



SUBSOLAR ENERGY (PTY) LTD SITE ASSEMENT OF REMAINING EXTENT
OF THE FARM KALKOENKRANS NO. 225, FREE STATE PROVINCE, SOUTH
AFRICA

AUGUST 2022

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1. Executive Summary

The town of Virginia is located approximately 7,5 km north-east of the proposed farm portion and is owned by William Peter Du Plessis Familie Trust. The identified site is located on the Remaining Extent of the Farm Kalkoenkrans No. 225 and the total size of the farm is approximately 855 hectares (ha) within the Free State Province, Registration Division Theunissen, South Africa (Figure 1). The study area falls within Matjhabeng Local Municipality.

The landscape consists of level plains with some relief. Access to the farm can be obtained from a gravel road off the R30. For connection to the grid there is four options. The electricity generation from the facility could connect into the Theseus MTS 400/132/22 kV substation or a loop-in loop-out connection into the Oryx 2 - Theseus 1 132kV Overhead Line, Oryx 1 - Theseus 1 132kV Overhead Line or the Beatrix - Theseus 1 132kV Overhead Line.

The site has low to medium agricultural potential as well as low to moderate potential grazing capacity. This site has favourable conditions for a solar power plant due to its environmental conditions, weather conditions (i.e. Virginia has good solar radiation levels) as well as good site access.

The site has good solar radiation, ecology and relative flat terrain (refer to Figures below). Some parts of this site may not be suitable due to issues found on it namely wetlands, drainage lines, etc.

2. Remaining Extent of the Farm Kalkoenkrans No. 225

The Remaining Extent of the Farm Kalkoenkrans No. 225 is located within the Free State Province, Registration Division Theunissen, South Africa and falls within the Matjhabeng Local Municipality.

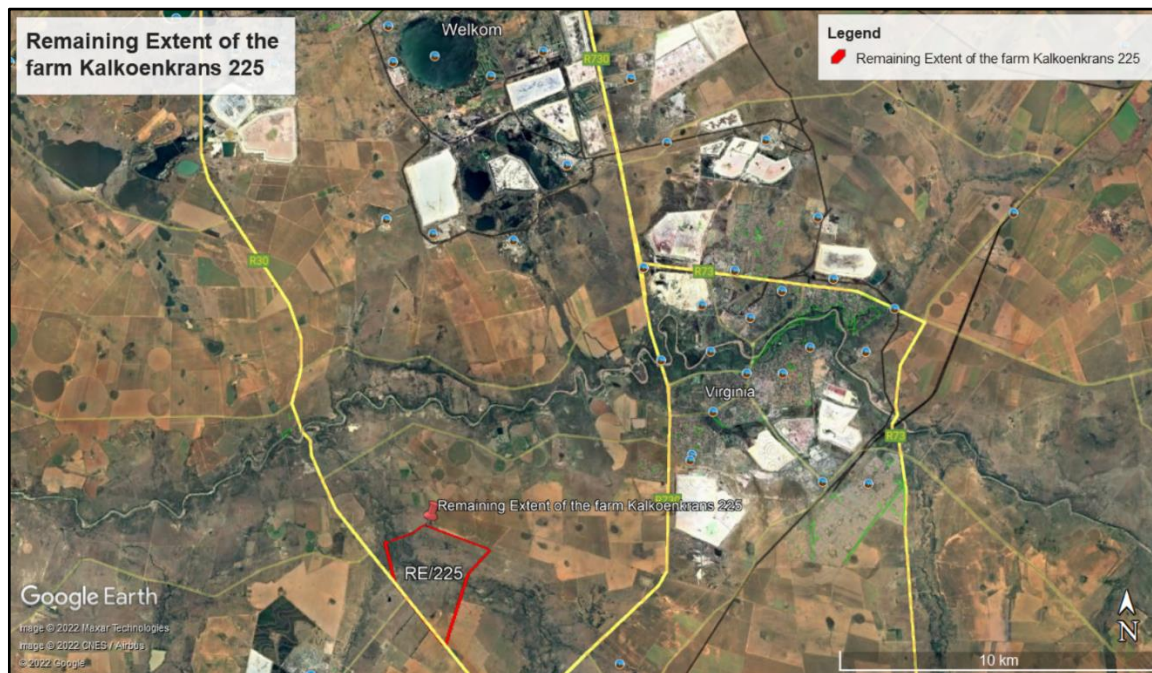


Figure 1: Remaining Extent of the Farm Kalkoenkrans No. 225 shown by the red pin

3. Power lines and substations

Virginia area Eskom Grid:

The Theseus Substation (MTS) is located approximately 5.5 km from the farm portion as illustrated in Figure 2 below.

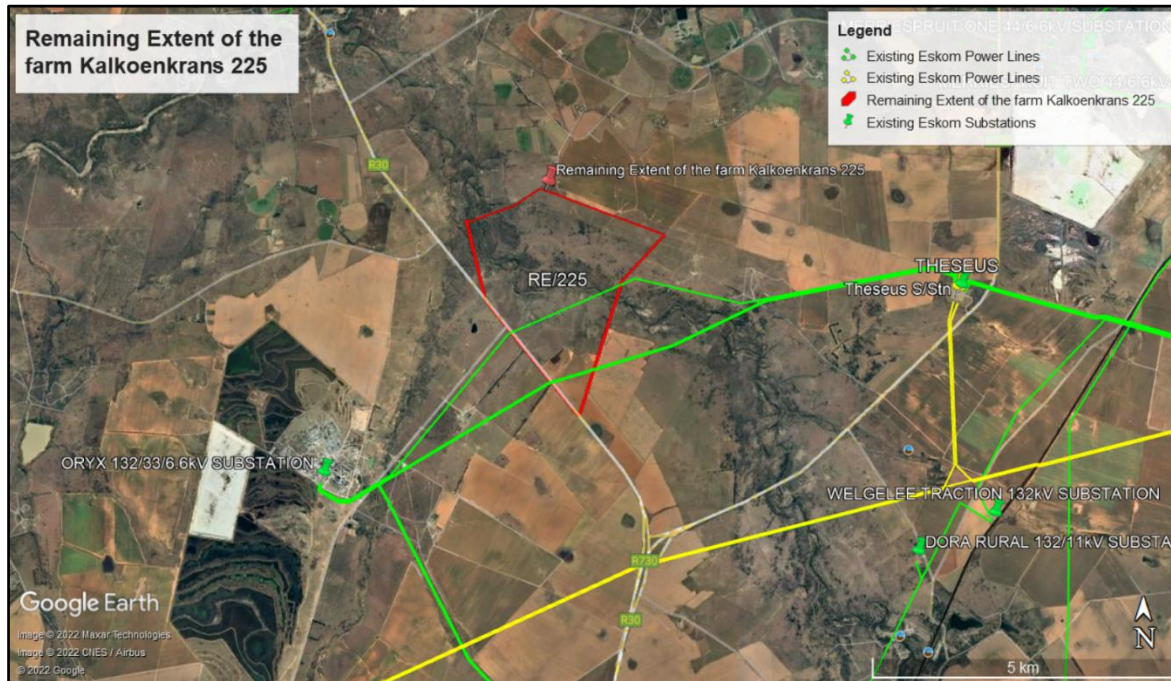


Figure 2: Remaining Extent of the Farm Kalkoenkrans No. 225 shown by the red pin and the proximity to the Theseus Substation (approximately 5.5 km)

Theseus MTS statistics:

- Supply Area: Free State province
- Local Area: Virginia
- Transformer Voltage: 400/132 kV
- Transformers installed: 2 x 500 MVA
- REIPPPP Generation allocation to date: 0 MW
- Load at Theseus MTS: 292 MW
- Transformer Limit: 1242 MW
- Substation Limit: 1480 MW
- Local Area Limit: 1280 MW
- Supply Area Limit: 1260 MW

Power Lines near site:

- Oryx 2 - Theseus 1 132kV Overhead Line;
- Oryx 1 - Theseus 1 132kV Overhead Line;
- Beatrix - Theseus 1 132kV Overhead Line.

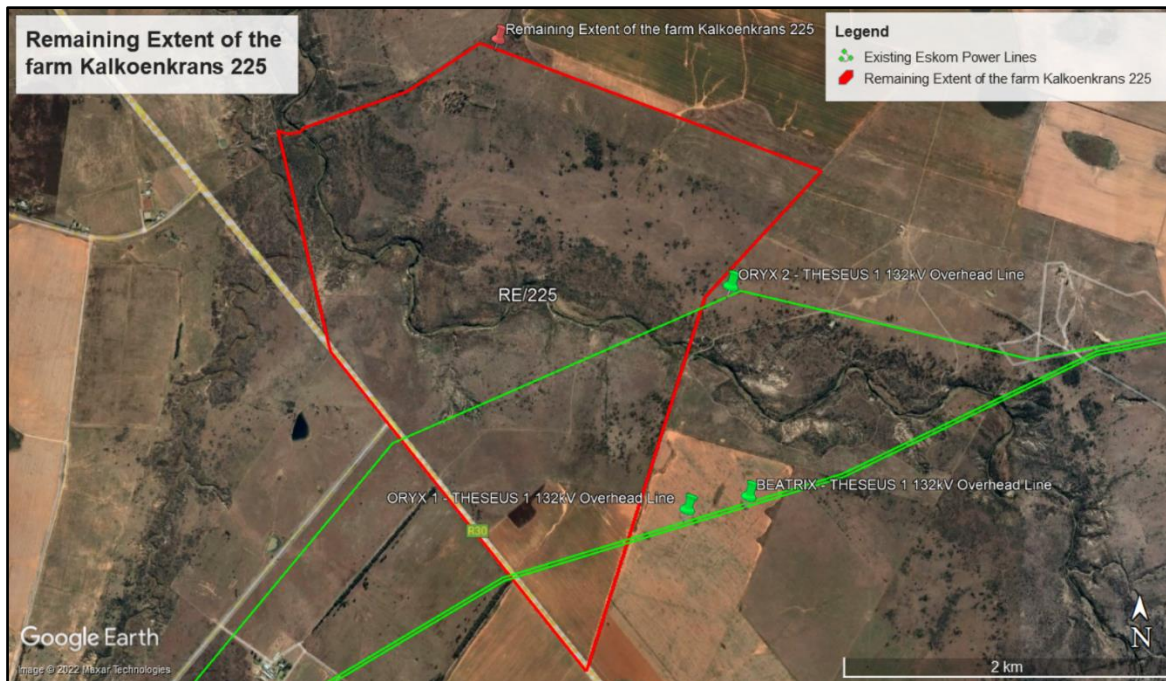


Figure 3: Three 132kv powerlines traverses the Remaining Extent of the Farm Kalkoenkrans No. 225

4. Environmental impact assessments done in the area

15 other EIAs have been conducted within a 30km radius of the farm portion:

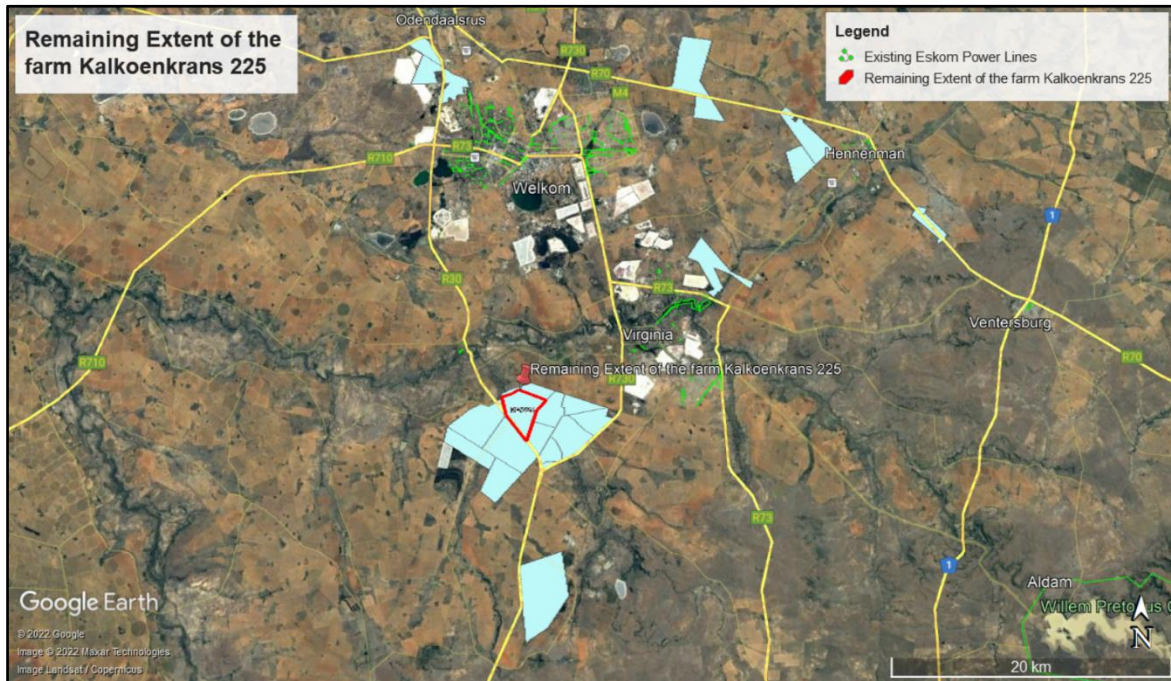


Figure 4: EIA's within 30km of the Remaining Extent of the Farm Kalkoenkrans No. 225

Summary of similar EIAs conducted within 30km of the site:

Project name	Proposed generation capacity (MW)	DFFE Reference	Project Status
Harmony Nyala solar energy facility	10MW	14/12/16/3/3/1/1472	Approved
Harmony Eland solar energy facility	10MW	14/12/16/3/3/1/1471	Approved
Proposed development of a 75 MW Photovoltaic Solar Farm on the Remaining Extent of the Farm Uitkyk No. 509, the Remaining Extent of the Farm Helderwater No. 494 and Portion 1 of the Farm Doornpan No. 426.	75MW	14/12/16/3/3/2/581	Approved
Everest solar energy facility near Hennenman, Free State Province	75MW	14/12/16/3/3/2/512	Approved
Photovoltaic energy farm on the farm Onverwag NO. 728 and PTN 2 of the farm Vaalkranz NO. 220, in Welkom	75MW	14/12/16/3/3/2/580	Approved
Solar photovoltaic project 221 for electricity generation on portion of the	19.9MW	12/12/20/2668	Approved

farm Leeubult 52 Beatrix Mine Shaft 2, Virginia,			
Sonvanger photovoltaic solar energy facility	75MW	14/12/16/3/3/2/672	Approved
Photovoltaic Solar Facility And Associated Infrastructure On Portion 225 Of Farm Kalkoenkrans, Beatrix Mine Shaft 4, Oryx Mine In Virginia	20MW	12/12/20/2669/A	Approved
Co-Generation Facility At The Beatrix Gold Mine Shaft 4, Located Between Theunissen And Virginia, Within Masilonyana Local Municipality	4MW	14/12/16/3/3/2/328	Approved
Photovoltaic Facility For The Generation Of Electricity On Portion Of Farm Palmietkuil 328, Beatrix Mine Shaft 4, Oryx Mine In Virginia.	19.9MW	12/12/20/2666/A	Approved
Keren Holdings Doornriver Solar plant on remainder of Farm NR330, Theunissen within Matjhabeng Local Municipality	No info available	14/12/16/3/3/2/436	Withdrawn/Lapsed
Keren Holdings Korhaan Creek Solar plant on Farm 330 Portion 5, Theunissen within Matjhabeng Local Municipality	No info available	14/12/16/3/3/2/434	Withdrawn/Lapsed
Proposed Keren Property Holdings Kalkoenkrans solar plant on Farm Kalkoenkrans NR 225 Portion 7, Theunissen, Matjhabeng Local Municipality, Free State	No info available	14/12/16/3/3/2/433	Withdrawn/Lapsed
Proposed 75MW Oryx solar energy facility near Virginia Free State Province	75MW	14/12/16/3/3/2/526	Withdrawn/Lapsed
Proposed 150MW Oryx solar energy facility near Virginia Free State Province	75MW	14/12/16/3/3/2/526	In Process

5. Natural resources

5.1 Geology

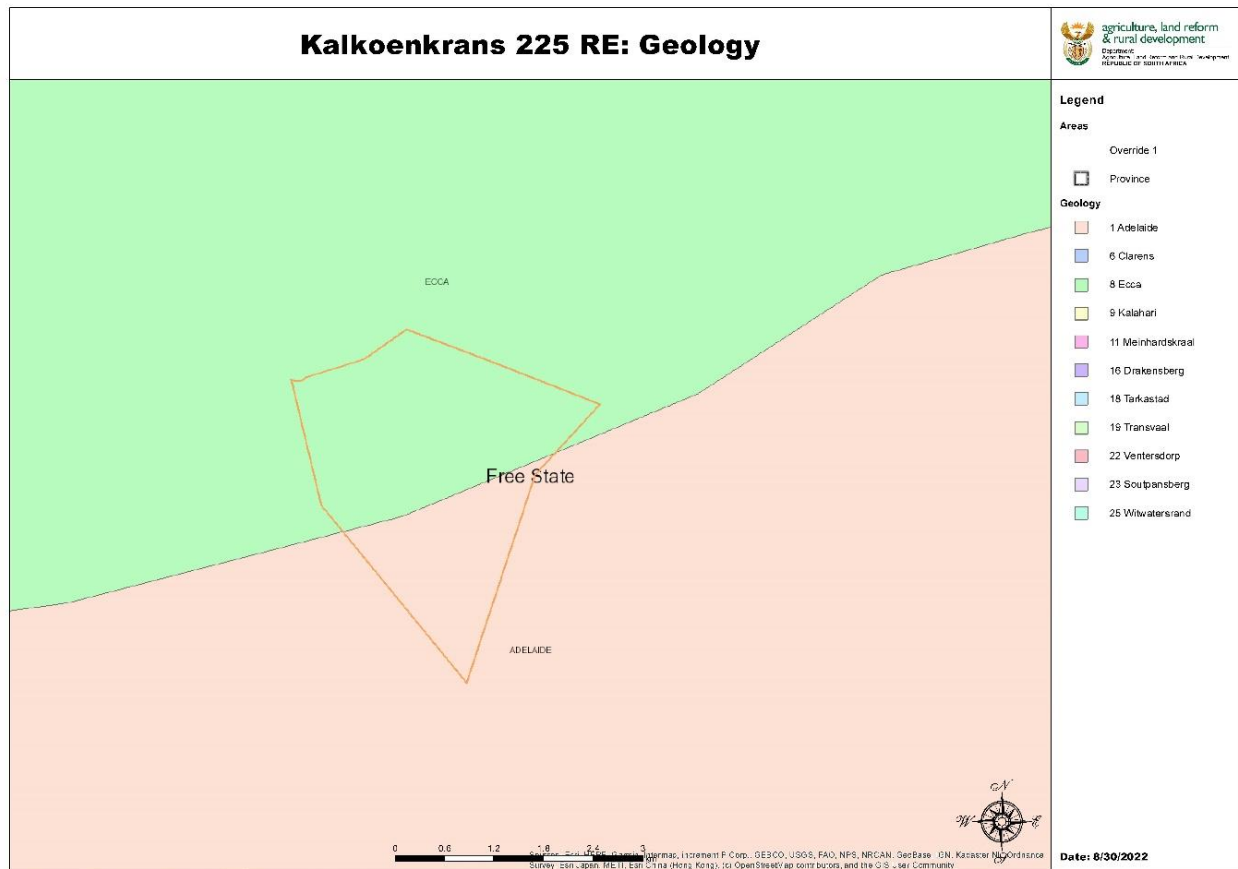


Figure 5: The proposed development is underlain by the Ecce and Adelaide Groups.

A review of the geological maps 2826 Winburg (Figure 6 below) indicates the site is underlain by the following:

Alluvium, calcified alluvium and river gravel over the southern part and buff-white to white sandstone, blue/ grey mudstone and shale and subordinate conglomerate of the Adelaide Subgroup, Beaufort Group along the northern boundary. There is also documented dolerite intrusion on the site.

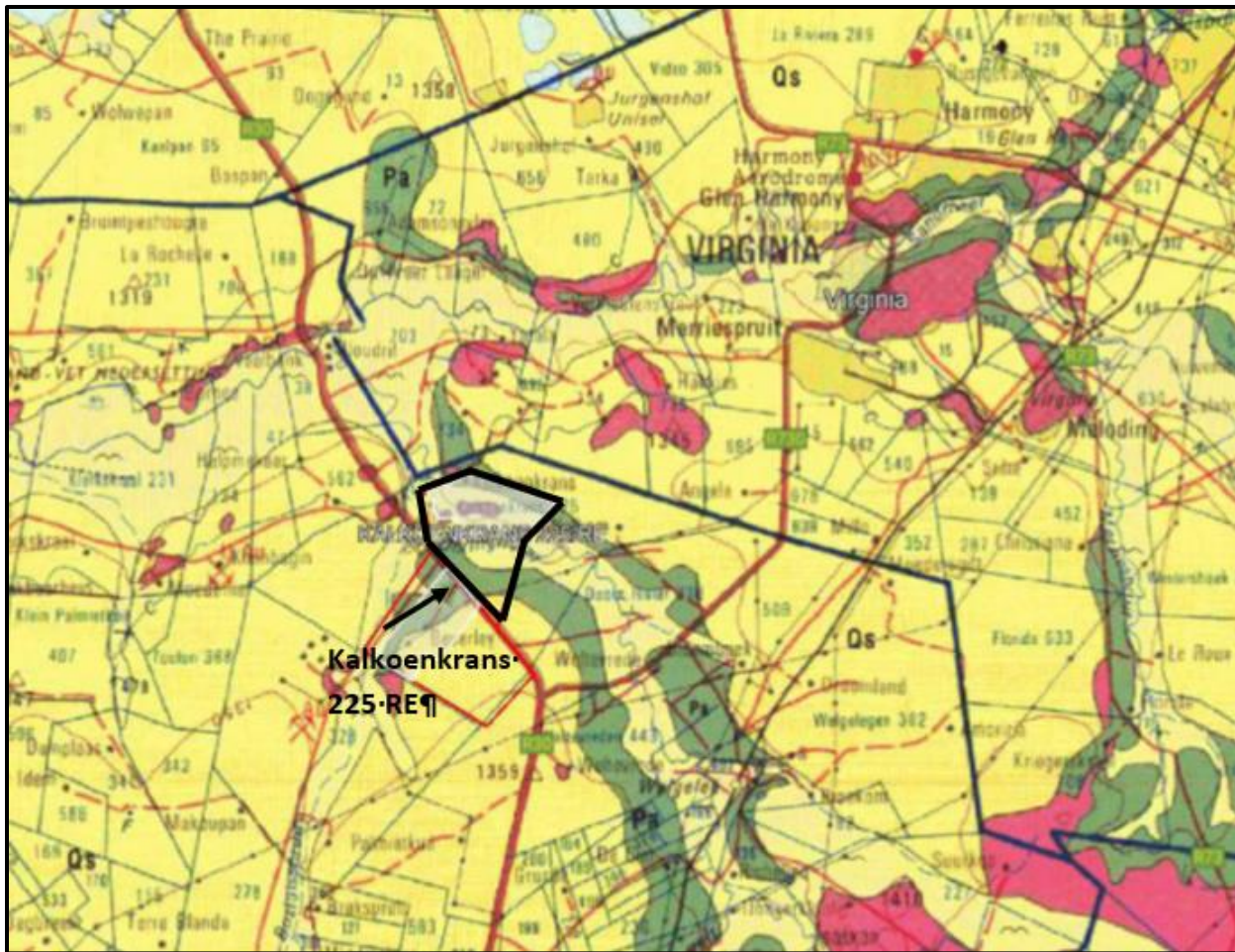


Figure 6: Geological maps 2826 Winburg, the proposed development is outlined in black.

A more detailed Geotechnical study will be undertaken in conjunction with a Environmental Impact Assessment.

6.2. Terrain

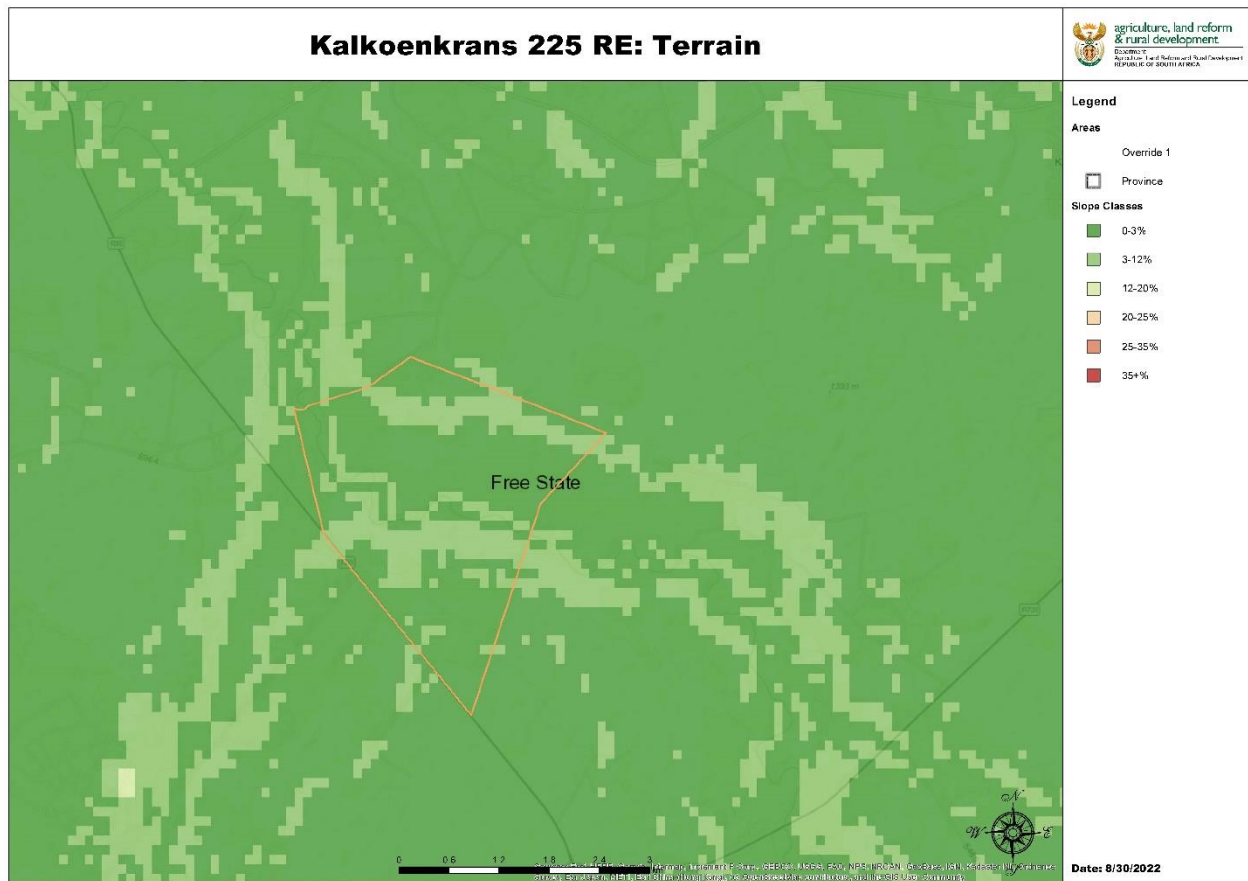


Figure 6: The slope class of the study area consists of the two lowest slope classes: 0-3% and 3-12%. The terrain is therefore considered relatively flat.

6.3 Vegetation:

As per data from the Free State Biodiversity Conservation Plan the farm portions falls within a Critical Biodiversity Areas (CBA) Ecological Support Areas (ESA). Most of the farms is represented by the Ecological Support Areas (ESA). And the CBA can be avoided within the development footprint.

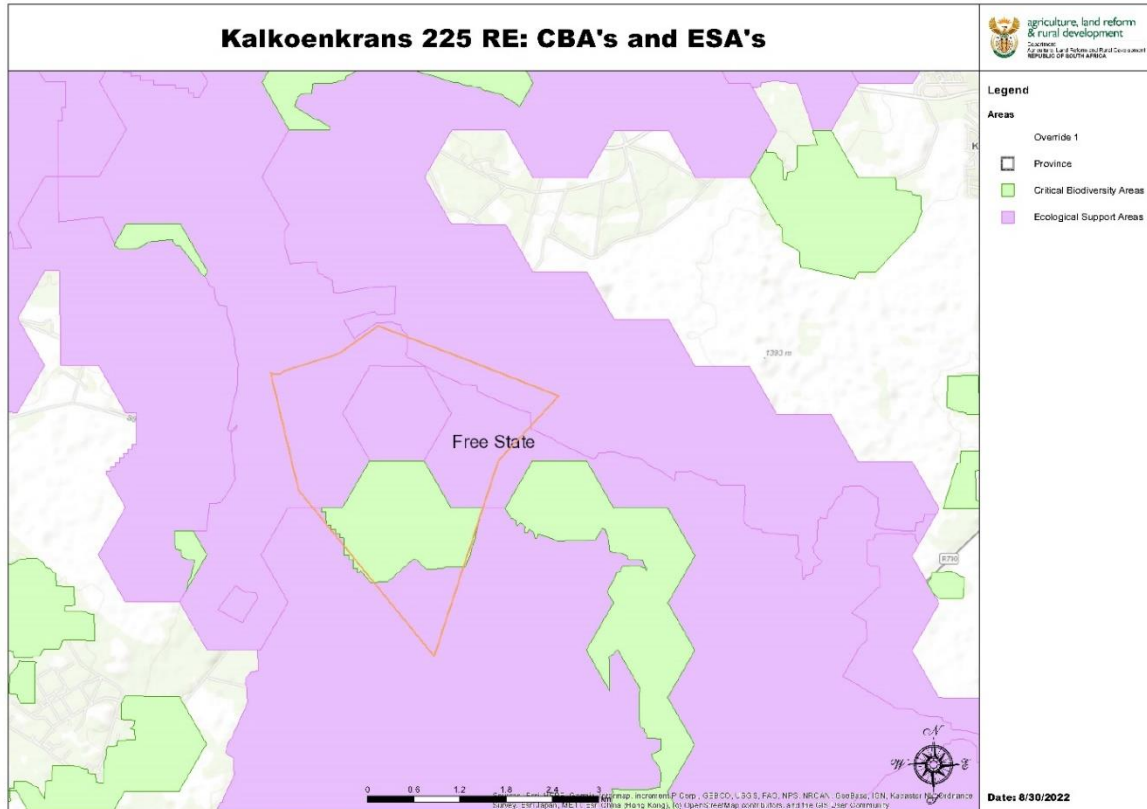


Figure 7: The study area falls within an Ecological Support Area (ESA) and a Critical Biodiversity Area (CBA) with the ESA covering the majority of the site.

6.4 Water

The Doringspruit traverses the farm portions, this along with the appropriate buffers can however be avoided within the development footprint.

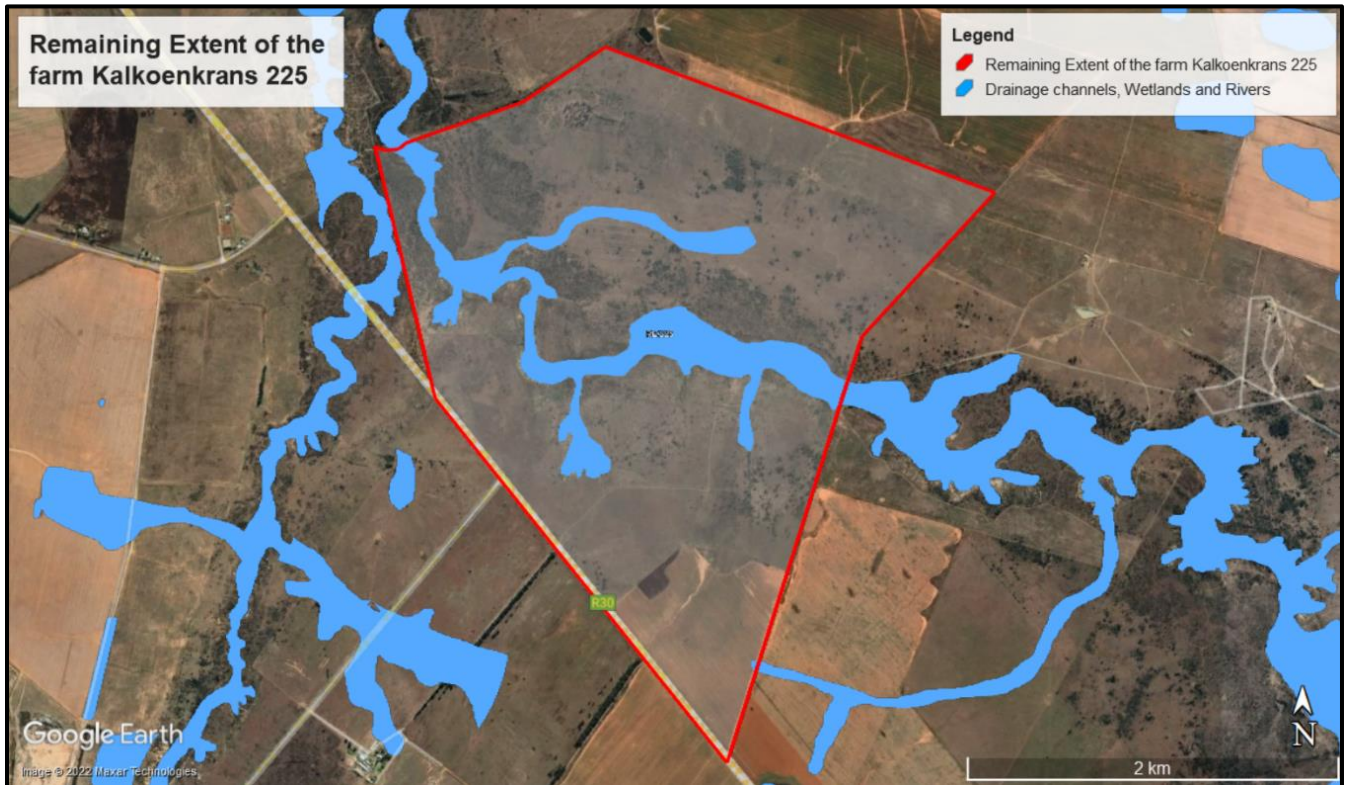


Figure 8: The Drainage channels and rivers present on the farm portion.

6.5 Agriculture

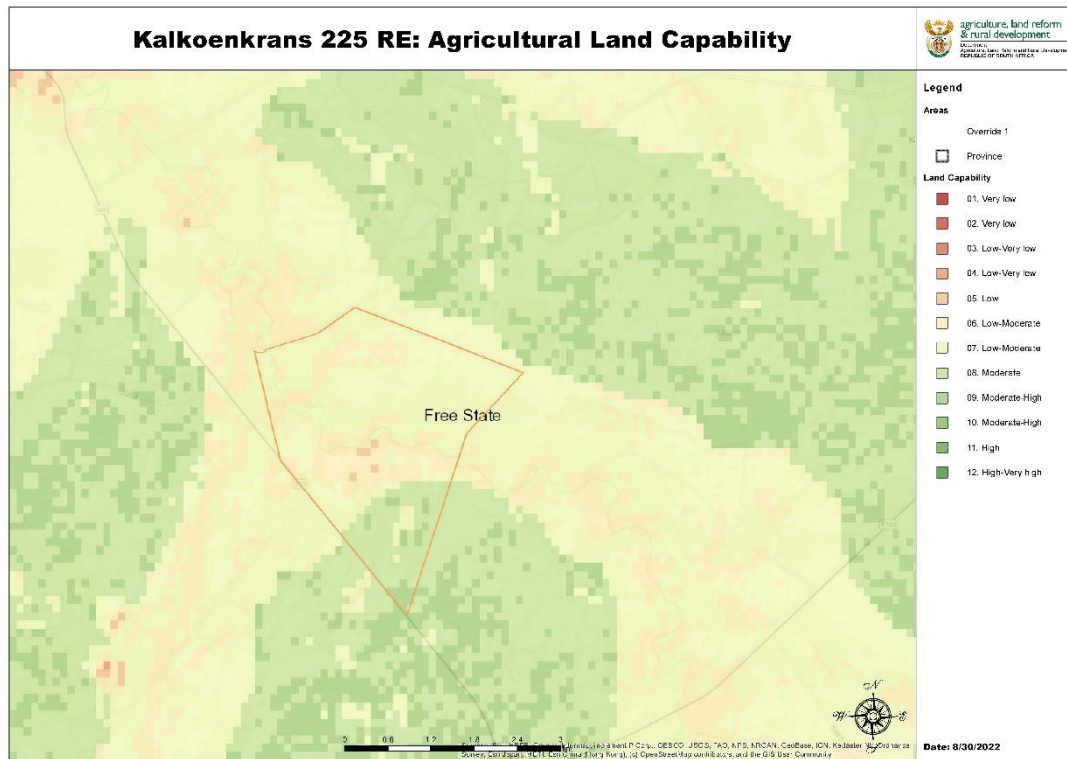


Figure 9: The land capability in the study area consists of Low to Moderate -high land capability.

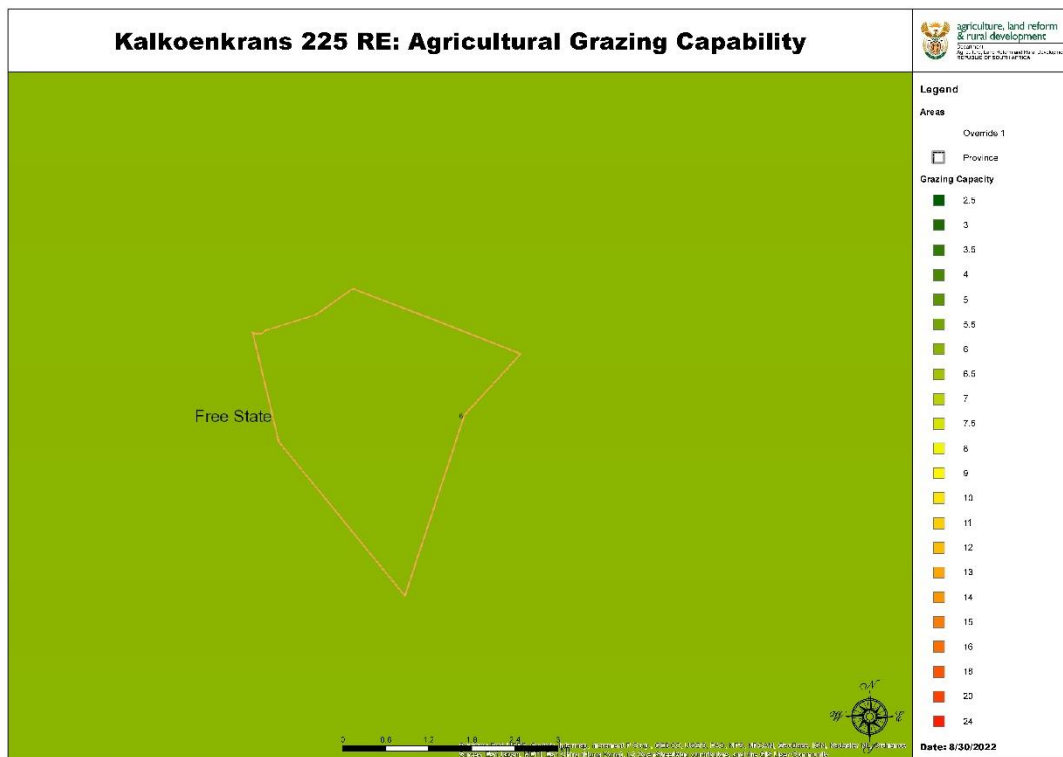


Figure 10: The grazing capability in the study area has a value of 6.

7 Global horizontal irradiation (SolarGIS)

The Global Horizontal Irradiation for the area derived from the World Bank Group's Global Solar Atlas is approximately 2118kWh/m². The site falls within a region that is considered to be suitable for solar energy development and the irradiation level is sufficient for the operation of a solar PV facility. This will enable the proposed project to compete competitively in the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate power in South Africa.

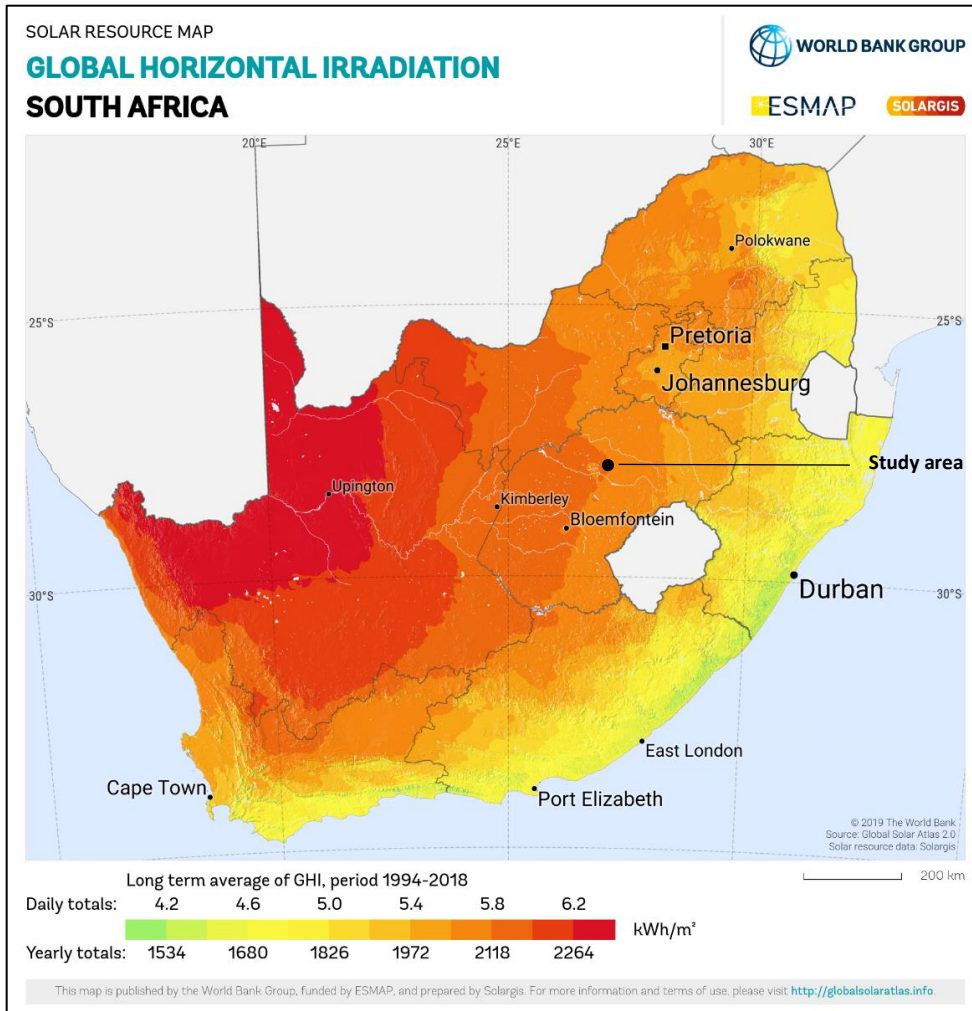


Figure 11: GHI of the study area is approximately 2118kWh/m².

8. Possible areas for development

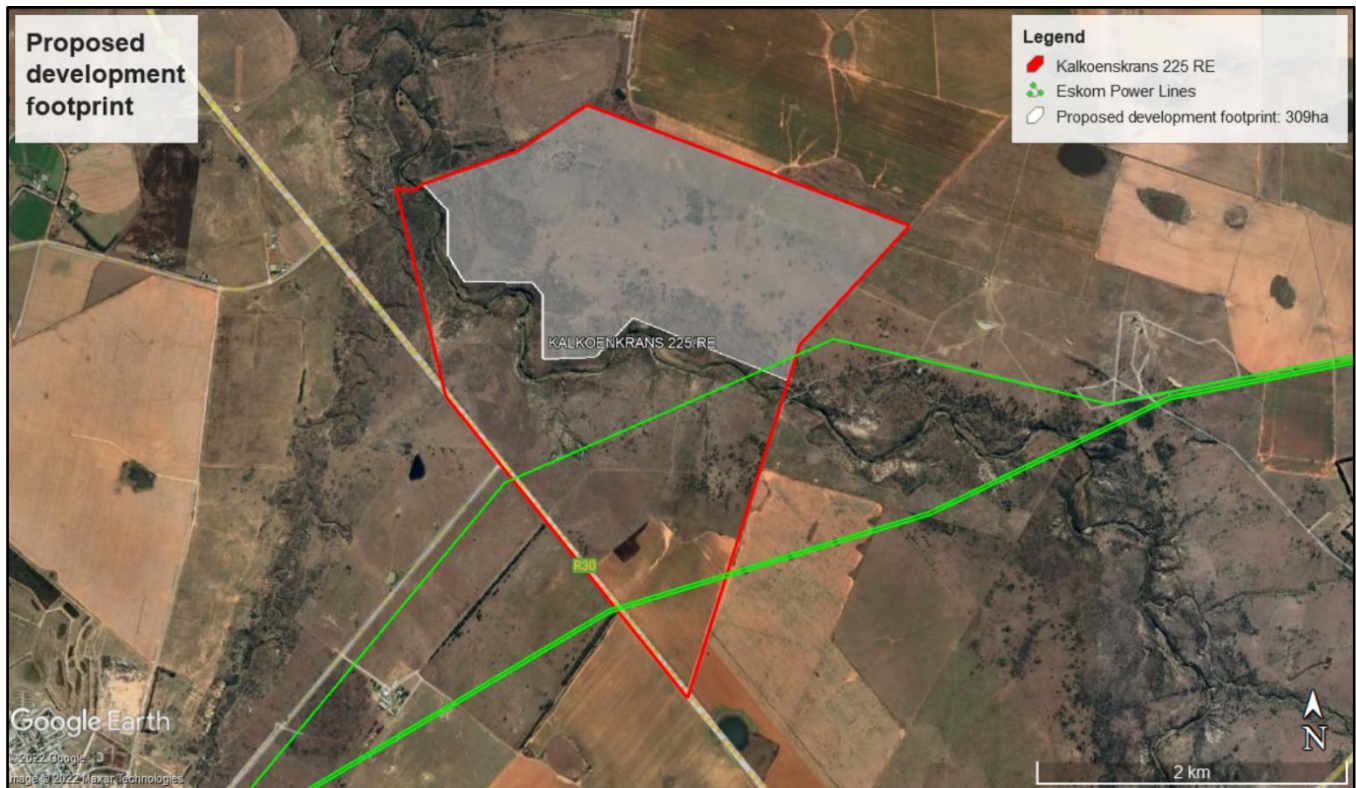


Figure 9: Proposed development area for a solar power plant

A proposed development footprint was identified for a proposed solar plant, this footprint is 309ha in extent.

Preferred development site (white portion): This is the preferred option since there are no major issues to be avoided near the site and the terrain is flat. This proposed development footprint has short power line routes to the Theseus MTS or connection is available via Li-Lo connctions to the power lines traversrsing the site.

Keeping all the above information into consideration, the proposed development footprint would be the preferred option for the development of a solar plant. This area was identified due to the low impact on the environment and infrastructure of the land portion.

9. Reference:

NDAGIS Esri website <https://ndagis.nda.agric.za/portal/apps/webappviewer>

SOLARGIS. 2022. SolarGIS GeoModal Solar, accessed from
<http://solargis.info/pvplanner/#tl=Google:hybrid&bm=satellite> on 12-04-2022