10. VEGETATION AND TERRESTRIAL FAUNA ASSESSMENT

This Vegetation and terrestrial fauna assessment report was undertaken by Dr P.J. du Preez in his capacity as an ecologist.

Dr Du Preez obtained his Ph.D. in Plant Ecology in 1991 from the University of the Free State (UFS) and has conducted several ecological studies in Southern Africa. He is also lecturing parts of the Masters in Environmental Management at UFS. His main focus of expertise is biodiversity and anthropogenic impact on ecosystems.

10.1. Introduction

Machetcha Development Associates (MDA) has been appointed by Bohlweki Environmental (Pty) Ltd to undertake a Vegetation and Zoological Survey of the preferred site for a concentrating solar thermal plant (CSP) near Upington in the Northern Cape. This is to comply with the requirements stipulated by the EIA process.

The zoological as well as vegetation survey of the sites are important as protected, and endangered species could occur on these selected sites.

This assessment, together with the recommendations, should be used in the planning and construction phases of the development, specifically the mitigation measures preventing potential disturbance to any sensitive vegetation, to ensure minimum impact on the environment as a result of the proposed development.

10.2. Scope and Limitations

MDA will provide an assessment of the potential impact that the CSP and related infrastructure will have on the ecology of the area (including potential impacts of the terrestrial fauna and flora).

10.2.1. Vegetation

- Veld composition in terms of:
  - * Vegetative structure and classification (main vegetation types)
  - * Plant species identification, including an indication of dominant species, rare and endangered species (Red data species), and exotic and invader species
  - * Plant species and the environment
  - * Plant species inter-relations
- Veld condition
  - * Assessment of veld condition

* Interpretation of veld condition assessment
* Rehabilitation needs and options
* Conservation status and potential

10.2.2. Terrestrial fauna

- Animal species identification, including an indication of dominant species, rare and endangered species (Red data species), and exotic and invader species
- Animal species and their habitats
- Assessment of the habitat condition of the animals
- Desktop study to determine the probability of occurrence of any fauna of concern within these identified habitats.

10.2.3. Ecology

- Determine the state of health of the ecosystem by taking into consideration all aspects concerning the natural resources;

Recommend mitigation measures to ameliorate the negative impacts of the proposed development on the natural environment to be included in the Environmental Management Plan.

10.2.4. Assumptions

None

10.2.5. Limitations

- No information of detail vegetation or terrestrial fauna assessments of the area exists. However general descriptions of the region fauna and flora are available and were used.
- Not all the species present in these vegetation units could be noted due to the dry conditions, the seasons and the time of day (nocturnal mammals) during which the surveys were undertaken.

10.3. Methodology

10.3.1. Information base (sources) for desk study

Existing databases and Red Data Books were checked for information.

- Vegetation
  * VEGMAP (Mucina & Rutherford & Powrie, 2005).
  * Red Data Plant Lists (Golding 2002, Hilton-Taylor 1996)

* Vegetation descriptions (Van Rooyen & Bredenkamp 1996: Hoffman 1996)
* Field guides and books (Shearing & Van Heerden 1994; le Roux & Schelpe 1988; Le Roux *et al.*1994; Smith *et al.* 1998; Van Oudtshoorn 1999: Van Rooyen 2005).

- Terrestrial Animals
  * Field guides & books (Branch, 1998, Migdol 1994; Smithers 1983; Struart & Stuart 1997).

10.3.2. Survey

The sites were visited and transects were walked across the areas. The following were noted.

- Veld composition in terms of:
  * Vegetative structure and classification (main vegetation types)
  * Plant species identification, including an indication of dominant species, rare and endangered species (Red data species), and exotic and invader species
  * Plant species and the environment
  * Plant species inter-relations
- Veld condition
  * Assessment of veld condition
  * Interpretation of veld condition assessment
  * Rehabilitation needs and options
  * Conservation status and potential
- Animal species identification, including an indication of dominant species, rare and endangered species (Red data species), and exotic and invader species
- Animal species and their habitats
- Assessment of the habitat condition of the animals

10.3.3. Habitat assessment

The vegetation characteristics, vegetation condition, and presence of terrestrial animals have been assessed.

- **Vegetation characteristics**

  *** Habitat diversity: Species composition / richness:** Normally a function of locality, habitat diversity and climatic conditions.
  [Scoring: High - 1, Medium - 2, Low - 3]

  *** Presence of rare and endangered species:** The occurrence or potential occurrence of any of the listed and /or endangered species can play a mayor role in the decision making process. Depending on the status and provincial

conservation policy, presence of a Red Data species can potentially be a fatal flaw.
[Scoring: Occurrence actual or highly likely - 1, Occurrence possible - 2, Occurrence highly unlikely - 3]

* **Ecological function:** All plant communities play a role within the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.
[Scoring: Ecological function critical for greater system - 1, Ecological function of medium importance - 2, No special ecological function (system will not fail if absent) - 3]

* **Uniqueness / conservation value:**
[Scoring: Very unique and / or in pristine condition - 1, Fair to good condition and / or medium uniqueness - 2, Not unique, degraded and / or poorly conserved - 3]

- **Vegetation condition**
The footprints are compared to a benchmark site in a good to excellent condition. Vegetation management practices (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of vegetation.

* **Percentage ground cover:** Ground cover is under normal and natural conditions a function of climate, and biophysical characteristics of the footprint. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.
[Scoring: Good to excellent - 1, Fair - 2, Poor - 3]

* **Vegetation structure:** This is the ratio between tree, shrub, sub-shrubs and grass layers. This ratio could be affected by browsing and grazing by animals.
[Scoring: All layers still intact and showing specimens of all age classes - 1, Sub-shrubs and / or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) - 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) - 3]

* **Infestation with exotic weeds and invader plants or encroachers**
[Scoring: No, or very slight infestation levels by weeds and invaders - 1, Medium infestation by one or more species - 2, Several weed and invader species present and high occurrence of one or more species (eg. Prickly pear). - 3]

* **Degree of grazing / browsing impact:**
[Scoring: No, or very slight notable signs of browsing and / or grazing - 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact - 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent - 3]

* **Signs of erosion:** The formation of erosion scars can often give an indication of the severity and /or duration of vegetation degradation
[Scoring: No or very little evidence of soil erosion - 1, Small erosion gullies present and / or evidence of slight sheet erosion - 2, Gully erosion well developed (medium to big dongas) and / or sheet erosion removed the topsoil over large areas - 3]

- **Terrestrial animal characteristics**
  * **Presence of rare and endangered species:** The occurrence or potential occurrence of any of the listed and /or endangered species can play a mayor role in the decision making process. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.
  [Scoring: Occurrence actual or highly likely - 1, Occurrence possible - 2, Occurrence highly unlikely - 3]

10.4. Regional Overview

10.4.1. Major plant communities

The site is situated in the **Kalahari Karroid shrubland** which belongs to the Nama-Karoo biome.

This Nama-Karoo vegetation type is found in the drainage basin of the Orange River. Calcrete outcrops, alluvial deposits as well as soils derived from the ancient basement granites and gneisses of the Namaqua Mobile Belt could be found on extensive plains. Pockets of aeolian sand could also be found in places, but most of the top soils and sand deposits have been washed away. In places the area is very rocky (Hoffman 1996).

On the pediments the shrub layer is well to poorly develop and individuals of Black Thorn (*Acacia mellifera*), Three Thorn (*Rhigozum trichotomum*), Karee-thorn (*Lycium boscifolium*), Shepherd's Tree (*Boscia albitrunca)* and Stink Shepherd's Tree (*Boscia foetida*) could be found. On the banks of the Orange River as well as in seasonal stream that drains into it, shrubs and tree such as Buffalo Thorn (*Ziziphus mucronata*), Wild Tamarisk (*Tamarix usneoides*), and Ebony (*Euclea pseuoebenus*) could be found (Hoffman 1996).

The grass layer is in most cases poorly developed. The cover depends on the amount of rainfall during the growing season. Lehman's Love grass (*Eragrostis lehmanniana*), Sour Bushman grass (*Schmidtia kalahariensis*), Silky Bushman grass (*Stipagrostis ciliata*) and *Stipagrostis obtusa* can dominate areas (Hoffman 1996).

Due to the palatability of the vegetation, presence of sweet grasses and sometimes relatively high livestock densities, grazing and browsing could have a major influence on the vegetation structure.

Aggressive invaders noted are the exotic Mesquite (*Prosopis glandulosa*) and the indigenous Three Thorn (*Rhigozum trichotomum*).

10.5. Site Specific Results

10.5.1. Olyvenhouts drift:

Habitat diversity: Species composition / richness:
Low, plains with seasonal drainage lines

Presence of rare and endangered species:
A few protected species were found such as *Nerine laticoma*, *Harpagophyum procumbens*, a *Lachenalia* sp*., Hoodia gordonii, Aloe claviflora* and *Aloe gariepensis.*

Ecological function:
The ecological function of the system is to some extent still intact, especially in those well vegetated areas. Several insect species were found on the site, Signs of small mammal presence were also notable.

Uniqueness / conservation value:
Site forms part of an extensive plain covered by the same vegetation type. It is therefore not unique and the site for the proposed development is not worth conserving.

Percentage ground cover:
Very low percentage ground cover. Large barren patches were noted.

Vegetation structure:
This is a typical Karroid shrubland with a few sparsely distributed small trees such as *Acacia erioloba, Parkinsonia africana* and *Boscia foetida* were noted along the drainage lines.

Infestation with exotic weeds and invader plants:
No exotic species were noted but patches of the indigenous invader namely the Three Thorn *Rhigozum obovatum* occur in overgrazed areas.

Degree of grazing / browsing impact:
The area is much degraded and has a low carrying capacity.

Signs of erosion:
No deep erosion gullies were noted; however sheet erosion on the large barren patches was notable.

Table 10.1: Olyvenhouts drift:

	LOW (3)	MEDIUM (2)	HIGH (1)
VEGETATION CHARACTERISTICS			
Habitat diversity: Species composition / richness	3		
Presence of rare and endangered species:	3		
Ecological function		2	
Uniqueness / conservation value	3		
VEGETATION CONDITION			
Percentage ground cover	3		
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers	3		
Degree of grazing / browsing impact		2	
Signs of erosion	3		
TERRESTRIAL ANIMAL CHARACTERISTICS			
Presence of rare and endangered species	3		
Sub total	21	6	0
TOTAL	**27**		

10.6. Conclusions

The results of the vegetation and terrestrial animal assessment reveal that the site at Olyvenhoutsdrift is suitable for a development such as the Concentrating Solar Power plant and its associated infrastructure. However protected plants do occur in the area of the proposed development.

10.6. Recommendations

- Drainage lines:
  * Care must be taken not to damage or pollute the drainage lines which are sensitive to impacts during the construction as well as operational phases.

  * Damage to the riparian vegetation in the drainage canal must be limited to the minimum as it also contributes to lower the flow speed of the water.

- Erosion:
  * Although the area is relatively flat it does slope slightly towards the Orange River. In view of the fact that many areas of land would be cleared of vegetation, erosion would become a major problem in case of heavy thunderstorms.

    Erosion control measures such as berms, gabions etc must be constructed where necessary in the natural drainage line in order to slow down the speed of the water and therefore lowering its scouring effect on the sediment.

  * Stockpiles of soil must be protected from getting washed into the drainage lines during thunderstorms.

- Plants & animals:
  * A search and rescue exercise must be conducted to relocate protected plants and animals to suitable habitats in the area. This can only take place after the exact location of the footprint of the site; access roads, stock pile areas, corridors for pipelines, transmission line alignments, etc. have been clearly marked. The search and rescue exercise has to be conducted by ecologists in collaboration with the officials of the McGregor Museum (Kimberley) and the National Museum (Bloemfontein).