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AGRICULTURAL IMPACT ASSESSMENT FOR PROPOSED ORYX SOLAR ENERGY FACILITY, FREE STATE PROVINCE

SCOPING PHASE REPORT

Report by
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May 2013

1. INTRODUCTION

FRV Energy South Africa (Pty) Ltd is proposing to develop the Oryx Solar Energy Facility near Virginia in the Free State Province. The development will have a generating capacity of up to 75MW and will consist of arrays of photovoltaic panels supported by mounting structures, an on-site substation, workshop, storage and office buildings, internal access roads, cabling, and fencing. The development is currently in the Scoping Phase and this scoping report describes the soils and agricultural potential of the proposed site and the likely impacts that the development may have on agricultural resources and production.

Johann Lanz was appointed by Savannah Environmental as an independent specialist to conduct the study on soils and agricultural potential as part of the EIA.

2. DESCRIPTION OF THE SOILS AND AGRICULTURAL CAPABILITY OF THE AFFECTED ENVIRONMENT

All the information on soils and agricultural potential in this report has been obtained from the AGIS online database, produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated).

The proposed energy facility site is on flat Free State plains, 11 kilometres south-west of the town of Virginia. Rainfall for the site is given as 523 mm per annum with a standard deviation of 118 mm according to the South African Rain Atlas (Water Research Commission, undated).

The land type classification is a nation-wide survey that groups areas of similar soil and terrain conditions into different land types. There is a boundary between two land types that runs close to the edge of the site (see Figure 1). Most of the site is on land type Bd20. This land type is dominated by deep, yellow, well-drained sandy to loamy soils. The adjacent land type is Dc8, which has shallower, clay rich, structured soils including vertic soils (soils with high swelling and shrinking capacity). A summary detailing soil data for each land type is provided in Table 1. The geology of the area is Ecca sandstone, mudstone and shale with overlying aeolian sands.

Land capability is the combination of soil suitability and climate factors. The entire area in Figure 1 has a land capability classification, on the 8 category scale, as: Class IV - marginal potential arable land.

Potential maize yield provides a good indication of agricultural potential across the site and is illustrated in Figure 2. There are two categories of potential maize yield, 0.6 to 1.4 and 2.5-3.4 tons per hectare. The natural grazing capacity of the farm is given as 9-

10 hectares per large stock unit for the eastern half and 11-15 hectares per large stock unit for the western half, in which the PV panels are proposed.

Land use in the area includes maize and wheat production. There is no evidence of irrigated land on the site.

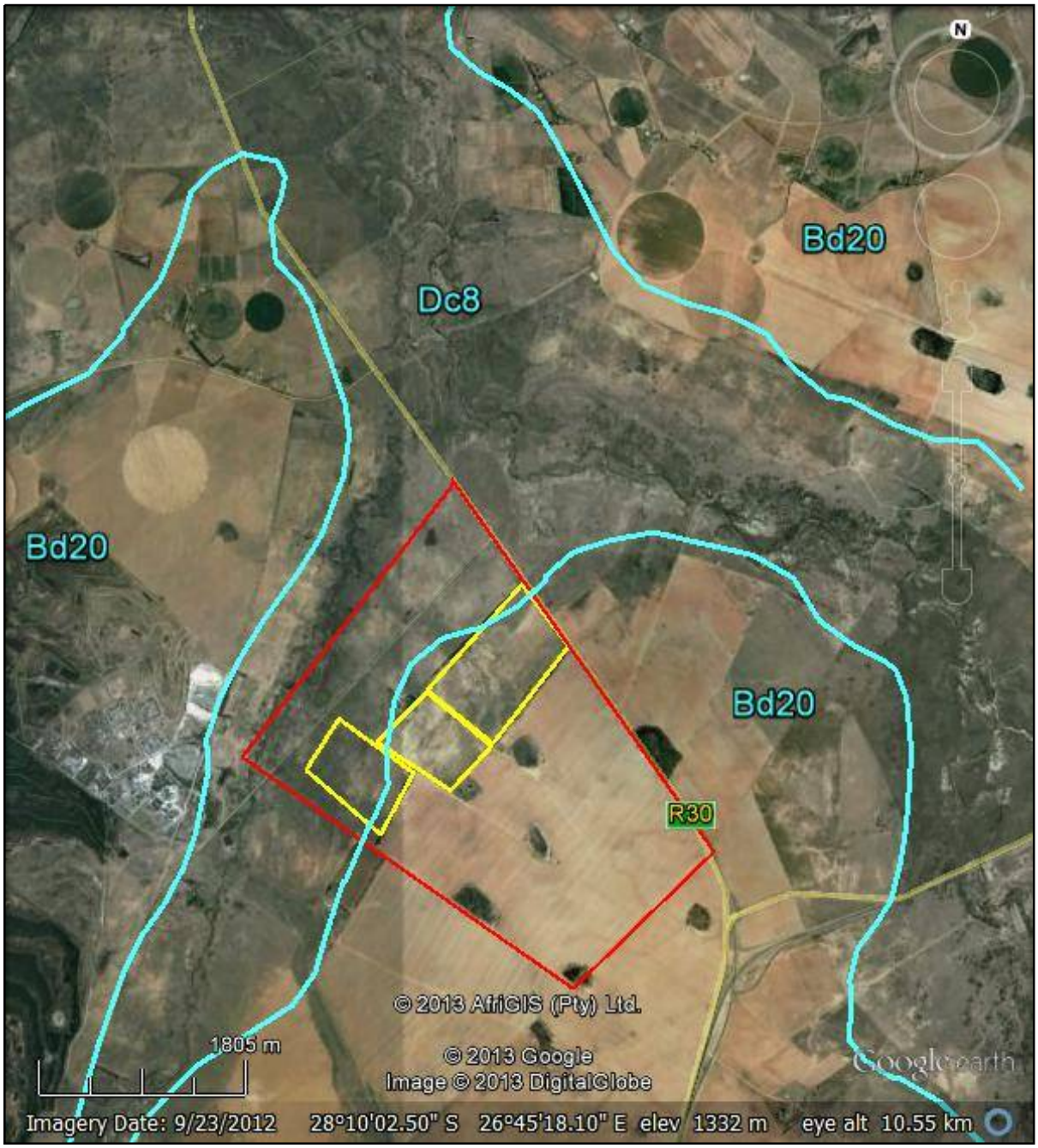

Figure 1. The 3 potential PV sites of 83, 43 and 48 hectares (yellow outlines), within the farm boundary of 860 hectares (red outline) showing the surrounding land type classifications, with boundaries and labels in blue.

Table 1. Land type data for site. Dominant soil forms are listed in decreasing order of surface coverage.

Land type	Land capability class	Dominant soil forms	Depth (cm)	Topsoil clay%
Bd20	IV	Clovelly Avalon Hutton	>120 60-100 >100	4-15 6-15 4-15
Dc8	IV	Arcadia Valsrivier Oakleaf Rensburg	>120 10-30 >120 90-120	40-55 15-26 4-20 44-70

Capability class is defined as:
IV - Marginal potential arable land

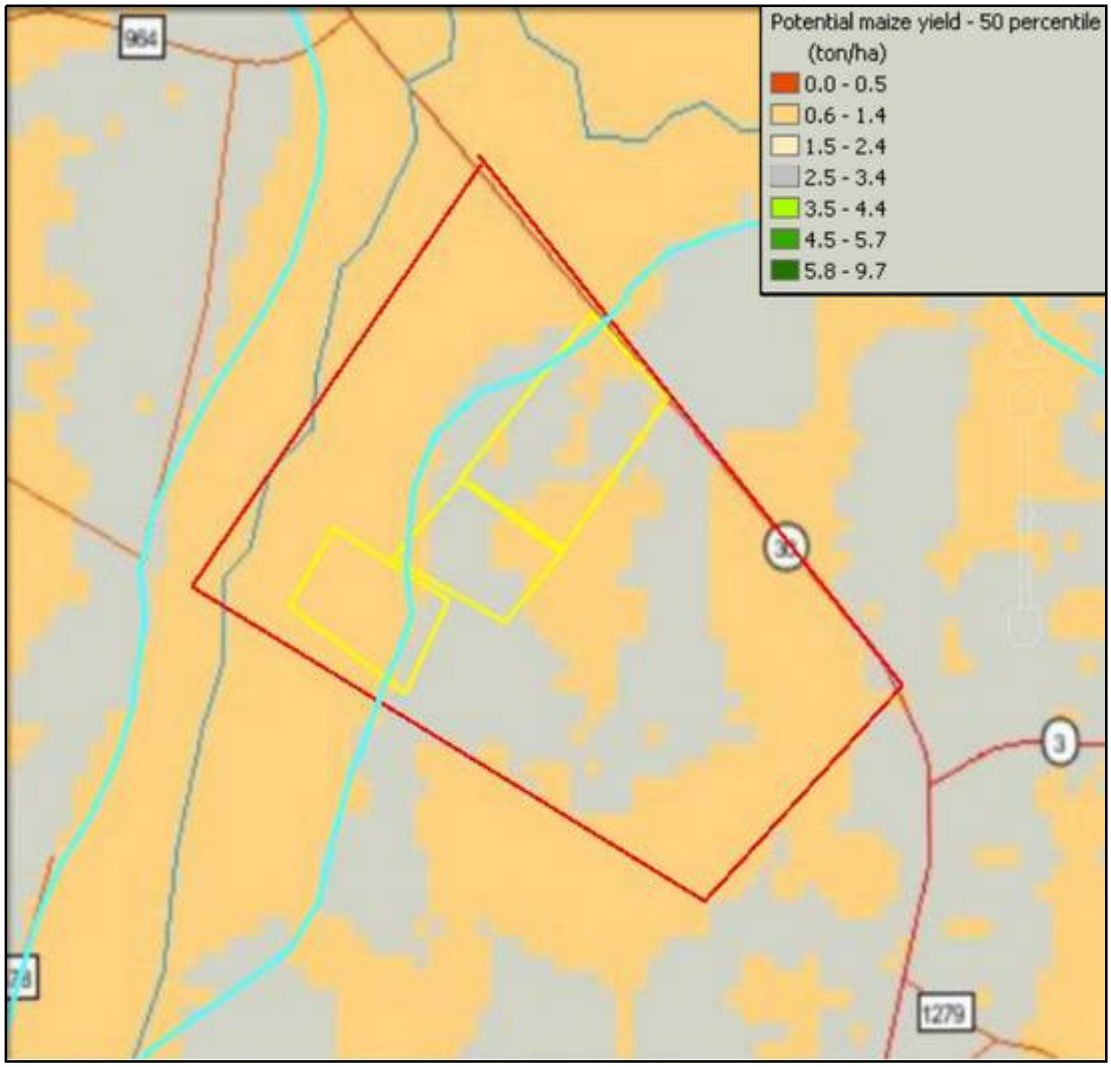

Figure 2. The potential maize yield across and surrounding the site. Land type

boundaries from Figure 1 are shown in blue.

3. POTENTIAL IMPACTS

The following have been identified as potential impacts on agricultural resources and productivity, the significance of which will be determined during the EIA Phase. All these impacts are local in extent.

1. Loss of agricultural land due to direct occupation by panels and other infrastructure, including roads, for the duration of the project. This will take affected portions of land out of agricultural production.
2. Land surface disturbance and alteration of its run-off characteristics due to construction activities, vegetation removal, and the establishment of hard standing areas and roads, and its resultant potential impact on erosion. Erosion will cause loss and deterioration of soil resources.
3. Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability.
4. Placement of spoil material generated from construction related excavations which can cover agricultural land and thereby render it unsuitable for future agriculture.
5. Generation of alternative farm income is a positive impact of the development on the financial sustainability of farmers.
6. Cumulative impacts due to the regional loss of agricultural resources and production as a result of other developments on agricultural land in the region.

4. THE POTENTIAL SIGNIFICANCE OF IMPACTS

The significance of agricultural impacts is influenced by the limited agricultural capability of the site and the fact that there is no irrigated agriculture. None of the above impacts are therefore likely to be of high significance. Mitigation measures can also be put in place to reduce the significance of many of these impacts.

5. ASSESSMENT TO BE UNDERTAKEN IN THE EIA PHASE

The following assessments will be undertaken in the EIA phase:

4.1 More detailed assessment of soil conditions

The EIA phase assessment will include a field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil conditions on site. It

will not be based on a grid spacing of test pits but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of the facility on agricultural resources and productivity.

4.2 Assessment of erosion and erosion potential on site

The field investigation will involve a visual assessment of erosion and erosion potential on site, taking into account the proposed development layout.

4.3 Assessment of the impacts of specific construction activities and layout on soil conditions

The EIA phase will include an assessment of the specifics of construction activities and the proposed development layout on potential loss of topsoil and generation of spoil material.

4.4 Assessment of specific on-site agricultural activities

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

4.5 Terms of reference for EIA study

The terms of reference for the EIA study will include the requirements for an agricultural study as described under point 4 of section C of the National Department of Agriculture, Forestry and Fisheries document: *Regulations for the evaluation and review of applications pertaining to renewable energy on agricultural land***,** dated September 2011.

The above requirements may be summarised as:

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on agricultural resources and production.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Assess the status of the land including erosion, vegetation and degradation.
- Describe the topography of the site.

- Do basic climate analysis and identify suitable crops and their water requirements.
- Summarise available water sources for agriculture.
- Describe historical and current land use and agricultural infrastructure on and surrounding the site, as well as possible alternative land use options.
- Determine and map the agricultural potential of the site.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for identified impacts.

5. REFERENCES

Agricultural Research Council. Undated. AGIS Agricultural Geo-Referenced Information System available at http://www.agis.agric.za/.

Water Research Commission. Undated. South African Rain Atlas available at http://134.76.173.220/rainfall/index.html.