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Agricultural Assessment Report
Maffra Solar Farm - Final

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Agricultural Assessment Report
Maffra Solar Farm

Executive Summary

This Agricultural Assessment Report examines the agricultural productivity of the proposed Maffra solar farm on the eastern side of the Maffra Briagolong Road, three km north of the Maffra township, and the impact of its construction on a range of agricultural considerations.

The site proposed for the solar farm is approximately 12 ha. It has previously been used exclusively for grazing. The soils in this location are classed as soils of moderate fertility and have acidity and sodicity subsoil constraints that limit 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 of the 5.4 KW Maffra solar farm has been requested by NGH Consulting. This report has been informed by 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,
- 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

[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 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 of approximately 12ha, shown in Figure 1, is located on the eastern side of the Maffra Briagolong Road, three km north of the Maffra township. The site is on elevated country between the Macalister Irrigation District (MID) along the Macalister River to the west and the Avon River to the east. The extent of the MID is shown in Appendix 2 and the location of the site in relation to the MID in Figure 2.

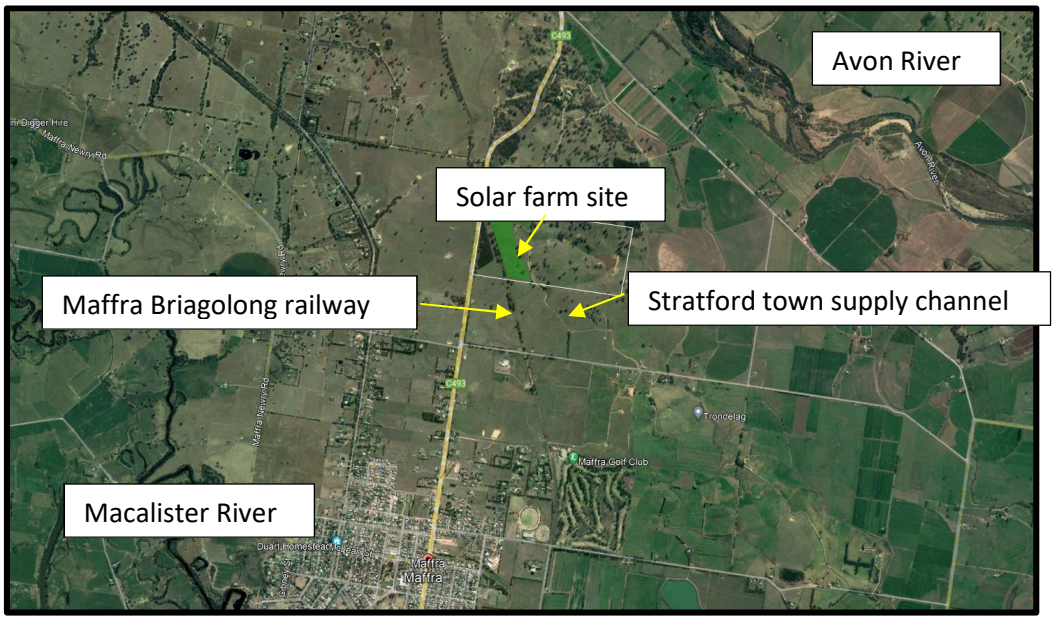

Figure 1. Location of Maffra solar farm.

The site is located adjacent a section of the decommissioned Maffra Briagolong railway on the west and the Stratford town water supply channel on the east.

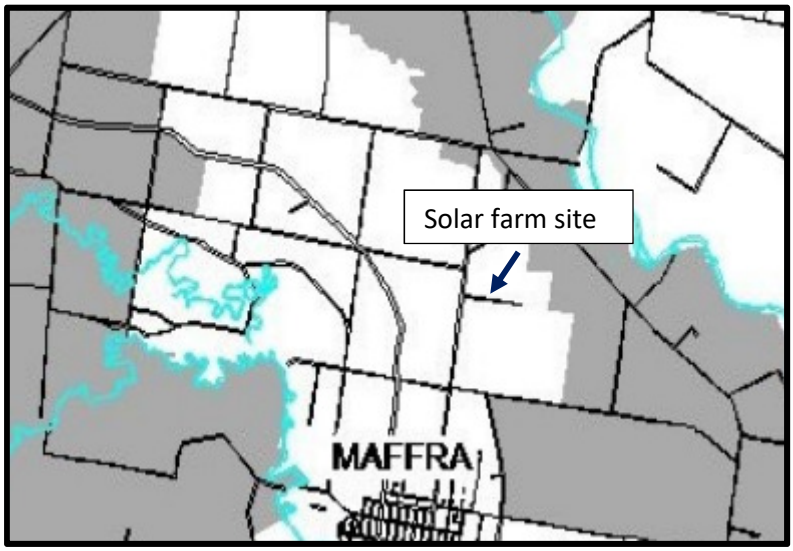

Figure 2. Boundaries of the Macalister Irrigation Area (shown in grey)

Site Characteristics

Geology, and Soils

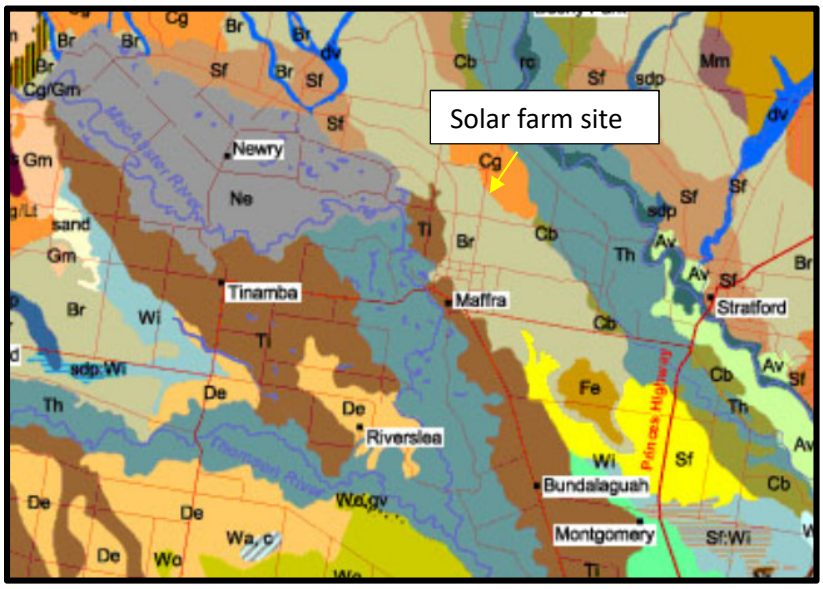

Figure 3. Soil types, Maffra district

The soils on the site form part of the Briagolong land form. The predominant soil types in this land form are yellow and brown sodosols.

Sodosols have acidic sodic subsoils. Acidity limits the range of deep rooted pasture species that can be grown and the sodic nature of the subsoil results in poor soil structure and a high potential for erosion when exposed.

These soils would not be considered high quality soils.

As with the majority of Victorian soils, these soils in their natural state, would have been deficient in phosphorus, nitrogen, sulphur and molybdenum as well as being strongly acidic in the top soil. 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 increase since clearing for agriculture and may or may not have been addressed through the addition of lime.

Agricultural Use

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

Strategic importance of land

The site has no strategic importance. The area is zoned Rural and 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[2] of an area. 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 six and a half months for the property. This equates to a potential stocking rate of around 13 Dry Sheep Equivalents[3] (DSE)/ha. For a cattle operation this would equate to a maximum of ten breeding cows on the site.

On current economic returns[4] this is likely to return an average gross margin of approximately $550/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 ten cows) is insignificant in relation to the State's cattle herd of 1.4 million head.[5]

Crop Productivity

While there is no evidence of a history of cropping, cropping would be possible, but unlikely due to the absence of cropping in the area and the small area involved.

However 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[6] indicates that the average growing season rainfall for the last 20 years has been approximately 320 mm. This equates to a potential yield of 6.4 t/ha for wheat and 3.2 t/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[7] indicated a conversion factor of 80%

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[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] 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.

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

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

[6] https://www.longpaddock.qld.gov.au/silo/point-data/ - -38.30 147.05

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

of potential yield is a realistic outcome. However the subsoil acidity and sodicity constraints of the soils outlined above, means that the yield would be less than 80% of potential yield. An estimate of potential yields of 4.5 t/ha wheat and 2.2 t/ha for canola would be more realistic.

Based on 50% price deciles for wheat[8], ($280/t) the gross income would be expected to be approximately $1260/ha if the site was cropped with wheat.

The latest available data for cropping[9] indicates average variable costs of $273/ha to give a gross margin of $987/ha for wheat. Again the return to the farmer would be reduced by the cost of overheads, depreciation and finance costs.

The removal of approximately 12.2hectares from agricultural production would on average result in a loss of approximately 55 t wheat/year to the State or 27 t canola/year. 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[10].

The site is located in the north western corner of the property and the installation of the facility will have no effect on the property owner to undertake grazing activities on the rest of the property or on the ability of surrounding property owners to undertake agricultural activities. It will not impact on the agricultural sector in the wider region.

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.

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 at decommissioning, if deemed appropriate by the owner.

[8] https://mecardo.com.au/wp-content/uploads/2022/08/Grain-Percentiles-August-2022.pdf
[9] The integration of technical data and profit drivers for more informed decisions, GRDC
[10] https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/australian-crop-report/victoria

Cumulative impact assessment

A 30MW solar farm has been approved for a site 2km north of Maffra and 600m south of the site evaluated in this report[11]. At the moment there are no other solar farms which are operational or proposed, within 20km of this proposed site.

The approved Maffra solar farm is relatively small and there are unlikely to be any cumulative effects on agriculture from the establishment of an additional small scale solar farm.

Summary

The proposed Maffra solar farm, three km north of Maffra, will cover an area of approximately 12 ha.

The site is located outside of the boundaries of the Macalister Irrigation District and therefore does not compromise the availability and/or productivity of high value agricultural land.

The site appears to have only been used for grazing, with no evidence of cropping. The soils are of moderate quality which limits their potential for high productivity.

The net return from grazing is not high and is subject to seasonal and market fluctuations. The returns from the solar farm will be more consistent, achieve better returns and provide a diversified source of income.

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.

J Shovelton
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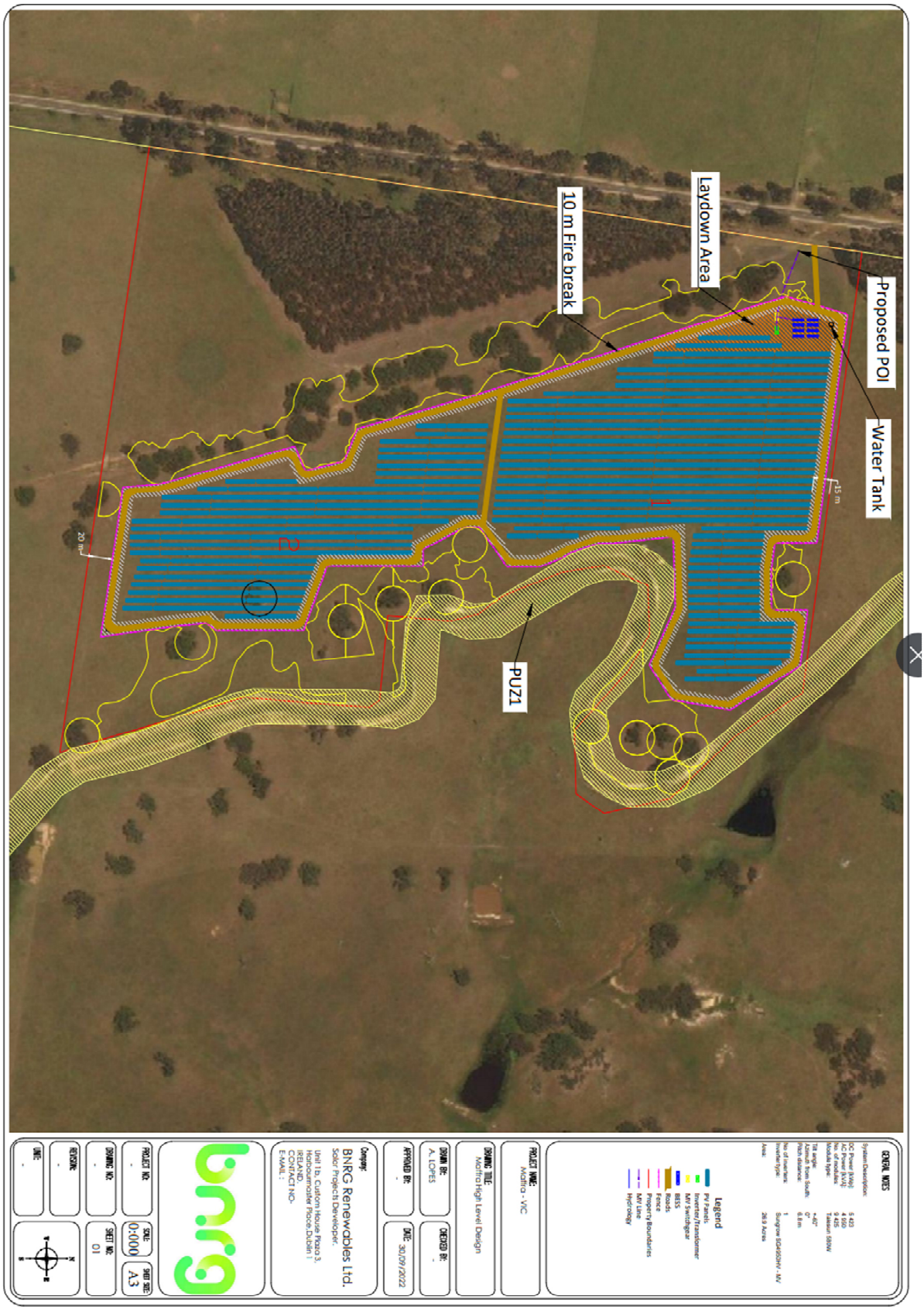
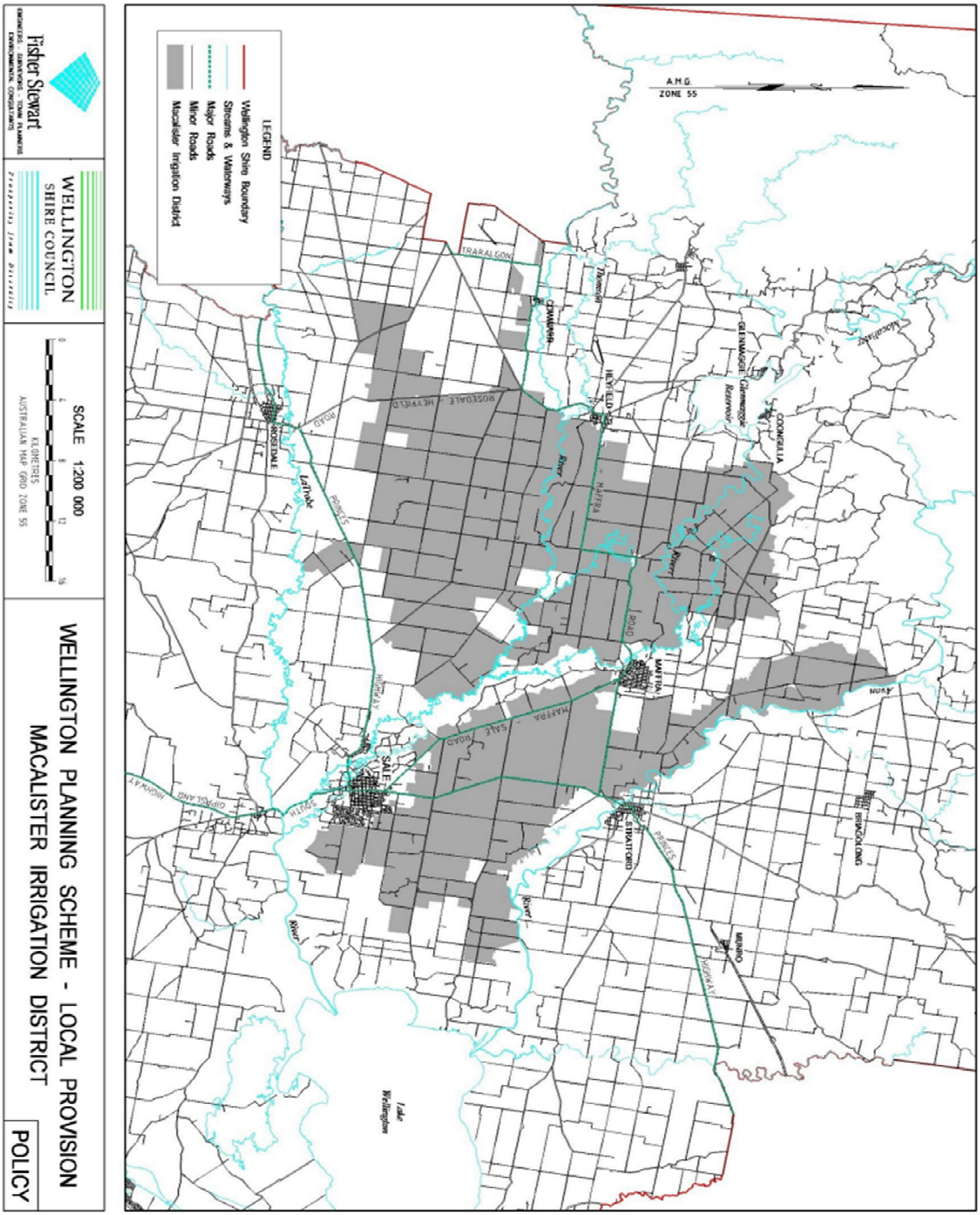
24 October 2022

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

Appendix 1 – Site Plan



Appendix 2 – Boundaries of the Macalister Irrigation District



Source: https://api.vicplanning.app/planning/v2/schemes/well/ordinances/6906057/pdf/