# SOVENTIX SOLAR PV PROJECT IN THE HANOVER DISTRICT, NORTHERN CAPE

(DE AAR/HANOVER AREA)

## GRAZING ASSESSMENT REPORT

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## EXECUTIVE SUMMARY

Potential grazing capacity, based on different ecological units identified within the soil and wetland delineation by Van den Berg (2017), is estimated for the study area. Current grazing capacity is determined by using the Veld Condition Index method from Du Toit, 1997). Veld condition at the time when the veld condition was assessed was characterised by a dormant Karoo-bossie component, an abundance of bare ground and an almost absence of the grass component. Stocking rates for sheep under the last few years of relative dry years correspond well to guidelines provided by the Department of Agriculture, but it is expected that improvement in veld condition can be expected with not only improved rainfall, but also by applying management recommendations provided in this report. Long term veld condition assessment and annual monitoring under different rainfall conditions is recommended to provide the range of fluctuations envisaged in veld condition and grazing capacity.

## 1. INTRODUCTION

### 1.1. Terms of Reference

Enviropulse CC was tasked to provide

- Grazing potential within the study area, which provides guidelines for development on the distribution of sensitive areas, based on information from soil mapping and classification by Hennie van den Berg (IRIS International) and
- Grazing management guidelines, based on veld condition.

## 1.2. Study Area – Soventix Proposed Solar Installation

Location

The study area is located in the Northern Cape, approximately 32 km from De Aar and 22 km from Hanover, directly northeast of the N10 highway. There are three potential footprints, which are the same size (minimum of 450 ha) as illustrated in the soil report of IRIS International (Van den Berg, 2017 and also appended in this report).

Geology and Soils

From the soil study of the Soventix SA Solar PV project at the De Bad area by Van den Berg (2017) the following information has become available.

A total of 12 ecological units have been identified, based on geology, soil texture and depth. These are:

1. Class 1. Sandstone outcrops,
2. Class 2. Dolerite outcrops,
3. Class 3. Very shallow yellow brown loamy soils,
4. Class 4. Very shallow yellow brown clayey soils,
5. Class 5. Very shallow red loamy soils,
6. Class 6. Very shallow red clayey soils,
7. Class 7. Shallow to medium deep yellow brown loamy soils,
8. Class 8. Shallow to medium deep yellow brown clayey soils,
9. Class 9. Shallow to medium deep red loamy soils,
10. Class 10. Shallow to medium deep red clayey soils,
11. Class 11. Structured shallow soils.
12. Class 12. Structured medium deep soils.

Vegetation and Veld Condition

The vegetation at the study area is classified as Eastern Upper Karoo (Vegetation unit NKu 4, Mucina and Rutherford (2006). This is described as flat and gently sloping plains, interspersed with hills and rocky areas, with grasses such as *Aristida* and *Eragrostis* species that dominate.

Five easily recognisable veld condition states (Trollope et al, 1990) are described in the Karoo – severely degraded, poor, intermediate, good and excellent (Esler *et al*, 2010).

## 2. METHODS

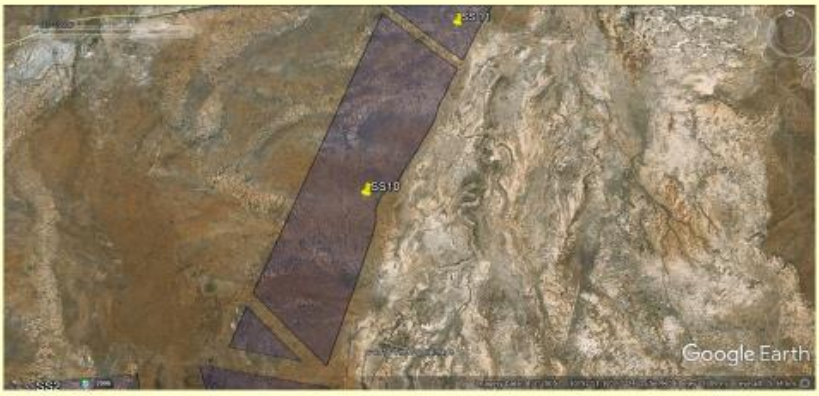
A total of 20 fixed points have been stratified within the study area for evaluation where the grass composition and grass basal cover (as reflected from point to tuft distance).

AREA A: DISTRIBUTION OF SURVEY SITES 14-20


AREA B: DISTRIBUTION OF SURVEY SITES 12 & 13

## AREA C : DISTRIBUTION OF SITES 1-9


## AREA C: POSITION OF SURVEY SITE 10



AREA C: POSITION OF SURVEY SITE 11


Soil classification at the 20 points (plus approximately 100 more for the purpose of a soil map) was done by Hennie van den Berg (IRIS International) according to the Taxonomic Classification System to soil form level, for each grazing assessment (MacVicar CN (ed.) (1991)). Point sampling was be done by the method of Du Toit (1997) of all plant species along 50-meter lines. The following have been recorded at intervals of one meter: list of forage plants, relative cover and plant canopy cover (%). The grazing index value and veld condition index was determined. Grazing capacity was calculated using the information from the veld condition index method. Grass tuft distances was recorded at each meter interval (nearest tuft distance to monitoring rod).

Vegetation crown cover recorded by Van den Berg (2017), including records of cover from dominant vegetation species would be used with detailed observations in the grazing report to model potential grazing capacity, based on ecological zones that would be delineated for the study area..

Due to very low grass abundance and presence due to recent drought conditions the grass phytomass was not determined.

A photo of the veld at each assessment point is available representing the condition at each assessment. It illustrates the condition at the monitoring point at the time when the survey was conducted for each of the 20 survey points.

The results are available in the appended tables, showing proportions of grass species in the survey within Decreasers and Increaser categories (Tainton, 1988 and Tainton, 1999), as well as on a degradation axis of the Integrated System of Plant Dynamics (Bosch and Booysen, 1992). The grazing gradient on the ISPD axis will be valuable for longer term monitoring purposes, to reflect future trends.

Management and veld condition will over time therefore be linked by following the trends on an ISPD grazing gradient (or degradation axis) (Bosch (1989) and Bosch and Gaugh (1991).

## 3. RESULTS AND DISCUSSION

### 3.1. Grazing Potential

Rainfall is the only factor affecting vegetation quantity and composition (Esler et al, 2010). Large fluctuations in veld condition and therefore also in grazing capacity can be expected over years. A difference in grazing capacity have been observed also on a spatial level within the study area. Even within similar topography and soil conditions the veld condition differed within the same veld condition assessment of January 2017.

Results from Van den Berg (2017) were studied and applied to obtain ecological and grazing units (see appended map).

Geology and land terrain position, together with soil depth and texture affect grazing potential. The following follows directly from the soil map which is now available for the study area (Van den Berg, 2017):

For grazing potential purposes the landscape can be divided into four main ecological zones, i.e.:

- GRAZING UNIT I = Classes 7 to 10 and Class 12. Medium deep soils at lower parts of the catena, including soils with lime present (i.e., Hutton, Oakleaf, Gamoep, Addo, Augrabies soils. It also includes Valsrivier soils).
- GRAZING UNIT II = Class 11. Shallow to slightly deeper structured soils (i.e., unit dominated by Swartland soils).
- GRAZING UNIT III = Classes 3 to 6: Shallow soils (i.e., Mispah and Glenrosa soils).
- GRAZING UNIT IV = Classes 1 and 2: Koppies of sandstone and dolerite. (i.e., outcrops and Mispah soils).

| Colour | No | Ecological zone | Grazing Capacity Range | Median Grazing capacity |
|---|---|---|---|---|
| | 1 | GRAZING UNIT I = Classes 7 to 10 and class 12: Medium deep soils at lower parts of the catena, including soils with lime present (i.e., Hutton, Oakleaf, Gamoep, Addo, Augrabies soils. It also includes Valsrivier soils) | 5-25 ha/LSU | 15 ha/LSU |
| | 2 | GRAZING UNIT II = Class 11: Shallow to slightly deeper structured soils (unit dominated by Swartland soils) | 10-30 ha/LSU | 20 ha/LSU |
| | 3 | GRAZING UNIT III = Classes 3 to 6: Shallow soils (i.e., Mispah and Glenrosa soils) | 15-55 ha/LSU | 35 ha/LSU |
| | 4 | GRAZING UNIT IV = Classes 1 and 2: Koppies of sandstone and dolerite (i.e., outcrops and Mispah soils) | 20-90 ha/LSU | 55 ha/LSU |
| | 5 | Permanent wetland | | Not assessed |

Grazing Unit I with medium deep soil at lower parts of the catena has a median grazing capacity of 15 ha/LAU.

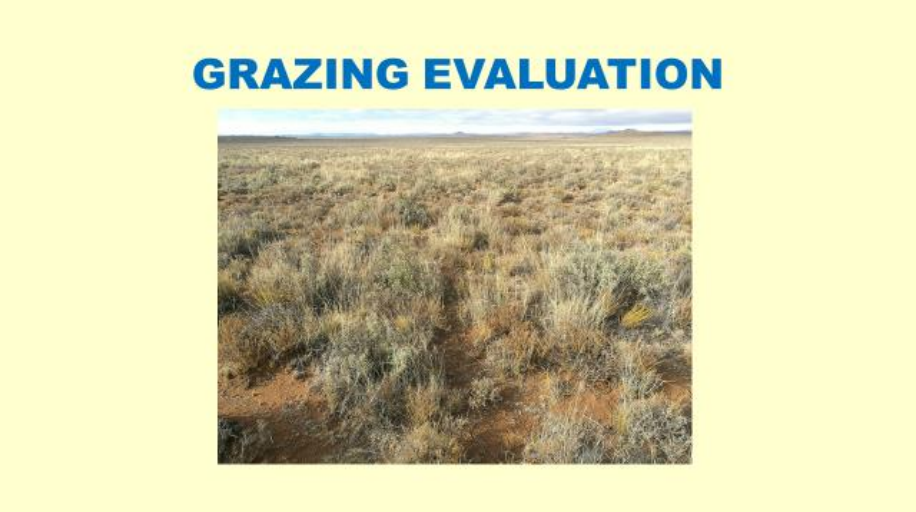
Grazing Unit II with shallow to slightly deeper structured soils has a median grazing capacity of 20 ha/LAU.

Grazing Unit III with shallow soils has a median grazing capacity of 35 ha/LAU.

Grazing Unit IV of the koppies of sandstone and dolerite has a median grazing capacity of 55 ha/LAU.

Permanent wetlands were not assessed with the grazing evaluation, as these are present mostly outside the study area.

## 3.2. Grazing Evaluation




The results of the findings for specific points or sites are available in the appended site reports, which have photos taken from the assessment point and Google Earth images. The detailed info of the vegetation (grass and bossies) are available on appended tables, reflecting grass and Karoo plant composition and cover. Grazing capacity and management recommendations are included.

See appended map of Veld Condition Index Values (Van den Berg, 2017). The veld condition index values obtained from the results were overlain on Landsat images for the study area. The grazing index zones are illustrated on the appended map and below into three classes, i.e. “Good” (median range 185-238), “intermediate” (median range 105-187) and “poor” (median range 66-147), with a classification reflecting good, intermediate and poor values relative to the results of the 2017 assessment, not relative to the potential.

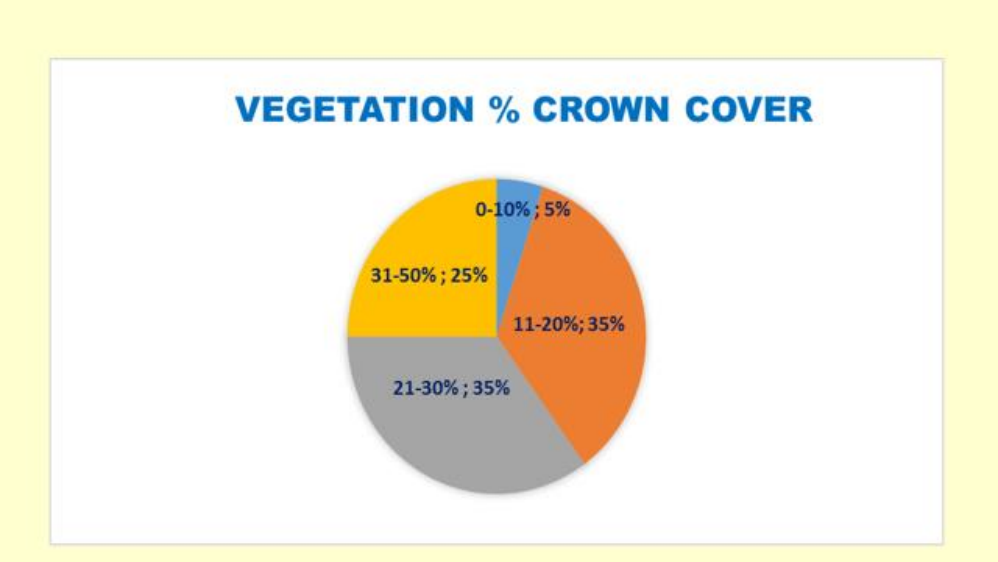
It must be born in mind that veld condition is a reflection of both rainfall and current management (and other factors discussed above).

| Colour | No | Veld Condition Index Zone | Veld Condition Index Range | Median Veld Condition Index |
|---|---|---|---|---|
| | 1 | GOOD | 185-238 | 211.5 |
| | 2 | INTERMEDIATE | 105-187 | 146.5 |
| | 3 | POOR | 66-147 | 106.9 |

The last few years the rainfall was below the long term average for the region. Besides that, the condition reflected by the results of this report is also strongly affected by the seasonal presence of plants, especially annuals (e.g., “opslag”).

At the time when the survey was undertaken (early January 2017) the vegetation was still mostly dormant due to little rain received. Bare ground was common and grass species richness low. Grass abundance could therefore potentially be very different (better) under good rainfall conditions in relation to what is reflected in the 2017 results.

95% of the vegetation crown cover recorded over the 20 survey sites were below 50% cover, with 5% of the survey sites that had less than 10% crown cover. This was mostly representing the non-grass component (Karoo-bossies). See illustrated below.




Veld condition index values reflect therefore largely the dormant status of vegetation at the time when the assessments were done, i.e., the non-grass perennial Karoo-bossie component, without 'opslag' and other Karoo plants that are common after good rains.

Domimant Plant Species – Bosies & Grasses:

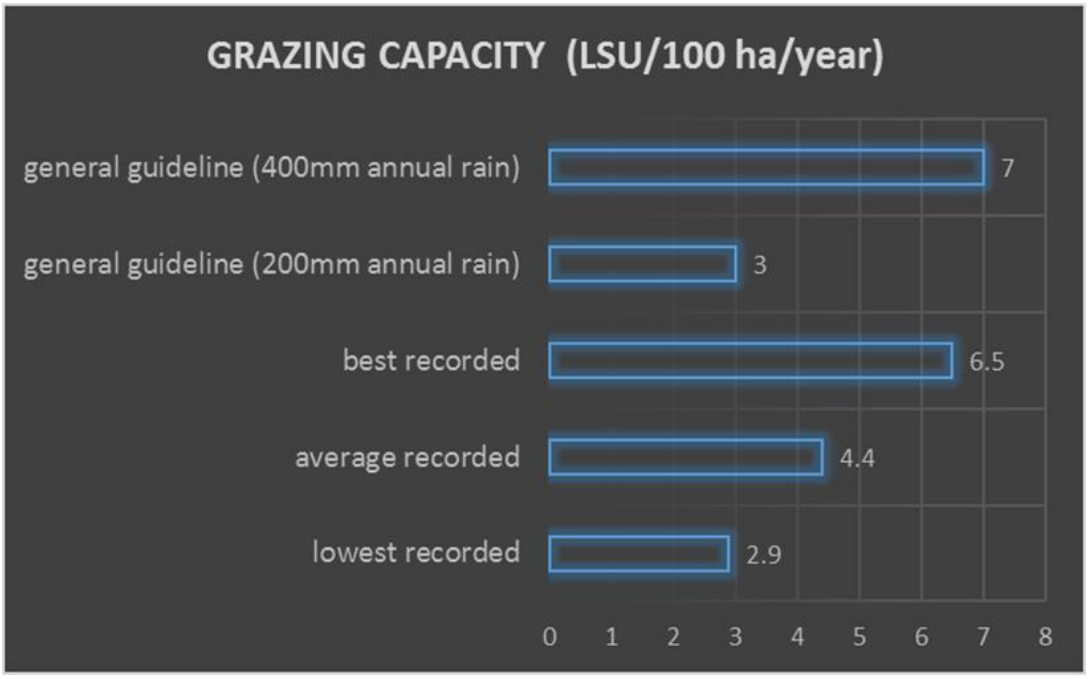
- Doringkapok
- Haasgras
- Ankerkaroo
- Doringvygie
- Wortelsaadgras
- Kapokbossie
- Douvatgras

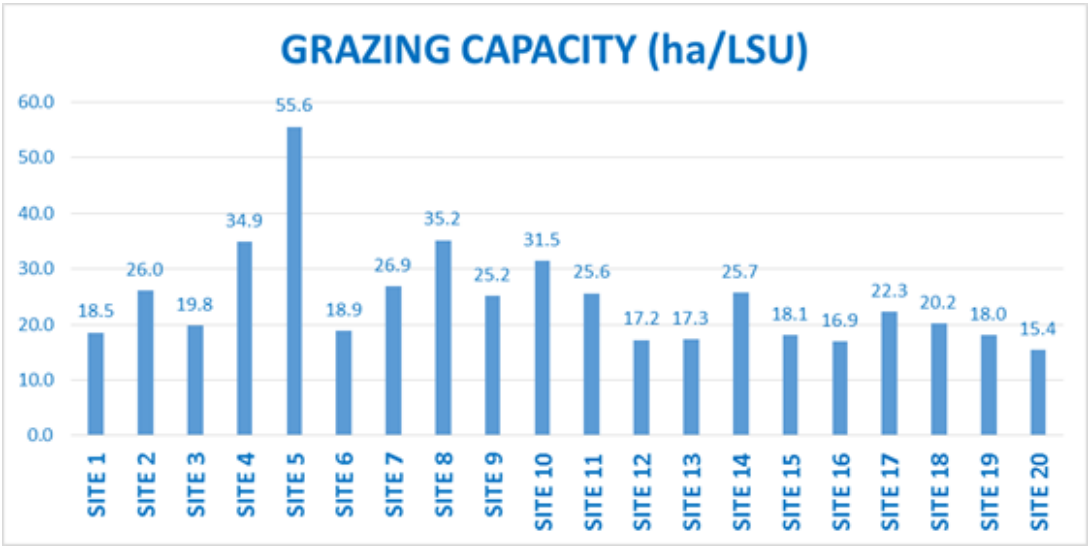
Veld condition is mostly poor to intermediate due to low grass cover and current grass composition reflected in veld condition assessment for January 2017 represent the abundance of a few species that have relative poor grazing value (Dwarf Grass/Haasgras, *Oropetium capense* and Creeping Carrotseed Grass, *Tragus koelerioides*).

A few other grasses are listed in the appended tables that are present but none of those were sufficiently abundant to contribute significantly to improved grazing capacity. One small grass species, *Pentameris montana*, has been identified is a first collection record for its distribution for the National Herbarium (SANBI).

### 3.3. Grazing Management Recommendations

Current grazing capacity based on the results from the evaluation in January 2017 are illustrated below.

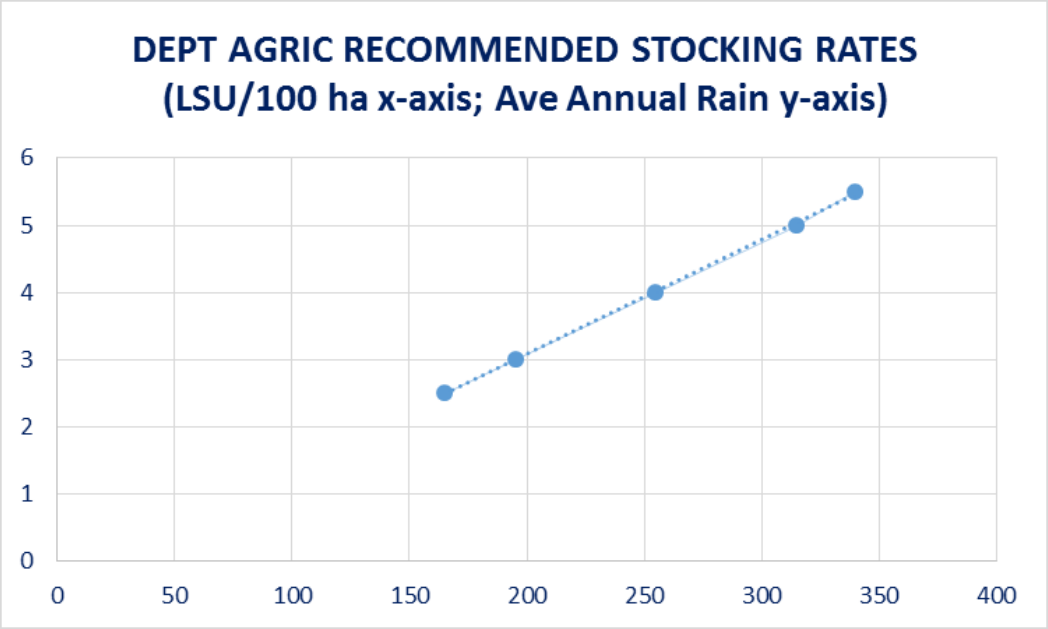


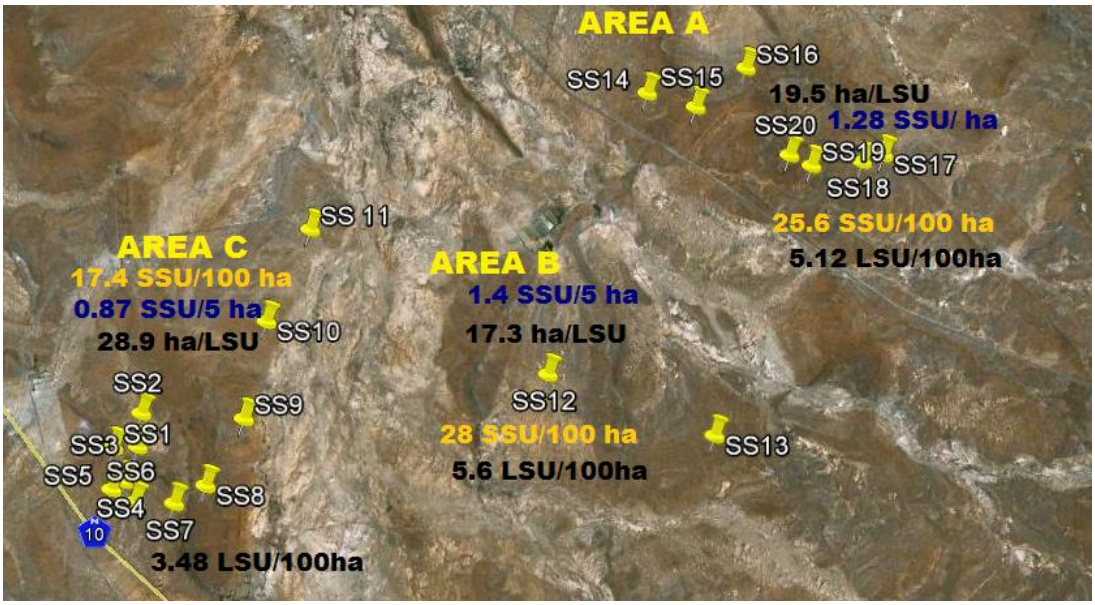

A grazing capacity of between 15 and 17 ha/LAU at better veld conditions, or an average of just less than 23 ha/LAU over all veld conditions in the study area would therefore be applicable for current rainfall conditions (excluding info from Site 5, where extreme poor conditions were observed). If only sheep were

accommodated, it would translate into less than 1760 sheep on 8000 ha under current rainfall conditions. Please note: This is applicable if only sheep graze within an area of 8000 ha, but other grazers also utilise the veld, such as horses, cattle and game, and the necessary adaption should be made to have the total number of grazers and stocking rate that correspond with the current grazing capacity.

Current stocking rates the last few years for sheep under an average rainfall of between 250 and 350 mm therefore correspond well with the guidelines (from Esler et al, 2010) recommended by the Department of Agriculture. See figure below.




The following comparison per alternative in the study (per Area A, B and C) corresponding to rainfall conditions experienced at the time that the study was undertaken is summarized in the figure below, with Area A with a recommend stocking rate of no more than 5.12 LSU/100ha, Area B with a stocking rate of no more than 5.6 LSU/100ha and Area C with a stocking rate of no more than 3.48 LSU/100ha.



However, all grazers present on the De Bad farm should be included when the current grazing capacity is applied and rotational resting per camp is recommended for periods up to 12 months at a frequency of once every four years. This will assist to improve grass seeding and an improvement in grass production potential of palatable species and will improve the grass component with important forage species. This recommendation applies to all the camps. Follow-up grazing assessments and annual monitoring of veld condition is recommended to record veld condition and grazing capacity under different rainfall conditions.

## 4. REFERENCES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# APPENDIX A

## Maps

# APPENDIX B

# Site Reports

# APPENDIX C

## Tables