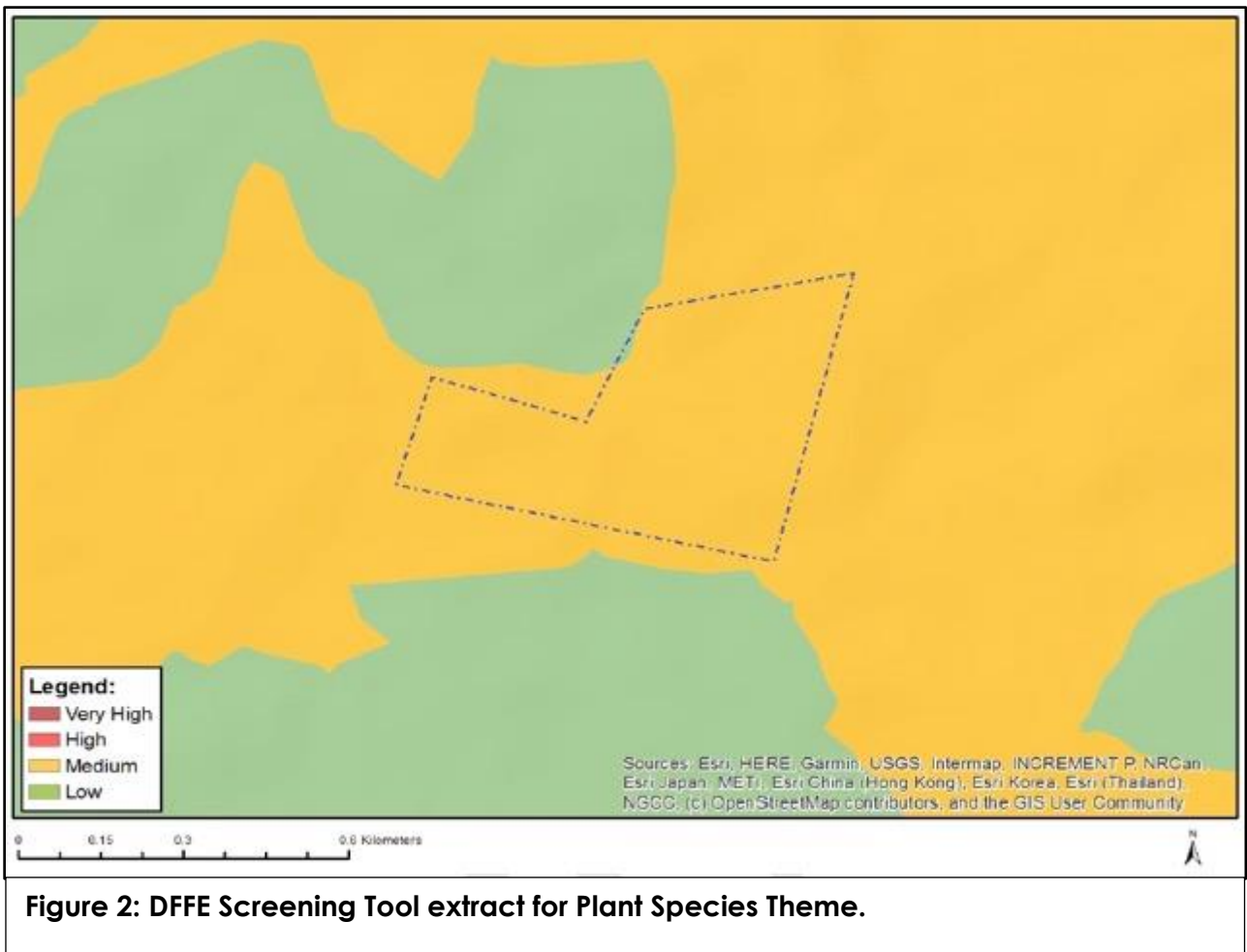
The DFFE Screening Tool report for the area (Figure 2) indicates the following ecological sensitivities:

| 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 |



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.

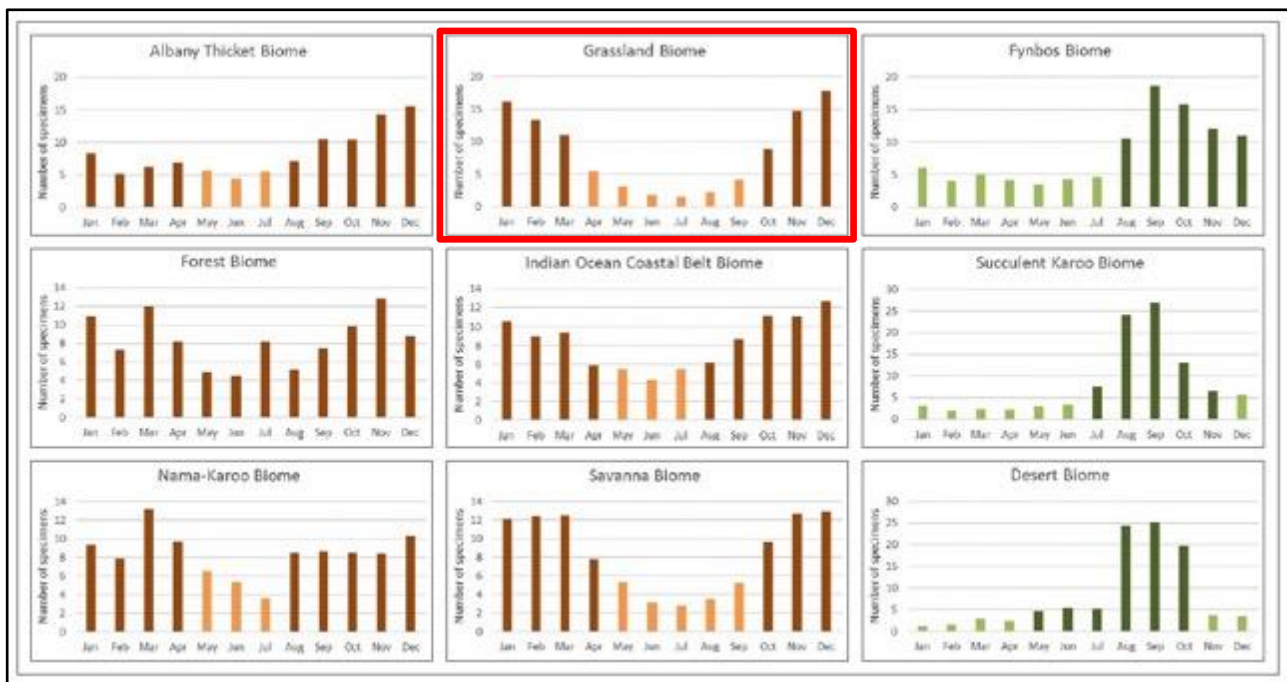


Figure 3: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines).

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

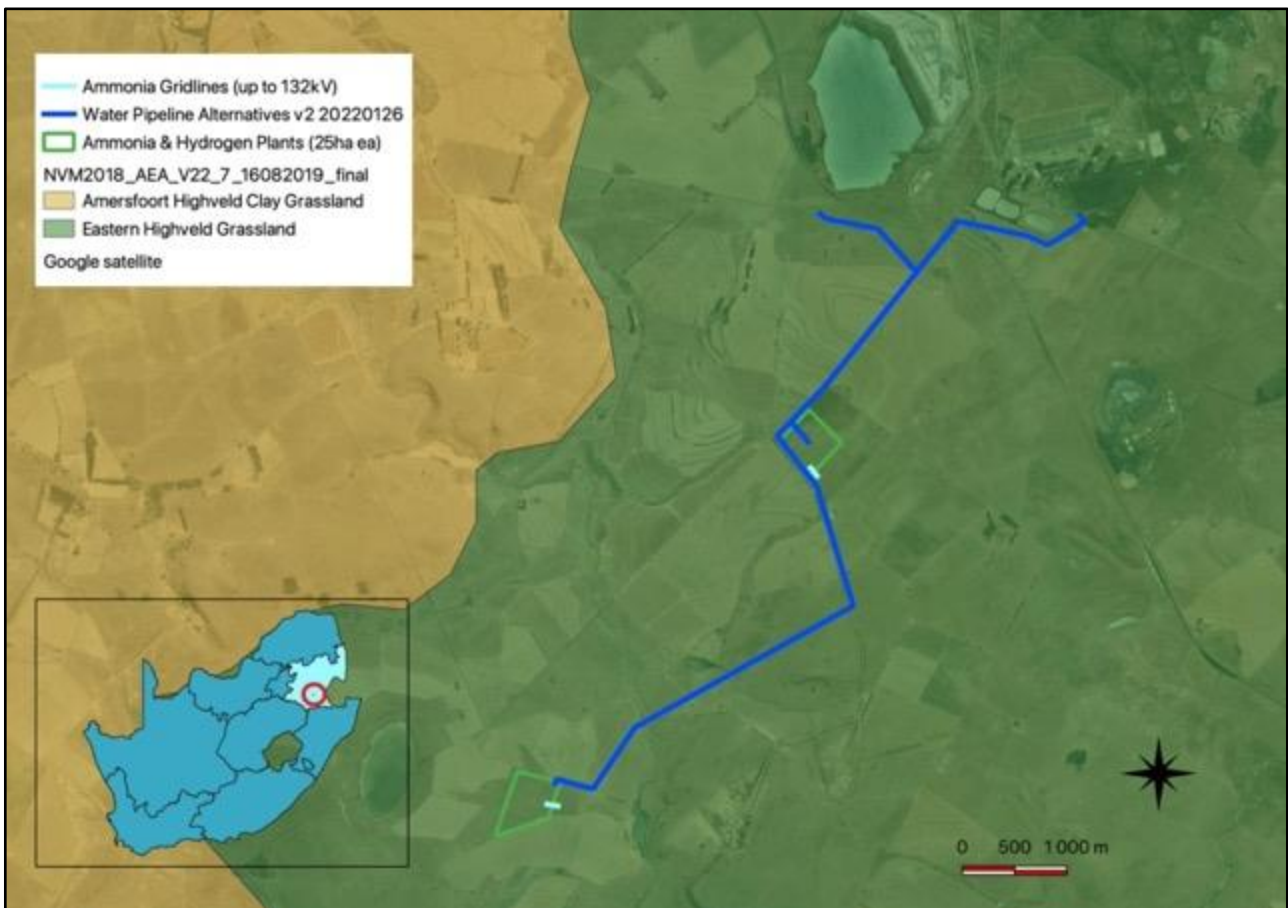


Figure 4: Regional vegetation types of the study area.

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 magalismsontanum*).

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

Habitats on site

A map of habitats within the study area is provided in Figure 5. The alternative site is within an area of natural grassland but degraded (from heavily to light) while the preferred site is within current cultivation. 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);

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 recolonization of the area through propagation. |

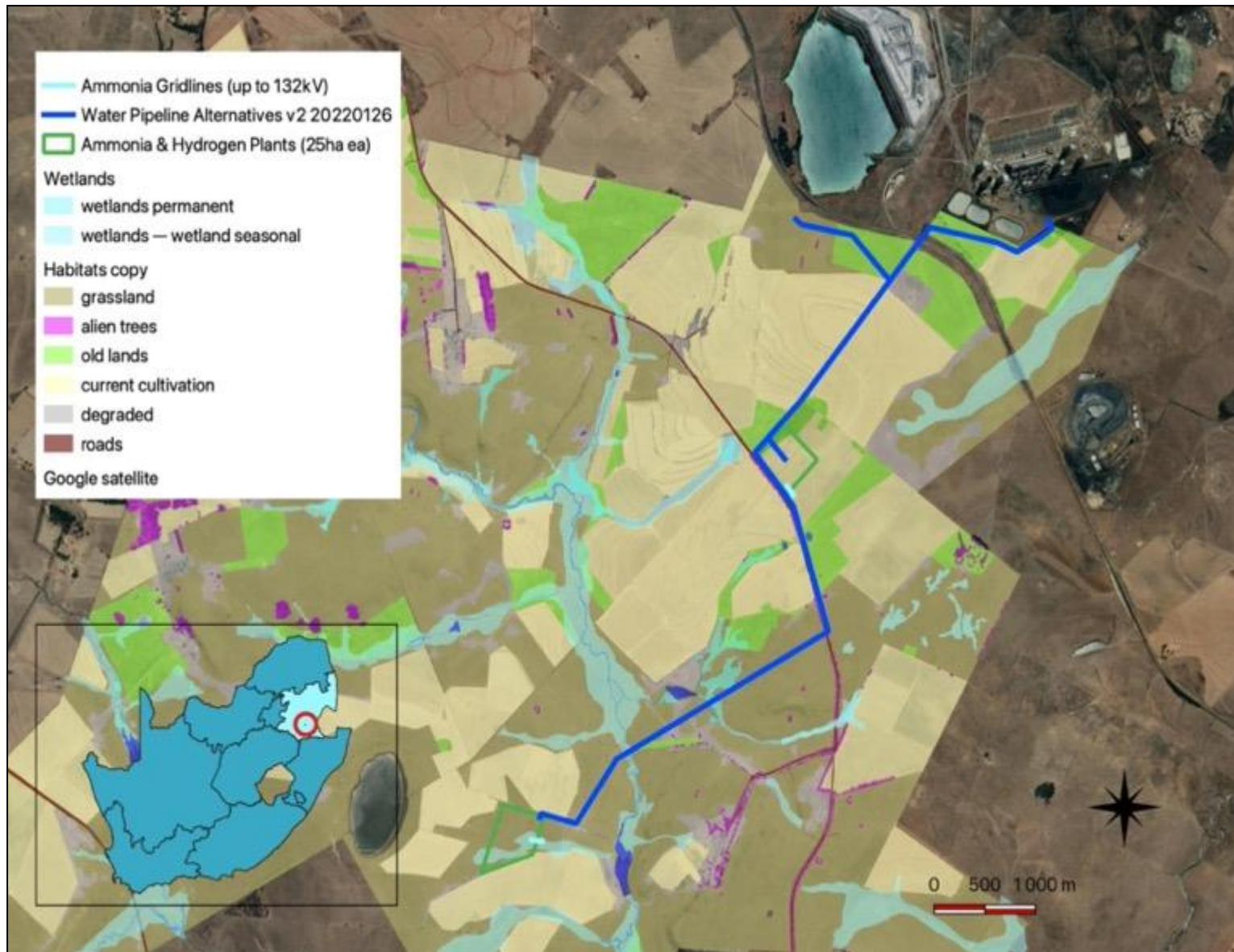


Figure 5: Main habitats of the study area.

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*, *Bewisia biflora*, *Brachiaria serrata*, *Diheteropogon amplexans*, *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 400m² 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. crassifolius* 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 it 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 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 |
|--|-----------------|--|----------------------------------|---|
| <i>Alepidea cordifolia</i> 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) |
| <i>Alepidea longeciliata</i> 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 scree, 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) |
| Merwillia plumbea HYACINTHACEAE | Near Threatened | Widespread in eastern half of South Africa, 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 recorded, is given in Appendix 2.

There are 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:

- Ammonia 2: the preferred site (PS) - in the north - this is within a cultivated land.
- Ammonia 1: alternative site (AS) - in the south - this is within a grassland area.

Pipelines

Each ammonia facility requires a pipeline to obtain water. The two potential sources are at Camden Power Station Confluence, and at a location along the Usutu bulk water pipeline. There are four pipeline route alternatives:

- Alternative 1: PS to Usutu Scour (preferred)
- Alternative 2: AS to Camden PS
- Alternative 3: AS to Usutu Scour
- Alternative 4: PS to Camden PS

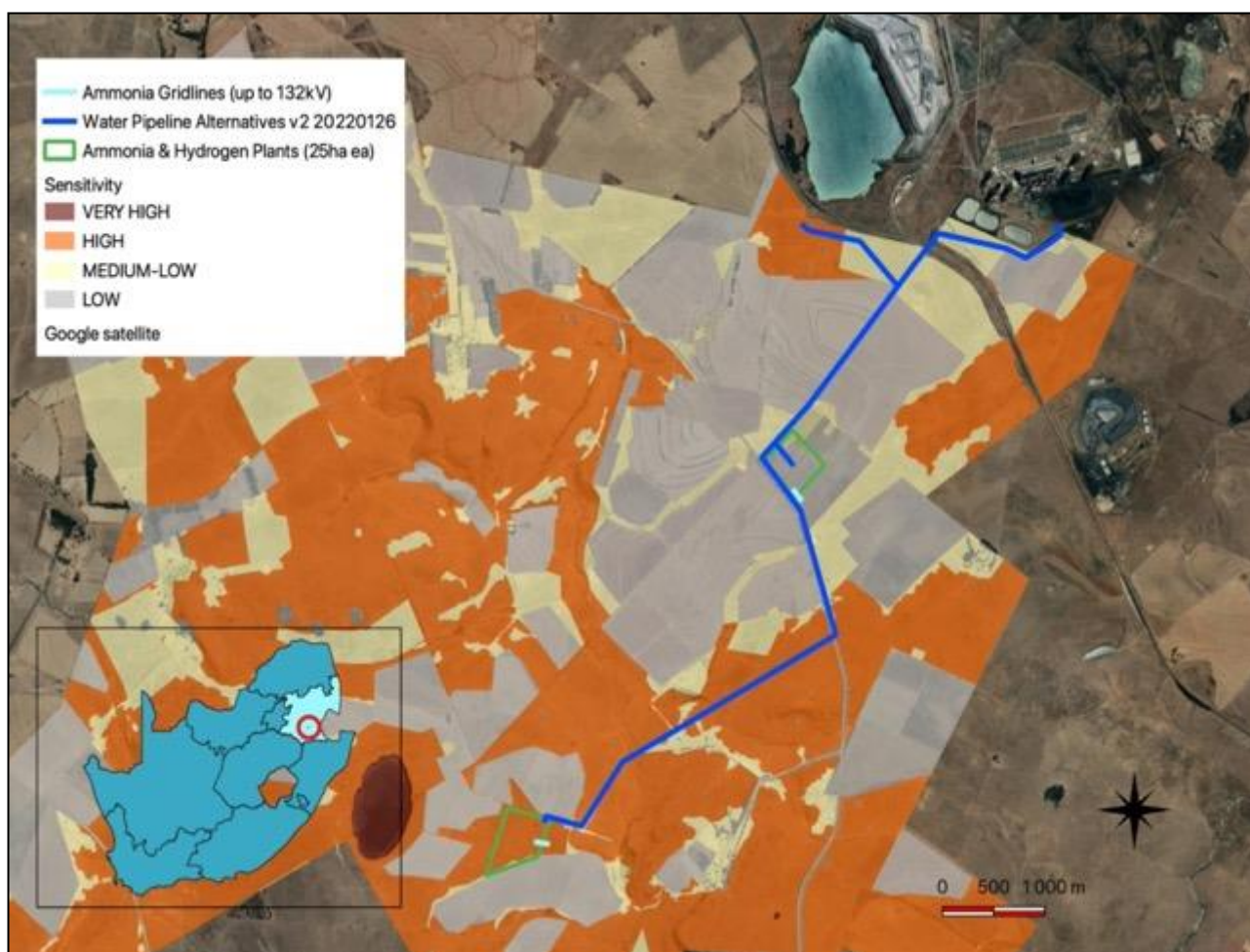


Figure 6: Location of proposed infrastructure relative to plant species sensitivity of the study area.

Distance of each type of habitat in the footprint of the water pipeline:

| Habitat | Status | Alternative 1 (Preferred) | Alternative 2 | Alternative 3 | Alternative 4 |
|---------------------|-------------|---------------------------|---------------|---------------|---------------|
| Grassland | Natural | 422 | 2698 | 3120 | |
| Wetland | Natural | | 200 | 200 | |
| Exotic trees | Degraded | | 1437 | 1437 | |
| Degraded areas | Degraded | 86 | 1174 | 610 | 650 |
| Old lands | Secondary | 1236 | 1781 | 1440 | 1577 |
| Current cultivation | Transformed | 1521 | 2036 | 1657 | 1900 |
| Road | Transformed | | 20 | 20 | |
| TOTAL | | 3265 m | 9346 m | 8484 m | 4127 m |

Facility options

There are two possible Green Hydrogen and Ammonia Facility site options (Figures 7-preferred; and Figure 8). The amount of habitat affected by each is provided in the table below each figure.

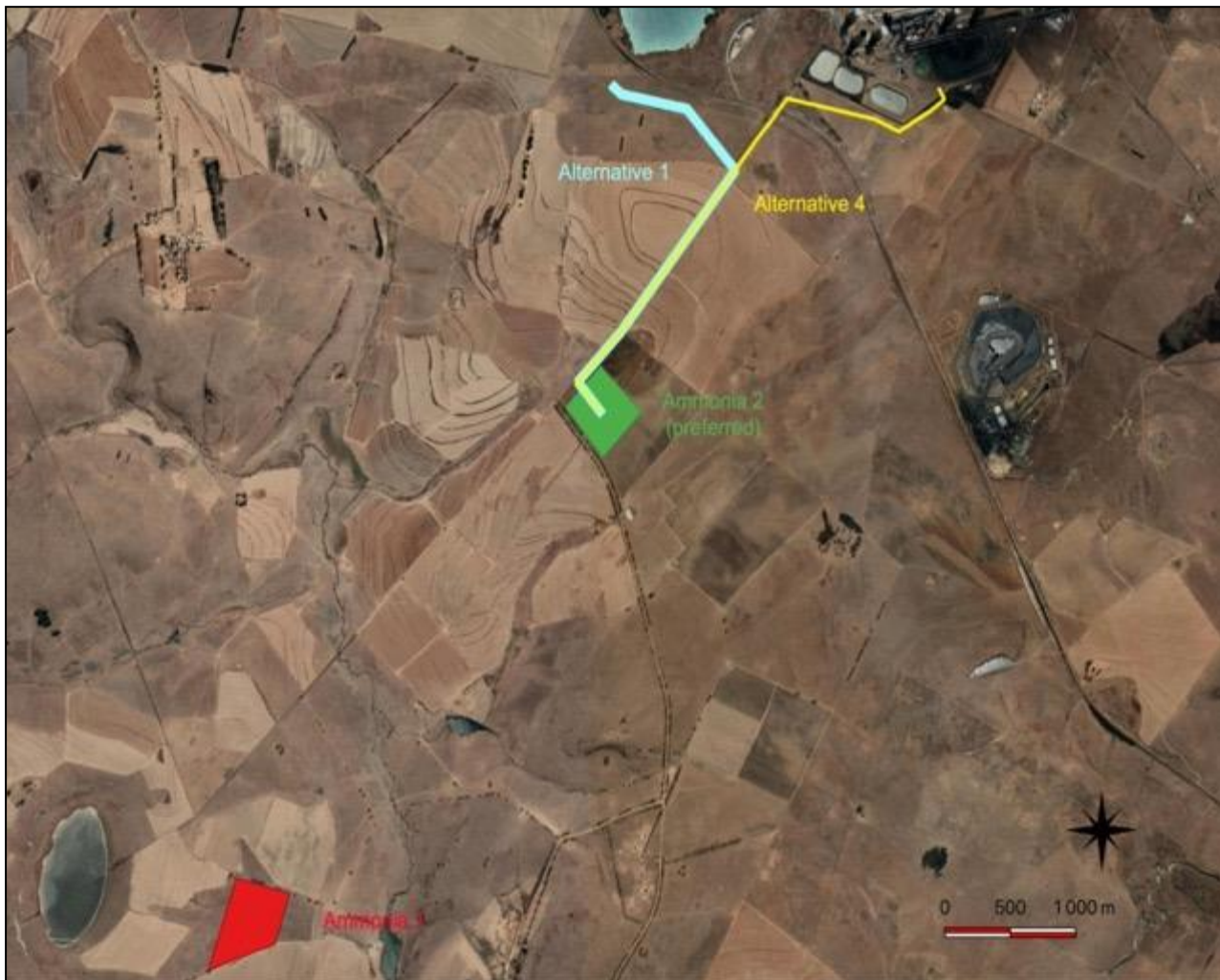


Figure 7: Pipeline alternatives for Ammonia 2.

Amount of each type of habitat in the footprint of Option 2 (preferred):

| Habitat | Status | Area in hectares | Proportion of total area |
|---------------------|-------------|------------------|--------------------------|
| Current cultivation | Transformed | 18.16 | 100.0 |
| TOTAL | | 18.16 ha | 100.0% |



Figure 8: Pipeline alternatives for Ammonia 1.

Amount of each type of habitat in the footprint of Option 1:

| Habitat | Status | Area in hectares | Proportion of total area |
|---------------------|-------------|------------------|--------------------------|
| Grassland | Natural | 15.29 | 71.2 |
| Wetland | Natural | 5.86 | 27.3 |
| Current cultivation | Transformed | 0.32 | 1.5 |
| TOTAL | | 21.47 ha | 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.

The appropriate 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 during the construction phase.

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 (Construction, Operation, Decommissioning and Cumulative) 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

Loss of individuals of Species of Conservation Concern due to clearing for construction

| 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

Cumulative impacts on SCC from construction clearing due to a number of projects

| Cumulative impacts on SCC from construction clearing due to a number of projects | | |
|--|--|---|
| Impact 2 | | |
| 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 and footprints of tower structures (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 and should include control sites (areas not disturbed by the project) to evaluate mortality relative to wild populations.
6. No 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. 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.

Option 2 (preferred) is the favoured option from a plant species perspective. It is situated entirely within a cultivated land, whereas Option 1 is mostly within a natural area (21.15 ha of natural habitat). If Option 2 (preferred) is selected, it also means that the pipeline Alternatives 1 or 4 are selected over Alternatives 2 or 3, which is preferred here. The pipeline route alternatives are preferred in the following order, due to the distance within natural habitats and therefore the likelihood of impacting on any SCC:

1. Alternative 4: preferred - does not affect any natural habitat.
2. Alternative 1: - distance of 422 m through grassland.
3. Alternative 2: - 2900 m through natural habitat.
4. Alternative 3: - 3300 m through natural habitat.

If Option 2 (preferred) is selected, along with pipeline Alternative 4, then no natural habitat is affected, which means no plant species of conservation concern will be affected. It is important to note that while there are preferences specified, all alternatives and options for pipeline, powerline and facility locations are considered feasible from a terrestrial plant perspective.

The project is deemed acceptable from a terrestrial plant perspective and it is recommended the Environmental Authorisation be granted. The author is of the opinion that the impacts associated with the project can be mitigated to acceptable levels provided the recommended mitigation measures identified are implemented.

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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- MUCINA, L. AND RUTHERFORD, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.
- VAN WYK, A.E. AND SMITH, G.F. (Eds) 2001. Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents, pp. 1-199. Umdaus Press, Pretoria.

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 |
|-----------------------------------|-----------------------------|---|-----------------------------|
| <i>Acacia erioloba</i> | Camel thorn | Kameeldoring (A)/Mogohlo (NS)/Mogoflho (T)/ | 168 |
| <i>Acacia haematoxylon</i> | Grey camel thorn | Vaalkameeldoring (A)/Mokholo (T)) | 169 |
| <i>Adansonia digitata</i> | Baobab | Kremetart (A)/Seboi (NS)/Mowana (T)/Ximuwu (XT) | 467 |
| <i>Azalia quanzensis</i> | Pod mahogany | Peulmahonie (A)/Mutokota (V)/Inkehli (Z) | 207 |
| <i>Balanites subsp. maughamii</i> | Torchwood | Groendoring (A)/Ugobandlovu (Z) | 251 |
| <i>Barringtonia racemosa</i> | Powder-puff tree | Poeierkwasboom (A)/lboqo (Z) | 524 |
| <i>Boscia albitrunca</i> | Shepherd's tree | Witgat (A)/Mohlōpi (NS)/Motlhōpi (T)/Muvhombwe (V)/Umgqomogqomo (X)/Umvithi (Z) | 122 |
| <i>Brachystegia spiciformis</i> | Msasa | Msasa (A) | 198.1 |
| <i>Breonadia salicina</i> | Matumi | Mingerhout (A)/Mohlome (NS)/Mutu-lume (V)/Umfomfo (Z) | 684 |
| <i>Bruguiera gymnorrhiza</i> | Black mangrove | Swartwortelboom (A)/isiKhangati (X)/IsiHlobane (Z) | 527 |
| <i>Cassipourea swaziensis</i> | Swazi onionwood | Swazi-uehout (A) | 531.1 |
| <i>Catha edulis</i> | Bushman's tea | Boesmanstee (A)/Mohlatse (NS)/lgqwaka (X)/Umhlwazi (Z) | 404 |

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

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

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. *hybridus* var. *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 magalismsontana subsp. *magalismsontana*
Searsia rigida var. *rigida*
Searsia tumulicola var. *tumulicola*

Apiaceae

Afrosciadium magalismsontanum
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 carnososa var. *carnososa*
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 pennsylvanica; 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
Maclodium 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 carnosia
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 parvinox
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
Indigastrium 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
Merwillia plumbea
Ornithogalum candicans
Ornithogalum capillare

Ornithogalum esterhuyseniae
Ornithogalum flexuosum
Ornithogalum juncifolium var. *juncifolium*
Schizocarpus 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
Crocasmia 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
Rothea 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*

Melanthaceae

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

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

| | |
|--|------------------------------|
| 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
Diaphanathe 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 hilderbrandii

VULNERABLE SPECIES

Flora

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

PROTECTED SPECIES

Flora

Adenia wilmsii
Aloe simii
Clivia mirabilis

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

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:**

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