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1 INTRODUCTION

Droërivier Solar Power Plant (Pty) Ltd is proposing to develop the Droërivier Solar Facility on Portion 55 of Farm 168 Steenrotsfontein and a portion of Portion 10 of Farm 170 Weltevreden, approximately 10 kilometres south west of the town of Beaufort West in the Western Cape Province (see figure 1). The facility will have a generation capacity of 75 MW and will utilise approximately 250 hectares land. It will consist of:

- Arrays of photovoltaic panels supported by mounting structures;
- An overhead 132kV transmission line of approximately 3km in length, which will align parallel to one of the two existing transmission lines already crossing the study site, to link the facility to the nearby Eskom Droërivier Substation north of the Gamka River;
- An on-site Switching / Sub-station;
- Auxiliary Buildings (Control Centre, Administration offices, Security etc.);
- A network of Inverters, Transformers & Underground Cabling;
- Access road off the N12 & internal road network to and around the Photovoltaic panels;
- Perimeter security fencing;
- Rainwater tanks.

The development is currently in the Scoping Phase of the Environmental Impact Assessment and this scoping report describes the soils and agricultural potential of the proposed site and the impacts that the development may have on agricultural resources and production. Johann Lanz was appointed by Cape Environmental Assessment Practitioners as an independent specialist to conduct this study on soils and agricultural potential as part of the EIA.

2 LEGISLATIVE REQUIREMENTS

Approval of the development is required from Department of Agriculture in terms of the Conservation of Agricultural Resources (CARA) Act, 43 of 1983 and the Sub-division of Agricultural Land (SALA) Act, 70 of 1970. Approval in terms of SALA is required for long term lease, or consent use, even if no subdivision is required for the project. A separate CARA permit application is not required, only approval of the EIA.

3 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 online Agricultural Geo-Referenced Information System (AGIS), produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated).
An more detailed satellite image of the site is shown in Figure 2.

3.1 Climate and water availability

Rainfall for the site is given as a low 180 mm per annum, with a standard deviation of 66 mm according to the South African Rain Atlas (Water Research Commission, undated). The average monthly distribution of rainfall is shown in Table 1. One of the most important climate parameter for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into 6 categories across the country (see Table 2). The proposed development site falls within class 6 which is described as a very severe limitation to agriculture.

Table 1. Average monthly rainfall for the site (32° 26’ S 22° 32’ E) in mm (Water Research Commission, undated)

<table>
<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Tot</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>22</td>
<td>27</td>
<td>21</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>180</td>
</tr>
</tbody>
</table>
Table 2. The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, Undated)

<table>
<thead>
<tr>
<th>Climate class</th>
<th>Moisture availability (Rainfall/0.25 PET)</th>
<th>Description of agricultural limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>&gt;34</td>
<td>None to slight</td>
</tr>
<tr>
<td>C2</td>
<td>27-34</td>
<td>Slight</td>
</tr>
<tr>
<td>C3</td>
<td>19-26</td>
<td>Moderate</td>
</tr>
<tr>
<td>C4</td>
<td>12-18</td>
<td>Moderate to severe</td>
</tr>
<tr>
<td>C5</td>
<td>6-12</td>
<td>Severe</td>
</tr>
<tr>
<td>C6</td>
<td>&lt;6</td>
<td>Very severe</td>
</tr>
</tbody>
</table>

3.2 Terrain and soils

The proposed development is located on a terrain unit of irregular plains with low hills or ridges in the central Karoo at an altitude of approximately 790 meters. Slopes across the proposed PV site are below 2%.

The underlying geology is mudstone, siltstone and sandstone of the Beaufort Group, Karoo Supergroup.

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. There is a single land type across the site where the solar panels will be erected, namely Fc160. Soils of this land type are predominantly very shallow, sandy to loamy sand soils on underlying rock. The soils would fall into the Lithic soil group according to the classification of Fey (2010). There is a second land type, Ia45, that occupies the flood plain area of the Gamka River, over which the overhead power line linking the facility to the substation will run. These soils are predominantly young soils that have formed in deep, sandy alluvial deposits and would fall into the Cumulic soil group according to the classification of Fey (2010). A summary detailing soil data for the land types is provided in Table A1.

The land is classified as having a low to moderate water and wind erosion hazard.

The biome classification for the majority of the site is Gamka Karoo, and for the riverine section is Southern Karoo Riviere.
3.3 Agricultural capability

Land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the 8 category scale, of Class 7 - non-arable, low potential grazing land. The limitations to agriculture are aridity and lack of access to water plus the very shallow soil depth and rockiness. Because of these constraints, agricultural land use is restricted to low intensity grazing only. The natural grazing capacity is low, at 41-80 hectares per animal unit.
3.4 Land use and development on and surrounding the site

The farm is located within a sheep farming agricultural region. There is no cultivation on the proposed site. There is a farmstead along the northern bank of the river with a small area of cultivated land on the flood plain around it.

3.5 Possible land use options for the site

Because of the severe climate and soil limitations, the site is not suitable for cultivated crops, and viable agricultural land use is limited to grazing of small stock or game only.

3.6 Agricultural sensitivity

Agricultural potential is uniform across the farm and the choice of placement of the facility on the farm therefore has minimal influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the proposed development footprint.

4 POTENTIAL IMPACTS

The following have been identified as potential impacts on agricultural resources and productivity. All these impacts are local in extent, confined to the site.

- Loss of agricultural land use due to direct occupation by the infrastructural footprint of the development for the duration of the project (all phases). This will take affected portions of land out of agricultural production.
- Soil erosion by wind or water due to alteration of the land surface characteristics. Alteration of surface characteristics may be caused by construction related land surface disturbance, vegetation removal, panel surfaces and the establishment of hard standing areas, surfaces and roads. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.
- 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 capability for supporting vegetation.
- Generation of alternative land use income through rental for energy facility. This will provide farming enterprises with increased cash flow and rural livelihood, and thereby improve the financial sustainability of farming on site.
- Cumulative impacts due to the regional loss of agricultural resources and production as a result of other developments on agricultural land in the region.
5 THE POTENTIAL SIGNIFICANCE OF IMPACTS

South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of land that may be valuable and important for agricultural production. The proposed site is on land which is totally unsuitable for cultivation due to both climate and soil constraints, and is only suitable for low intensity grazing. This means that the significance of all agricultural impacts is likely to be low.

6 RECOMMENDATIONS FOR ASSESSMENT TO BE UNDERTAKEN IN THE EIA PHASE

The following assessments are recommended for the EIA phase:

6.1 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 and agricultural 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, if necessary. 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 development on agricultural resources and productivity.

6.2 Assessment of erosion status and erosion potential on site

The field investigation will involve a visual assessment of existing erosion, and other potential land degradation, as well as erosion potential on site, taking into account the proposed development layout.

6.3 Assessment of the impacts of specific construction activities and layout on loss of topsoil

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

6.4 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.

7 CONCLUSIONS

The key findings of this study are:

- The development of the solar facility is predicted to have low negative impacts on agricultural resources and productivity but also to deliver a positive impact on agriculture.
- The significance of all agricultural impacts is influenced by the fact that the site has extremely limited agricultural potential, with a land capability of class 7, non-arable, low potential grazing land. The site is used only for low intensity grazing.
- No agriculturally sensitive areas occur within the proposed development footprint.
- Soils are predominantly extremely shallow, sandy to loamy sand soils on underlying rock.
- The major limitations to agriculture are the aridity and lack of access to water, as well as the extremely shallow and rocky soils.
- Three potential negative impacts of the development on agricultural resources and productivity were identified as:
  - Loss of agricultural land use caused by direct occupation of land by the energy facility footprint.
  - Soil Erosion caused by alteration of the surface characteristics.
  - Loss of topsoil in disturbed areas, causing a decline in soil fertility.
- One potential positive impact of the development on agricultural resources and productivity was identified as:
  - Generation of additional land use income through rental for energy facility, which provides farming enterprises with increased cash flow and rural livelihood, and thereby improves the financial sustainability of farming on site.
- The conclusion of this assessment is that, from an agricultural impact perspective, there are no fatal flaws associated with the development.

8 REFERENCES


**APPENDIX 1: SOIL DATA**

**Table A1.** Land type soil data for site.

<table>
<thead>
<tr>
<th>Land type</th>
<th>Land capability class</th>
<th>Soil series (forms)</th>
<th>Depth (cm)</th>
<th>Clay % A horizon</th>
<th>Clay % B horizon</th>
<th>Depth limiting layer</th>
<th>% of land type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fc160</td>
<td>7</td>
<td>Mispah</td>
<td>5-20</td>
<td>6-15</td>
<td></td>
<td>R</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glenrosa</td>
<td>10-30</td>
<td>6-20</td>
<td>10-20</td>
<td>so</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td>0</td>
<td></td>
<td></td>
<td>R</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oakleaf</td>
<td>50-&gt;120</td>
<td>6-10</td>
<td>10-25</td>
<td>R, ca</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ia45</td>
<td>7</td>
<td>Oakleaf</td>
<td>60-&gt;120</td>
<td>6-15</td>
<td>10-35</td>
<td>R, ca</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dundee</td>
<td>60-&gt;120</td>
<td>0-6</td>
<td></td>
<td>R, ca</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clovelly</td>
<td>&gt;120</td>
<td>6-10</td>
<td>6-15</td>
<td>R</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valsrivier</td>
<td>15-25</td>
<td>6-15</td>
<td>35-55</td>
<td>vr, vp</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rock outcrop</td>
<td>0</td>
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<td></td>
<td>R</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swartland</td>
<td>15-20</td>
<td>6-15</td>
<td>25-55</td>
<td>vr</td>
<td>3</td>
</tr>
</tbody>
</table>

Land capability classes: 7 = non-arable, low potential grazing land.

Depth limiting layers: R = hard rock; so = partially weathered bedrock; ca = hardpan carbonate; vp = dense, structured clay layer; vr = dense, red, structured clay layer.