REPORT

On contract research for

SAVANNAH ENVIRONMENTAL

SOIL INFORMATION FOR POWER LINE ALTERNATIVES FOR THE PROPOSED WIND ENERGY FACILITY, WESTERN CAPE

By

D.G. Paterson (Pr. Sci. Nat. 400463/04)

Report Number GW/A/2007/XX

January 2008

ARC-Institute for Soil, Climate and Water,
Private Bag X79, Pretoria 0001, South Africa
Tel (012) 310 2500 Fax (012) 323 1157

DECLARATION

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

D G Paterson

CONTENTS **Page**

1. TERMS OF REFERENCE 1

2. SITE CHARACTERISTICS 1

3. METHODOLOGY 2

4. SOILS 3

5. AGRICULTURAL POTENTIAL 3

6. IMPACTS 4

REFERENCES 5

APPENDIX: MAP OF LAND TYPES

1. TERMS OF REFERENCE

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by Savannah Environmental to undertake a soil investigation north of the Olifants River, on the west coast of the Western Cape Province. The purpose of the investigation is to contribute to the Environmental Impact assessment (EIA) process for a proposed wind energy facility, and more specifically, for the proposed transmission line corridors to serve the facility. 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

The area of the proposed facility lies on the farms, Grave Water Kop 158/5 and Portions 617 and 620 of the farm Olifants River Nedersetting. This area will have to be connected to the Juno Substation, near Vredendal by means of a 132 kV power line, of which there are two proposed alternative corridors. These are shown on the map in the Appendix, and comprise a northern route (Alternative 1), which partly follows the existing Juno-Koekenaap power line servitude, as well as a southern route (Alternative 2).

2.2 Terrain

The site lies inland of the coastal ridge at a height of 60-110 metres above sea level and consists of virtually flat to slightly undulating topography, with slopes of less than 4%. The only zones with slightly steeper slopes are where the line will cross two small side tributaries of the Olifants River.

2.3 Climate

The climate of the area was derived from the closest station, namely Vredendal, some 20 kms inland. The climate can be regarded as typical of the Cape west coast, with an extremely low, all-year round rainfall distribution, warm to hot summers and cool winters. The main climatic indicators are given in Table 1.

Table 1. Climate Data

Month	Rainfall (mm)	Min. Temp (ºC)	Max. Temp (ºC)
Jan	2.2	14.8	29.8
Feb	3.0	14.9	30.5
Mar	5.9	14.1	29.9
Apr	14.0	12.2	27.6
May	21.2	9.7	24.2
Jun	26.8	8.0	21.5
Jul	22.0	7.0	20.9
Aug	20.0	7.5	21.5
Sep	10.7	8.9	23.5
Oct	9.2	10.7	25.5
Nov	7.0	12.4	27.7
Dec	5.9	14.0	28.8
Year	**147.9 mm**	**18.6ºC (Average)**	

The extreme high temperature that has been recorded is 46.0ºC (presumably in "berg wind" conditions) and the extreme low –1.0ºC.

2.4 Parent Material

The site has aeolian sandy material overlying granite and gneiss of the Namaqualand Metamorphic Complex (Geological Survey, 2001).

3. METHODOLOGY

Existing information was obtained from the map sheet 3118 Calvinia (Potgieter, 1995) 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 five land types, as shown by the blue lines on the map in the Appendix, namely:

Ae372 (red, high base status soils, usually deep)
Ae373 (red, high base status soils, usually deep)
Ag203 (shallow, red soils)
Ai66 (yellow, sandy soils)
Hb108 (deep, grey sands)

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.

4. SOILS

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

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

Land Type	Dominant soils	Depth (mm)	Percent of land type	Characteristics
Ae372	Hutton 31	300-900	54.0%	Red, sandy, structureless soils on rock or calcrete
	Hutton 30/40/41	200-1200	14.9%	Red, sandy, structureless soils on rock or calcrete
	Oakleaf 11/21/10	300-1200	10.4%	Red, sandy, structureless soils on rock or calcrete
Ae373	Hutton 31	300-900	54.0%	Red, sandy, structureless soils on rock or calcrete
	Hutton 30/40/41	200-1200	14.9%	Red, sandy, structureless soils on rock or calcrete
	Oakleaf 11/21/10	300-1200	10.4%	Red, sandy, structureless soils on rock or calcrete
Ag203	Hutton 33/43	200-300	47.7%	Red, sandy, structureless soils on rock or calcrete
	Hutton 40/43	300-600	19.8%	Red, sandy, structureless soils on rock or calcrete
	Mispah/Glenrosa	50-150	7.5%	Shallow lithosols with rock
Ai66	Clovelly 31	600-1200	85%	Yellow, sandy, structureless soils on rock
	Kroonstad/Pinedene	800-1200	10%	Grey/yellow, sandy soils on gleyed clay
Hb108	Fernwood 21	1000-1200	62.0%	Grey, sandy, structureless soils
	Clovelly 31	800-12000	15.0%	Yellow-brown, sandy, structureless soils on rock

5. AGRICULTURAL POTENTIAL

As can be seen from the information contained in Table 2, most of the area contains a greater or lesser proportion of deep soils, usually sandy.

However, these deeper soils have a low agricultural potential, due to a combination of:

- excessive drainage due to the sandy texture,
- low fertility associated with the low clay content and
- a susceptibility to wind erosion if exposed, caused by the fine to medium grade of sand. This may be especially prevalent in dune areas.

In addition, the low rainfall in the area (Table 1) means that there is little potential for arable agriculture in the area and that the soils are suited for extensive grazing at best. The grazing capacity of the area is low, namely around 30 ha for a large

stock unit (cattle) and around 10 ha per small stock unit (sheep/goats) ARC-ISCW, 2004).

The fact that a power line is planned, with pylons at intervals, will mean that disturbance to surface soils will be minimal even if an access road has to be created alongside the power line.

The only possible area where higher potential soils might be affected would be could be along Alternative 2, where the route skirts the irrigated floodplain of the Olifants River (crossing it twice) and where areas with intensively irrigated, high value crops might well occur. Vines are grown along the route of Alternative 2, so care would have to be taken, both in the height of the lines above the crop, and positioning of pylons. Advice from experts in viticulture (such as at ARC- Nietvoorbij) could be sought to accurately determine the possible type of power line tower to use when crossing a vineyard.

6. IMPACTS

The siting of a power line will not have a severe impact on the soils and agricultural potential, especially if Alternative 1 is followed as this will mitigate/avoid any possible conflicts close to the Olifants River irrigation area. The proposed amendment, Alternative 1a, will not have a significant effect on the soils that might be disturbed.

With the general agricultural potential of the region being low (mainly due to the dryness), the areas of irrigable land that can be used productively should be treated as a precious resource and disturbed/affected as little as possible.

The impact can be summarised as follows:

Table 3. Impact significance

Nature of impact	Loss of agricultural land	Land that is no longer able to be utilised due to construction of infrastructure
Extent of impact	Site only (**1**)	Confined to transmission towers
Duration of impact	Long-term (**4**)	Will cease if operation of activity ceases
Magnitude of impact	Minor (**2**)	Very localised
Probability of impact	Some possibility (**2**)	
Significance of impact	Low (**14**)	Mainly due to low potential of area, as well as scattered nature of infrastructure

Mitigation factors	The main mitigation would be to ensure that the power line flows the existing servitude (Alternative 1 or sub-alternative 1a) and remains distant from the Olifants River and the areas of agricultural potential that mirror the watercourse.

REFERENCES

ARC-ISCW, 2004. Overview of the status of the agricultural natural resources of South Africa (First Edition). ARC-Institute for Soil, Climate and Water, Pretoria

Geological Survey, 2001. 1:250 000 scale geological map 3118 Calvinia. Department of Mineral and Energy Affairs, Pretoria.

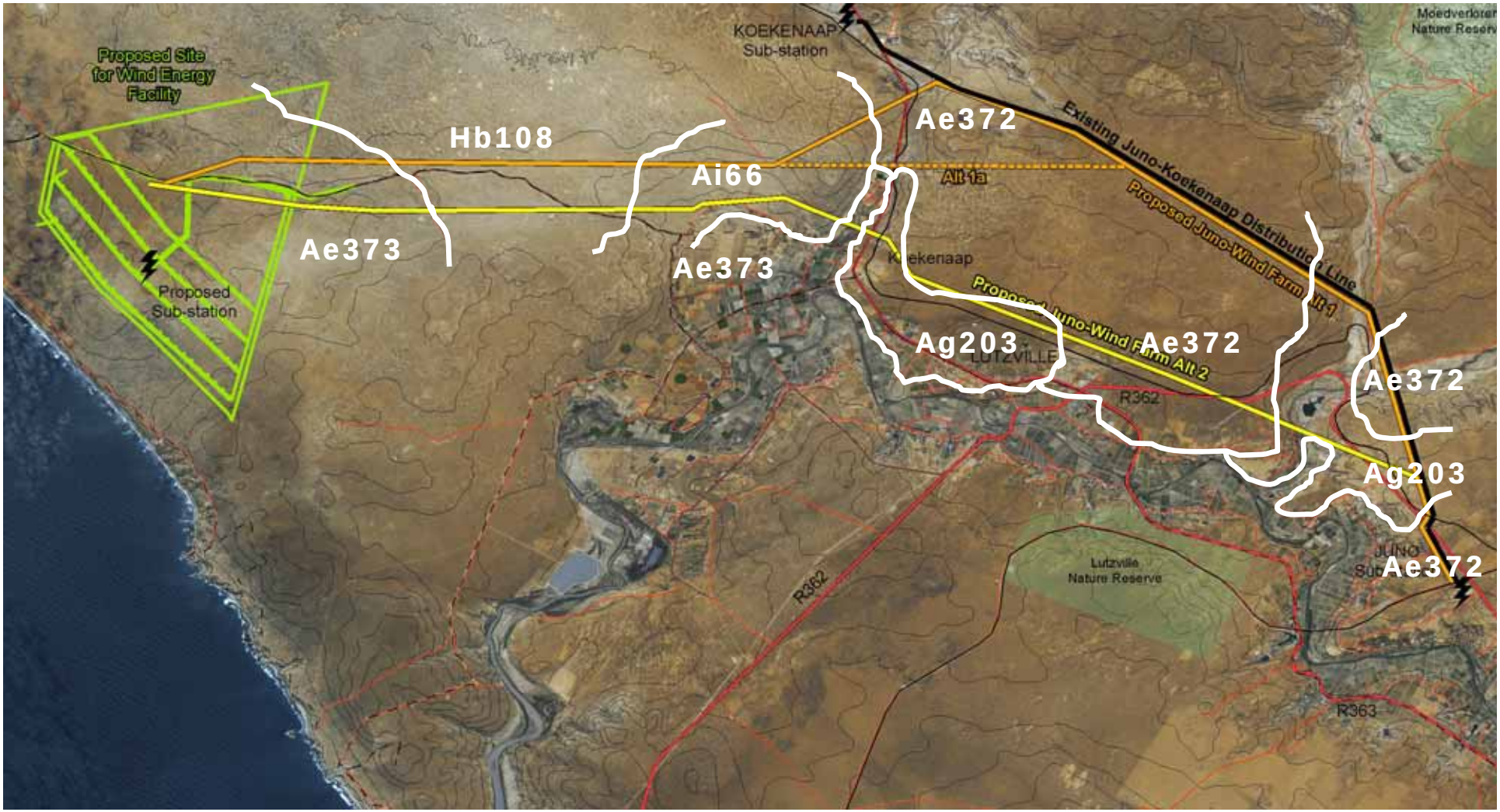
MacVicar, C.N., de Villiers, J.M., Loxton, R.F, Verster, E., Lambrechts, J.J.N., Merryweather, F.R., le Roux, J., van Rooyen, T.H. & Harmse, H.J. von M., 1977. Soil classification. A binomial system for South Africa. ARC-Institute for Soil, Climate & Water, Pretoria.

Potgieter, L.J.C., 1995. Land types of the map 3118 Calvinia. Field information. *Mem. Nat. Agric. Res. S. Afr.* No. 30. ARC-Institute for Soil, Climate and water, Pretoria.

Soil Classification Working Group, 1991. Soil classification. A taxonomic system for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

APPENDIX

MAP OF LAND TYPES


Proposed Site for Wind Energy Facility
Proposed Sub-station
KOEKENAAP Sub-station
Hb108
Ai66
Ae373
Ae373
Ae372
Alt 1a
Existing Juno-Koekenaap Distribution Line
Proposed Juno-Wind Farm Alt 1
Proposed Juno-Wind Farm Alt 2
Ag203
Ae372
Ae372
Ag203
Ae372
R362
R362
R363
Lutzville Nature Reserve
Moedverloren Nature Reserv