SCOPING REPORT

On contract research for

Lidwala Consulting Engineers

SOIL INFORMATION FOR PROPOSED UPINGTON SOLAR PARK, NORTHERN CAPE

By

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Report Number GW/A/2014/05

January 2014

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DECLARATION

I hereby declare that:

- I am qualified to compile this report as a registered Natural Scientist;
- I am independent of any of the parties involved;
- I have compiled an impartial report, based solely on all the information available.

D G Paterson
January 2014

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1. TERMS OF REFERENCE

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by Lidwala Consulting Engineers to undertake a soil investigation near Upington, in the Northern Cape Province. The purpose of the investigation is to contribute to the scoping phase of the Environmental Impact assessment (EIA) process for the proposed 1 GW Upington Solar Park.

Scoping Report

The scoping report must include:

» a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project

» a description and evaluation of environmental issues and potential impacts (including direct, indirect and cumulative impacts) that have been identified

» Direct, indirect and cumulative impacts of the identified issues must be evaluated within the Scoping Report in terms of the following criteria:

☐ the nature, which shall include a description of what causes the effect, what will be affected and how it will be affected;

☐ the extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international

» a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts

» a comparative evaluation of the identified feasible alternatives, and nomination of a preferred alternative for consideration in the EIA phase

» identification of potentially significant impacts to be assessed within the EIA phase and details of the methodology to be adopted in assessing these impacts.

The objectives of the study are;

- To obtain all existing soil information and to produce a soil map of the specified area as well as

- To assess broad agricultural potential.

2. SITE CHARACTERISTICS

2.1 Location

An area was investigated lying approximately 10 km to the west of the town of Upington. The area comprises parts of the farm Klipkraal 451. The area lies between 28° 23' and 28° 31' S and between 21° 02' and 21° 10' E. The position of the site is shown on the map in Figure 1.

2.2 Terrain

The site is generally flat to gently undulating and lies at a height of approximately 800-900 metres above sea level, sloping to the south. The Gariep River (formerly known as Orange River) lies close to the south-eastern boundary of the area.

Figure 1 Locality map

2.3 Climate

The climate of the study area (Koch & Kotze, 1986) can be regarded as warm to hot with rain in summer and dry winters. The long-term average annual rainfall in this region of the Northern Cape is only 175 mm, of which 142 mm, or 81%, falls from

November to April. Rainfall is erratic, both locally and seasonally and therefore cannot be relied on for agricultural practices. The average evaporation is 2 375 mm per year, peaking at 11.2 mm per day in December.

Temperatures vary from an average monthly maximum and minimum of 35.0ºC and 18.7ºC for January to 20.8ºC and 3.3ºC for July respectively. The extreme high temperature that has been recorded is 43ºC and the extreme low –7.9ºC. Frost occurs most years on 6 days on average between mid-June and mid-August.

2.4 Parent Material

The geology of the area comprises wind-blown sands with dunes of the Gordonia Formation, Kalahari Group (Geological Survey, 1988).

3. METHODOLOGY

Existing information was obtained from the map sheet 2820 Upington (Eloff, Bennie, Dietrichsen & Geers, 1983) from the national Land Type Survey, published at 1:250 000 scale. A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar *et al* (1977).

The area under investigation is covered by only two land types, as shown on the map in the Appendix, namely:

- **Ae10** (Deep, red, freely-drained soils, high base status)
- **Af8** (Deep, red, freely-drained soils, high base status, with dunes)

It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Also, other soils that were not identified due to the scale of the survey may also occur. **The site was not visited during the course of this study, and so the detailed composition of the specific land types has not been ground-truthed.**

A summary of the dominant soil characteristics of each land type is given in Table 2 below (the colours correspond to those used in the map in the Appendix).

The distribution of soils with high, medium and low agricultural potential within each land type is also given, with the dominant class shown in **bold type**.

4. SOILS

A summary of the dominant soil characteristics is given in **Table 2** below.

Table 2 Land types occurring (with soils in order of dominance)

Land Type	Depth (mm)	Dominant soils	Percent of land type	Characteristics	Agricultural Potential (%)
Ae10	450-1000 100-250	Hutton 33/34 Mispah 22	42% 40%	Red, sandy soils, occasionally on hardpan calcrete Red-brown, sandy topsoils on hard rock and calcrete	High:0.0 Mod: 47.0 **Low: 53.0**
Af8	300-1200+ 300-900	Hutton 31/30 Hutton 33/34	64% 35%	Red, sandy soils on hard rock and calcrete Red, loamy sand soils on hard rock and calcrete	High:0.0 Mod: 35.0 **Low: 65.0**

5. AGRICULTURAL POTENTIAL

Much of the area comprises red, sandy soils, with wind-blown sands (dunes) especially prevalent in the north (land type **Af8**). Some of the soils in the southern part (land type **Ae10**) are shallow to very shallow, although there are some deep soils, as can be seen from the information contained in Table 2.

This is supported by the geotechnical report that was carried out (Aurecon, 2013). Based on test pits that were excavated and sampled, the soils were analyzed as having between 4 and 8% clay on average, with depths to underlying calcrete and rock varying from less than 0.5 m to over 3 m.

However, the very low rainfall in the area (Section 2.3) means that the only means of cultivation would be by irrigation and the Google Earth image of the area shows absolutely no signs of any agricultural infrastructure and certainly none of irrigation. The only irrigation occurs along the Gariep River, to the south of the area.

The climatic restrictions mean that this part of the Northern Cape is suited at best for grazing and here the grazing capacity is very low, around 40-50 ha/large stock unit (ARC-ISCW, 2004).

6. IMPACTS

6.1 Loss of agricultural land

The major impact on the natural resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. However, this impact would in all probability be of limited significance and would be local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential.

The impact can be summarized as follows:

Table 3 Impact significance (loss of agricultural land)

Nature of impact	Loss of agricultural land	Land that is no longer able to be utilized due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where infrastructure will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Moderate	
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that as little pollution or other non-physical disturbance occurs.	

6.2 Wind erosion hazard

The sandy nature of the soils, along with the dry climate, means that if the soil surface is denuded of vegetation, there will be an increased risk of topsoil removal by wind action. However, mitigation measures, such as restricting the infrastructure footprint as much as possible, as well as providing windbreaks if required, should keep this impact to a low level of significance.

The impact can be summarized as follows:

Table 4 Impact significance (wind erosion)

Nature of impact	Increased susceptibility to wind erosion	Land that has lost topsoil to wind action due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where infrastructure will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Low	If mitigated
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that as little removal of surface vegetation as possible occurs.	

Conclusion

The soils in the study area are sandy, often shallow and often with dunes. They have very little potential for dryland cultivation. The impact on these soils, regarding loss of agricultural potential, will be limited.

Due mainly to the prevailing unfavourable climatic conditions for arable agriculture, as well as the prevalence of sandy soils with limited depth, it is not envisaged that any more detailed soil investigation will be required.

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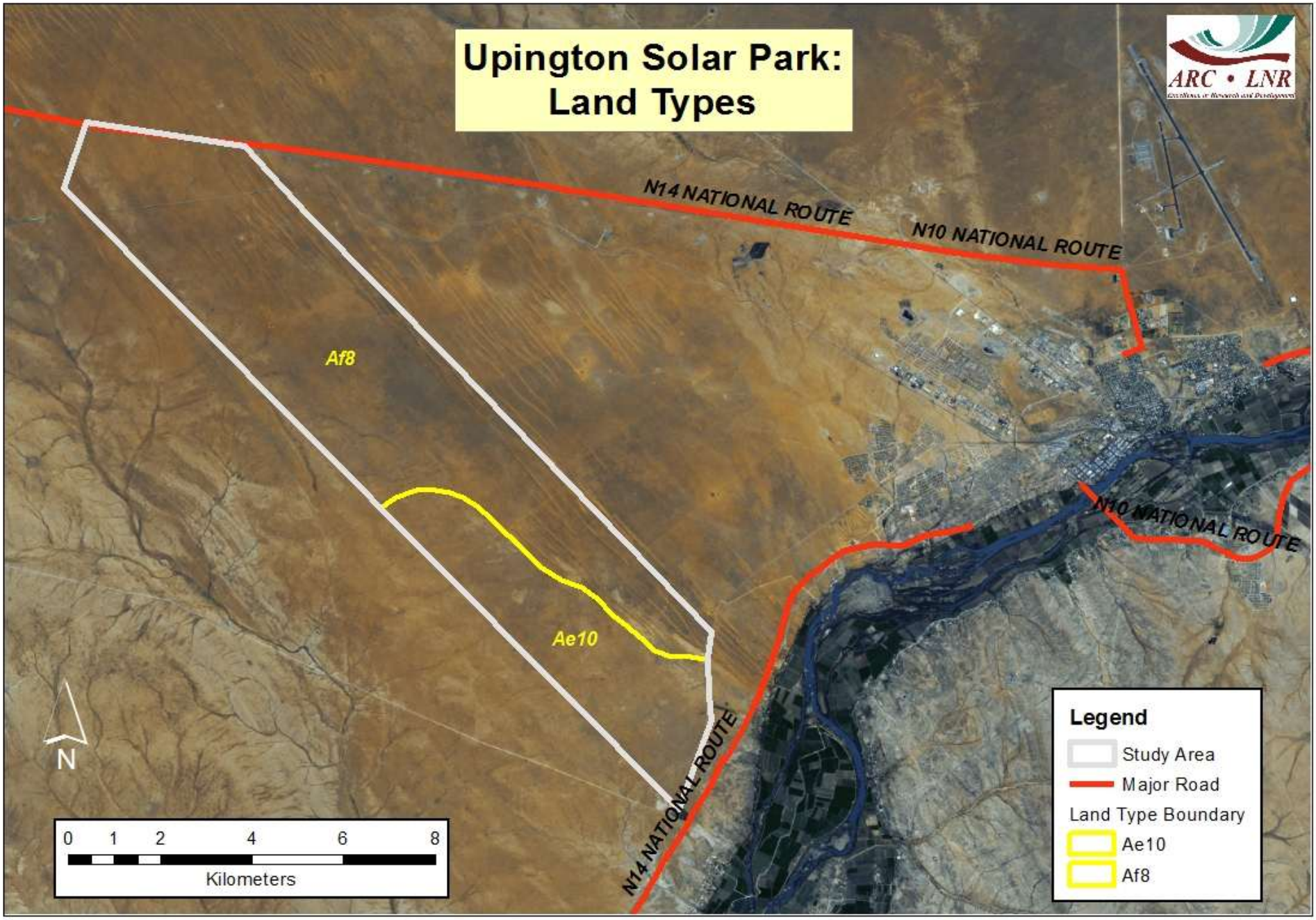
APPENDIX

MAP OF LAND TYPES


Upington Solar Park:
Land Types
ARC • LNR
N14 NATIONAL ROUTE
N10 NATIONAL ROUTE
N10 NATIONAL ROUTE
N14 NATIONAL ROUTE
Af8
Ae10
N
0 1 2 4 6 8
Kilometers
Legend
Study Area
Major Road
Land Type Boundary
Ae10
Af8