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Agriculture

Fosterville Solar Farm

Agricultural Assessment

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Agricultural Assessment Report
Fosterville Solar Farm

Executive Summary

The site proposed for the solar farm at Fosterville is located on recent stream deposits which traditionally have been used for broad acre cropping and grazing. These soils would be considered soils of average quality for the area and considerably better than nearby sedimentary derived soils to the west. The installation of a solar farm on 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 or impact on the ability of neighbouring business to operate. There is the potential for the site to be used grazing sheep. Factors which need to be addressed for this use are outlined in the document.

Background

An agricultural assessment of the site for up to 100MW solar farm and battery energy storage system at Fosterville has been requested by Energy Forms on behalf of FRV Services Australia Pty Ltd. The site was inspected on 10th September, 2021 and subsequent discussions were held with the owner and his retail agronomist.

The solar farm is proposed for a parcel of land of approximately 188 ha on the south eastern corner of Browne's Lane and Russell's Bridge Road, Axedale. It adjoins the western side of the proposed UPC Axedale Solar Farm Project which is approximately 350 ha.

The requirements of an agricultural assessment are outlined in the Victorian Solar Energy Facilities Design and Development Guidelines, July 2019.

These guidelines specify a number of issues which should be addressed in such a report

- Whether agricultural land is strategically important or high-value at local and regional levels due to features such as high-quality soils, good rainfall, access to water, resilience to climate change, infrastructure investment and integration with industry – and including whether it is highly productive, highly versatile, or located in an irrigation district.

- Assessment of the agricultural productivity/carrying capacity of the land.

- Impacts of the proposal on the agricultural use of a site and whether any continued agricultural use (or 'agrophotovoltaics') can be achieved.

- Impacts on the agricultural values of adjacent and surrounding land (such as their ability to operate efficiently or their productivity) and impacts on the agricultural sector in a wider region (such as supply or market competition).

Site Characteristics

Geology and Topography

While there is volcanic bedrock (Qvn1) at depth, the surface soils are derived from flood plain deposits (Qs1/Qs2.)[1]

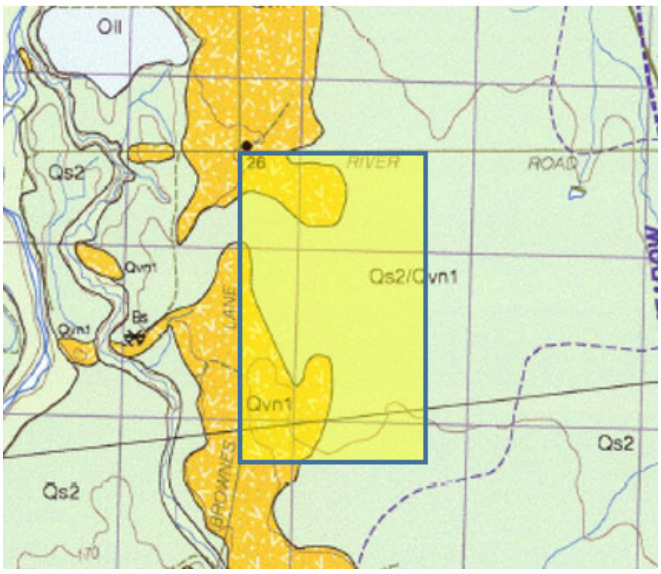

Figure 1. Geology of the Fosterville solar farm site

The area is slightly undulating

Soils

These soils would be considered of average quality for the area. A broad level survey of soils of the area was published in 1976.[2] This report classed the soils as yellow sodic duplex soils, with a clay loam surface texture. Sodic soils have a tendency to disperse when wet and hard setting when dry and are gypsum responsive.

The soils were slightly acidic at the surface grading to strongly alkaline at depth. Surface and soil permeability was classed as low to very low. Low soil permeability would be expected in sodic soils.

In their natural state all these soils would have been deficient in phosphorus, nitrogen, sulphur and molybdenum. The current nutrient status of soils will be a reflection of recent fertilizer history. No

1 Avonmore sheet, 7824-4, Geological Survey of Victoria. 1:50,000,

2 Mikhail, E.H. (1976) Soils of the Bendigo District, Soil Survey Report No 56, Department of Agriculture Victoria

recent soil tests are available but it would be expected that at least the phosphorus and sulphur levels would have improved and that soil acidity levels will have been maintained in the slightly acidic range.

Agricultural Use

The proposed site has been continuously cropped since at least 2009 in a wheat, wheat, canola rotation. The entire area is currently under canola. Prior to the cropping regime the property was used for sheep production. There are four dams still on the property as shown in Figure 2 and there are two minor drainage lines traversing the property to the north east, in the lower half of the property.

Figure 2 Property showing dam locations and drainage lines (green lines)

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Strategic importance of land and cumulative impact of solar farm development.

The land has no direct strategic importance being similar to much of the surrounding farming land. While the area is a reasonable size for a cropping operation, it constitutes approximately 0.068% of the cropping area in the Bendigo statistical district and 0.029% of the total agricultural land in the district[3]. The solar farm site is located to the west of UPC's Axedale Solar Farm. This facility will cover approximately 350 ha split almost evenly between the north and south of Russell's Bridge Road. Historical images indicate that the southern section of 180 ha has been used for cropping, while the northern portion of 170 ha has been used for grazing. The area devoted to cropping is similar to the area for the Fosterville site so the combined area represents approximately 0.13% of the cropping area in the Bendigo statistical district

The Fosterville site is not located in an irrigation district.

Agricultural Productivity

Given the absences of infrastructure (subdivisional fences, stock handling facilities) it is likely that the land would continue to be cropped if it was not used for a solar farm.

Productivity is ultimately determined by available water. While the soils are of average quality, similar soils in higher rainfall areas would have higher productivity as a result.

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 (Muskerry data set[4]) indicates that the average growing season rainfall for the last 20 years has been around 284 mm. This equates to a potential yield of 5.7 t/ha for wheat and 2.8t/ha for canola. These figures assume excellent agronomy and absence of subsoil impediments. Data from a recent survey of the economics of grain production in Victoria[5] indicated a conversion factor of 80% of potential yield is a realistic outcome. Therefore lower yields of 4.54t/ha wheat and 2.27 t/ha for canola should be achievable, long-term yields for this site.

On average, in the years that they were grown, the property would produce 410 t canola and 810 t wheat. This is equivalent to 0.02% (one five thousandth) and 0.04% (two five thousandths) of the predicted Victorian harvest of wheat and canola respectively. [6]

Based on 50% price deciles for wheat and canola[7], the annual gross income would be expected to be around $1250/ha.

[3] Agricultural commodities–Australia, States and Territories and ASGS regions–2019-20, ABS, May 2021
[4] https://www.longpaddock.qld.gov.au/silo/point-data/,
[5] Cropping Zone Management Guideline Victorian High Rainfall. GRDC (2017)
[6] https://www.awe.gov.au/abares/research-topics/agricultural-outlook/australian-crop-report/victoria
[7] https://mecardo.com.au/wp-content/uploads/2021/08/Grain-Percentiles-August-2021-2.pdf

The latest data for cropping[8] indicates average variable costs of $273/ha to give a gross margin of $977/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 area to be occupied by the solar farm is approximately 188 ha. The removal of this area of land from agricultural production and the adjoining cropping area for the Axedale site will have an insignificant impact on the agricultural productivity of the region. The grazing land on the northern portion of the Axedale solar farm site could result in little loss of overall production if used for grazing under the panels.

Agrovoltaic considerations

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 difficulties of managing animal welfare issues during lambing.

The weed control under the current crop is very good and it is assumed that this has been the case with previous crops. It is therefore unclear what plant species will return after the cessation of cropping. Discussions with the farm agronomist, indicated that there was likely to be some annual ryegrass and a number of weeds (such as sow thistle) which will re-establish over a period of time. However the effectiveness of weed control may mean that grazing, as a vegetation control strategy, will be limited in the initial years until plant numbers build up. If there is poor germination, following the cessation of cropping resulting in bare ground, or if it is important to optimise grazing returns, consideration should be given to reintroducing appropriate species prior to the construction of the solar farm. Suitable species would be Wimmera ryegrass and subterranean clover.

If the area was to be grazed to manage pasture growth, consideration should be given to subdividing the land into paddocks of no more than 50ha. This size will enable controlled grazing of areas by large numbers of stock to reduce pasture mass but not overgraze some areas due to selective grazing. It will be important to ensure that there is sufficient water available. There are four dams on the property.

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

Figure 3. Northernmost dam on Browne's Lane with pipeline to kaolin mine visible at the base of the boundary fence

While the capacity of the dams appeared generally suitable for stock, there may be issues with adequate water during dry seasons. There is a bore[9] on the north east corner of Browne's Lane and Russell Bridge Road which supplies water to the kaolin mine adjacent to the McIvor Highway. The depth to the water table at the bore site is approximately 30m. The salinity of the water is recorded as being between 1200mg/l and 1000mg/l. These levels are satisfactory for all classes of stock. It would seem likely that the aquifer would extend under the solar farm site and would be a more reliable source of stock water, if required. Utilizing this source would mean that the existing dams could be decommissioned.

The location of the subdivisional fences and water sources will be influenced by the orientation of the solar panels and could be installed after the solar farm when the location of the trenched cabling is known.

Artichoke thistles are present of the banks of the two dams abutting Browne's Lane. These weeds should be managed annually by hand rogueing or spot spraying to prevent their encroachment into the solar farm. It is understood that weed management will form part of the solar farm Operational Management Plan(s.) after the solar farm is constructed.

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 in a quickly through the addition of appropriate amendments.

[9] https://www.vvg.org.au/view_bore.php?database=dse_gms&bore_id=112208

Impact on surrounding land

The installation of the solar farm will have no effect on the ability of surrounding property owners or the owner to undertake grazing or cropping activities, nor will it impact on the agricultural sector in the wider region.

Other issues

The continuous cropping history of the property in recent years means that is highly unlikely that there will be any remnant native vegetation on the property.

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