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Agricultural Assessment Report
Coldstream Solar Farm - Final

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Agricultural Assessment Report Coldstream Solar Farm

Executive Summary

This Agricultural Assessment Report examines the agricultural productivity of the proposed Coldstream solar farm on the northern side of Cully's Road, Lancefield and the impact of its construction on a range of agricultural considerations.

The site proposed for the solar farm is up to 15 ha. In recent times, at least, it has been used exclusively for grazing with sheep and/or cattle. The soils at the solar farm location are classed as soils of moderate quality with likely internal drainage issues that limits their ability to be highly productive.

The proposed solar farm at this site would have no long term detrimental effect on the productive capacity of the soil, nor would it have a significant impact on the overall productivity of the region or state, nor impact on the ability of neighbouring businesses to operate.

Background

An agricultural assessment of the site for the BRNG Coldstream 5 MW solar farm at Lancefield has been requested by URBIS Consulting. The site description is given as 313 Colliver's Road, Lancefield, however the site is located on the northern side of Cully's Road, south of Colliver's Road.

This report addresses the requirements of the "Solar Energy Facilities, Design and Development Guidelines", Victorian Government (2019)[1].

The requirements outlined in the Guidelines are to:

- protect strategically important agricultural and primary production land from incompatible land use,
- protect productive agricultural land that is of strategic significance to a local area or in a regional context, and
- avoid the loss of productive agricultural land without considering the impact of the loss on the agricultural sector and its consequential effect on other sectors.

Specifically the report covers the following aspects:

- the impact on the loss of the site if it has high quality soils, particularly soils that are niche to a type of crop or other agricultural activity,
- the potential loss of reliable, accessible water (such as irrigated areas) and its impact at a local or regional scale,
- the impact of fragmentation and a change of land use to non-agriculture activity on local and regional productivity and output,
- the impact of a change of land use on recent and/or current efforts to modernise and reform agricultural activity in the area,

[1] https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/428275/Solar-Energy-Facilities-Design-and-Development-Guideline-August-2019.pdf

- whether the land has specifically been set aside or defined for agricultural use and development in a planning scheme or other strategic document,
- whether the change in land use is to the detriment of a government's previous or existing investment and support for the site or the area, and
- whether the proposed solar energy facility can co-locate with other agricultural activity, to help diversify farm income without reducing productivity.
- Assess the cumulative impact of this solar farm development with other solar farms in the vicinity.

The proposed site, shown in Figure 1, is located 3.5 km south west of Lancefield on the northern side of Cully's Rd.

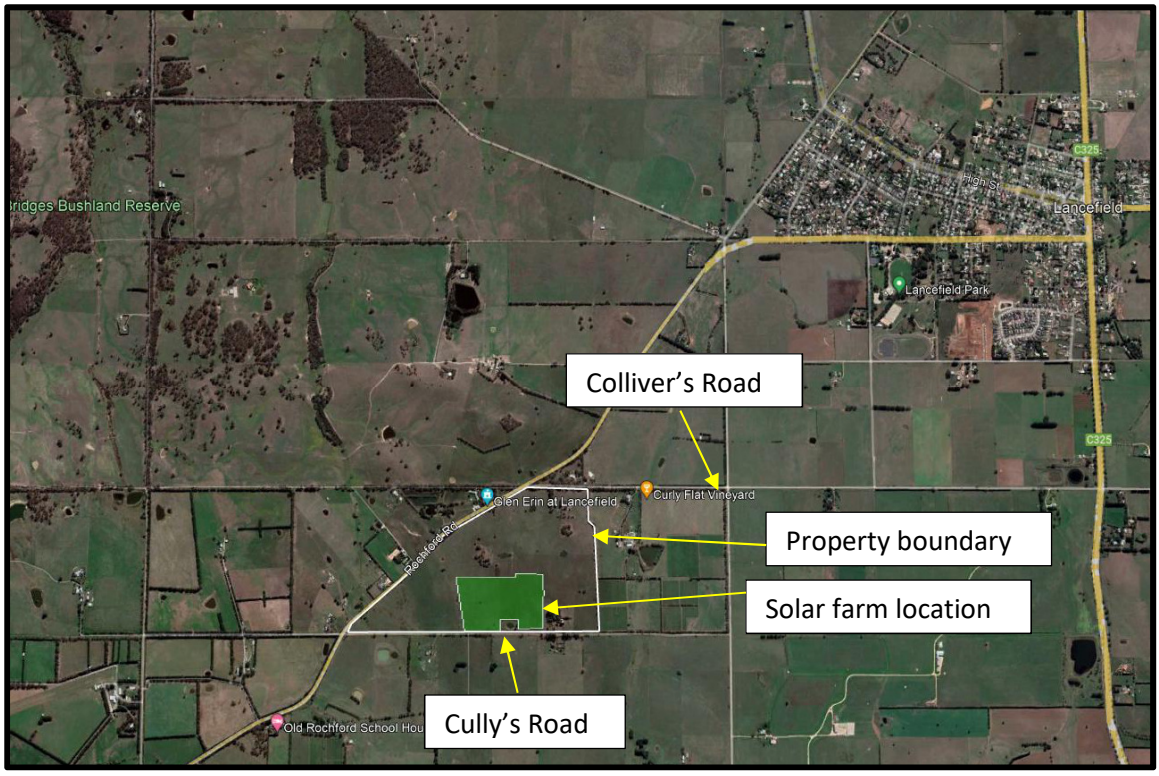

Figure 1 Location of Lancefield solar farm.

The site plan of the solar farm is shown in Figure 2.

Figure 2. Coldstream solar farm design.

Site Characteristics

Topography

The site is relatively flat, but slopes towards Cully's Rd where there is a surface fed dam. There are elevated areas to the north west and east of the site. Figure 3 is a general view of the site from Cully's Road showing the rising country to the north of the site.

Figure 3. Site view from Cully's Rd, looking north

Geology, and Soils

The soils on the site are derived from the recent volcanics (Figure 4)[2]. Qnab and Qnah refer to different volcanic parent materials.

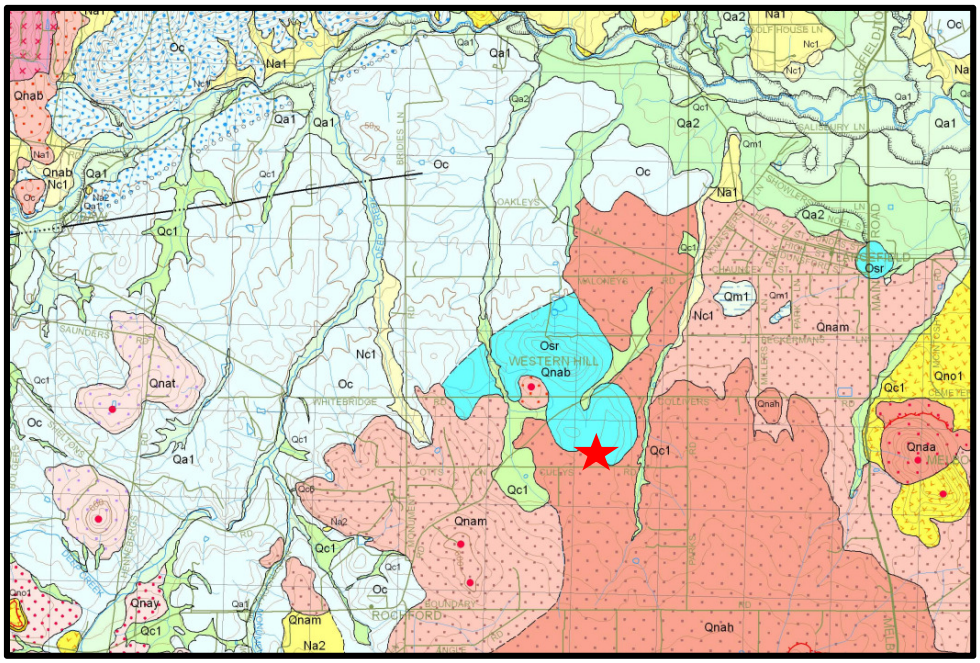

Figure 4. Geology, Lancefield area. (★ Solar farm site)

There are no specific soil data available for the site but based on the parent material they would be expected to be fine-textured, i.e. clay loams/clays. Data from the Soil Atlas Australia3 indicates that the soils on the low hills surrounding the site would be characterised as red earths. These soils are well drained soils but are generally acidic in nature and lacking in nutrients in their natural state. The site is located between these elevated areas. The site's soils are not as well drained and would less well-structured and less friable than the red earths. As with the adjacent red earths, these soils would have been low in nutrients and acidic prior to development of farming on the site.

The current nutrient status of soils will be a reflection of recent fertilizer history and it would be expected that, at least the phosphorus and sulphur levels would have improved through the addition of fertilizers. Soil acidity would have increased since clearing for agriculture and may or may not have been addressed through the addition of lime.

These soils would be considered moderate quality soils.

[2] https://geoscience-unclassified.s3.amazonaws.com/erd_publications/maps/50000/32473_lancefield_50_geol_ed1.pdf?response-content-disposition=inline%3B%20filename%3D%2232473_lancefield_50_geol_ed1.pdf%22&response-content-type=application%2Fpdf&AWSAccessKeyId=AKIAILARA4VCSSNMR2YQ&Expires=1666235178&Signature=Pa3BJBbT0tBz4k6Jl7q5dtmn8KI%3D

[3] https://www.asris.csiro.au/themes/Atlas.html#Atlas_Digital

Agricultural Use

The predominant land use in the area is beef and sheep grazing. There are a number of vineyards in the vicinity of the site: a small vineyard associated with the Glen Erin restaurant (500m to the north), the Curly Flat vineyard to the 400m east of the site and another small vineyard 850 south west of the site. These vineyards are located on the red earth soils associated with the rising country.

Historical images indicate that, for the last 20 years, the site has been used only for grazing by sheep and/or cattle. While not a complete time record the historical images show no evidence of pasture improvement/resowing having taken place in last twenty years. There is evidence of hay being cut in some years.

Agricultural Assessment

Regional Context

The site has no strategic agricultural importance. The area is not specifically mentioned in any planning scheme as being of high value agricultural land nor has the land been subject to government programs that would limit the ability of the facility to proceed.

Agricultural Productivity

Stock Productivity

The length of growing season can be used to provide an estimate of potential stock carrying capacity[4] of an area. The growing season is a function of amount of rain and its distribution. Realisation of this potential depends on the consistent good agronomy and husbandry and the absence of inherent soil constraints.

Based on the rainfall data for the area, the likely average growing season is around seven months for the property. This equates to a potential stocking rate of around 14 Dry Sheep Equivalents[5] (DSE) /ha. For a cattle operation this would equate to a maximum of eleven breeding cows on the site.

At current economic settings[6] this stocking rate is likely to return an average gross margin[7] of approximately $630/ha.

Overhead costs such as rates, insurance, power, etc. need to be deducted from these gross margin figures to arrive at net farm income, out of which financing costs, capital purchases, etc., would need to be paid.

The loss of the number of stock potentially carried on the site (maximum eleven cows) is insignificant in relation to the State's cattle herd of 1.4 million head.[8]

[4] Saul G.R and Kearney, G.A (2003) Potential carrying capacity of grazed pastures in southern Australia, Department of Natural Resources and Environment, Victoria.

[5] Dry Sheep Equivalent is a standard animal (non lactating/non pregnant 50 kg sheep) that is used to compare carrying capacity, profitability, etc., between different stock types. For example, one breeding ewe is equivalent to two DSE over a year and a cow and calf is equivalent to 17 DSE over a year.

[6] https://agriculture.vic.gov.au/about/agriculture-in-victoria/livestock-farm-monitor-project#h2-0

[7] Gross margin is the gross returns minus the direct costs associated with the enterprise.

[8] https://agriculture.vic.gov.au/__data/assets/pdf_file/0012/699285/Beef-Fast-Facts-June-2021-Final.pdf

Crop Productivity

While there is no evidence of a history of cropping, limited cropping would be possible – if access to cropping equipment was available in the area. Potential crop yields can be inferred from the growing season rainfall (GSR). In simple terms, growing season rainfall (mm) is a combination of a 50% discount of the rain falling from February to April, plus the rainfall from May to October. This figure is multiplied by a factor of 20 to give the potential yield of wheat and by 10 to give the potential yield for canola.

Rainfall data for this location[9] indicates that the average growing season rainfall for the last 20 years has been approximately 440 mm. This equates to a potential yield of 8.8 t/ha for wheat and 4.4 t/ha for canola. These figures similarly assume excellent agronomy and absence of subsoil impediments. Data from a recent survey of the economics of grain production in Victoria[10] indicated a conversion factor of 80% of potential yield is a realistic outcome. However the drainage constraints of the soils outlined above, means that the yield would likely be much less than 80% of potential yield. An estimate of potential yields of 5.6t/ha wheat and 2.8 t/ha for canola would be more realistic.

Based on 50% price deciles for wheat[11], ($280/t) the gross income would be expected to be approximately $1570/ha if the site was cropped with wheat.

The latest available data for cropping[12] indicates average variable costs of $273/ha which gives a gross margin of $1297/ha for wheat. Again the return to the farmer would be reduced by the cost of overheads, depreciation and finance costs.

The removal of this area of up to 15 hectares from agricultural production on average would result in a loss of approximately 73t wheat/year to the State or 36t/year canola. As with the livestock figures, these are insignificant numbers when compared to the State's predicted production for 2022-23 of 3,813,000 t wheat and 990,000 t canola[13].

The financial return from farming will be season specific and influenced by product prices and production costs. The returns from the solar farm, if of similar or greater value than that identified above, will provide for a more stable income than agriculture alone.

Agrovoltaic considerations

The likely growth of pasture under the solar panels will require management to reduce fire risk. If grazing was to be considered, the most suitable agricultural use of the land once under solar panels will be sheep grazing. The relative importance of the need to generate agricultural income and the management of vegetation under the solar panels, will determine the appropriate grazing/pasture strategy. Trading stock or non-breeding animals are likely to be the most appropriate enterprises due to the risk of difficulties and potential animal welfare issues during lambing.

The location of the subdivisional fences if any, and water sources will be influenced by the orientation of the solar panels and could be installed after the solar farm, when the locations of the cabling trenches are known

[9] https://www.longpaddock.qld.gov.au/silo/point-data/ - -37.27 144.72

[10] Cropping Zone Management Guideline Victorian High Rainfall. GRDC (2017)

[11] https://mecardo.com.au/wp-content/uploads/2022/08/Grain-Percentiles-August-2022.pdf

[12] The integration of technical data and profit drivers for more informed decisions, GRDC

[13] https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/australian-crop-report/victoria

Impact on agricultural use of land

When the solar farm is decommissioned, there will be no residual detrimental impact on the productivity of the site. Soil fertility will decline over time, but this can be corrected through the addition of suitable amendments, if deemed appropriate by the owner.

Cumulative impacts from existing solar farms.

There are no current or proposed solar farms documented by Planning Victoria within a 30km radius of the site.[14.]

Conclusion

The proposed Lancefield solar farm, will cover an area of up to 15 hectares. The site has been used for grazing, with no evidence of cropping over the last twenty years.

The soils are of moderate quality which limits their potential for high productivity.

The loss of production from the diversion of this land to a solar farm will have an insignificant impact on the State's agricultural production and is unlikely to impact on the activities of surrounding farming properties.

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[14] https://www.planning.vic.gov.au/permits-and-applications/specific-permit-topics/solar-energy-facilities/solar-energy-projects