

Ecological and wetland survey of the site for the proposed Metsimatala solar plant Postmasburg district, Northern Cape Province

Prepared by

P.J du Preez (Ph.D., Pr.Sci.Nat.)

EnviroNiche Consultants

150 Swartwitpens Avenue,

Woodland Hills Wildlife Estate

Bloemfontein,

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ENVIRO-NICHE
CONSULTING
(Sandersonia Trust trading as Enviro-Niche)

BIODIVERSITY
AND ENVIRONMENTAL
CONSULTANTS

PO BOX 11945
UNIVERSITAS
BLOEMFONTEIN
9321
greenrsa@gmail.com
Contact no.: 0823764404
Fax: 0866452222

ABSTRACT

Two vegetation types namely the Kuruman Mountain Bushveld (SVk10) and Olifantshoek Plains Thornveld (SVk13) dominate the study area. According to Mucina & Rutherford (2006), both vegetation types have a conservation status of "Least threatened".

The requirements of this study were to undertake a specialist study to describe the vegetation and flora on site as well as the wetland assessment.

Although the Photo Voltaic site will totally transform the site, the proposed Photo Voltaic site is situated on a flat degraded plain to the west of Metsimatala. The site is not situated in any sensitive ecosystem or plant community.

Species richness of the vegetation of the study area is relatively low with a total of 33 species.

No Red or Orange List species were found to occur on the site although a protected species namely *Olea europaea* subsp. *africana* occurs on the rocky outcrops.

RECOMMENDATIONS

The following is recommended:

- An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly
- Measures to control erosion must always be applied;
- No dumping of building waste or spoil material from the development should take place on other areas other than a licenced landfill site.
- Weed control measures must be applied to eradicate the noxious weeds on disturbed areas

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APPOINTMENT OF SPECIALIST

EnviroNiche Consulting was appointed by Enviroworks Consultants (Pty) Ltd to conduct a vegetation survey for the study site as part of the process in support of an application to develop the site. The terms of reference were to undertake a specialist study to describe the vegetation and flora on site as well as to do a wetland assessment for the site.

Details of specialist

Johann du Preez

EnviroNiche Consulting Biodiversity and Environmental Consultants

PO Box 11945

Universitas

9321

Fax: 086 645 2222

Email: greenrsa@gmail.com

Summary of expertise

- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science), registration number: 400271/07.
- Ecological consultant since 2000.
- Conducted, or co-conducted, over 1 500 specialist ecological surveys as an ecological consultant.
- Co-author of a book on ecology
- Published over 30 refereed scientific reports,
- Presented 17 scientific conference presentations,

DECLARATION OF INDEPENDENCE

I, Pieter Johannes du Preez, ID 6008215016087, declare that I:

- am the owner of EnviroNiche Consulting
- act as an independent specialist consultant in the field of botany, ecology and vegetation science;
- am assigned as specialist consultant by **Enviroworks Consultants (Pty) Ltd** for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making authorities responsible for permitting this proposal and
- the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project.
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



PJ DU PREEZ PhD PrSciNat

INTRODUCTION

Terms of reference

In November 2015 Enviro-Niche Consulting was appointed by Enviroworks Consultants (Pty) Ltd to conduct a flora and vegetation survey as well as a wetland assessment for the study site in support of an application to develop the site. A detailed investigation into the status of the vegetation was to be undertaken, including:

- Assessment of the natural vegetation;
- General floristic diversity;
- Habitat suitability for Red Data flora species;
- Potential presence of Red Data flora species;
- Assess the site for any wetland
- Delineate wetlands if present on site

The following was to be provided / undertaken:

- A brief discussion on the vegetation type in which the study area is situated, using available literature, in order to place the study in context.
- A broad-scale map of the vegetation and land cover of the site using available aerial photography. A description of the dominant and characteristic species within the broad-scale plant communities comprising each of these units was to be provided. This was to cover the entire site.
- List of all plant species recorded during the survey.
- A list of Red List plant species previously recorded within the quarter degree grids in which the study area is situated, obtained from the relevant authorities.
- List of naturalized plant species recorded on site, indicating which are declared weeds or alien invasive species, according to the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014*.
- Identification of sensitive habitats and plant communities. A map of sensitive areas of the site was to be provided.

ACTS & LEGISLATION

Acts such as these listed below (Table 1); ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes or products or human activities.

Table 1: List of relevant legislation

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act, No. 107 of 1998 (NEMA), as amended & NEMA EIA Regulations, 2010: GN544, published in Government Gazette 33306 on 18 June 2010	A full Environmental Impact Assessment Report (EIA) is required for this project	Department of Environmental Affairs (DEA)	1998
National Water Act, No. 36 of 1998	The proposed transmission lines may trigger a section 21(C and/or i) water use.	Department of Water Affairs (DWA)	1998
National Heritage Resources Act (Act No 25 of 1999)	Resources could be identified during construction phase	South African Heritage Resources Agency	1999
Northern Cape Nature Conservation Act (Act 9 of 2009)	Protected Shepherd's trees and other protected species could occur on the proposed sites	Department of Environment and Nature Conservation (DENC)	2009
National Forests Act (Act 84 of 1998)	Protected Shepherd's trees could occur on the proposed sites	Department of Agriculture, Forestry and Fisheries (DAFF)	1998

DESCRIPTION OF STUDY AREA

Location

The site of the proposed development is situated east of Postmasburg (Figure 1). The proposed solar site falls within the quarter degree square 2823AD. Figure 2 is a Google Earth photo of the study site.

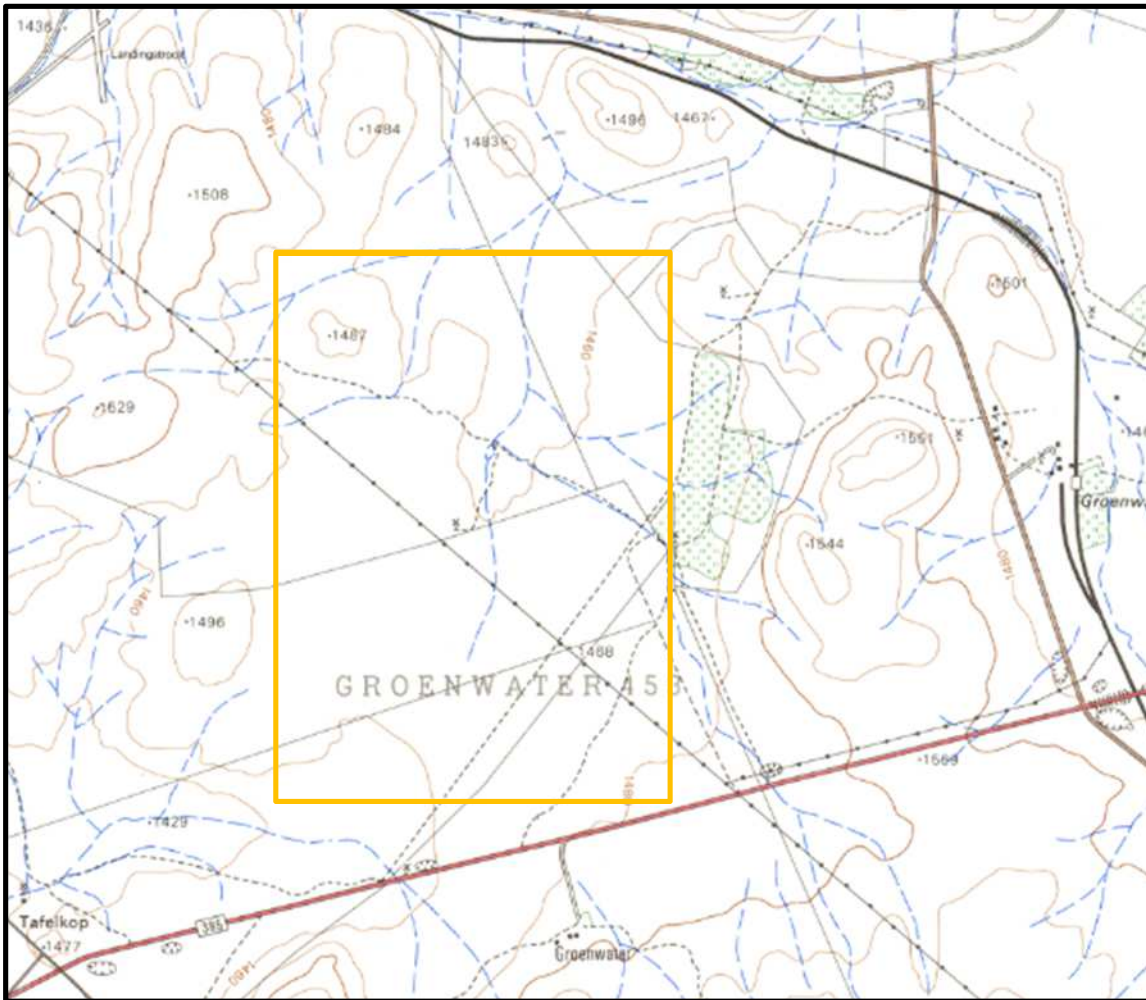


Figure 1: Topographic map of the study area



Figure 2: A satellite image of the Metsimatala site. The square area indicates the proposed solar site (Google Earth).

Topography

The site's altitude is approximately 1 480m. The study area is situated on a flat dwarf shrub/grass-covered plain. There are no distinct drainage lines on the site.

Geology & soils

The geology consists of region especially the ridges and mountains belong to the Olifantshoek Supergroup. It is dominated by quartzite outcrops, hematite deposits and other metamorphosed rock types. The plains are covered by Kalahari sand. The soils are of the Plooyburg, Kimberley, Hutton, Mispah, and Namib soil forms (MacVicar *et al.* 1974).

Climate (Rainfall & temperatures)

The area receives summer rainfall and it is approximately 289 mm per annum. The mean annual temperature is 17,1°C (Mucina & Rutherford, 2006).

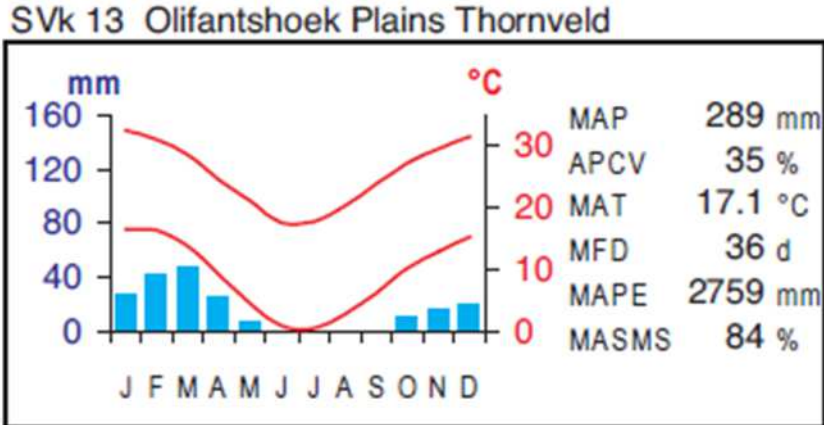


Figure 3: A climate-diagram of the Metsimatala (Groenwater) area which is dominated by the Olifantshoek Plains Thornveld (Mucina & Rutherford, 2006).

Landuse & landcover

The solar site is situated on relatively natural savanna which is mainly used for grazing (agriculture). An existing 132kV power line cuts across the site

Vegetation, biogeography and conservation value

The most recent description of the study area's vegetation is the relatively detailed but general description by Mucina & Rutherford (2006) namely "Vegetation of South Africa, Lesotho and Swaziland" as well as an accompanying map of the country by (Mucina *et al.*, 2005). This memoir contains species information and a comprehensive conservation assessment of all vegetation types.

Two vegetation types namely the Kuruman Mountain Bushveld (SVk10) and Olifantshoek Plains Thornveld (SVk13)(Fig 4) dominate the study area. According to Mucina & Rutherford (2006), both vegetation types have a conservation status of "Least threatened" The vegetation of the study is dry low shrub-savanna with scattered individuals of shrubs such as *Grewia flava*, *Rhigozum trichotomum*, *Ziziphus mucronata*, and *Tarchonanthus camphoratus* and *Acacia mellifera*. Important grasses include *Aristida congesta*, *Eragrostis lehmanniana*, *E. trichophora*, *Enneapogon scoparius*,

Aristida adscensionis, *Heteropogon contortus*. Dwarf shrub such as *Felicia muricata*, *Sutera halimifolia* *Monechma incanum*, *Lycium villosum* also occur in the area.

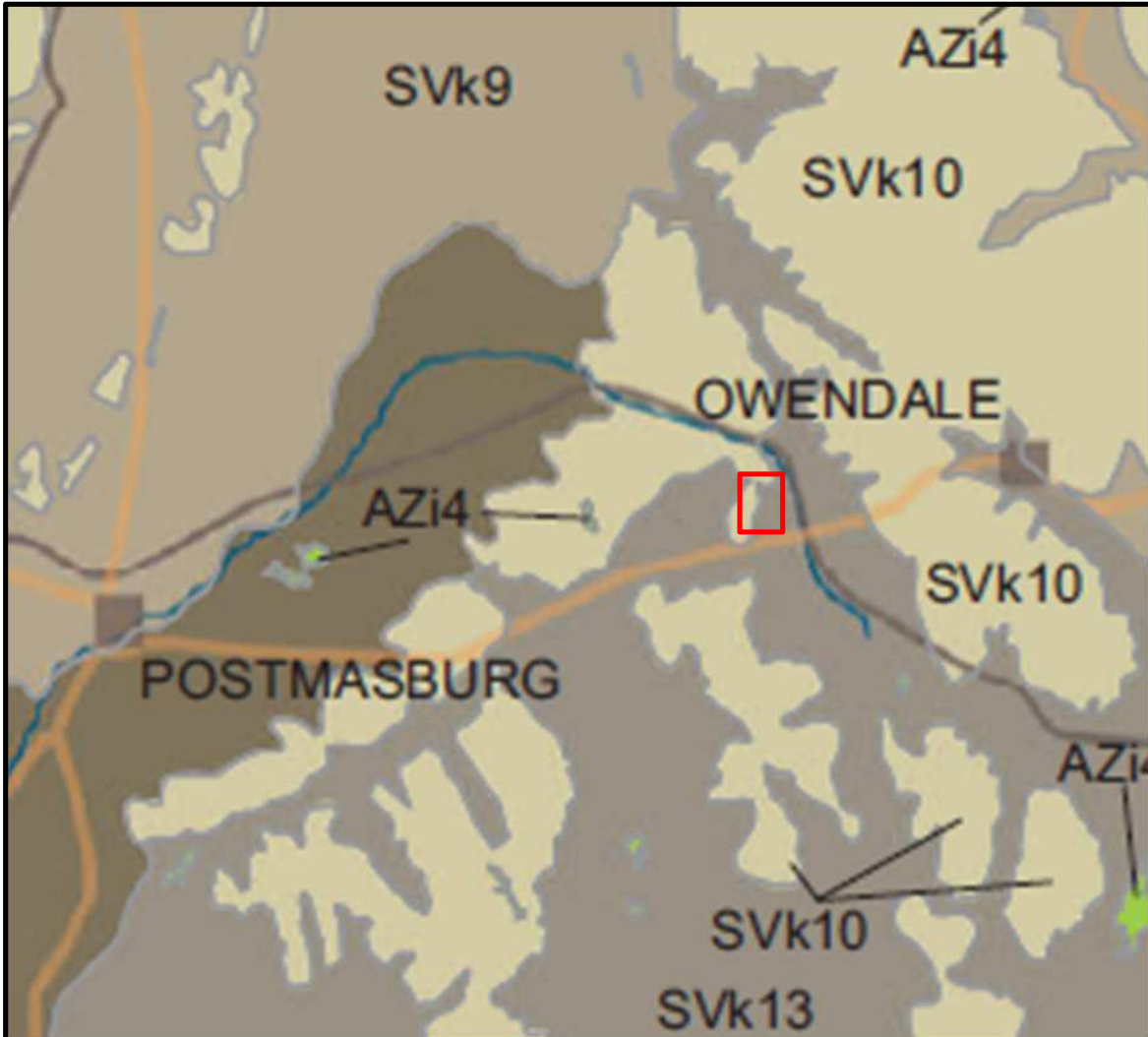


Figure 4: A vegetation map of the study area (red square) which is dominated by the Olifantshoek Plains Thornveld (SVk13) and small patches of Kuruman Mountain Bushveld (SVk10) (Mucina & Rutherford, 2006).

METHODOLOGY

Vegetation survey

Date of fieldwork: 22 November 2015.

Satellite imagery (Google Earth photos), 1:50 000 topographic maps were used to find features on the site.

Quantitative data was collected in each quadrat by undertaking vegetation sampling according to the Braun-Blanquet approach (Mueller-Dombois & Ellenberg 1974; Westhoff & van der Maarel 1978). In each sample site the following data was collected:

Habitat data:

- amount of bare soil
- rock cover,
- slope,
- aspect in degrees,
- latitude and longitude position (from GPS) in decimal degrees,
- presence of biotic disturbances, e.g. grazing, animal burrows, etc.

Vegetation data

- species present,
- cover estimation of each species according to the Braun-Blanquet scale,
- vegetation height,

Data analysis

- The plant communities that were identified were then described using the vegetation sample data.
- Additional checklists of plant species were compiled by traversing the study area on foot and recording species as they were encountered. Plant names follow those of POSA (2015).
- All exotic species categorised as alien invaders or weeds as listed in the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014* were also recorded.

Due to the brief duration of the survey, the species list provided for the area cannot be regarded as comprehensive, but is nevertheless likely to include the majority of the dominant and common species present.

Red Data plant species

A list of species collected within the quarter degree square 2823AD is listed together with the species noted during the site visit. For all threatened plants that occur in the general geographical area of the site, a rating of the likelihood of it occurring on site is given as follows:

- **LOW:** no suitable habitats occur on site / habitats on site do not match habitat description for species;
- **MEDIUM:** habitats on site match general habitat description for species (e.g. grassland), but detailed microhabitat requirements (e.g. rocky grassland on shallow soils overlying dolomite) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;
- **HIGH:** habitats found on site match very strongly the general and microhabitat description for the species (e.g. rocky grassland on shallow soils overlying granite);
- **DEFINITE:** species found on site.

WETLAND ASSESSMENT AND DELINEATION METHODOLOGY

Wetland delineation

Introduction

For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

In 2005 DWAF published a wetland delineation procedure in a guideline document named “*A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas*” Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments. These guidelines state that a wetland delineation procedure must identify the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and

adjacent terrestrial areas and is that part of the wetland that remains flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

The guidelines also state that locating the outer edge of the temporary zone must make use of four specific indicators namely:

- the terrain unit indicator,
- the soil form indicator,
- the soil wetness indicator and
- the vegetative indicator.

In addition the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland; the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive and a 32m buffer delineated around the edge of the wetland in which no development must be allowed to occur.

Desktop delineation

Use was made of 1:50 000 topographic maps, and geo-referenced Goggle Earth images to generate digital base maps of the study area onto which the wetland boundaries were delineated. A desktop delineation of suspected wetland areas was undertaken by identifying rivers and wetness signatures from the digital base maps. All identified areas suspected to be wetland were then further investigated in the field.

Site assessment

The area was traversed by foot and road to determine the presence of any wetland area/s. Notes were made of the broad ecological condition of the study site and any signs indicating the presence of a wetland.

The wetlands were subsequently classified according to their hydro-geomorphic determinants based on modification of the system proposed by Brinson (1993), and modified for use in South Africa by Marneweck and Batchelor (2002) and subsequently revised by Kotze *et al.* (2004). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present.

Sensitivity assessment (Table2)

The assessment of sensitivity on site follows the guidelines provided by GDACE in the section on Sensitivity Mapping Rules for Biodiversity Assessments in the GDACE document on “Guidelines for Biodiversity Assessments”. As per these guidelines, the sensitive features on site and the mapping rules are given in the table below:

Table 2: The sensitivity mapping rules

Biodiversity element	Sensitivity mapping rule
River/stream	Stream + 100 m buffer zone (outside urban edge) from the edge of the riparian zone as determined according to DWAF guidelines
Wetland	Wetland + 50 m buffer zone extending from edge of wetland temporary zone
Primary vegetation classified as Endangered (SANBI VegMap)	Extent of vegetation type in moderate to good condition
Primary vegetation suitable as habitat for Red or Orange List plant species	Extent of vegetation type in moderate to good condition
Primary vegetation suitable as habitat for Red List bird or animal species	Extent of vegetation type in moderate to good condition

Assumptions, uncertainties and gaps in knowledge

1. Assume databases and literature sources are adequate for determining the possible presence of threatened species. These often depend on good geographical coverage of species observations, which is seldom the case.
2. Assume species threatened status has been correctly determined and that no other species should be on the Red Lists.

Limitations

1. This report has been prepared on the strengths of the information available at the time of the assessment. The major reference works consulted is included in the reference list. There is sufficient base line information available in the literature for the area and hence the availability of baseline information was not considered a constraint.
2. There were no financial or confidentiality constraints.
3. Descriptions of vegetation are based primarily on the site assessment in combination with a literature review. Sufficient published information is available for the study area and the surveys provided sufficient site-specific information. There were, therefore, no biophysical constraints.
4. All attempts were made to cover the entire study area at a similar degree of detail. However, due to the fact that the study constituted a single survey in one season it is unlikely that all species that occur on site were located. It was, however, possible to cover it in some detail during the field survey and field data was supplemented with data collected in the area from a previous survey.

Exclusions

This study reports on flora and vegetation within habitats on site.

IMPACT RATING METHODOLOGY

The significance of each identified potential impact was assessed by using the following criteria:

- **Duration** of the impact (time scale);
- **Extent** of the impact (spatial scale);
- Degree to which the impact may cause **irreplaceable loss of resources**;
- Degree to which the impact can be **reversed**;
- **Magnitude (or Nature)** of negative or positive impacts;
- **Probability** of the impact occurring;
- **Cumulative impacts**; and the
- Degree to which the impact can be **mitigated**.

The scales to be used to assess these variables and to define the rating categories are tabulated in the tables below:

TABLE 1: EVALUATION COMPONENTS, RANKING SCALES AND DESCRIPTIONS (CRITERIA).

Evaluation component	Ranking scale and description (criteria)
DURATION	<p>5 – Permanent 4 - Long term: Impact ceases after operational phase/life of the activity (> 20 years). 3 - Medium term: Impact might occur during the operational phase/life of the activity (5 to 20 years). 2 - Short term: Impact might occur during the construction phase (< 5 years). 1 – Immediate</p>
EXTENT (or spatial scale/influence of impact)	<p>5 - International: Beyond National boundaries. 4 - National: Beyond Provincial boundaries and within National boundaries. 3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries. 2 - Local: Within 5 km of the proposed development. 1 - Site-specific: On site or within 100 m of the site boundary. 0 – None</p>
IRREPLACEABLE loss of resources	<p>5 - Definite loss of irreplaceable resources. 4 - High potential for loss of irreplaceable resources. 3 - Moderate potential for loss of irreplaceable resources. 2 - Low potential for loss of irreplaceable resources. 1 - Very low potential for loss of irreplaceable resources. 0 – None</p>
REVERSIBILITY of impact	<p>5 - Impact cannot be reversed. 4 - Low potential that impact might be reversed. 3 - Moderate potential that impact might be reversed. 2 - High potential that impact might be reversed. 1 - Impact will be reversible. 0 - No impact.</p>
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high: Bio-physical and/or social functions and/or processes might be <i>severely</i> altered. 8 - High: Bio-physical and/or social functions and/or processes might be <i>considerably</i> altered. 6 - Medium: Bio-physical and/or social functions and/or processes might be <i>notably</i> altered. 4 - Low : Bio-physical and/or social functions and/or processes might be <i>slightly</i> altered. 2 - Very Low: Bio-physical and/or social functions and/or processes might be <i>negligibly</i> altered. 0 - Zero: Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high (positive): Bio-physical and/or social functions and/or processes might be <i>substantially</i> enhanced. 8 - High (positive): Bio-physical and/or social functions and/or processes might be <i>considerably</i> enhanced. 6 - Medium (positive): Bio-physical and/or social functions and/or processes might be <i>notably</i> enhanced. 4 - Low (positive): Bio-physical and/or social functions and/or processes might be <i>slightly</i> enhanced. 2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be <i>negligibly</i> enhanced. 0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain <i>unaltered</i>.</p>

Evaluation component	Ranking scale and description (criteria)
PROBABILITY (of occurrence)	<p>5 - Definite: >95% chance of the potential impact occurring.</p> <p>4 - High probability: 75% - 95% chance of the potential impact occurring.</p> <p>3 - Medium probability: 25% - 75% chance of the potential impact occurring.</p> <p>2 - Low probability: 5% - 25% chance of the potential impact occurring.</p> <p>1 - Improbable: <5% chance of the potential impact occurring.</p>
CUMULATIVE impacts	<p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment.</p>

Once the evaluation components have been ranked for each potential impact, the significance of each potential impact will be assessed (or calculated) using the following formula:

$$\text{SP (significance points)} = (\text{duration} + \text{extent} + \text{irreplaceable} + \text{reversibility} + \text{magnitude}) \times \text{probability}$$

The maximum value is 150 significance points (SP). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per the table below.

TABLE 2: DEFINITION OF SIGNIFICANCE RATINGS (POSITIVE AND NEGATIVE).

Significance Points	Environmental Significance	Definition
100 – 150	High (H)	<p>An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.</p> <p>Cumulative Impact: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p>
40 – 99	Moderate (M)	<p>If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.</p> <p>Cumulative Impact: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p>
<40	Low (L)	<p>An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.</p> <p>Cumulative impact: The activity is localised and might have a negligible cumulative impact.</p>
+	Positive impact (+)	<p>A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.</p>

RESULTS

The following section provides a description of the floristic environment that may be affected by the proposed development.

Vegetation and land cover of the study area

The natural vegetation on site is mostly natural savanna with some serious disturbance due to overgrazing, vehicle tracks & fire breaks)(**Annexure A**).

Alien trees & weeds

The largest concentration of alien species is trampled areas and camps where domestic animals are concentrated. The most commonly found alien trees on site are Prosopis (**Prosopis glandulosa*), and Pepper Trees (**Schinus molle*).

The weeds noted are **Verbena encelioides* and **Tridax procumbens*, **Argemone mexicana*, **Datura stramonium*, **Tagetes minuta*, **Bidens bipinnata*, **Conyza bonariensis*.

Cultivation

There is no area of current or previous cultivation at or near the site. The only cultivated areas are small areas close to the dwellings.

Streams & Wetlands

The area is relatively flat and no seasonal drainage lines occur on the site. The long distances between the contour lines in Figure 5 indicate a very flat topography with no well-developed drainage lines.

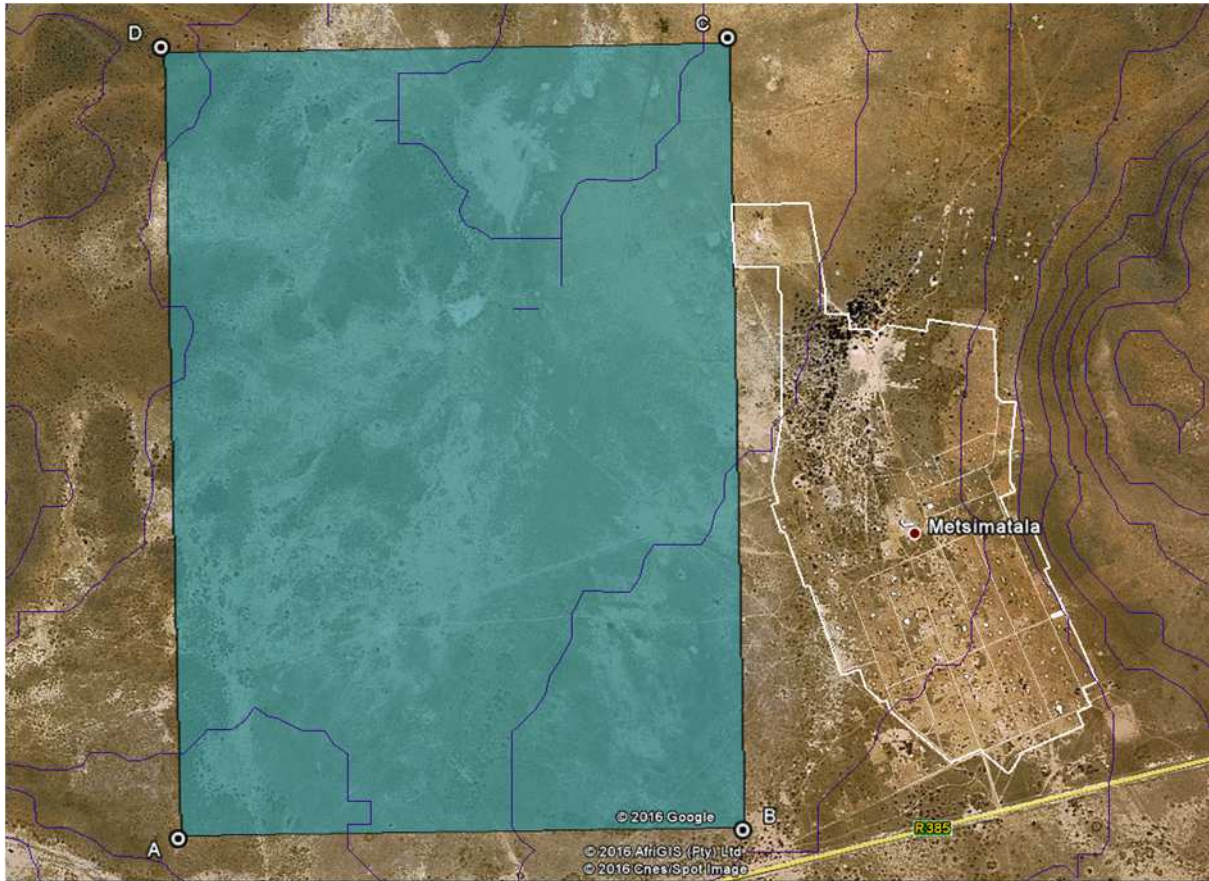


Figure 5: The study area (green square) with the contour lines (blue lines) indicating a very flat area with a poor drainage.

Savanna vegetation

The savanna community present on the site are patches of Driedoring (*Rhigozum trichotomum*) are also proof of the previous statement. Grasses such as *Enneapogon desvauxii*, *Cynodon dactylon*, *Aristida canescens*, *Aristida congesta* and *Eragrostis lehmanniana* dominate the herbaceous layer. All the grasses are pioneer grasses which indicate degradation of the vegetation. Other species present in this layer are *Felicia muricata*, *Oropetium capense*, *Pentzia spaerocephala*, *Gnidia polycephala*, *Chrysocoma ciliata* and *Erioccephalus merxmulleri*. This savanna is free of alien invasive species except for a few individuals of *Prosopis* (*Prosopis glandulosa*). This alien invader is according to the *National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014* a declared invader - Category 1b).

On the rocky outcrops trees and shrubs such as *Acacia tortilis*, *A. mellifera*, *A. hebeclada*, *Tarchonanthus camphoratus*, *Olea europaea* subsp. *africana*, the grasses *Heteropogon contortus*, *Aristida congesta*, *A. canescens* and *A. adsencionis* and *Themeda triandra* occur.

Flora and diversity of the specific site

The plant species found during the surveys at each borehole site are listed in **Annexure B** and gives a good indication of the species diversity and composition of the different sites.

Protected species

The aim of this section was to list those plant species for which there is conservation concern that may be affected by the proposed infrastructure. This includes threatened, rare, declining and protected plant species.

a) Red List Plant Species

There are three basic rules of conservation that apply to populations of Red List Plant Species. Should any Red List plant species be recorded on site then these guidelines would apply. The guidelines are as follows:

1. All populations of Near Threatened and Threatened plant taxa must be conserved *in situ*.
2. All populations of Near Threatened and Threatened plant taxa must be protected with a buffer zone in accordance with guidelines as set out in the Policy.
3. An Ecological Management Plan must be compiled in respect of all actions that affect populations of Red List Plant Species, and such Ecological Management Plans must conform to the Guidelines.

The site assessment of the solar site and power line routes site did not reveal any Red Data plant or animal species.

b) Protected species in terms of the National Forests Act (Act 84 of 1998)

The only tree species noted in the area which are protected terms of the National Forests Act (Act 84 of 1998) are the Shepherd's Tree (*Boscia albitrunca*) and the Camel Thorn (*Acacia erioloba*). No individuals of these two species occur at the site.

c) Northern Cape Nature Conservation Act (Act 9 of 2009)

A number of protected species occur in the plant communities as listed by POSA (Appendix C). Appendix B list the species present at each borehole site. The protected species are marked by a yellow flag.

Aquatic assessment of the episodic streams

No drainage lines are present on site.

Wetland assessment at the study sites:

Wetland vegetation:

No wetland vegetation are present on site.

Present Ecological State (PES)

Not applicable because no wetlands occur.

Ecological Importance and Sensitivity (EIS) of wetlands

Not applicable due to the absence of wetlands

Wetland and stream functionality:

Not applicable due to the absence of wetlands

SENSITIVITY ASSESSMENT

The sensitivity assessment identifies those parts of the study area that may have high conservation value or that may be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to have low sensitivity. The habitat sensitivity assessment was done according to the rules provided in the “Sensitivity mapping rules for biodiversity assessments”

There are features on site that may be considered to have high conservation value, as follows:

1. Streams (perennial and seasonal)

Episodic streams with a medium sensitivity occur in area

2. Sensitive vegetation:

No sensitive savanna vegetation type occurs in the study area

3. Threatened plant species:

There are few protected species near the bore holes but not at the specific borehole sites.

This information was used to compile the sensitivity map (Figure 4 - 9). Table 7 is a summary of the factors used to classify the different habitats is based on current information and the requirements of all the above guidelines, policies and Acts.

Impact Assessment Summary Tables

The tables below summarise the potential impacts as identified, and provide the significance ratings for these impacts, without and with the implementation of the prescribed mitigation measures.

*This table is only an example and should be completed according to specialist findings. Please only edit the sections in **red** and use the table format as below.*

Table 3: Impact Assessment – e.g. Alternative 1 (Preferred) and Alternative 2

PROJECT PHASE	POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE																		MITIGATION SUMMARY
		BEFORE MITIGATION									AFTER MITIGATION									
		DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	
Aspect: Flora																				
Activity Alternative: Solar Site and Power Line Alternative 1 (Preferred Alternative)																				
Planning	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	L	L	Not necessary to appoint specialist to identify Red Data species and recommend appropriate protection action and buffers.
Construction	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	L	L	Demarcation of Red Data Plant and buffer area & No-go area for construction activities not necessary
Operational	Red Data plant species could be damaged or removed.	0	0	0	0	0	0	0	L	L	0	0	0	0	0	0	0	L	L	The Red Data plant and buffer zone is part of conservation and No-go area.
Aspect: Soil																				
Project Alternative: Solar Site & Power Line Alternative 1																				

PROJECT PHASE	POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE																		MITIGATION SUMMARY
		BEFORE MITIGATION									AFTER MITIGATION									
		DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	DURATION	EXTENT	IRREPLACEABILITY	REVERSIBILITY	MAGNITUDE	PROBABILITY	TOTAL (SP)	SIGNIFICANCE	CUMULATIVE	
Planning	Commercial farming land (Fertile soil)	5	5	4	3	6	5	<u>115</u>	H	H	5	5	4	3	6	5	<u>115</u>	H	H	Environmental specialists to be contracted for the control of soil erosion to avoid environmental degradation.
Construction	Land (commercial land)	5	5	4	3	6	5	<u>115</u>	H	H	0	5	4	3	6	5	<u>90</u>	M	M	Commercial land that is critically impacted by the construction of the wind farm should be closely monitored to avoid soil erosion by officials from the lands department.
Operational	Commercial land	0	5	4	3	6	5	<u>90</u>	M	M	0	5	4	3	6	5	<u>90</u>	M	M	Alternative land for commercial farmers affected by the solar farm to continue their farming activities and reclamation of land affected by operations taking place on the site.

CONCLUSIONS

The requirements of this study were to undertake a specialist study to describe the vegetation and flora on site as well as the wetland assessment.

Although the Photo Voltaic site will totally transform the site, the proposed Photo Voltaic site is situated on a flat degraded plain to the west of Metsimatala. The site is not situated in any sensitive ecosystem or plant community.

Species richness of the vegetation of the study area is relatively low with a total of 33 species.

No Red or Orange List species were found to occur on the site although a protected species namely *Olea europaea* subsp. *africana* occurs on the rocky outcrops.

RECOMMENDATIONS

The following is recommended:

- An Environmental Control Officer (ECO) must be appointed to oversee that the aspects stipulated in the Environmental Permit be carried out properly
- Measures to control erosion must always be applied;
- No dumping of building waste or spoil material from the development should take place on other areas other than a licenced landfill site.
- Weed control measures must be applied to eradicate the noxious weeds on disturbed areas

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ANNEXURE A: PHOTOS OF THE SITES



Figure 1: View of the vegetation at the site. Note the degraded nature of the site



Figure 2: View of the rocky outcrop vegetation.



Figure 3: View of the vegetation at the site.



Figure 4: View of the vegetation at the site. Note the effect of overgrazing on the vegetation

ANNEXURE B:

Preliminary checklist of plant species recorded on site.

Family	Species	
ANACARDIACEAE	Searsia tridactyla	X
ASPARAGACEAE	Asparagus suaveolens	X
ASTERACEA	Chrysocoma ciliata	X
ASTERACEAE	Dicoma schinzii	X
ASTERACEAE	Eriocephalus ericoides	X
ASTERACEAE	Felicia muricata	X
ASTERACEAE	Geigeria ornativa	X
ASTERACEAE	Osteospermum muricatum	X
ASTERACEAE	Pentzia incana	X
ASTERACEAE	Tarchonanthus camphoratus	X
BIGNONIACEAE	Rhigozum trichotomum	X
FABACEAE	Indigofera alternans	X
FABACEAE	Acacia mellifera	X
FABACEAE	Acacia hebeclada	X
FABACEAE	Elephantorrhiza elephantina	X
OLEACEAE	Olea europaea subsp. africana	X
POACEAE	Aristida adscensionis	X
POACEAE	Aristida congesta	X
POACEAE	Enneapogon desvauxii	X
POACEAE	Enneapogon scaber	X
POACEAE	Eragrostis lehmanniana	X
POACEAE	Eragrostis echinochloidea	X
POACEAE	Eragrostis rigidior	X
POACEAE	Eragrostis trichophora	X
POACEAE	Fingerhuthia africana	X
POACEAE	Heteropogon contortus	X
POACEAE	Oropetium capense	X
POACEAE	Pogonarthria squarrosa	X
RHAMNACEAE	Ziziphus mucronata	X
SANTALACEAE	Thesium hystrix	X
SCROPHULARIACEAE	Aptosimum spinescens	X
SOLANACEAE	Lycium cinereum	X
THYMELAEACEAE	Gnidia polycephala	X
	TOTAL	33

ANNEXURE C: POSA species present in the 2823AD grid

Yellow flagged species are protected

Download from POSA (http://posa.sanbi.org)	Grid: 2822BD	
Family	Species	Threat status
ACANTHACEAE	Blepharis mitrata	LC
ACANTHACEAE	Justicia puberula	LC
ACANTHACEAE	Justicia thymifolia	LC
ACANTHACEAE	Monechma incanum	LC
AIZOACEAE	Aizoon asbestinum	LC
AIZOACEAE	Galenia pubescens	LC
AIZOACEAE	Tetragonia arbuscula	LC
AMARANTHACEAE	Hermbstaedtia odorata	LC
AMARANTHACEAE	Sericocoma avolans	LC
ANACARDIACEAE	Searsia burchellii	LC
ANACARDIACEAE	Searsia tridactyla	LC
APOCYNACEAE	Sarcostemma viminalis	LC
APOCYNACEAE	Tridentea gemmiflora	LC
APONOGETONACEAE	Aponogeton junceus	LC
ASPARAGACEAE	Asparagus striatus	LC
ASTERACEAE	Eriocephalus ericoides	LC
ASTERACEAE	Felicia fascicularis	LC
ASTERACEAE	Garuleum schinzii	LC
ASTERACEAE	Geigeria ornativa	LC
ASTERACEAE	Phymaspermum parvifolium	LC
ASTERACEAE	Psiadia punctulata	LC
BRASSICACEAE	Sisymbrium burchellii	LC
CELASTRACEAE	Putterlickia pyracantha	LC
CHENOPODIACEAE	Salsola armata	LC
CHENOPODIACEAE	Salsola kalaharica	LC
CRASSULACEAE	Crassula corallina	LC
CUCURBITACEAE	Citrullus lanatus	LC
CUCURBITACEAE	Coccinia rehmannii	LC
CUCURBITACEAE	Kedrostis capensis	LC
CUCURBITACEAE	Trochomeria debilis	LC
CYPERACEAE	Cyperus bellus	LC
EBENACEAE	Diospyros lycioides	LC
ELATINACEAE	Bergia anagalloides	LC
EUPHORBIACEAE	Euphorbia gariepina	LC
FABACEAE	Indigofera alternans	LC
FABACEAE	Senna italica	LC
GISEKIACEAE	Gisekia africana	LC

LAMIACEAE	Salvia disermas	LC
LAMIACEAE	*Salvia stenophylla	
LOPHIOCARPACEAE	Lophiocarpus polystachyus	LC
LORANTHACEAE	Tapinanthus oleifolius	LC
MALVACEAE	Hermannia abrotanoides	LC
MALVACEAE	Hermannia affinis	LC
MALVACEAE	Hermannia desertorum	LC
MALVACEAE	Hermannia linearifolia	LC
MALVACEAE	Hermannia linnaeoides	LC
MALVACEAE	Hermannia modesta	LC
MALVACEAE	Hermannia tomentosa	LC
MALVACEAE	Melhania prostrata	LC
MALVACEAE	Melhania rehmannii	LC
MALVACEAE	Melhania virescens	LC
MELIACEAE	Nymania capensis	LC
MOLLUGINACEAE	Limeum aethiopicum	Not Evaluated
OPHIOGLOSSACEAE	Ophioglossum polyphyllum	LC
POACEAE	Andropogon chinensis	LC
POACEAE	Anthephora argentea	LC
POACEAE	Anthephora pubescens	LC
POACEAE	Aristida adscensionis L.	LC
POACEAE	Aristida congesta	LC
POACEAE	Aristida engleri	LC
POACEAE	Aristida vestita	LC
POACEAE	Brachiaria brizantha	LC
POACEAE	Chloris virgata	LC
POACEAE	Coelachyrum yemenicum	LC
POACEAE	Digitaria eriantha	LC
POACEAE	Digitaria polyphylla	LC
POACEAE	Enneapogon cenchroides	LC
POACEAE	Enneapogon desvauxii	LC
POACEAE	Enneapogon scaber	LC
POACEAE	Eragrostis bicolor	LC
POACEAE	Eragrostis echinochloidea	LC
POACEAE	Eragrostis glandulosipedata	LC
POACEAE	Eragrostis lehmanniana	LC
POACEAE	Eragrostis nindensis	LC
POACEAE	Eragrostis porosa	LC
POACEAE	Eragrostis truncata	LC
POACEAE	Eustachys paspaloides	LC
POACEAE	Fingerhuthia africana	LC
POACEAE	Heteropogon contortus	LC
POACEAE	Melinis nerviglumis	LC
POACEAE	Microchloa caffra	LC

POACEAE	<i>Microchloa kunthii</i>	LC
POACEAE	<i>Pogonarthria squarrosa</i>	LC
POACEAE	<i>Schmidtia pappophoroides</i>	LC
POACEAE	<i>Sporobolus fimbriatus</i>	LC
POACEAE	<i>Stipagrostis ciliata</i>	LC
POACEAE	<i>Stipagrostis obtusa</i>	LC
POACEAE	<i>Stipagrostis uniplumis</i>	LC
POACEAE	<i>Stipagrostis uniplumis</i>	LC
PORTULACACEAE	<i>Portulaca quadrifida</i>	LC
PORTULACACEAE	<i>Talinum arnotii</i>	LC
PORTULACACEAE	<i>Talinum crispatum</i>	LC
SANTALACEAE	<i>Thesium lacinulatum</i>	LC
SCROPHULARIACEAE	<i>Aptosimum albomarginatum</i>	LC
SCROPHULARIACEAE	<i>Diclis petiolaris</i>	LC
SCROPHULARIACEAE	<i>Jamesbrittenia integerrima</i>	LC
SOLANACEAE	<i>Lycium cinereum</i>	LC
SOLANACEAE	<i>Solanum burchellii</i>	LC
SOLANACEAE	<i>Solanum capense</i>	LC
SOLANACEAE	<i>Solanum catombelense</i>	LC
ZYGOPHYLLACEAE	<i>Zygophyllum microcarpum</i>	LC