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Agriculture

Agricultural Assessment Report
Cooba Solar Project

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Final

Document control and status

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Agricultural Assessment Report
Cooba Solar Project - Revised

Executive Summary

The site proposed for a solar farm and battery energy storage site, 4.5 km south of Colbinabbin, is located on recent stream deposits and colluvium which traditionally have been used for broadacre cropping and grazing. There is a narrow band of soil on the western edge of the property which is of higher quality and, where it occurs elsewhere in the district, in a significant size, it is used for viticulture. Most of the soils on the property would be considered soils of moderate quality for the area. The property is conservatively managed for cropping and grazing, with two thirds used for grazing and one third to crop on a rotational basis. In the absence of a solar farm, these management settings would continue.

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 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 solar farm and battery energy storage system 4.5 km south of Colbinabbin has been requested by NGH on behalf of Venn Arbitir Group. The solar farm will be located on a property of approximately 1147 ha, bordered by the Rochester-Heathcote Road on the west, McEvoy Road on the south, Cornella Creek in the east and extending some 600 m north of Cornella Church Road on the northern boundary.

The site was inspected on 24th October, 2021 in conjunction with the owner, Mr Glenn Rathjen. Subsequent to the preparation of an initial report, the site layout has been revised and an updated report was submitted (16 August 2023). The revised layout is shown in Figure 1. Following the August 2023 report, the Department of Planning and Transport requested clarification on:

"The potential for the use or development to impact the operation and expansion of adjoining and nearby agricultural uses."

This revised report addresses that request.

The orange area indicates the extent of the project which includes solar arrays and associated infrastructure. The purple zones along the two creeks on the eastern side of the property and the area on the western side of the property are areas cultural heritage sensitivity and excluded from the development. The removal of the cultural heritage areas from the initial proposal, has reduced that footprint of the solar farm to approximately 665ha.

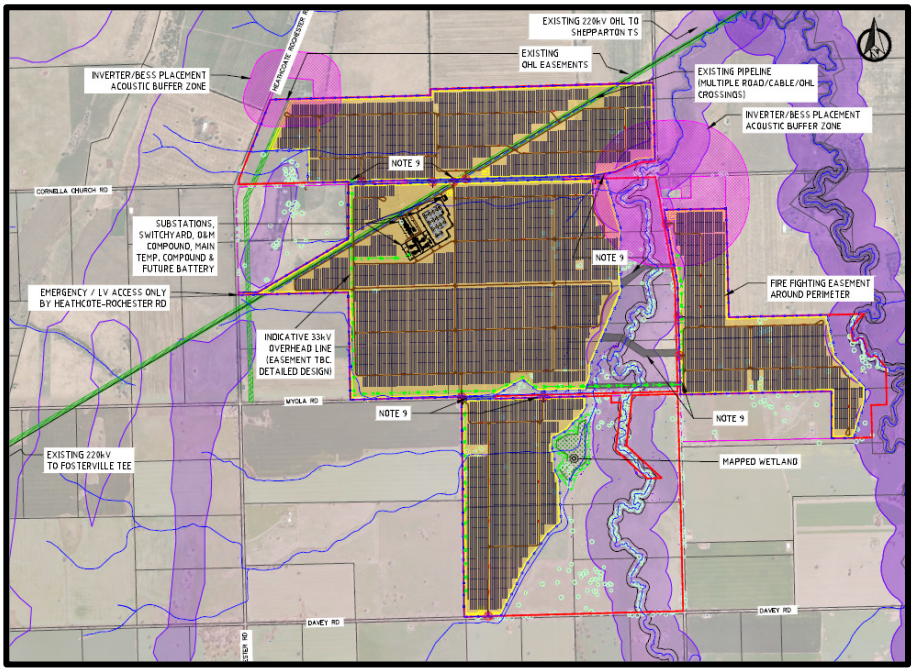

Figure 1. Cooba solar farm plan.

The requirements of an agricultural assessment are outlined in the Victorian Solar Energy Facilities Design and Development Guidelines, July 2019 (amended October 2022).

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,
- 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 activities, to help diversify farm income without reducing productivity.

Site Characteristics

The property is bounded by the Cornella Creek on the east and the Yallagallorah Creek flows through the property. These creeks are fed by a number of minor drainage lines and drain to the north.

Geology and Topography

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

The geology of the vast majority of the site is recent stream deposits (Qs1, Qs2) and colluvium (Qrc1)[1]. There is a small intrusion of Heathcote Volcanics (€hs) on the western side of the property and a small area of colluvium (Qrc) at the base of the Colbinabbin Range on the north west corner of the property.

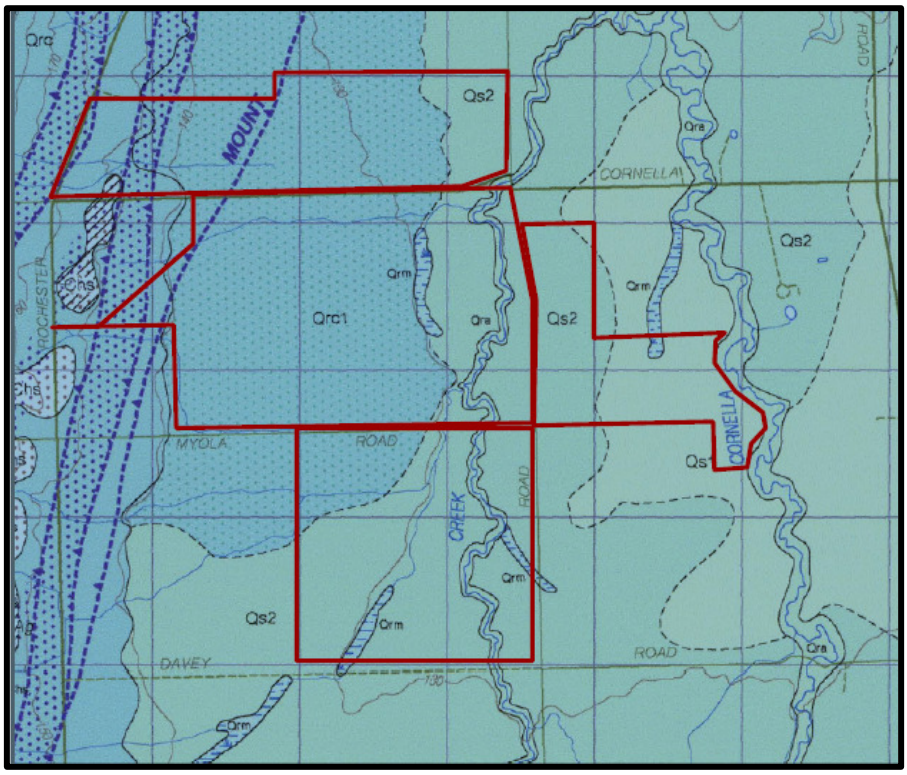

Figure 2. Geology of the Cooba solar farm site

Soils

There are no specific soil surveys for the area. However, there are three main soil types on the property. There is a band of well-draining friable red soils extending from the Colbinabbin Range on the western side of the property that have been derived from Heathcote Volcanics parent material.

These soils are considered very good soils and are used for the extensive vineyard plantings along the range. In the revised layout, these soils have been excluded from the solar farm site.

The major soil type on the property (to the east of the red friable soils) is a cracking black clay which is considered to be good quality for the area, but not as versatile as the red soils. Loam soils are found in the proximity of the Cornella and Yallagallorah Creeks.

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

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 under agriculture and that soil acidity levels will have been maintained in the moderately acidic range.

There are 16 dams located on the solar farm site, as shown in Figure 3.

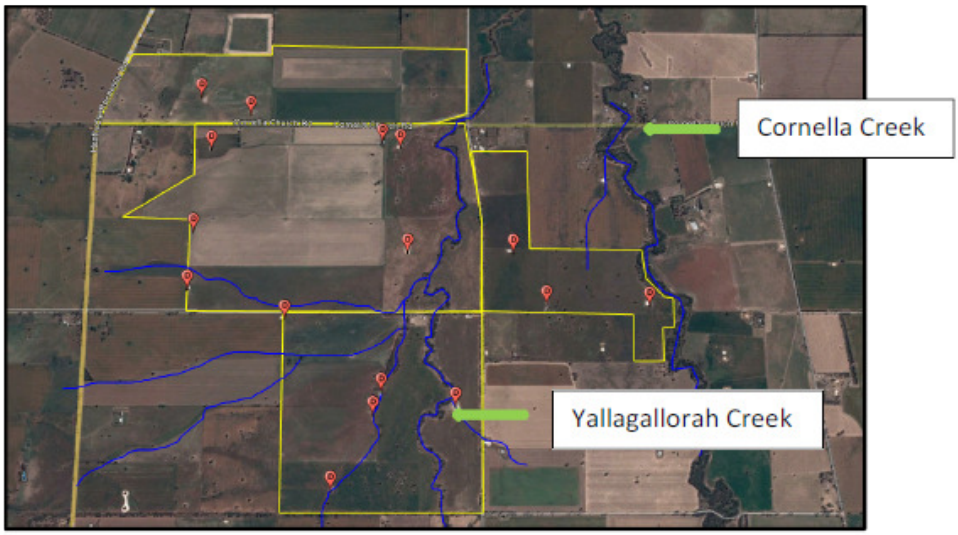

Figure 3. Property showing dam locations (D) and drainage lines (blue lines)

The property has been conservatively farmed for many years. One third of the property (approximately 300ha) is cropped on a rotation of wheat, barley and oats before being returned to annual pasture for a number of years. There is little use of nitrogen fertilizers, so that the actual cropping productivity of the property will be considerably less than that indicated by the following water-use calculations. The owner does not grow canola due its high input costs.

The majority of the property is used to run a flock of around 1300 South African Meat Merinos (SAMMs). These are stocked very conservatively at around 2 ewes per hectare.

Agricultural Productivity

Stock Productivity

The length of growing season is used to provide an estimate of potential stock carrying capacity[2]. 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 6 months for the property. This equates to a potential stocking rate of around 10.5 Dry Sheep Equivalents'[3] (DSE)/ha. The potential stocking rate should be achievable on this property, given the quality of the soil, provided there are appropriate pasture species present and nutritional deficiencies are addressed.

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

[3] A 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.

At the current conservative stocking rate of 2 ewes per hectare this is equivalent to 4-4.5 DSE/ha for this class of stock.

Because the property has not been intensively cropped, there has been, and will be good regeneration of pasture after cropping. When the solar farm is constructed, cropping will not be feasible but the previously cropped land will be available for grazing. The good regeneration of pastures means that the current stocking rate should be able to be maintained and stock numbers increased, to manage the extra land retired from cropping.

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 as tonnes per hectare.

Rainfall data for this location (Colbinabbin dataset[4]) 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' 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 less intensive management settings of the property, average wheat yields closer to 4.0t/ha are more realistic for this site.

The area to be occupied by the solar farm is approximately 665 ha. In any one year 222ha would be expected to be in crop. Using the conservative wheat yield of 4.0t/ha this equates to a total potential yield of 880t wheat annually.

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.

The farm would continue to be managed conservatively if it was not being used for the solar farm. The removal of this area of land from agricultural production on average would result in a loss of around 888t wheat/year to the state. This is less than 0.01% of the State's predicted production for 2022-23[7].

Agrovoltaic considerations

The likely strong annual 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.

[4] https://www.longpaddock.q1d.gov.au/silo/point-data

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

In order to effectively manage grazing there 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. While there are 16 dams on the property, the property has access to the Colbinabbin-Cornella irrigation pipe which runs along the western boundary of the property. This pipeline is a private irrigation system supplying water to 16 properties including vineyards on the Colbinabbin Range. The subject property has two outlets from this pipeline. Accessing this source and using troughs would be a more reliable means of ensuring adequate water for stock rather than relying on surface dams.

The location of the sub-divisional fences for stock management 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.

Agricultural Assessment

Surrounding agricultural uses and strategic importance of land

There have been extensive plantings of grape vines along the eastern side of the Colbinabbin Range (to the west of the proposed site). These plantings have been made on the deep red soils formed from colluvium parent material (Qrc) and Heathcote Volcanics soils (€hs). These soils are not present on the site apart from a small section on the northwest corner. There are extensive areas of these soil types along the Range that have the capacity for further planting of vines should water be available. It is not expected that the construction of the solar farm would have any impact on the operation or productivity of vineyards.

The vast majority of the property's soils are similar to those to the north, east and south of the site. These soils are used predominantly for extensive grazing and cropping. Because the land on the site is similar to much of the surrounding farming land, it has no direct strategic importance. The large areas of soils, similar to those on the site, should allow for the expansion of existing cropping and grazing enterprises if required.

While the area is a reasonable size for a cropping operation, it constitutes approximately 0.046% of the cropping area in the Bendigo statistical district and only 0.16% of the agricultural land in the district devoted to grazing.[8]

A recent amendment to the planning guidelines states that a solar energy facility's location should, if possible, avoid land in a declared irrigation district that is, or was, serviced on 17 September 2019 by irrigation infrastructure managed by a rural water corporation unless the infrastructure has been, or is planned to be, decommissioned. The location of the site in relation to nearby irrigation districts is shown in Figure 4.

[8] Agricultural commodities—Australia, States and Territories and ASGS regions-2019-20, ABS, May 2021_[4] Cropping Zone Management Guideline Victorian High Rainfall. GRDC (2017)

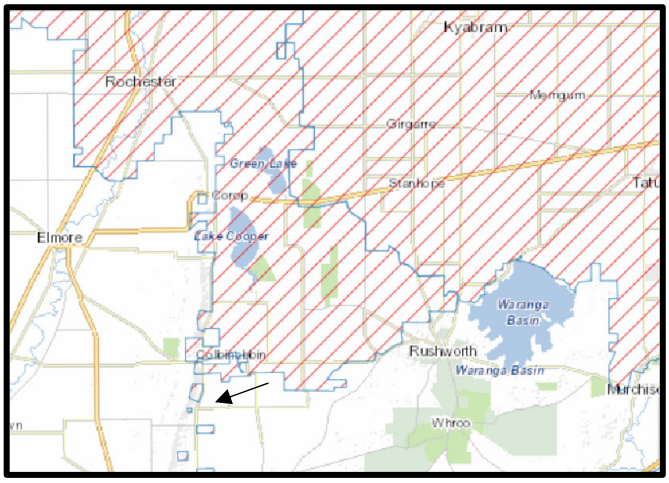

Figure 4. Location of solar farm site (arrowed) in relation to surrounding irrigation districts

The site is not located in an irrigation district so this provision does not apply.

Impact on agricultural use of land

If fertilizer cannot be applied during the operation of the solar farm, soil fertility will decline. This decline can be corrected quickly through the addition of appropriate amendments after the decommissioning of the site with no residual detrimental impact on the long term productivity of the site.

Impact on surrounding land

The installation of the solar farm will have limited or no effect on the ability of surrounding property owners to use their land for agricultural purposes and will have negligible impacts on the agricultural sector in the wider region.

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