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Agricultural Assessment Report
Anakie Solar Farm

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Document control and status

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Agricultural Assessment Report
Anakie Solar Farm

Executive Summary

The site proposed for the solar farm is a parcel of approximately 13.5 ha on the Geelong-Ballan Road, Anakie.

The property has been used almost exclusively for grazing of cattle in the past although there is evidence of hay being cut in some years, on the roadside section of the site. The property has potential for cropping as evidenced by activities on adjoining properties. By virtue of its small size, the property contributes insignificantly to the agricultural output of the region and is not located on a unique, high value soil type.

There is potential for a sheep grazing enterprise to continue under the solar. Factors which need to be addressed if grazing was to take place are outlined in the document.

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 the state, or impact on the ability of neighbouring businesses to operate.

Background

An agricultural assessment of the site for a 6.16 KW solar farm at Anakie has been requested by NGH Consulting.

The solar farm is proposed for a parcel of land of approximately 13.5 ha located approximately 21 km north of Geelong, on the western side of the Geelong Ballan Road.

Figure 1. Location of the Anakie solar farm site.

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[1]

The surface geology of the site is newer basalts (Qvn) with a section of You Yang's granite (Dug) at depth towards the south eastern corner of the site.

1 You Yangs sheet, 28120- ed 1, Geological Survey of Victoria. 1:50,000,

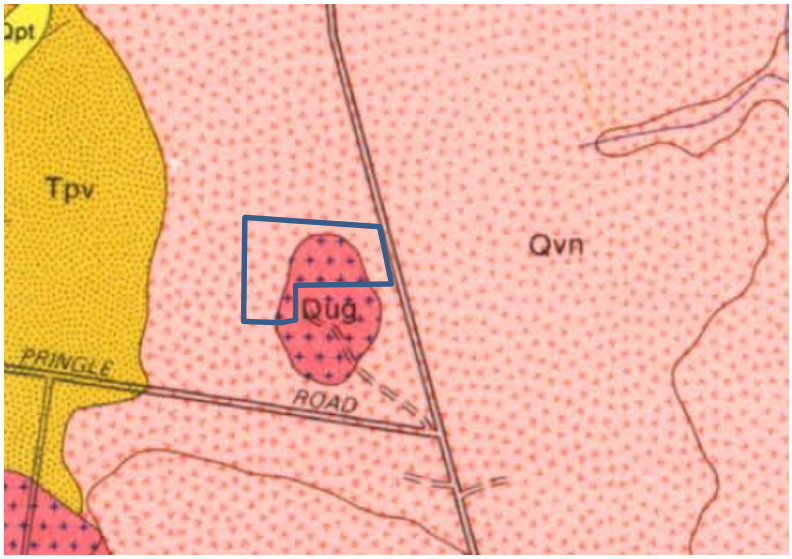

Figure 2. Approximate location of the Anakie solar farm site (outlined in blue) in relation to surrounding geology.

The property is very slightly undulating and slopes to the east.

Soils

There are no specific soil surveys for the area. However, soils developed from the newer volcanics are typically duplex soils (having distinct soil horizons) and may have impeded internal drainage.

In their natural state, the 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 which is not available. While no soil tests are available but it would be expected that at least the phosphorus and sulphur levels would have improved under agriculture and that soil acidity levels would have increased, if lime has not been applied.

These soils have high water-holding capacity but require significant amounts of rain before water is available to plants. Gypsum and/or lime may be required to improve their structure. These soils can be difficult to cultivate especially when they are wet and crops may suffer from waterlogging in years of high rainfall.

Vegetation

Vegetation assessment has been carried out by NGH. This indicates that the majority of land contains exotic species while there are smaller area of open grassland and ECV55 Plains Grassy Woodland derived grasslands.

Agricultural Use

Historical images indicate that the property has been used for grazing at least since 2010. The stock run appear mainly to be cattle although there is evidence that sheep have been run occasionally during the last ten years. There is a shearing shed and yards on the property south of the area proposed for

the solar farm. Stock water in the paddock proposed for the solar farm is supplied from a trough. (Figure 3).

Figure 3. Property showing trough location and the sheep handling facilities

While the property has not been cropped, the properties to the north and east have been cropped in recent years. There are two housed-poultry farms to the north (400m) and to the south (800m).

Agricultural Assessment

Strategic importance of land

The land has no direct strategic importance being similar to much of the surrounding farming land. It is a very small area (approx. 13.5ha) compared to the land used for grazing (306,414ha) and cropping (128,905ha) in the Barwon Statistical District.[2]

The site is not located in an irrigation district.

Agricultural Productivity

While the area is small, it would be possible to crop the land although the area may not be practical for contractors to service.

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 (Anakie data set[3]) indicates that the average growing season rainfall for the last 20 years has been around 340 mm. This equates to a potential yield of 7.2 t/ha for wheat and 3.6t/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[4] indicated a conversion

[2] Agricultural commodities–Australia, States and Territories and ASGS regions–2019-20, ABS, May 2021
[3] https://www.longpaddock.qld.gov.au/silo/point-data/,
[4] Cropping Zone Management Guideline Victorian High Rainfall. GRDC (2017)

factor of 80% of potential yield is a realistic outcome. Therefore lower yields of 5.7t/ha wheat and 2.9t/ha for canola should be achievable, long-term yields for an intensively farmed cropping property.

Based on 50% price deciles for wheat[5], the gross income would be expected to be around $1100/ha or $17,600 for the block.

The latest available data for cropping[6] indicates average variable costs of $273/ha to give a gross margin of $827/ha or $13,250. 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.

Stock Productivity

The length of growing season is used to provide an estimate of potential stock carrying capacity[7]. The growing season is a function of amount of rain its distribution and the water-holding capacity of the soil . Realisation of this potential similarly 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 6.5 months for the property. This equates to a potential stocking rate of around 13 Dry Sheep Equivalents[8] (DSE) /ha. The potential stocking rate should be achievable given the type of soil, provided there are appropriate pasture species and nutritional deficiencies are addressed.

Because the property has not been cropped there will be continued growth of pasture after the installation of the solar farm.

Agrovoltaic considerations

The likely strong regeneration of pasture 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 difficulties of managing 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 trenched cabling trenches are known.

[5] https://mecardo.com.au/wp-content/uploads/2021/08/Grain-Percentiles-August-2021-2.pdf

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

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

[8] 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.

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 rapidly through the addition of appropriate amendments.

Impact on surrounding land

The installation of the solar farm will have no effect on the ability of surrounding property owners to operate, nor will it impact on the agricultural sector in the wider region.

Other issues

The previously section sown to exotic species on the northern boundary of the sites indicates that it is highly unlikely that there will be any remnant native vegetation in this section. The remaining areas with open grassland and Grassy Woodlands derived grassland have developed under grazing and should not be affected should grazing be continued under the solar panels.

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