Appendix D Agricultural assessment report

Agricultural Assessment Report
Corop Solar Farm Final

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Agricultural Assessment Report
Corop Solar Farm

Executive Summary

This Agricultural Assessment Report examines the agricultural productivity of the proposed Corop Solar Farm and the impact of its construction on agricultural output.

The site proposed for the solar farm is north of Rushworth and south of Stanhope will cover a total area of 1275ha. The site comprises two properties each of around 630ha – a southern property and a northern property. The soil types vary across the two properties. The northern most property has predominantly heavy soils with some lighter soils on its eastern side. The southern property soils are a little lighter in texture and there is a section of high quality loamy soils on the south eastern corner.

While some 840 ha would be considered suitable for cropping, only about 300 ha of the total area is cropped annually, mainly on the lighter soil types. In most years the lighter soils should produce reasonable yields, but may suffer in wet years. The remainder of the area (420 ha) is more suited to grazing. Under current conditions, the pastures present would be unlikely to carry high stocking rates.

If the current cropping intensity was continued, the removal of this area of land from agricultural production on average would result in a loss of around 1200 t wheat/year to the state. This is less than 0.0003% of the State's predicted production for 2021-22.

There is potential for a sheep grazing enterprise to continue under the solar farm at comparable stocking rates to those being run at the moment. The cessation of cropping would allow for more stock to be run and offset the loss of product from the crop. Factors which need to be addressed for a grazing enterprise are outlined in the document.

The proposed 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, nor impact on the ability of neighbouring businesses to operate.

Background

An agricultural assessment of the site for the Corop solar farm has been requested by Leeson Consulting Pty. Ltd.

The proposed site consists of two stages totalling 1275ha. Each stage is separately owned. The properties are located 6 km south west of Stanhope and 6km north-west of Rushworth. The southern boundary is the Old Corop Road and the western boundary is Geodetic Road North. Carag Road runs along the north east corner of Stage 2. (Figure 1) This report relates to both stages.

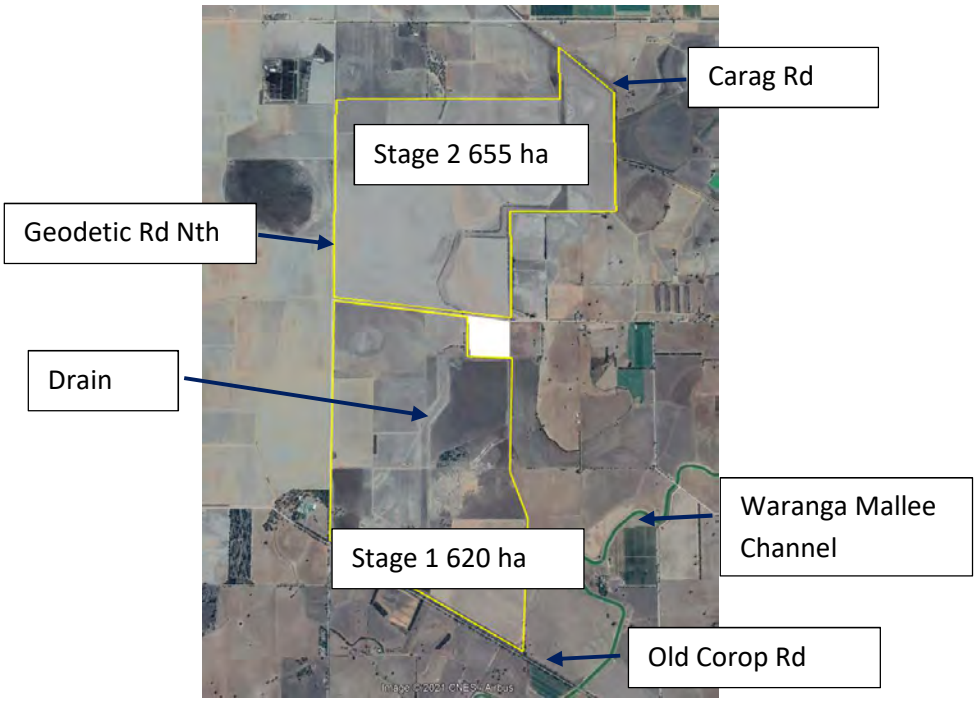

Figure 1 Location of Corop solar farm

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 an agricultural assessment.

- 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, Hydrology and Topography[1]

The soils are derived from the Shepparton formation. These are recent deposits. The area is gently sloping to the north with a fall of only 3m over the length (5.3km) of the two Stages. The low relief predisposes the area to flooding from overland flows from the hill country to the south. A Community Drain was installed some 20 years ago to address this issue and has resulted in facilitating the removal of surface water from the properties. At this time an irrigation delivery channel along the Old Corop Road was decommissioned.

Soils

A detailed soil survey of the Goulburn Valley irrigation district was undertaken in 1962[2] to assess the suitability of soils in the region for the irrigation of a range of crops – both horticultural and broadacre. The site no longer has irrigation infrastructure, but the soil classifications have relevance to broadacre agriculture.

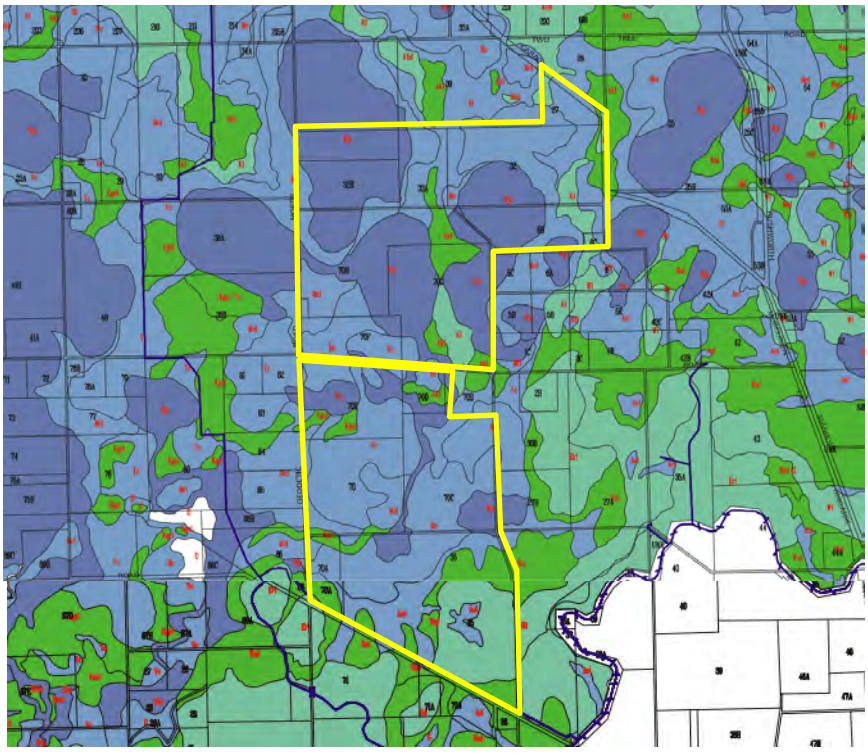

Figure 2. Soil types, Corop solar farm

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

2 Skene J.K.M. and Poutsma T.J. (1962) Soils and land use in part of the Goulburn Valley, Victoria : comprising the Rodney, Tongala-Stanhope, North Shepparton and South Shepparton Irrigation areas. Technical bulletin (Victoria. Dept. of Agriculture) ; no. 14.

The soils have been colour coded based on their texture and other characteristics.

The light green soils are loams, (Wanalta loam, Karook loam) suitable for most horticultural and pasture purposes.

Dark green soils (Arkoo loam, Wana loam, Wenora loam) were considered fair soils for pears and plums and good soils for summer fodder crop cereals and perennial and annual pastures.

Light blue soils (Moora clay, Alta clay loam, Yuga clay) are only suitable for horticultural crops if well drained. Summer fodder crops cereals and pastures can be grown on these soil types.

The dark blue soils were not recommended for irrigation because of swampiness or uneven surface features making irrigation layout impractical. These soils are heavy clays (Wallenjoe clay, Carag clay). While these soils can be used for pasture, crops would likely suffer in wet years. These heavy soils comprise approximately 420 ha across the two sites.

In summary, some 840 ha would be considered reasonable cropping country while the remaining 420 ha is more suited to grazing.

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 recent soil tests are available but it would be expected that at least the phosphorus and sulphur levels would have improved through the addition of fertilizers during the cropping phase. The pasture soils did not have the appearance of regular recent applications of fertilizer but previous applications will have lifted phosphorus and sulphur levels above the original levels. Soil acidity levels will have been maintained in the slightly acidic range, particularly in the cropped soils. These additions of soil amendments will have resulted in increased productivity above natural levels (see below for productivity estimates).

Agricultural Use

Approximately one hundred and fifty hectares of the Stage 1 property have been leased to a neighbour for cropping for at least 10 years. The remaining land is used for agistment of sheep by a farmer from southern NSW. The majority of soils in the Stage 1 area are listed as suitable for cropping and grazing. There is a section of higher quality soil on the south eastern corner of the Stage 1 property. The current areas of crop are shown in Figure 3Figure 3.

The pastures on the remainder of the property are dominated by Tall Wheat Grass. This is a poorer quality, salt tolerant species and reflects the situation during the 1970s and 1980s when there were elevated saline water tables in the area. The water tables have since fallen due to cessation of irrigation, drier seasons and the installation of drains to quickly re move surface water.

This property used to have an 800 ML water right but that was sold some years ago which coincided with the construction of the Community Drain. The property still retains a 15 ML water right which is delivered to the SE corner through a 65mm pipe and is used for stock purposes.

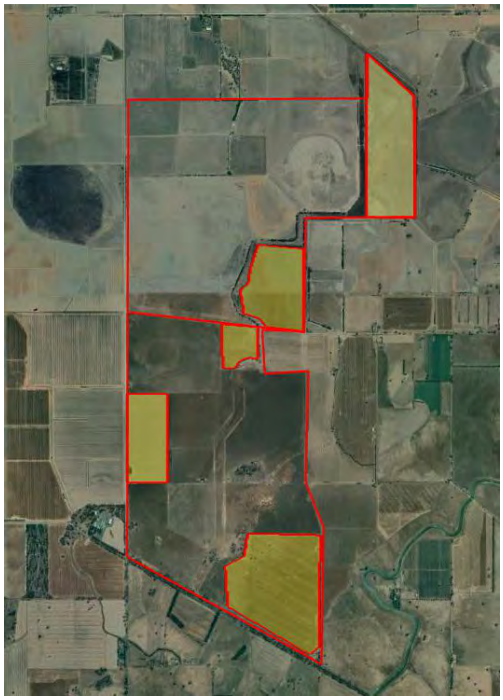

Figure 3. Cropped areas, 2021

The Stage 2 property was purchased some 7-8 years ago. The areas cropped in 2021 are shown in Figure 3. It is noted that the areas cropped have favoured the lighter soil types on the north eastern corner and the south east corner of the property. The majority of the soils are heavy clay soils and while they can be cropped they are likely to have reduced yields in wet seasons.

Pastures in the Stage 2 property are annual based.

Despite the soils having a heavy texture, dams do not hold water well. Stock water is reticulated to troughs from a 50mm pipe from another property owned by the owner of the Stage 2 property. The areas not cropped are used to graze merino ewes.

Agricultural Assessment

Strategic importance of land

While the Stage 1 property was previously irrigated, irrigation ceased some 20 years ago and there is no infrastructure available to deliver water to this block. The Stage 2 property has never been irrigated.

Agricultural Productivity

Crop Productivity

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.

Rainfall data for this location[3] indicates that the average growing season rainfall for the last 20 years has been around 280 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[4] 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 an intensively farmed cropping property. Given the potential issues with waterlogging on the heavier soil types on the property, wheat yields closer to 4.0t/ha are more realistic for this site. The area under crop in 2021 was 300ha. The removal of this area of land from agricultural production on average would result in a loss of around 1200 t wheat/year to the state. This is less than 0.0003% of the State's predicted production for 2021-22.

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

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

Stock Productivity

An accurate assessment of the current carrying capacity of each property is not possible due to the movement of stock on and off the properties during the year. However, the length of growing season can be used to provide an estimate of potential stock carrying capacity[7]. The growing season is a function of amount of rain and its distribution. 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 months for the property. This equates to a potential stocking rate of around 10.5 Dry Sheep Equivalents[8] (DSE) /ha. In this instance achieving the potential stocking rate will be limited by the poor pasture composition and the heavy nature of the soils used for grazing.

On the basis of the lower quality pastures a stocking rate of 2-3 ewes per hectare is a conservatively realistic stocking rate. This is equivalent to 4-6 DSE/ha for this class of stock. On current economic returns this is likely to return a gross margin of $160-$240/ha.

Again the return to the farmer would be reduced by the cost of overheads and depreciation.

[3] https://www.longpaddock.qld.gov.au/silo/point-data/ -36.55/144.95

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

[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.

Agrovoltaic considerations

The likely strong regeneration of pasture particularly in the existing pasture paddocks will require management to reduce fire risk. If grazing was to be considered, the most suitable agricultural use of the land once solar panels are installed, 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.

In order to effectively manage grazing the area should be fenced 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. Given the unreliability of rainfall to fill dams and the poor ability of some of the soils to hold water, accessing water from the 15 ML water right on the Stage 1 property and obtaining a stock water diversion licence from the Waranga – Mallee channel would be the most appropriate solution.

The location of the internal fences and water sources will be influenced by the orientation of the solar panels and need to be installed prior to the solar farm construction to prevent interference with solar panel cabling.

No weeds of significance were observed on the Stage 1 property. However, on the Stage 2 property, there was a heavy infestation of Bathurst Burr on the northern most paddock adjacent to Geodetic Road North and isolated Artichoke thistles on a large paddock south of the paddock with the Bathurst Burrs.

Bathurst Burrs have exceptionally long lived seeds and on-going control measures will be required to prevent their spread throughout the rest of the property and to neighbouring properties. Similarly, there will need to be ongoing management of the Artichoke thistles.

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 quickly 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, nor will it impact on the agricultural sector in the wider region.

Conclusion

The proposed Corop Solar Farm will cover an area of 1260 ha, north-west of Rushworth. The area was once in an irrigation district and consequently a detailed soil survey was undertaken which provides data about the soils on the site. The soils are reasonably characteristic of the area and while they can be productive they would not be considered soils of very high value. With the removal of irrigation infrastructure, the area is now entirely dryland. It is estimated that some 840 ha would be suitable for broad acre cropping with the remainder being favoured for grazing. Current cropping programs

only cover 300 ha per year with the rest of the site being used for low intensity grazing due to low – moderately productive pastures.

Grazing of suitable stock could be continued after the construction of the solar farm to partially off-set the loss of crop production from the area.

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