

**SUBSOLAR ENERGY PTY (Ltd) SITE ASSESSMENT OF
REMAINING EXTENT OF PORTION 2 OF THE FARM
RUBY VALE 266, NORTHERN CAPE PROVINCE, SOUTH
AFRICA**

APRIL 2015



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1. Executive Summary

The farm Remaining extent of portion 2 of the farm Ruby Vale 266, located near Postmasburg is owned by the Wilhelm Uys trust. The farm is approximately 5735.53 hectares (ha), within the Northern Cape Province, Registration Division Gordonia, South Africa (Figure 1). The study area falls within the Siyanda District Municipality, located in the Tsantsabane local Municipality.

The landscape consists of level plains with some relief. The farm is situated next to a gravel road leading up to the N14. For connection to the grid, there is a substation on site. The site has low agricultural potential as well as moderate potential grazing capacity. From a hydrological perspective, there are no rivers or pans on the site. This site has favourable conditions for a solar power plant due to its environmental conditions, weather conditions (i.e. Postmasburg has high solar radiation levels) as well as good site access.

This is a large site with more than 5000 ha; has good solar radiation, ecology and relative flat terrain (refer to Figures below). One EIA's has been conducted next to this farm portion.

Some parts of this site may not be suitable due to issues found on it namely structures, railways, etc.

2. The farm Remaining extent of portion 2 of the farm Ruby Vale 266

The farm Remaining extent of portion 2 of the farm Ruby Vale 266 is located within the Northern Cape Province, Registration Division Gordonia, South Africa and falls within the Siyanda District Municipality, located in the Tsantsabane Local Municipality.

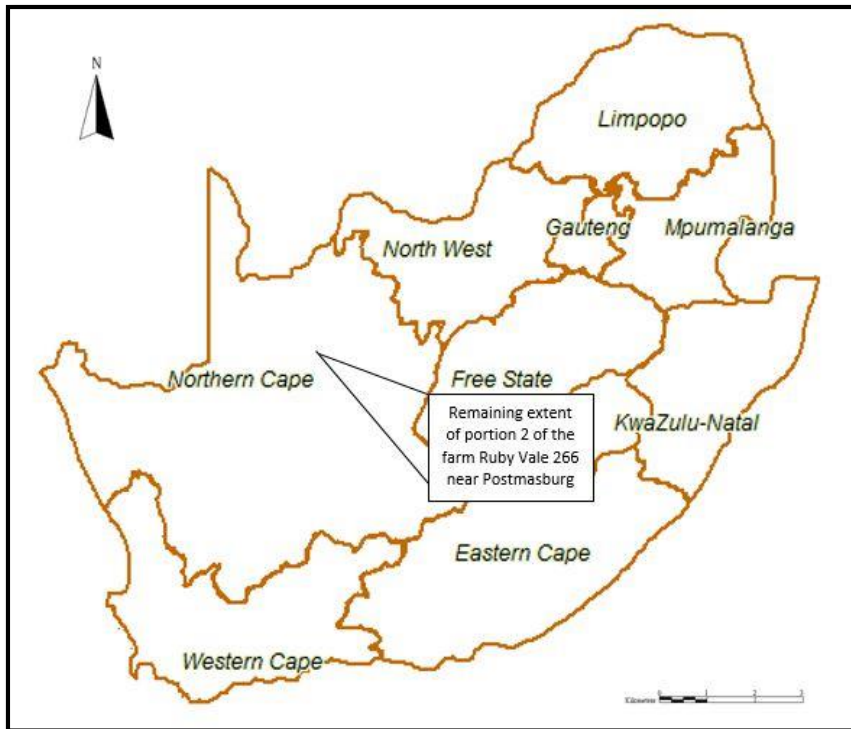


Figure 1: Location of the site

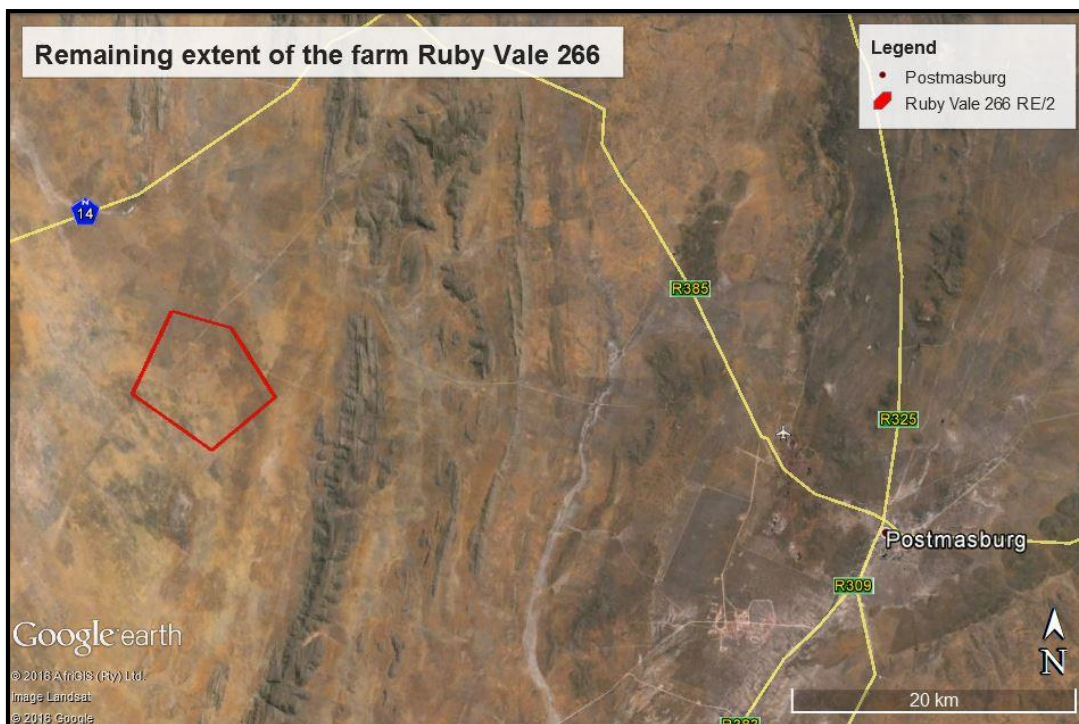


Figure 2: Land Portion of farm

3. Power lines and Substations

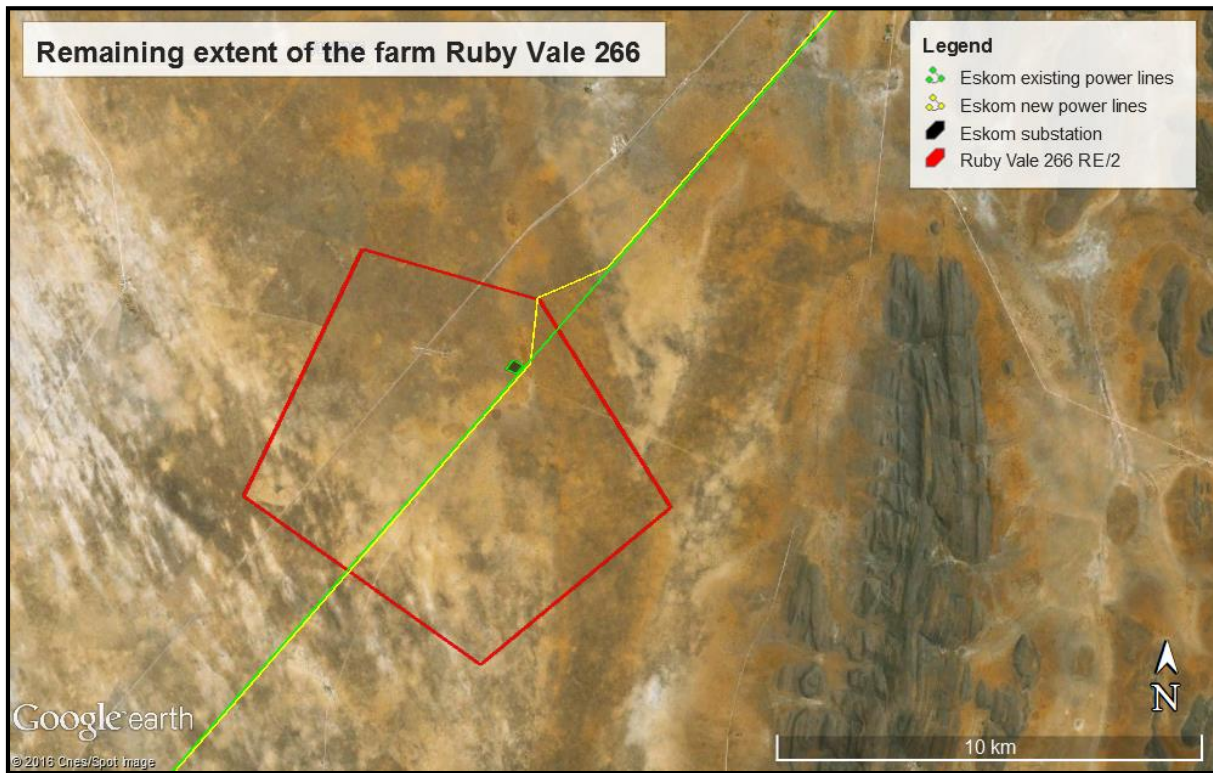


Figure 3: Power lines and substations

3.1. Substations near sites

Lewensaar Substation

Description: Lewensaar 275/50kV Substation

Voltage: 275.0 [kV]

3.2. Power Lines near site

Lewensaar-Ferrum Eskom Power line

Description: Lewensaar-Ferrum

Voltage: 275.0 [kV]

Lewensaar-Garona Eskom Power line

Description: Lewensaar-Garona

Voltage: 275.0 [kV]

4. Farm portions and size

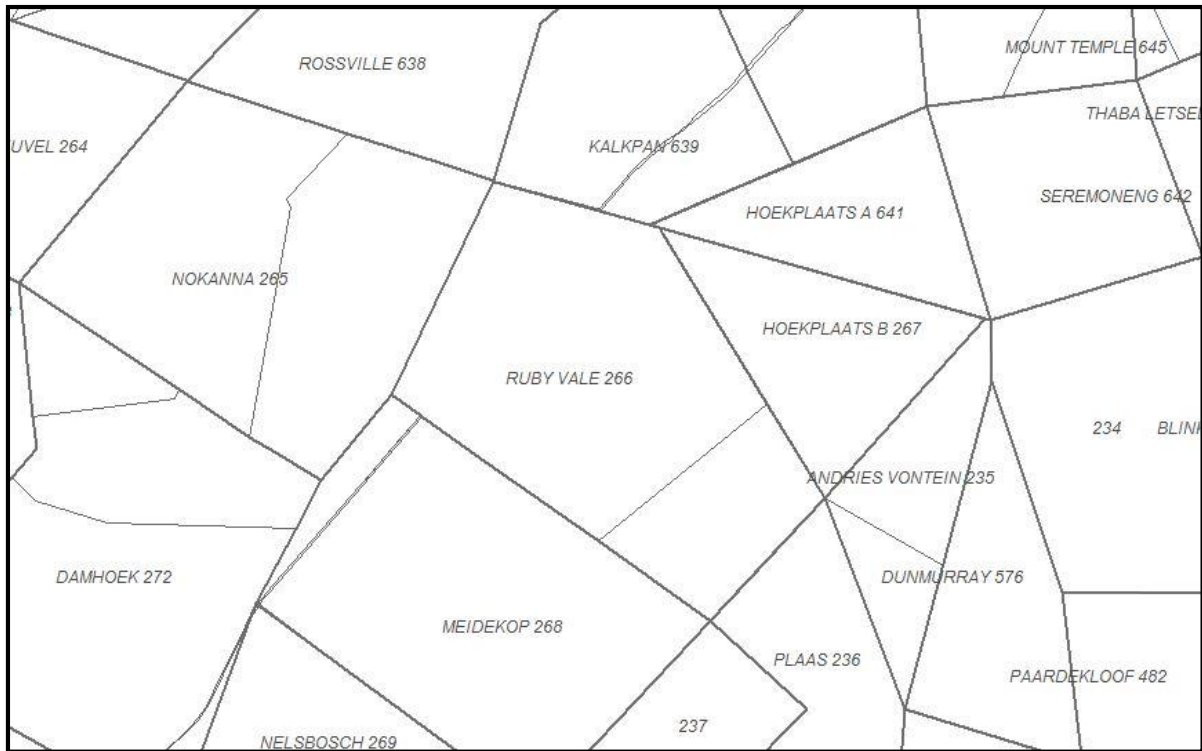


Figure 4: Farm portion (Planet GIS)

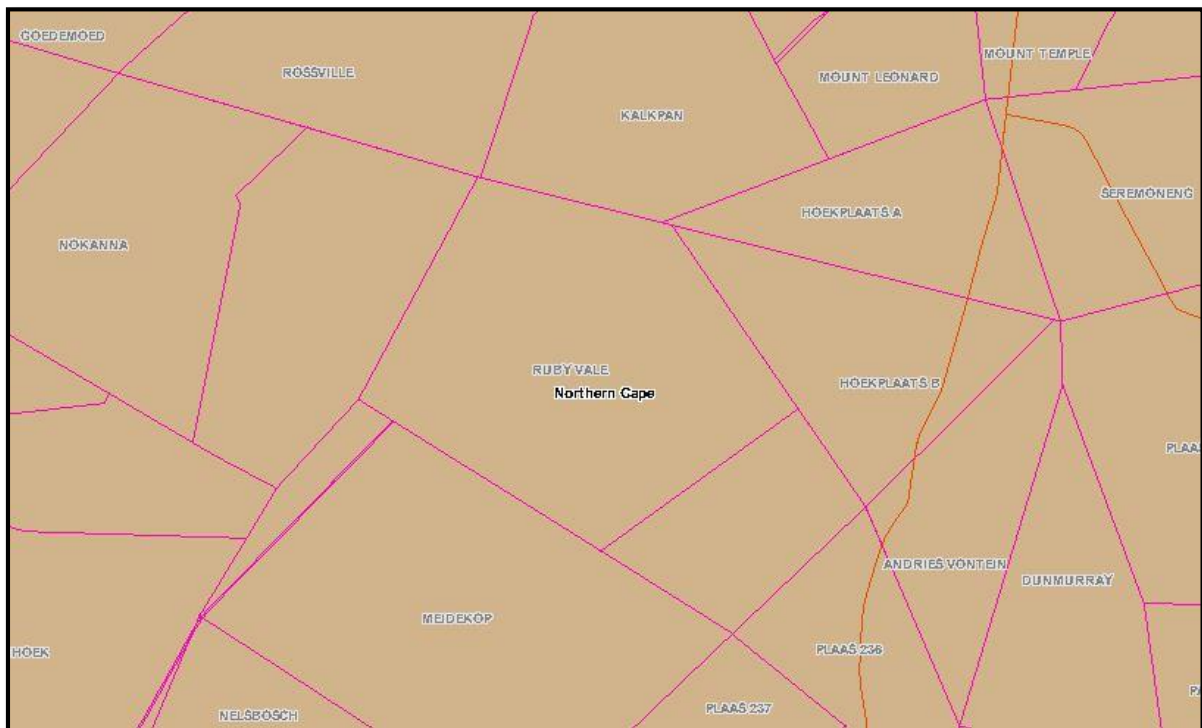


Figure 5: Land Portions (Agis)

5. Environmental impact assessments done in the area:

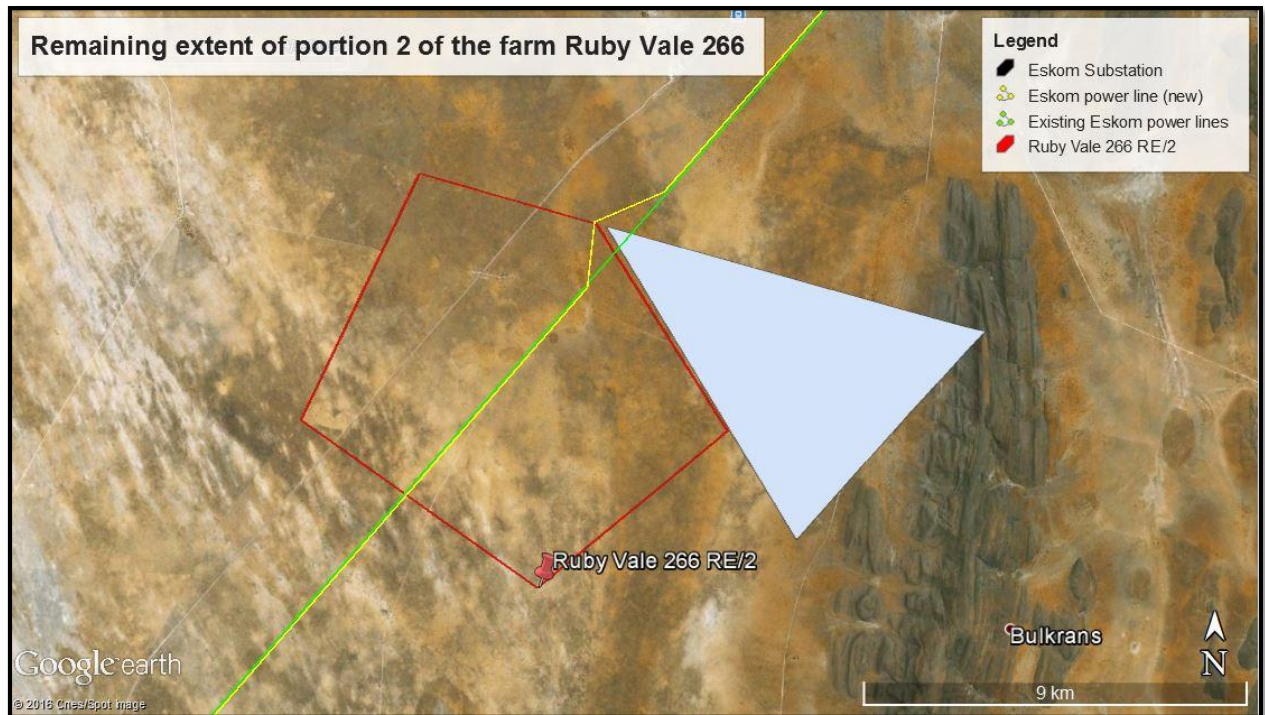


Figure 6: EIA's done in the surrounding area

EIA towards the east of the farm portion:

12/12/20/2649	
PRJ_REF	12/12/20/2649
ARCHIVE	Active
PROVINCE	Northern Cape
LOCAL_MUNI	Tsantsabane Local Municipality
DISTRICT_M	Siyanda
TOWN	Tsantsabane Rural
APP_DATE	2011/11/01
EA_DATE	2013/02/01
NEAS_NO	DEA/EIA/0000850/2011
PRJ_TITTLE	Jasper Power Company
EA HOLDER	Solar Reserve South Africa Pty Ltd
MEGA_WATT	75
TECHNOLOGY	Solar PV
EA_PROCESS	Scoping and EIA

6. Natural Resources

6.1. Geology

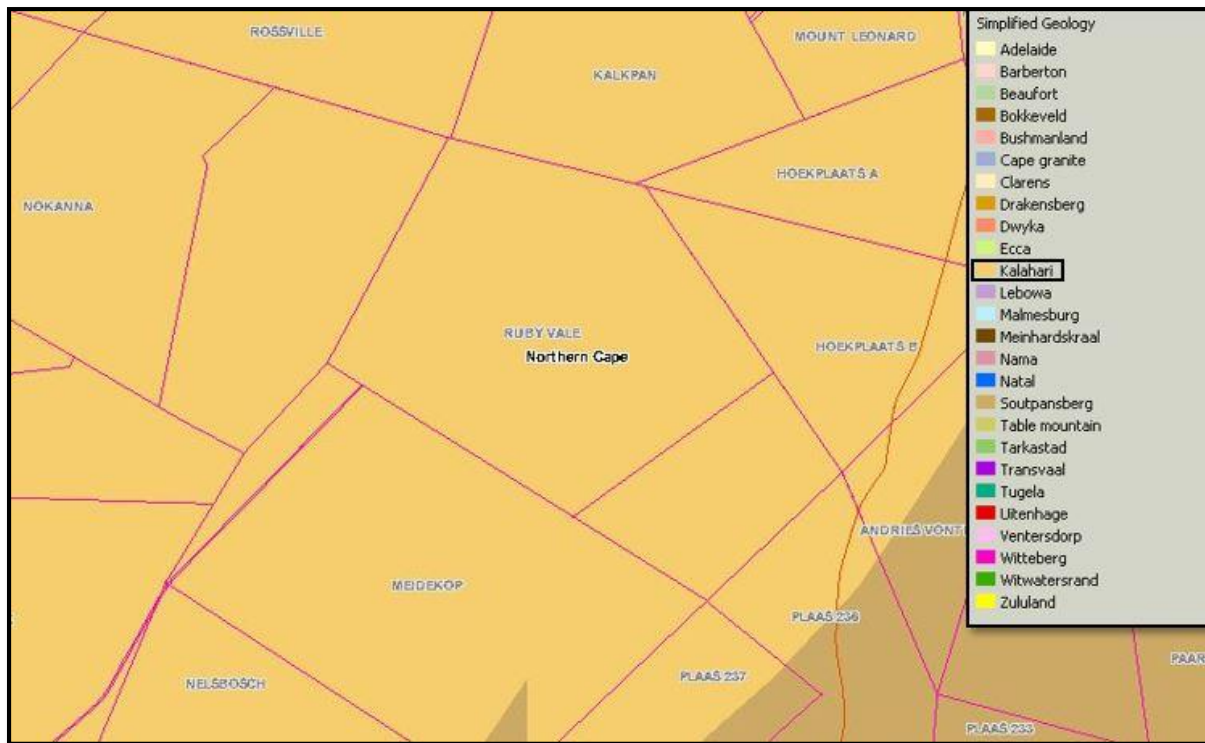


Figure 7: Simplified Geology (Agis)

6.2. Terrain

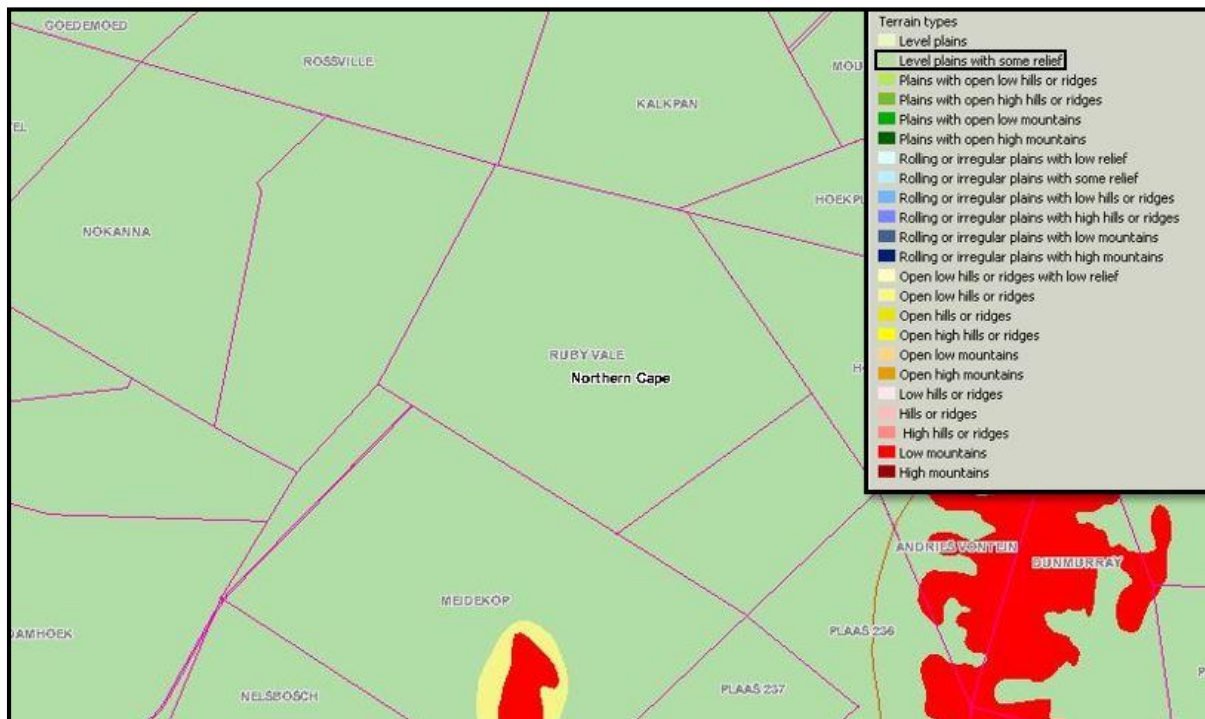


Figure 8: Terrain type (Agis)

6.3. Vegetation:



Figure 9: Vegetation biome (Agis)

6.4. Water

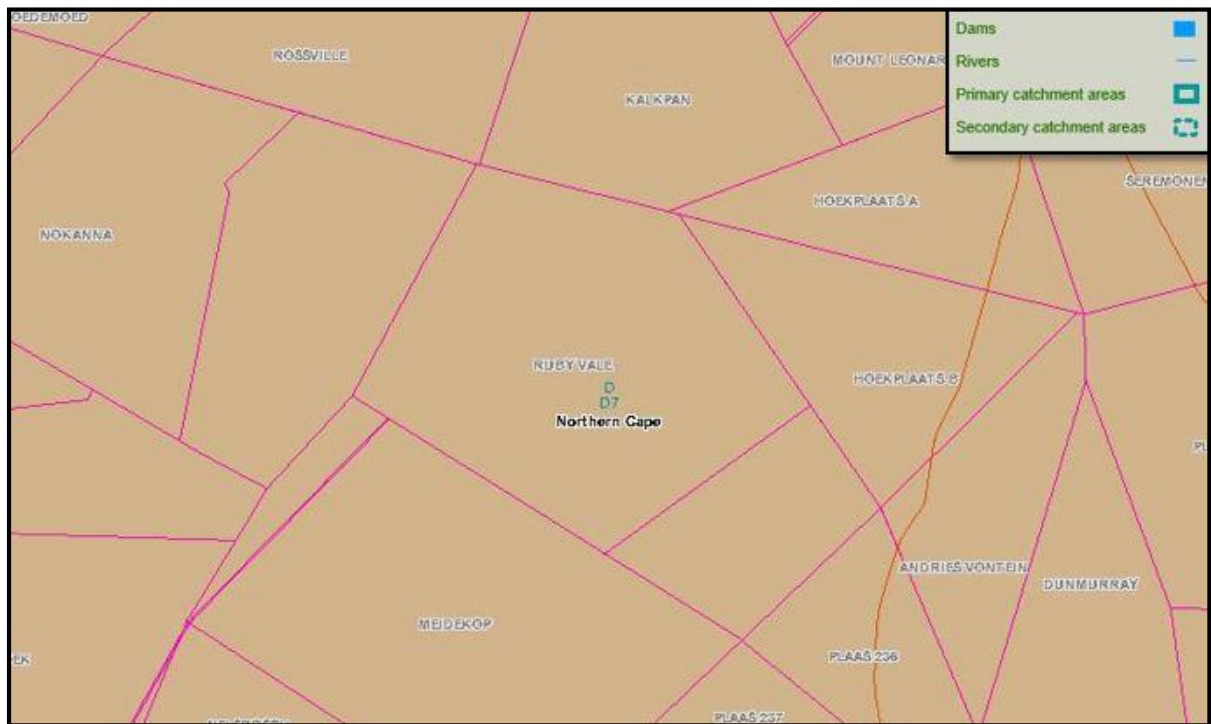


Figure 10: Dams and rivers (Agis)

7. Agricultural Potential

7.1. Land capability

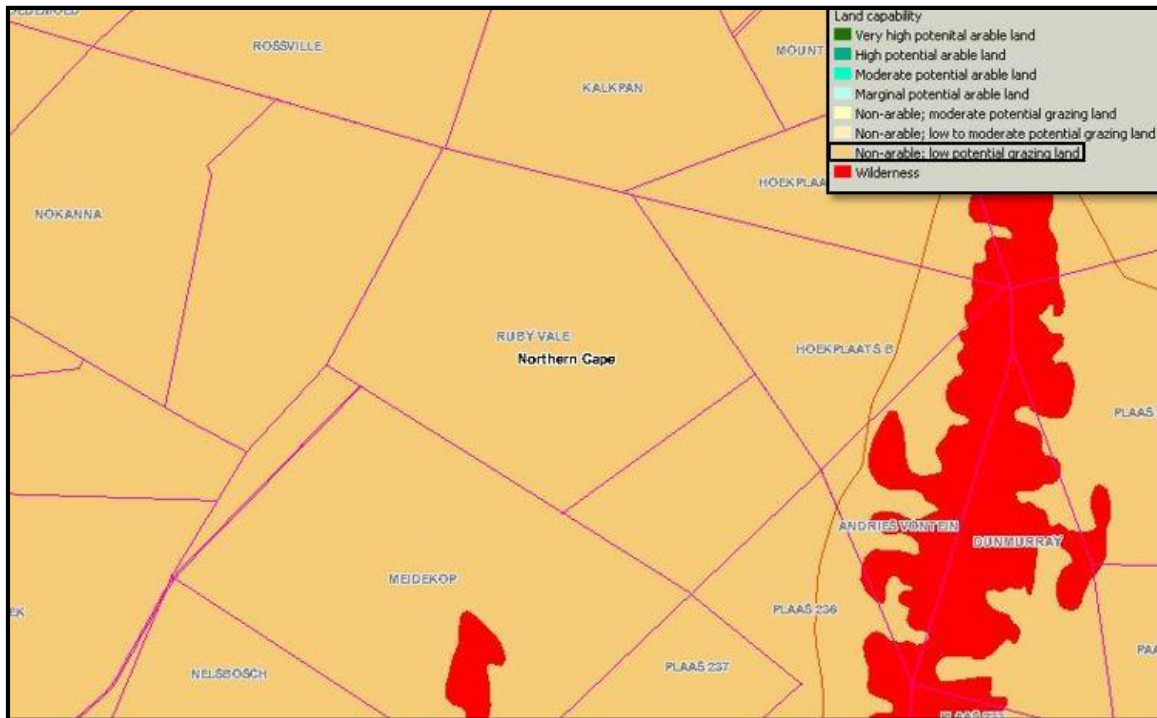


Figure 11: Land Capability (Agis)

7.2. Livestock

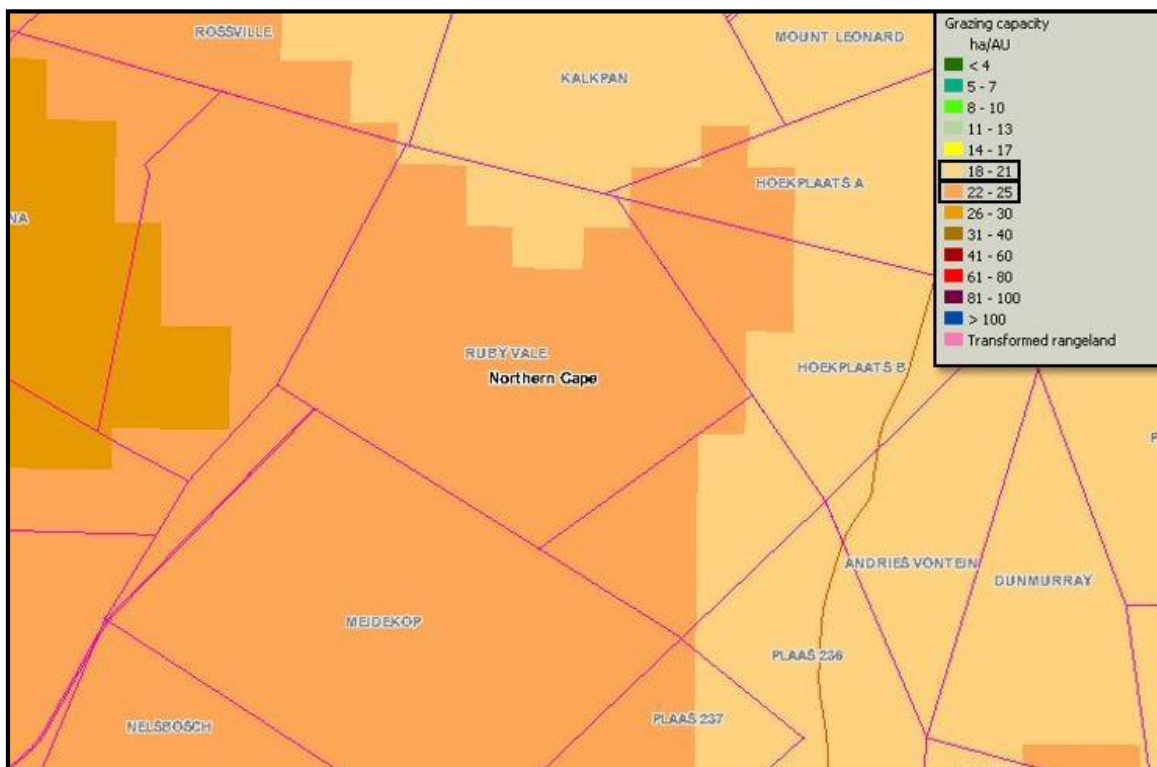


Figure 12: Grazing Capacity (Agis)

8. Land cover and Land use

8.1. Land use

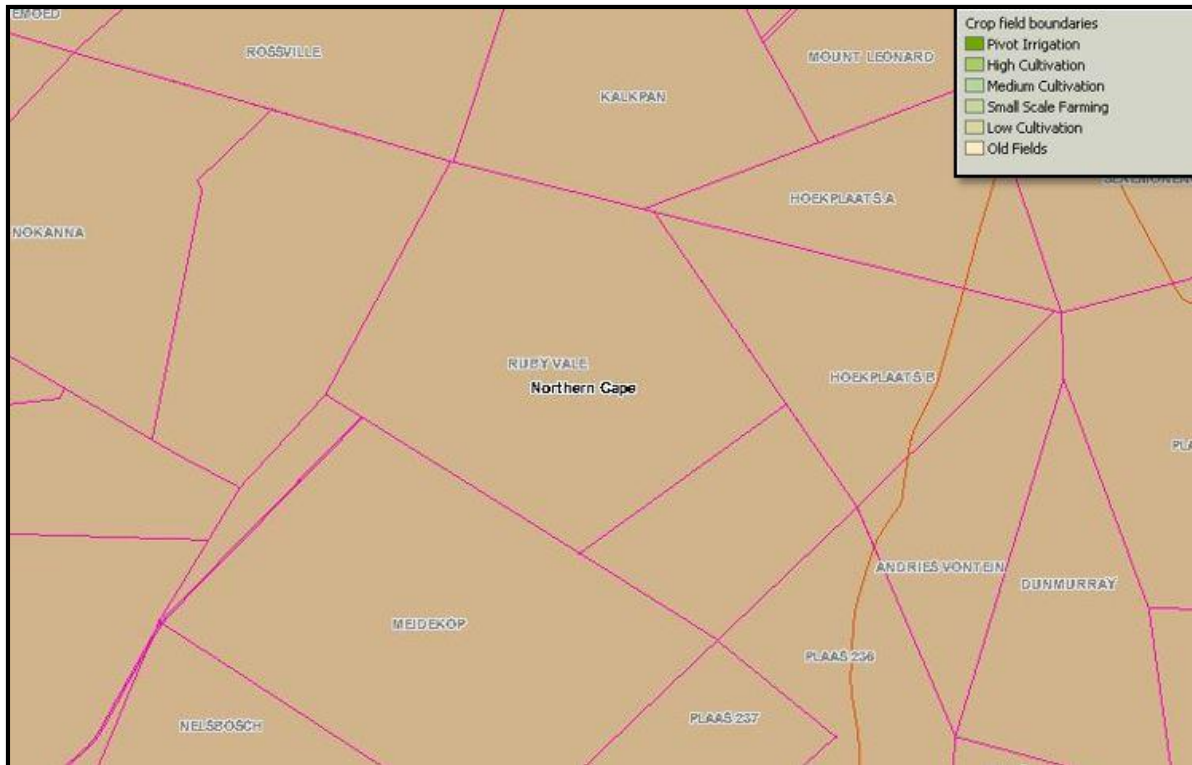


Figure 13: Crop field boundaries

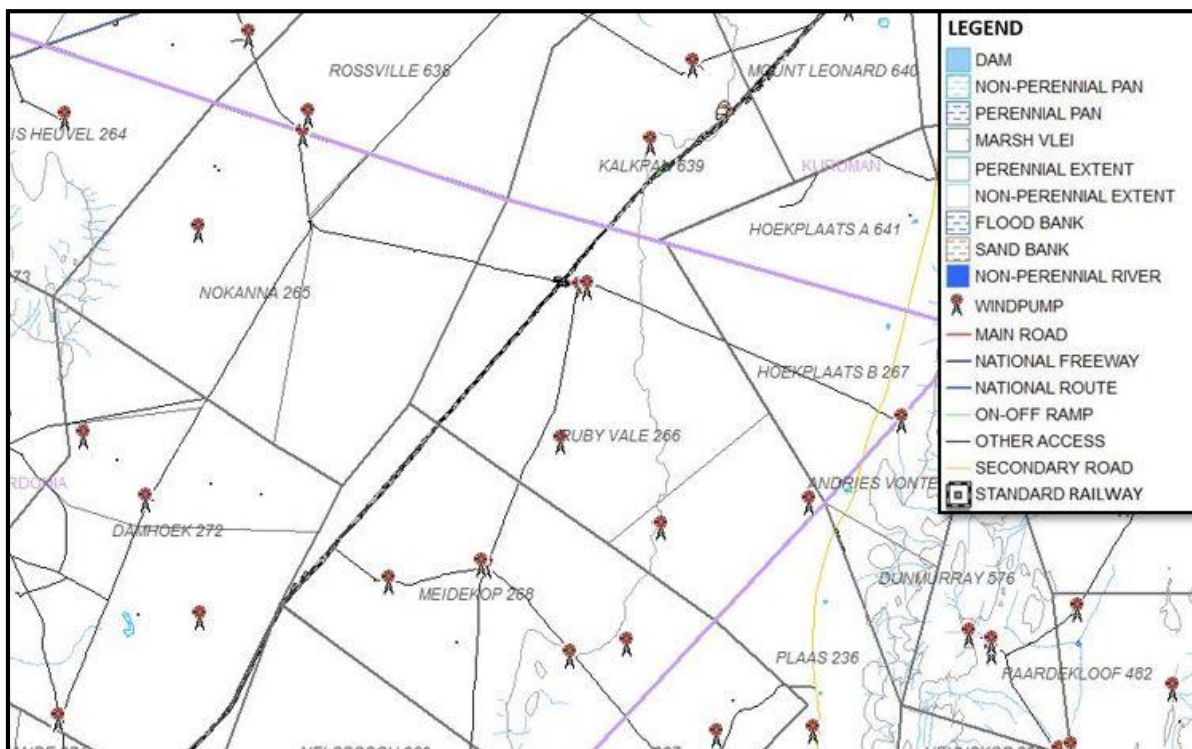
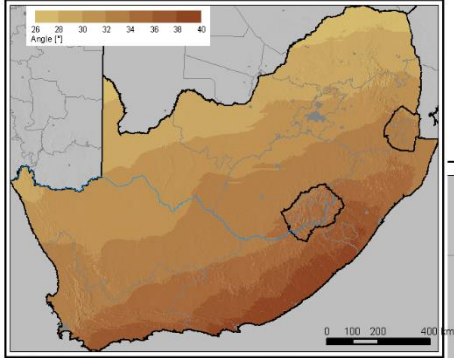


Figure 14: Vegetation and structures (PlanetGIS)

9. Solar Resource

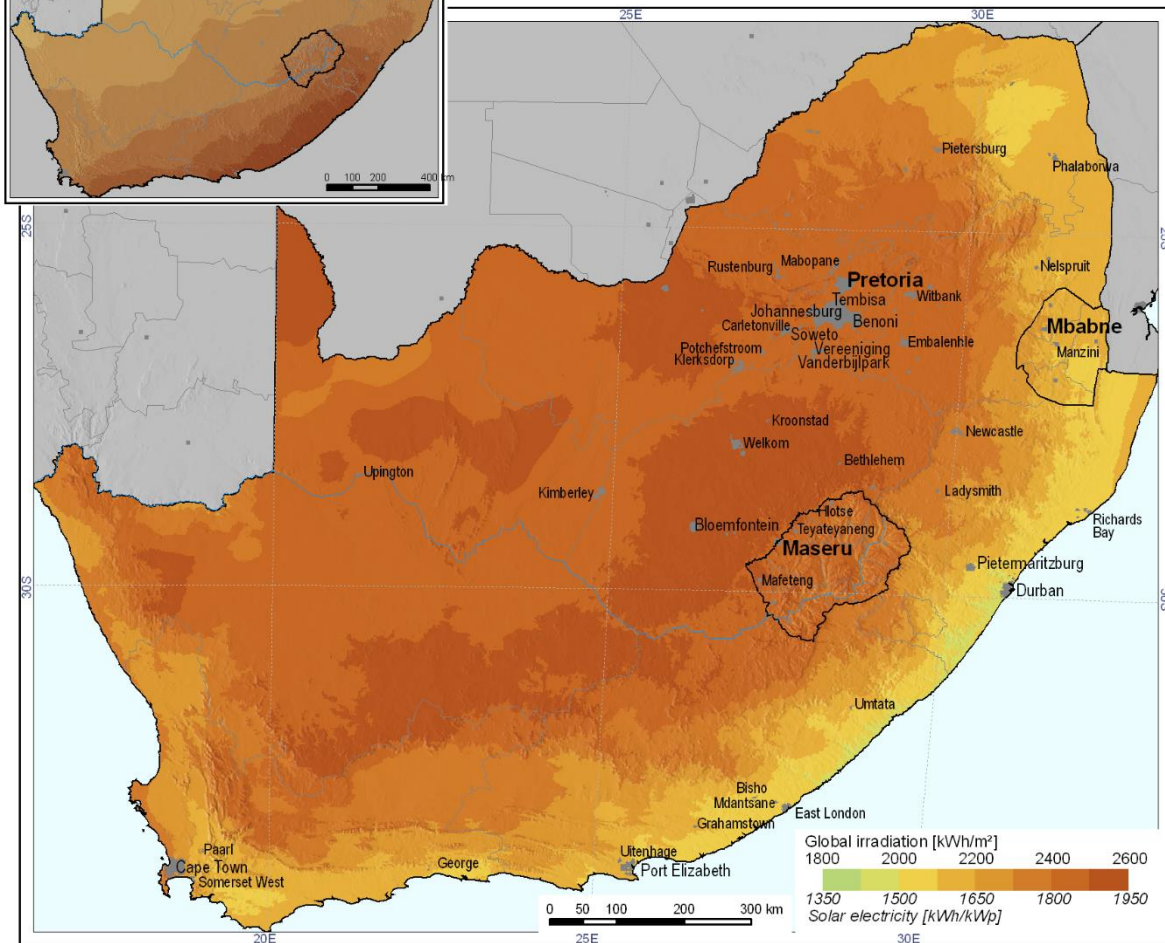
The E_m is 1908 kWh/kWp yearly (free standing one angle) with estimated losses due to temperature and low irradiance: 22.49%. The E_m is 2378 kWh/kWp on a North South horizontal axis with estimated losses due to temperature and low irradiance: 21.8%.

Optimum inclination of PV modules to maximize yearly energy yield



South Africa

Yearly sum of global irradiation incident on optimally-inclined surface
Yearly sum of solar electricity generated by 1 kWp system with optimally-inclined modules and performance ratio 0.75



PVGIS © European Communities, 2001-2006
HelioClim-1 © Ecole des Mines de Paris/ARMINES, 2001-2006

<http://re.jrc.ec.europa.eu/pvgis/pv/>
<http://www.helioclim.org/>

Figure 15: Global irradiation

10. Possible areas for development

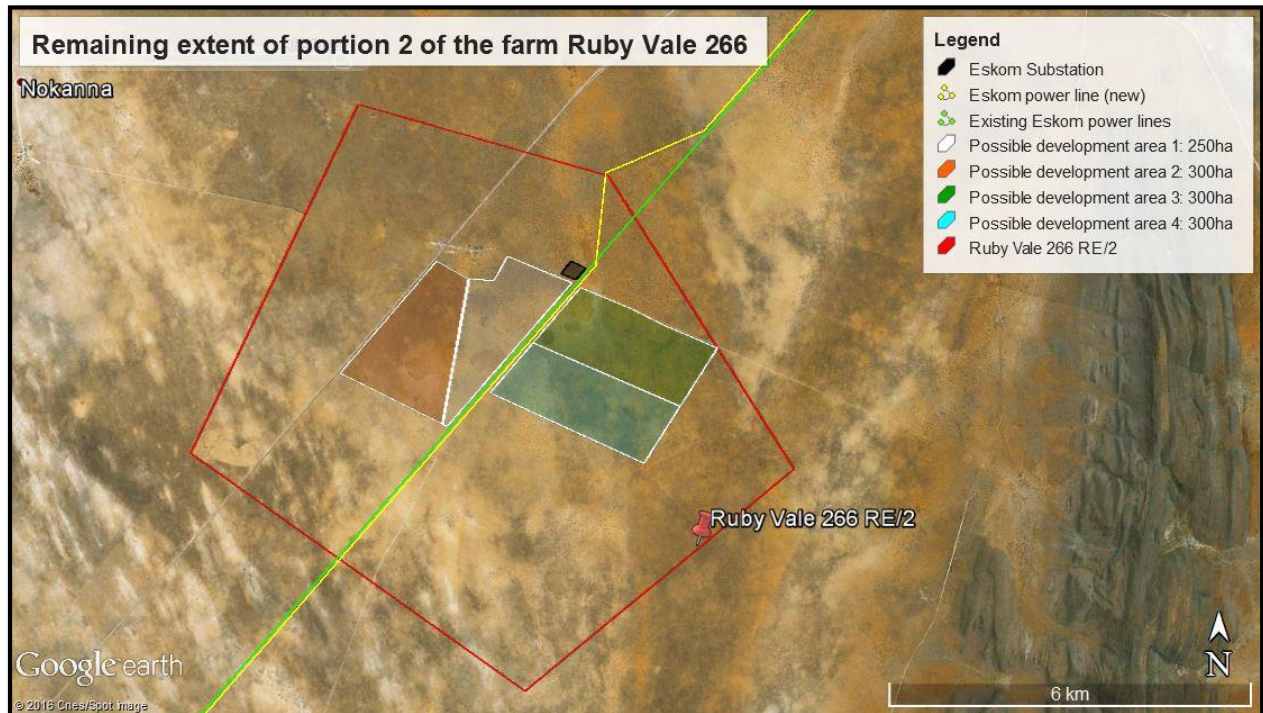


Figure 16: Proposed development areas for a solar power plant

Four possible areas were identified for a proposed solar plant. Each of these portions are more than 250ha in extent. The areas identified are as follows:

Preferred development site (white portion): This is the preferred option since the terrain is regular and the vegetation here seems less dense, i.e. smaller loss vegetation would occur when clearing the area. This area would require the shortest power line route and is situated next to the public road and no new road would have to be created to gain site access.

Alternative 1 (orange portion): This area also has a regular terrain and the vegetation here also seems less dense. This area would however require a longer power line route but it is situated close to the public road for site access.

Alternative 2 (green portion): This area contains dense vegetation and a slightly steeper terrain. This option is also situated close to the substation so a short power line route is required and this option is situated next to the public road and no new road would have to be created to gain site access.

Alternative 2 (blue portion): This area also contains dense vegetation and a slightly steeper terrain. This area would also require a much longer power line route and would require longer new roads to be constructed for site access.

Keeping all the above information into consideration and due to the large size of the farm, it is recommended that that two areas of 250ha each be used for the development of a solar plant. The preferred development site and alternative 1 would be best suitable for the development of a solar plant. These areas were identified due to the low impact on the environment and infrastructure of the land portion.

Reference:

AGIS. 2007. Agricultural Geo-Referenced Information System, accessed from www.agis.agric.za on 15-09-2015

SOLARGIS. 2016. SolarGIS GeoModal Solar, accessed from <http://solargis.info/pvplanner/#tl=Google:hybrid&bm=satellite> on 04-04-2016
