Appendix G.7

AGRICULTURAL SCOPING REPORT

info@soilza.co.za
www.soilza.co.za
1A Wolfe St Wynberg
Cape Town, 7800
South Africa

AGRICULTURAL SITE SENSITIVITY VERIFICATION
FOR
THE PROPOSED PHEFUMULA EMOYENI ONE ELECTRICAL GRID INFRASTRUCTURE NEAR ERMELO, MPUMALANGA

Report by
Johann Lanz

24 June 2024

TABLE OF CONTENTS

1 METHODOLOGY OF STUDY

The assessment was based on an on-site investigation of the soils and agricultural conditions conducted on 20 April 2023. It was also informed by existing climate, soil, and agricultural potential data for the site (see references). The aim of the on-site assessment was to:

1. ground-truth cropland status;
2. ground truth the land type soil data and achieve an understanding of the general range and distribution patterns of different soil conditions across the site
3. gain an understanding of overall agricultural production potential across the site.

Soils were assessed based on the investigation of existing soil exposures in combination with indications of the surface conditions and topography. Soils were classified according to the South African soil classification system (Soil Classification Working Group, 2018).

This level of soil assessment is considered entirely adequate for an understanding of on-site soil potential for the purposes of a wind farm and associated electrical grid infrastructure assessment. For this purpose, only an understanding of the general range and distribution patterns of different soil conditions across the site is required. A more detailed soil survey would be extremely time consuming and impractical to conduct, given the very large assessment area, and would not provide any additional data that would add value to the assessment of the agricultural impact of the development.

An assessment of soils and long-term agricultural potential is in no way affected by the season in which the assessment is made, and therefore the date on which this assessment was done has no bearing on its results.

2 SITE SENSITIVITY VERIFICATION

A specialist agricultural assessment is required to include a verification of the agricultural sensitivity of the development site as per the sensitivity categories used by the web-based environmental screening tool of the Department of Forestry, Fisheries and the Environment (DFFE). Agricultural sensitivity is an indication of the capability of the land for agricultural production, based only on its climate, terrain, and soil capabilities and its agricultural land use. The different categories of agricultural sensitivity indicate the priority by which land should be conserved as agricultural production land. However, the screening tool's agricultural sensitivity is often of very limited value for assessing agricultural impact. What is of importance to an agricultural assessment, rather than the site sensitivity verification, is its assessment of the cropping potential and its assessment of the impact significance, both of which are not necessarily correlated with sensitivity.

The screening tool classifies agricultural sensitivity according to two independent criteria, from two independent data sets, both of which may be indicators of the land's agricultural production potential but are limited in that the first is outdated and the second is fairly course, modelled data. The two criteria are:

1. whether the land is classified as cropland or not on the field crop boundary data set (Crop Estimates Consortium, 2019), and
2. its land capability rating on the land capability data set (DAFF, 2017)

All classified cropland is, by definition, either high or very high sensitivity. Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain-fed agricultural production. It is rated by the Department of Agriculture's updated and refined, country-wide land capability mapping (DAFF, 2017). The higher land capability values (≥8 to 15) are likely to indicate suitability as arable land for crop production, while lower values (<8) are likely to only be suitable as non-arable grazing land. The direct relationship between land capability rating, agricultural sensitivity, and rain-fed cropping suitability is shown in Table 1.

Table 1: Relationship between land capability, agricultural sensitivity, and rain-fed cropping suitability.

Land capability value	Agricultural sensitivity	Rain-fed cropping suitability
1 - 5	low	Unsuitable
6 - 8	medium	Unsuitable to marginally suitable
9 - 10	high	Suitable
11 - 15	very high	Suitable

The agricultural sensitivity of the site, as classified by the screening tool, is shown in Figure 1. However, the screening tool sensitivity requires specialist verification because of the limitations of the data sets on which it is based.

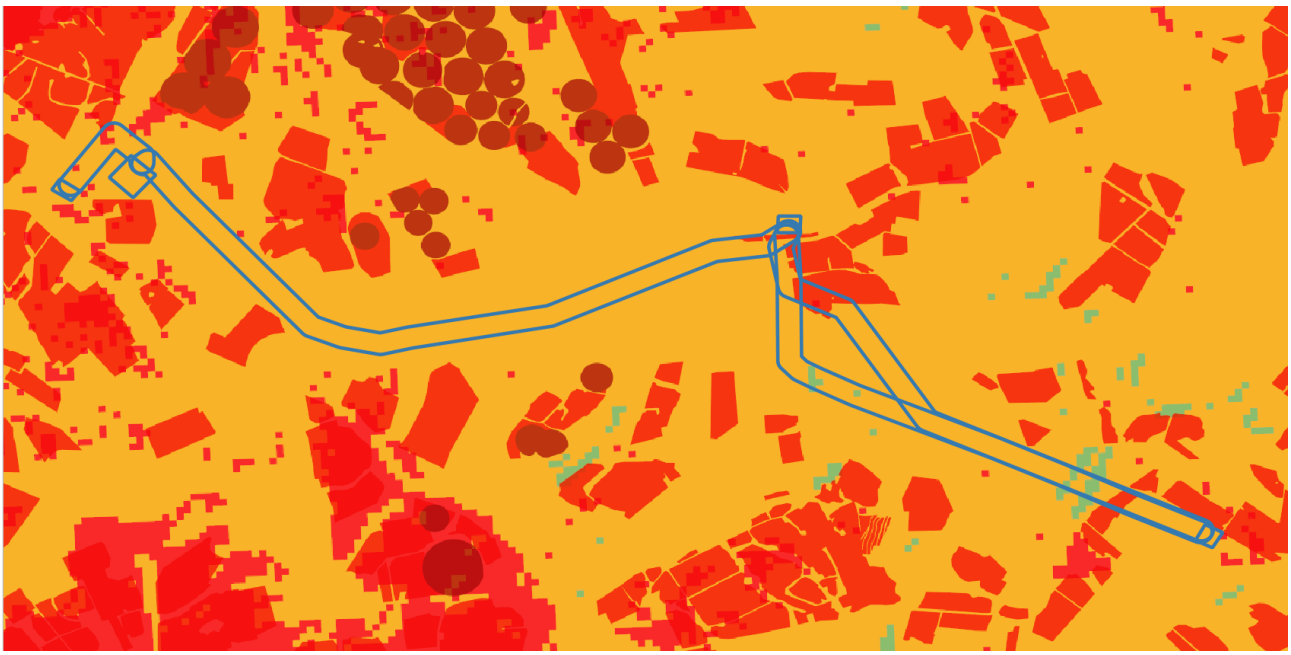

Figure 1. *The assessed grid corridor (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high). The screening tool's low to high sensitivity is confirmed by this assessment.*

This verification of sensitivity addresses both components that determine it, namely cropping status and land capability. The screening tool classifies the assessed area as ranging from low to high agricultural sensitivity. The high sensitivity classification is due to a combination of some land being classified as cropland and some being classified with a land capability of 9. This assessment confirms the high sensitivity rating by the screening tool that is based on cropping status.

The classified land capability of the site ranges from 4 to 9. The rating of land capability used by the screening tool is determined by an average soil capability value attributed to each land type. However, there are a range of soil capabilities within each land type, the detail of which the land capability data is unable to take account of and map. On the ground, the soils (and therefore the land capability) vary in a complex pattern across the landscape, which is not reflected at the scale of the land capability data. The most reliable indication of soil cropping potential or soil capability at a landscape scale in this environment is current and historical land use. The suitable versus the unsuitable soils have been identified over time through trial and error. In an agricultural environment like the one being assessed, all the suitable soils are generally cropped. Cropped soils have a real land capability of ≥8 because the relationship between land capability and agricultural production potential is such that a land capability of ≥8 should denote land that is suitable for viable rainfed crop production. Uncropped soils can fairly reliably be considered to have limitations that make them unsuitable for crop production with the result that their real land capability is less than 8.

In conclusion, this assessment disputes some of the detail of the sensitivity classification by the screening tool. It rates those parts of the site, on which there are currently viable croplands as being

of high agricultural sensitivity and the rest of the site as being of medium agricultural sensitivity with a land capability of <8.

3 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The purpose of this section is firstly to present the baseline information that controls the agricultural production potential of the site and then to assess that potential. Agricultural production potential, and particularly cropping potential, is one of three factors that determines the significance of an agricultural impact, together with size of footprint and duration of impact. However, in the case of a power line, one of the three factors, namely total footprint of land that will be lost to agriculture, is negligible and therefore determines the significance of the impact as negligible, regardless of what the value of the other two factors might be. The agricultural production potential of the site is therefore irrelevant, other than that cropland exists in the corridor and should be accommodated, where possible, by pylon locations.

All the important parameters that control the agricultural production potential of the site are given in Table 2. The land type soil data is given in Appendix 1. A satellite image map of the development site is given in Figure 2.

The site falls inside of an area that is classified as a Protected Agricultural Area (PAA). A PAA is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, or in a regional context, has made important contributions to the production of the various crops that are grown across South Africa. Within PAAs, the protection of arable land, is considered a priority for the protection of food security in South Africa. However, PAAs are demarcated broadly, not at a fine scale, and there may therefore be much variation of agricultural production potential within a PAA. All land within these demarcated areas is not necessarily of sufficient agricultural potential to be suitable for crop production, due to finer scale terrain, soil, and other constraints.

Table 2: Parameters that control and/or describe the agricultural production potential of the site.

	Parameter	**Value**
Climate	Köppen-Geiger climate description (Beck *et al*, 2018)	Temperate, dry winter, hot summer
	Mean Annual Rainfall (mm) (Schulze, 2009)	632
	Reference Crop Evaporation Annual Total (mm) (Schulze, 2009)	1219
	Climate capability classification (out of 9) (DAFF, 2017)	Between 5 (moderate) and 6 (moderate-high)

	Parameter	Value
Terrain	Terrain type	Low hills
	Terrain morphological unit	Varied
	Slope gradients (%)	0-20
	Altitude (m)	1700
	Terrain capability classification (out of 9) (DAFF, 2017)	Between 3 (low) and 8 (high-very high), but predominantly 6 (moderate-high)
Soil	Geology (DAFF, 2002)	Dolerite; sandstone, grit and shale of the Ecca Group, Karoo Sequence.
	Land type (DAFF, 2002)	Ea23
	Description of the soils	Predominantly very shallow to deep, very heavy textured, dark coloured soils on underlying rock, clay, or hardpan.
	Dominant soil forms	Arcadia, Mayo, Milkwood
	Soil capability classification (out of 9) (DAFF, 2017)	5 (moderate)
	Soil limitations	Limited soil depth, drainage
Land use	Agricultural land use in the surrounding area	dry land crop production, grazing
	Agricultural land use on the site	dry land crop production, grazing
General	Long-term grazing capacity (ha/LSU) (DAFF, 2018)	4
	Land capability classification (out of 15) (DAFF, 2017))	4 (low-very low) to 9 (moderate-high)
	Within Protected Agricultural Area (DALRRD, 2020)	Yes

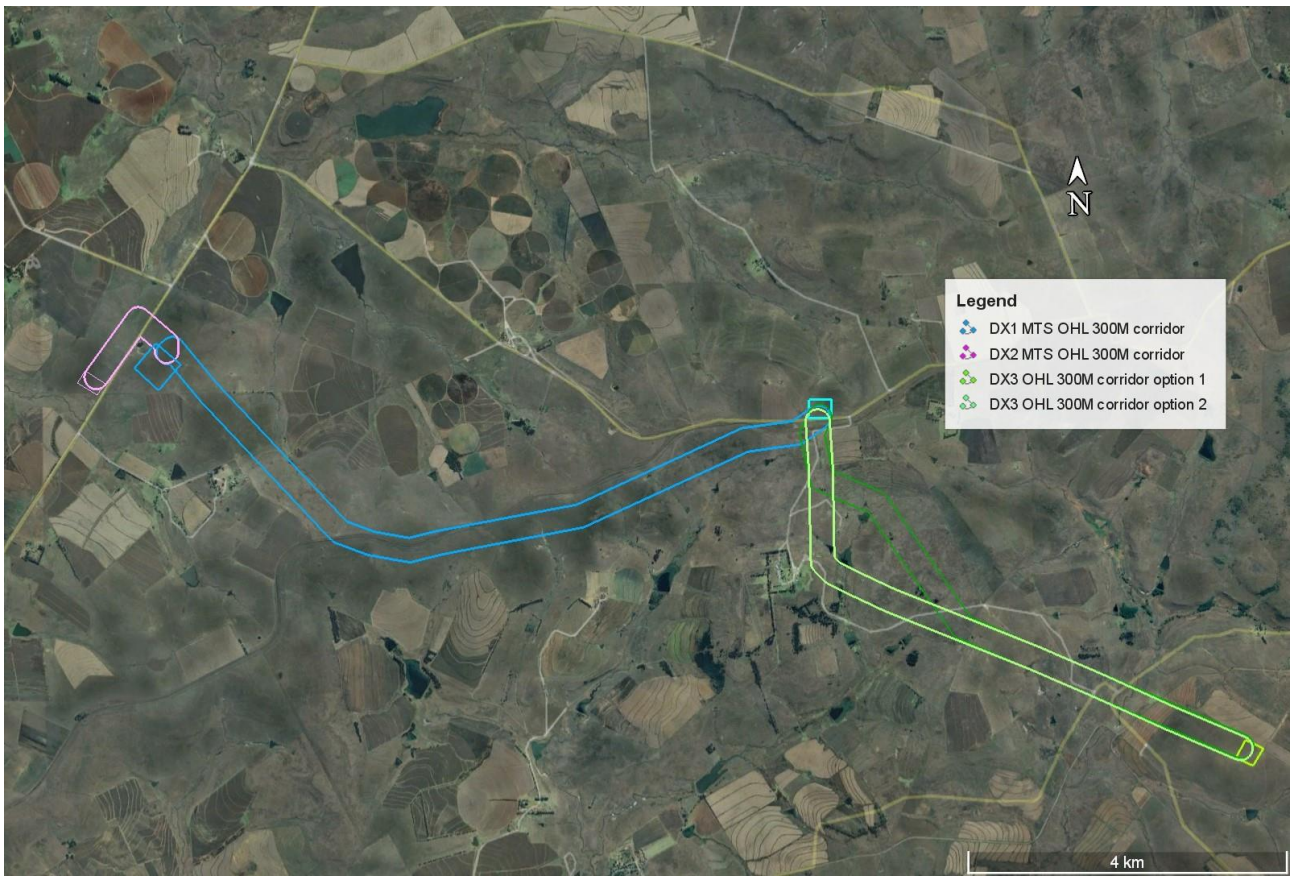

Figure 2. *Satellite image map of the proposed development.*

3.1 Assessment of the agricultural production potential

This assessment of the agricultural production potential of the site is based on an integration of the different parameters in Table 2 above and the on-site soil investigation.

In general, the soils across much of the site have insufficient capability for viable crop production while certain patches within it are suitable for viable cropping. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. The crop-suitable versus unsuitable soils have been identified over time through trial and error. All the deep, well-drained, suitable soils are generally cropped, and uncropped soils that are used for grazing can fairly reliably be considered to have various limitations that make them unsuitable for crop production.

In general, the site is within an area that makes a significant contribution to food production in the country. Due to the favourable climate, crop yields are high on the suitable soils with average maize yields of around 7 tons per hectare according to the farmers on site.

4 CONCLUSION

The site is classified as low to high agricultural sensitivity by the screening tool. This assessment confirms the high sensitivity of all the cropland areas within the site and rates all other areas within it as being of medium agricultural sensitivity.

5 REFERENCES

Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood. 2018. Present and future Köppen-Geiger climate classification maps at 1-km resolution, Nature Scientific Data. Available at: https://gis.elsenburg.com/apps/cfm/.

Crop Estimates Consortium, 2019. Field Crop Boundary data layer, 2019. Pretoria. Department of Agriculture, Forestry and Fisheries.

Department of Agriculture Forestry and Fisheries (DAFF). 2018. Long-term grazing capacity map for South Africa developed in line with the provisions of Regulation 10 of the Conservation of Agricultural Resources Act, Act no 43 of 1983 (CARA), available on Cape Farm Mapper. Available at: https://gis.elsenburg.com/apps/cfm/

Department of Agriculture, Forestry and Fisheries (DAFF). 2017. National land capability evaluation raster data layer, 2017. Pretoria.

Department of Agriculture, Forestry and Fisheries (DAFF). 2002. National land type inventories data set. Pretoria.

Department of Agriculture, Land Reform and Rural Development (DALRRD). 2020. Protected agricultural areas – Spatial data layer. 2020. Pretoria.

Schulze, R.E. 2009. South African Atlas of Agrohydrology and Climatology, available on Cape Farm Mapper. Available at: https://gis.elsenburg.com/apps/cfm/

Soil Classification Working Group. 2018. Soil Classification: A Natural and Anthropogenic System for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

APPENDIX 1: SOIL DATA

Table of land type soil data

Land type	Soil series (forms)	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Ea23	Ar	300 - 900	40 - 70		so,lc	19,5
Ea23	My	200 - 500	30 - 55	20 - 45	so,lc	14,8
Ea23	My	300 - 500	30 - 55	20 - 45	so,lc	14,8
Ea23	Mw	200 - 400	30 - 45		H	10,5
Ea23	Sw	250 - 400	20 - 30	35 - 45	so,lc	8,5
Ea23	R					6,3
Ea23	Rg	600 - 1000	40 - 70		gc	5,5
Ea23	Va	250 - 400	20 - 30	35 - 50	vp	4,3
Ea23	Kd	500 - 1000	15 - 30	40 - 60	gc	4,3
Ea23	Bo	700 > 1200	30 - 55	25 - 50	so,lc	3,3
Ea23	Av	600 - 1000	25 - 35	35 - 45	sp	2,8
Ea23	Hu	400 > 1200	25 - 35	35 - 45	so,lc	2,8
Ea23	Ms	100 - 300	20 - 30		H,P	2,0
Ea23	S					1,0