REPORT

On contract research for

SAVANNAH ENVIRONMENTAL

ARC • LNR

SOIL INFORMATION FOR STEELPOORT INTEGRATION PROJECT, LIMPOPO PROVINCE

By

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SUMMARY OF RELEVANT EXPERTISE & EXPERIENCE

Garry Paterson is a registered Soil Scientist, having been involved in soil classification and mapping since 1981. He is immediate past President of the Soil Science Society of South Africa and is a member of both the South African Soil Classification Working Group, as well as the South African Soil Surveyors Organisation. He has been responsible for approximately 150 soil surveys and other investigations, including for agricultural potential, State of the Environment reporting and environmental impact assessments.

1. TERMS OF REFERENCE

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by Savannah Environmental to undertake a soil investigation in the Steelpoort River valley, Limpopo Province. The purpose of the investigation is to look at the soils occurring, and their agricultural potential, within a corridor identified as part of the Steelpoort Integration Project. 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.

- To provide information on the soils of the proposed site of the substation on the northern edge of the lower reservoir at the southern end of the route.

2. SITE CHARACTERISTICS

2.1 Location

The area lies to the south-west of the town of Steelpoort, as shown in Figure 1.

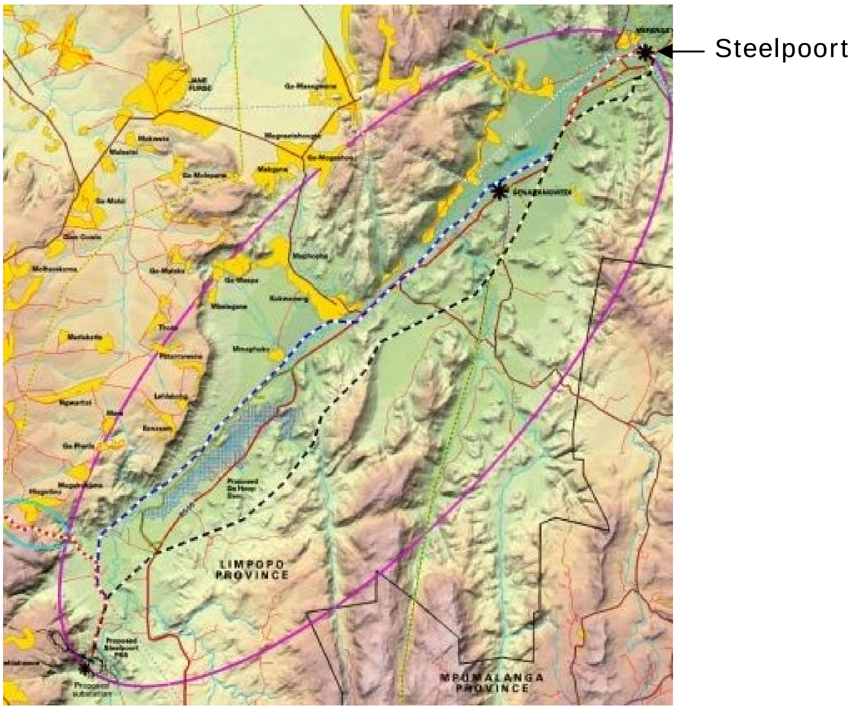

Figure 1. Locality map

2.2 Terrain

The area comprises part of the valley of the Steelpoort River system, which varies in width from approximately one to eight kilometers, as well as the surrounding hills. Slopes in the river valley areas vary from 1% to around 5%, while the surrounding hills are much steeper, with cliffs that approach vertical in places, and general slopes of 30% to 100%. The higher lying parts are at an altitude of over 1 600 metres above sea level, while the lower parts of the valley are much lower, below 850 metres.

2.3 Climate

The climate of the area can be regarded as typical of the Highveld, with cool to cold, dry winters and warm, moist summers (Koch, 1987).

The rainfall on top of the escarpment and surrounding hills will be in the order of around 700 mm, compared to the valley below, where only around 525 mm may be expected.

Temperatures for the Steelpoort valley vary from an average monthly maximum and minimum of 30.1ºC and 17.6ºC for January to 21.6ºC and 3.8^{o}C for July respectively. The extreme high temperature that has been recorded is 39.7^{o}C and the extreme low –2.3ºC.

2.4 Parent Material

The parent material of the soils is mainly rocks of the Bushveld Igneous Complex, with hornblende- and biotite-granite of the Lebowa Granite Suite in the south-west, and gabbro, norite, diorite, pyroxenite and anorthosite of the Rustenburg Layered Suite in the rest of the area (Geological Survey, 1984).

3. METHODOLOGY

Existing information was obtained from the map sheets 2428 Nylstroom (Paterson, Plath & Smith, 1989), 2430 Pilgrim's Rest (Schoeman, Turner & Geers, 1987) and 2528 Pretoria (Schoeman, Fitzpatrick & Verster, 1987) 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 various alternative routes under investigation are covered by a total of eleven land types, as shown in the map in the Appendix, namely:

Ae26, Ae27 (red, high base status soils, usually deep)
Bc7 (red, high base status soils with plinthic subsoils, usually deep)
Dc31 (varied duplex and clay soils)
Ea88 (structured, swelling clay soils)
Ib30, Ib31, Ib38, Ib39, Ib192 (shallow soils with rock)
Ic154 (rocky areas with little soil)

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 national Land Type Survey may also occur.

4. SOILS

A summary of the dominant soil characteristics is given in **Table 1** below.
The dominant agricultural potential class in each land type is marked in bold type.

Table 1. Land types occurring (with soils in order of dominance)

Land Type	Dominant soils	Depth (mm)	Percent of land type	Characteristics	Agricultural Potential
Ae26	Hu36/46	450-1200	39%	Red, loamy, structureless soils, occasionally calcareous	High: 13.3%
	Va/Sw21/41	300-800	30%	Red & brown, structured clay soils, usually calcareous	**Medium: 69.6%**
	Lithosols & Rock	100-350	11%	Brown, loamy topsoils on rock	Low: 17.1%
Ae27	Hu36/46	450-1200	39%	Red, loamy, structureless soils, occasionally calcareous	High: 13.3%
	Va/Sw21/41	300-800	30%	Red & brown, structured clay soils, usually calcareous	**Medium: 69.6%**
	Lithosols & Rock	100-350	11%	Brown, loamy topsoils on rock	Low: 17.1%
Bc7	Hu36	450-800	39%	Red, loamy, structureless soils	High: 10.5%
	Gs16/17, Ms10/11	200-450	30%	Brown, loamy topsoils on rock, occasionally calcareous	**Medium: 49.5%**
	Rock		10%		Low: 40.0%
Dc31	Va/Sw21/41	600-1200	29%	Red & brown, structured clay soils, usually calcareous	**High: 38.5%**
	Hu36/46	300-1200	26%	Red, loamy, structureless soils, occasionally calcareous	Medium: 27.5%
	Sd21/31	600-1200	11%	Red, clayey, structured soils	Low: 34.0%
Ea88	Ar40/Rg20	500-800	62%	Black, swelling clay soils, usually calcareous	High: 5.0%
	Bo41	600-1000	11%	Dark, non-swelling clay soils, usually calcareous	**Medium: 71.1%**
	Ms10/Gs26	150-300	8%	Brown, loamy topsoils on rock, occasionally calcareous	Low: 24.4%
Ib30	Rock		59%		High: 0.0%
	Hu36/37	450-1200	11%	Red, loamy, structureless soils	Medium: 15.0%
	My10/Mw10	300-450	11%	Dark, non-swelling clay soils, usually calcareous	**Low: 85.0%**

Table 1. Land types occurring (with soils in order of dominance)

Land Type	Dominant soils	Depth (mm)	Percent of land type	Characteristics	Agricultural Potential
Ib31	Rock Ms10/Gs26	 100-450	67% 31%	 Brown, loamy topsoils on rock, occasionally calcareous	High: 0.0% Medium: 2.0% **Low: 98.0%**
Ib38	Rock Ms10/Gs26	 100-450	60% 40%	 Brown, sandy clay loam topsoils on rock, occasionally calcareous	High: 0.0% Medium: 0.0% **Low: 100.0%**
Ib39	Rock Ms10/Gs26	 100-450	70% 30%	 Brown, sandy clay loam topsoils on rock, occasionally calcareous	High: 0.0% Medium: 0.0% **Low: 100.0%**
Ib192	Rock Ms10/Gs26	 100-450	64% 25%	 Brown, loamy topsoils on rock, occasionally calcareous	High: 0.0% Medium: 0.6% **Low: 99.4%**
Ic154	Rock Ms10/Gs26	 100-450	85% 9%	 Brown, loamy topsoils on rock, occasionally calcareous	High: 0.0% Medium: 0.4% **Low: 99.6%**

5. AGRICULTURAL POTENTIAL

5.1. Power line corridor

As can be seen from the information contained in Table 2, only land type **Dc31** (and, to a lesser extent **Ae26/Ae27**) has any significant proportion of high potential soils. All of the various Ib and Ic land types are predominantly steep and rocky.

Conclusion

Eastern Alternative: mainly rocky in the central portion, some high potential soils in places

Western Alternative: mixed, low to medium potential soils for most of route

Northern Sub-Alternative: mixed, low to medium potential soils

Turn-In Line: steep rocky areas, then mixed, low to medium potential soils closer to the river

There is no clear alternative as to whether the line should follow the Eastern or Western Route, but based on the above, it would appear as if the preferred route would be the Western Alternative (potentially fewer high potential soils) followed by the Northern Sub-Alternative.

5.2. Substation site

The area around the proposed site of the substation was investigated in another report (Paterson, 2007). In that report, it was established that the site, lying as it does in the foothills of the escarpment (land type **Ib25** as mentioned in this report) contains shallow soils (generally <300 mm deep) on to rock, with much rock outcropping on the surface. These soils have a low to very low potential for agriculture.

It is therefore not necessary to carry out a detailed survey for the proposed substation site.

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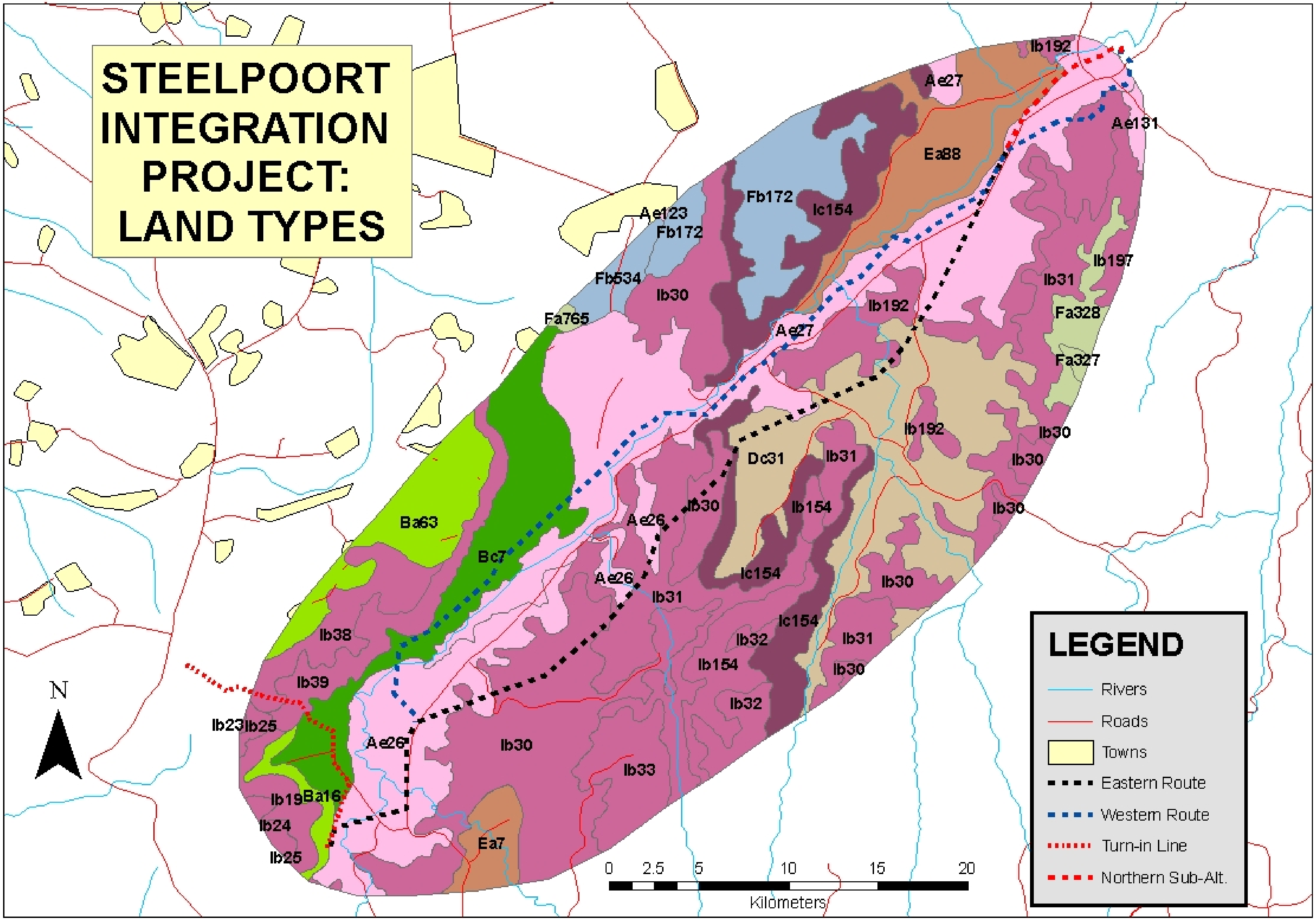
APPENDIX

LAND TYPE MAP


STEELPOORT INTEGRATION PROJECT: LAND TYPES
LEGEND
Rivers
Roads
Towns
Eastern Route
Western Route
Turn-in Line
Northern Sub-Alt.
N
0
2.5
5
10
15
20
Kilometers
Ib192
Ae27
Ae131
Ea88
Fb172
Ic154
Ae123
Fb172
Fb534
Ib30
Fa765
Ib192
Ae27
Ib197
Ib31
Fa328
Fa327
Ib192
Ib30
Ib30
Dc31
Ib31
Ib30
Ib154
Ib30
Ae26
Ba63
Bc7
Ae26
Ic154
Ib31
Ib30
Ic154
Ib38
Ib32
Ib31
Ib154
Ib30
Ib39
Ib32
Ib23
Ib25
Ae26
Ib30
Ib33
Ib19
Ba16
Ib24
Ea7
Ib25