RMCG

ADVERTISED PLAN

MAY 2024

1033 Oxley-Meadow Creek Rd, Meadow Creek, VIC

Combined Agricultural Assessment and Agri-Solar Assessment

Urbis

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ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Taungurung people as the Traditional Owners of the Country on which this project has been conducted. We recognise their continuing connection to land, waters and culture and pay our respects to their Elders past and present, and we acknowledge emerging leaders. Moreover, we express gratitude for the knowledge and insight that Traditional Owners and other Aboriginal and Torres Strait Islander people contribute to our shared work in Australia.

1 Introduction

1.1 THIS PROJECT

This report relates to the solar energy facility proposed to be constructed at 1033 Oxley-Meadow Creek Road, Meadow Creek. This location is within the Wangaratta Rural City Council boundary and is therefore covered by the Wangaratta Planning Scheme.

This report contains a high-level review of points that need to be taken under consideration for the proposed solar energy facility application in relation to the agricultural considerations. The Victorian Planning Amendment VC161 amended the Victorian Planning Provisions (VPP) planning schemes in the Rural City of Wangaratta on 17 September 2019 in order to introduce new requirements for renewable energy facilities (other than a wind energy facility).

The use of land for solar farms in the Wangaratta region has been a contested issue over recent years. In response, the Victorian Government has developed the Solar Energy Facilities - Design and Development Guideline to support the siting, design, and assessment of large-scale solar energy facilities in Victoria. This Guideline has recently been updated (October 2022) and the guidelines state that "A solar energy facility should not lead to the loss of productive, state-significant agricultural land … and avoid land in a declared irrigation district that is serviced 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."

This report will provide a response to the guidelines at a high level and will assess if the proposal has merit in terms of meeting the requirements of the guidelines as measured by the agricultural impacts. The key points assessed will be:

- Soil types – are the soils considered to be of high value
- The agricultural productivity of the site and its significance at a regional and state level
- The continuation of agricultural activity on the site
- Cumulative effects of solar facilities – will the potential growth of solar facilities have implications to the district
- Assessment of the site in relation to implications to irrigation districts.

This report will also provide recommendations on the best suited options for agriculture as an agri-solar farm at this location.

Daryl Poole from RMCG inspected the site on 5th of December 2022 to further support the findings of this report.

2 Site

2.1 LOCATION

The solar energy facility is proposed to be installed on the existing property on the block bordered by Oxley-Meadow Creek Rd, Docker-Carboor Rd, Allans Lane and another property to the south in Meadow Creek, as shown in Figure 2-1. The transmission line will run North from Docker-Carboor Rd up through a number of paddocks to the sub-station located at Whorouly-Bobinawarrah Road. The site sits within Rural City of Wangaratta.

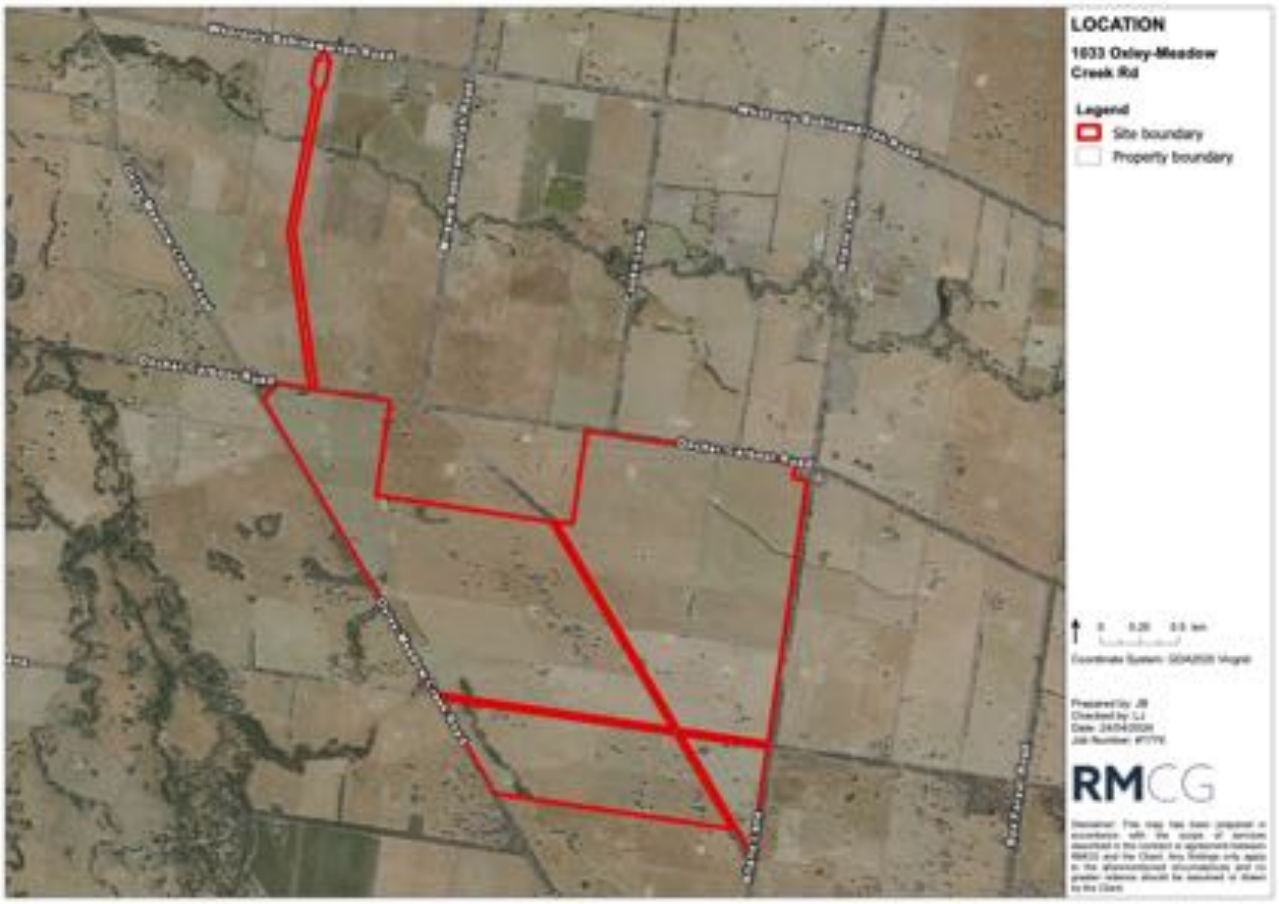

Figure 2-1: Location of proposed solar energy facility and transmission line

The permit for the proposed development is intended to be used to construct a solar energy facility with a peak capacity of 332 Megawatts (MWp), serving local industry, integrated with agriculture. The Subject Land is currently used primarily for cattle grazing. The intention is to integrate the solar farm with agricultural practices that are most suited to agri-solar farming and management options.

Figure 2-2: Cattle grazing the property during site visit in December 2022

2.2 LAND USE

The proposed site would be located at 1033 Oxley-Meadow Creek Road, in the area of Meadow Creek, approximately twenty-one kilometres south-east of Wangaratta. The current available land is 566 hectares.

There is a dwelling where the manager currently resides with machinery sheds located on the property. High quality covered stockyards, hay sheds and stock yards can also be found on the property behind the house and on the opposite side of the property, close to Allans Lane.

Figure 2-3: Current covered stockyards on property in December 2022

Figure 2-4: Current covered stockyards and shed on property in December 2022

Figure 2-5: Current Hay shed close to Allans Lane on property in December 2022

In the top north-east corner, there is a neighbouring residence and in the top north-west corner, a neighbouring fire station and hall. The remainder of the property is surrounded by other similar farming properties.

A bore is located on the property which gravity-feeds the stock water troughs placed strategically over the property. Sheep Station Creek runs close to the border of the south-west bottom half of the property, near Oxley-Meadow Creek Rd. There are also approximately 27 farm dams found around the site.

Figure 2-6: One of the many dams located on the property.

Figure 2-7: Sheep Station Creek located on the property.

3 Key Agricultural Considerations

3.1 SOIL TYPE

An important consideration in relation to the establishment of a solar facility is to prevent the loss of high-quality soils. The soil class for the area is SOAB which means that the soils belong to the Order Sodosols with the Suborder Brown. Sodosols have a strong texture contrast between surface horizons and subsoil horizons and the subsoil horizons are sodic, meaning that the subsoils contain sufficient exchangeable sodium to interfere with the growth of plants, including crops[1]. The surface soil textures, and depth of Sodosols vary considerably and have significant implications for management, affecting soil workability, permeability, crop establishment, moisture availability and erodibility. The suborder is based on the colour of the upper 20cm of the subsoil. Brown and Yellow Sodosols are associated with less permeable situations, and are generally quite dense and coarsely structured, indicating restricted drainage, however some are whole coloured and strongly structured which makes them more workable[2].

The property is situated on an Alluvial plain (ALP2), which is known to be flat with poor drainage and used for grazing and cropping[3]. This was evident at the site inspection with sections of the property showing signs of water logging. This is further outlined in section 3.2 of this report.

The proposed transmission line will also traverse SOAB soils, along with DEAB classed soils and a small area of CHAA classed soils. DEAB soils are Brown Dermosols that are non-texture contrast soils with structured subsoils. Brown Dermosols in the area are less well developed, shallow and stony. Many of these soils are sodic at depth and there are salinity problems in some areas which require careful management[4]. The DEAB soils are situated as part of the flood plains (FLP3).

The small area of CHAA classed soils is Red Chromosols that have a strong texture contrast between surface and subsoil horizons. The upper part of the subsoil ranges from slightly acid to alkaline but is not sodic. The Red Chromosols have the highest permeability of the Chromosols in the region and tend to be better drained[5]. This small area of the transmission line will traverse an Alluvial plain with prior stream channels associated with the Ovens River (ALP1), which is known to be moderately well drained and used for grazing and cropping[6]

A soil map is provided in Figure 3-1 which provides the distribution of the different soil types across the area.

1 Victorian Resources Online, Soil Glossary, https://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/gloss_SZ#sodicity, viewed 16th December 2022
2 Victorian Resources Online, Sodosols, https://vro.agriculture.vic.gov.au/dpi/vro/gbbregn.nsf/pages/soil_soil_gbb_sodosols, viewed 16th December 2022
3 Victorian Resources Online, ALP2, https://vro.agriculture.vic.gov.au/DPI/Vro/neregn.nsf/0d08cd6930912d1e4a2567d2002579cb/6ed3fbacfa690ca6ca2574c800099d4d/$FILE/ALP2.pdf, viewed 3rd January 2023
4 Victorian Resources Online, Dermosols, https://vro.agriculture.vic.gov.au/dpi/vro/gbbregn.nsf/pages/soil_soil_gbb_dermosols, viewed 26th April 2024
5 Victorian Resources Online, Chromosols, https://vro.agriculture.vic.gov.au/dpi/vro/gbbregn.nsf/pages/soil_soil_gbb_chromosols, viewed 26th April 2024
6 Victorian Resources Online, ALP1, https://vro.agriculture.vic.gov.au/DPI/Vro/neregn.nsf/0d08cd6930912d1e4a2567d2002579cb/6ed3fbacfa690ca6ca2574c800099d4d/$FILE/ALP1.pdf, viewed 26th April 2024

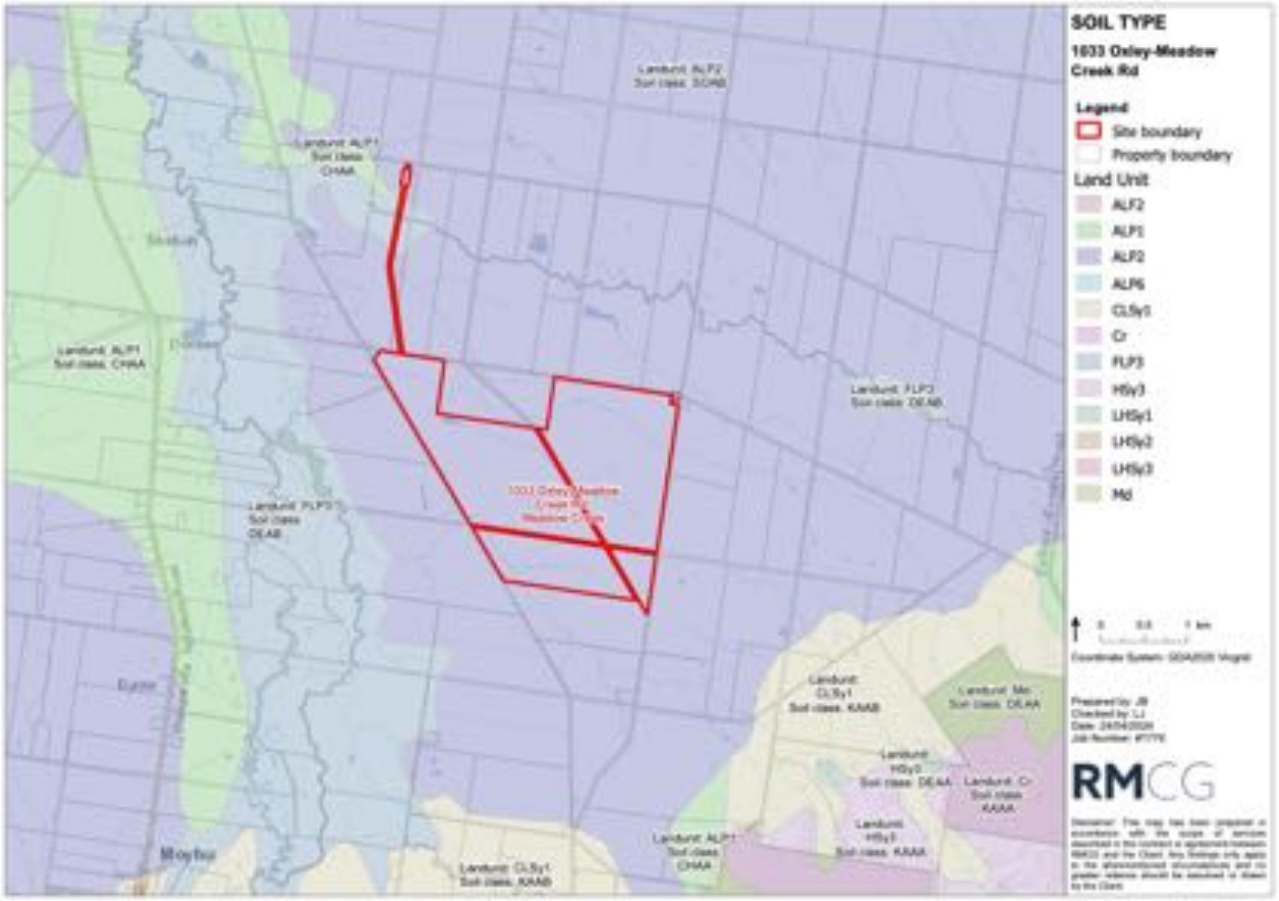

Figure 3-1: Proposed site, overlayed with soil type and soil grouping

The description of the soils matched what was observed by RMCG at the site inspection. It is considered that soils on the site are of moderate quality and suitable for grazing which is aligned to the current land use. The waterlogging nature of some of the site would not make it suitable for horticulture or cropping.

The Solar Energy-Facilities Design and Development Guideline (October 2022) outlines that solar proposals should assess “the impact of 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”. While it is considered that the soils on the site are of moderate quality, they would not be considered to be soils that are niche to a type of crop or other agricultural activity. This is further discussed in Section 4 of this report.

The proposal is also considering the introduction of sheep grazing that will retain some of the agricultural output from the site. This is further explained in Section 7 and 8 outlining the Agri-solar opportunity that can be implemented at the site.

The development of the solar facility at the Subject Site will not result in the loss of high-quality soils.

3.2 EROSION

Upon the site visit there was no noticeable signs of erosion. Erosion is driven by wind, water and gravity and the most common forms of erosion include wind erosion, sheet and rill erosion, tunnel or gully erosion, or mass movement. The topography of the area is reasonably flat reducing the likelihood of erosion driven by water and gravity. The susceptibility of erosion has been mapped by the NECMA and can be found in Appendix 1. The location of the subject site shows that the susceptibility to mass movement and sheet & rill erosion is low, wind erosion susceptibility is low-moderate, and gully & tunnel erosion susceptibility is moderate.

Gully erosion is caused when flow of water concentrates in lower laying parts of the landscape causing entrenched channels. To manage gully erosion high levels of vegetative cover should be maintained and over-grazing should be avoided. Tunnel erosion is a subtle form of erosion and is created by channels and tunnels developing beneath the surface, it is not readily noticeable apart from sediment fans at the tunnel discharge point. It is also managed with vegetative cover along with possibly modifying clay dispersion in the profile with the use of gypsum.

Sound agricultural practices should be maintained to limit the risk of overall erosion. These include:

- Maximise vegetative cover
- Avoid over-grazing
- Avoid soil disturbance when the soils are wet
- Manage equipment traffic to avoid compaction – keep to tracks where possible
- Maintain improved drainage at the site
- Ensure vegetative wind breaks remain in place
- Suppress dust by watering down exposed areas.

During construction, existing ground cover should be retained for the majority of the site. Solar farms are erected onto post structures which creates a minimal footprint and allows for minimal disturbance to the existing ground cover. Rainfall runoff on the downslope of the solar panels will discharge into the existing vegetative cover which will assist infiltration and surface flows and decrease the risk of erosion. There has been evidence that solar panels have improved plant growth underneath the panels[7] which creates a natural erosion control measure even in dry seasons.

The proposed solar facility will not increase the likelihood of erosion if managed appropriately.

3.3 TOPOGRAPHY

The site is described as being reasonably flat with some natural depressions and water ways through the site. The natural waterways located on the site are provided in Appendix 2 of this report. As outlined in the previous section, the site can be prone to waterlogging that can reduce its agricultural capacity.

Figure 3-2 shows areas of the site that are more prone to waterlogging and requires careful management during the winter and spring months. The current landowner will remove young stock from the property during the winter months and only retain the breeding mothers on site to avoid pugging of the wetter areas of the property.

[7] Hassanpour, Elnaz & Good, Stephen & Calaf, M. & Higgins, Chad. (2019). Solar PV Power Potential is Greatest Over Croplands. Scientific Reports. 9. 10.1038/s41598-019-47803-3; Oregon State University, 2018, “Solar arrays could be used as resources for plant productivity, study shows”

Figure 3-2: Areas prone to waterlogging on the site marked with criss-cross pattern

To improve the productivity of the site the landowner has laser graded sections of the farm area and constructed farm drains to help improve the drainage from the site.

3.4 CLIMATE

Data from the Bureau of Meteorology, Wangaratta Aero (number 082138) was used to gather climate statistics, as shown in

Table 3-1: Climate data

PARAMETER	VALUE
Rainfall	Mean = 604.8
Temperature	Mean maximum = 22.2 Mean minimum = 7.6

The rainfall at the site would be sufficient to support a range of agricultural activities including grazing or cropping. It is considered that it is insufficient to support permanent horticulture or dairying without access to irrigation.

3.5 SURFACE WATER

Sheep Station Creek is located along the south-east boundary and then crosses under Oxley-Meadow Creek road and flows into the King River. King River is located approximately 1.3km to the west of the property.

The environmental condition of this section of King River is classified as Moderate in the Index of Stream Condition: The Third Benchmark of Victorian River Condition (2010). The King River flows to meet with the Ovens River on the riverine plain at Wangaratta to then flow into Lake Mulwala onto the Murray River.

Based on the topography of the site, it is expected that rainfall runoff will drain to the southeast and enter sheep station creek.

The proposal will have no impact on the flow of surface water to the natural water streams and therefore have no change on downstream users of water.

3.6 GROUNDWATER

Data provided by Visualising Victoria's Groundwater, indicates that the groundwater at the site is between 10m and 20 m below the surface and is of good to excellent quality, with a salinity of <500 mg/L TDS at the southern half of the property and between 500-1,000 mg/L TDS at the northern half of the property. This places the groundwater within beneficial use segment A1 and A2.

There is groundwater access on the site through two bores. Bore WRK957389 is located on Oxley-Meadow Creek road south of the residence. It was constructed in 2005 to 15.41m, it is no longer actively monitored. Bore 82108 was constructed in 1975 to a depth of 9.44m behind the residence, it is no longer actively monitored.

The bores are only for stock and domestic use and not used for irrigation.

3.7 IRRIGATION CONNECTIONS

The DELWP design and development guidelines provide direction in respect to solar energy facilities in irrigated districts. The Victorian Planning Provisions (VPPs) Clause 14.02-3S Protection of Declared Irrigation Districts sets out objectives and strategies to manage and protect irrigated areas.

The site is not within a Victorian Irrigation District and has no connection to modernised irrigation infrastructure. Therefore:

- The area is not serviced by irrigation infrastructure and therefore does not have irrigation capability
- The requirements of the DELWP guidelines with regards to irrigation infrastructure designate the site as not strategically significant agricultural land.

3.8 VEGETATION

There are native trees along the road boundaries. Crossed through the property there are significant native trees along some of the paddock boundaries. There are some scattered remnant native trees across the site. Much of Sheep Station Creek has a native vegetation buffer along its length.

The land has been cleared and levelled for agricultural production. The majority of the site features a mix of annual and perennial pasture species. see Figure 3-4 and Figure 3-5 below.

There were no notable weed species upon the site visit.

Figure 3-3: Google Earth image of property accessed December 2022

Figure 3-4: Paddock showing improved pastures, December 2022

Figure 3-5: Paddock showing pasture and scattered trees, December 2022

3.9 SURROUNDING AREA

The site is in a rural setting approximately 11km from the closest town of Moyhu (Population of 437 people[8]). Properties adjacent to the site are mixed farming operations that are mainly dryland livestock grazing.

Agri-solar farming has been active in Australia since its commencement in 2015, where sheep grazing was introduced on a farm in the ACT. Several other forms of agri-solar have been developed around the world including beekeeping, horticulture, floriculture, viticulture, and aquaculture. Agri-solar farming has not proven to be a cause for concern to the agricultural practices involved and therefore there will be no implications on the agricultural activities of the neighbouring properties if the site was to be developed as a solar facility.

[8] ABS, 2021 Census, https://abs.gov.au/census/find-census-data/quickstats/2021/SAL21820, viewed 26th April 2024

There are minimal residential properties close to the site. In the north-west corner there is a residential property that abuts the proposed solar farm and another residential property opposite it on the corner of Oxley-Meadow Creek Rd and Docker-Carboor Rd. In the north-east corner there is a fire station and hall that also abuts the proposed solar farm and a residential property opposite that on the corner of Allans Lane and Docker-Carboor Rd.

3.10 QUALITY OF AGRICULTURAL LAND

DEECA defines high quality productive agricultural land as:

> *"Land which is used for animal husbandry or crop raising, and is capable of continuing to sustain agricultural production, and:*
>
> *a) is of prime, or very good, agricultural quality, having regard to soil type, growing season, and availability of infrastructure, and is of sufficient extent to support agricultural activities on an economically viable scale; or*
>
> *b) has been identified through a regional, sub-regional, or local study as being of particularly good quality and strategic significance for agriculture in the regional or local context"*

The subject site does not meet the definition of high-quality productive land due to the aforementioned reasons in this chapter:

- The soils are of moderate soil quality
- The soils are suitable only for grazing
- The property has high waterlogging properties
- The area is not serviced by irrigation and does not have irrigation capability.

In addition, the property has not been identified as being of strategic significance as described in section 6.4 of this report.

The conclusion is supported by the NECMA Agricultural Capability mapping in Appendix 2 which has found the subject site to be in a location of low agricultural capability. This is further described in section 5 of this report.

Concern for losing good agricultural land to solar operations is also diminished as the subject site will retain some agricultural value through the plan to graze sheep on the property as an Agri-solar venture. This is further explained in Section 6 of this report.

The nature of construction for solar facilities is considered to be low impact, avoiding heavy duty foundations and disturbance to the land. This significantly reduces impact to the land in comparison to other built form development. This leads to opportunities for regenerative land management which revitalizes soils, restores grassland ecosystems while maintaining light agricultural production for sheep grazing and cropping after the decommissioning of the solar farm. This will not compromise the long-term agricultural value of land for the community.

4 Land Capability Assessment

In 2002, Department of Natural Resources and Environment published Land Resource Assessment for the North East Catchment Management Authority Region. As stated in this document:

The assessment of land capability provides a guide to the type of agriculture that can be supported by a specific land unit. As the capability of the land increases, so will the opportunities for agricultural diversification (versatility). Therefore, areas of high capability are most valued as they can provide greater flexibility for landholders seeking alternative agricultural enterprises.

To assess the capability of land for various forms of agriculture the report considers the key factors of Climate, Landscape, and Soil Conditions. The information can be used to direct development of regional and local planning policies. The capability assessment map (provided in Appendix 3) shows that the majority of the "high" capability soils are alluvial soils along the river flats of the Ovens and King Rivers. These "high" alluvial soils are very different in origin and type compared to the soils at the subject site. The definitions of the agricultural versatility classifications are provided in Table 4-1.

Table 4-1: Reproduction of agricultural versatility definitions

CAPABILITY CLASS	DESCRIPTION	ENTERPRISE GROUP
1 High	High to moderate productivity on the alluvial floodplain and wider alluvial plain. Suited to a wide variety of horticultural applications on the floodplain and generally suited to grazing, viticulture and opportunistic cropping on the wider alluvial plain. Note: Flooding risk needs to be considered in floodplain areas. Note: Waterlogging is an issue on the wider alluvial plain. Note: Remnant vegetation needs to be considered within this class.	Irrigated horticulture, irrigated broadacre cropping, dairying, broadacre cropping, broadacre grazing, viticulture, forestry, nature conservation
2 Moderate	Moderate productivity on moderate to gentle slopes. Commonly suited to grazing and viticulture. Note: Flooding risk needs to be considered in floodplain areas. Note: Remnant vegetation needs to be considered within this class.	Broadacre grazing, broadacre cropping on gentler slopes, viticulture, forestry, nature conservation
3 Low	Low to moderate productivity or severe landform constraints exist (e.g. very steep slopes, rock outcrop). Typically utilised for forestry and marginal grazing, or nature conservation.	Forestry, marginal broadacre grazing, nature conservation

The proposed site is shown in the map in Appendix 3 and has the site at class 3 - low capability. As described in Table 4-1 as being suited to forestry, marginal broadacre grazing, nature conservation. In practice, the site has already been converted to agricultural land with limited nature conservation possible, with the exception of the corridors and waterway vegetation buffers. We note that native conservation is planned for continuation in those areas of the subject site.

It is also noted that the classifications are at a broad scale and do not take into account specific characteristics down to a farm and paddock scale. As outlined in section 3.2 of this report, the site has areas that are prone to waterlogging and require careful management during the wetter months. This reduces the sites versatility and lowers its suitability for cropping. As previously stated, the proposal is also considering the introduction of sheep grazing thus reducing the potential loss of agricultural output from the site.

5 Property Analysis

5.1 AGRICULTURAL CAPABILITY

The land capability assessment and regional climate are the prime determinants for the agricultural capacity of the site.

Information provided by the farming landowner regarding current agricultural activities are provided in the site inspection are summarised as follows:

- Site used for beef production with a breeding herd of approximately 450
- Young stock are removed from the property during winter months to reduce the stocking rate pressure and avoid pugging damage on areas prone to waterlogging
- Sections of the property have been laser graded with the construction of farm drains to improve the drainage characteristics of the site
- The property supports improved pastures of perennial ryegrass and clover
- Spring surplus pasture production is conserved as silage or hay and fed back to the breeding herd during times of lower pasture growth rates.

The property is currently supporting 450 breeders which is equivalent to a stocking rate of 12.7 DSE/ha[9]. The average rainfall at the property is 604mm per annum. Typically, grazing properties have stocking rates of 1.5–2 DSE/ha per 100 mm of rainfall. Thus, the stocking rate is around 2 DSE/ha per 100 mm at this property and represents an average stocking rate (based on RMCG data over many years). This is also comparable to the Victorian Livestock Monitor Report published by Agriculture Victoria that has the average stocking rate for beef properties in northern Victoria at 13.2 DSE/ha[10].

Based on this carrying capacity, the economic production has been calculated.

5.2 ECONOMIC EVALUATION

The gross economic return from the property gives a measure of the property's economic value. This can then be related to the size of the farm business. The gross farm income is estimated based on the stocking rate calculated in Section 5.1 and using the average farm financial information from the Victorian Livestock Monitor Report[10]. Note the economic value is based on the subject site of the solar farm covering a total area of approximately 566 ha.

Table 5-1: Calculated economic value of site

GROSS FARM INCOME POTENTIAL	PRICE FACTORS
Stocking rate (DSE /ha)	13.2
Total area (ha)	566
Kg LWT sold/ha	242
Av Price Kg LWT	$4.10
Stock sales $/ha	978
Total Gross Income	$533,548

[9] Based on average DSE of a breeding beef cow of 16 DSE on an area of 566 ha -https://www.landscape.sa.gov.au/mr/publications/grazing-livestock-mlr-stocking-rates

[10] Livestock Farm Monitor Project – Victoria Annual Report 2020-21.

Generally, RMCG finds that a farm business with a single owner operator (that is, one full-time equivalent employee) needs between $250,000 and $500,000 gross income. This estimate assumes around 60% operating costs, 10% for equipment depreciation, 20% for owner's salary and 10% to fund borrowings or profit. This property's income is therefore determined sufficient for an owner/operator operation.

The total agricultural production value for Wangaratta shire is approximately $168m and there is approximately 127,000 ha of agricultural land in the Shire. Therefore, the average production value is $1322/ha. Based on the gross income calculated in Table 5-1, the site produces approximately $978/ha which is 70% of the average production value for the Shire.

This indicates that other land uses particularly cherries, wine grapes, dairy, and specialist horticulture crops like berries, kiwi fruit, and sweet corn produce well above the average income of $1322/ha. There is limited ABS data on the area of individual crops within the region but ABS data for the Wangaratta shire indicates that the return per ha of some of the higher value enterprises are: Kiwi fruit - $85,708/ha; cherries - $61,138; berries - $32,018/ha; sweet corn - $14,173/ha; and wine - $7,728/ha. These enterprises produce between 8 times the income (wine grapes) and 87 times the income (kiwi fruit) when compared to this site's land capability of around $978/ha.

This demonstrates that the proposed site has the income potential to support individual or family business but is on the lower end of agricultural value compared to other higher value crops. However, we have further evaluated the value of the site at a regional and state level.

5.3 RELATIVE VALUE – REGION AND STATE

To put the value of the site into a regional perspective, the relative value of production calculated previously can be compared to that of the local region. ABS data for 2020/21, shown in Appendix 4 shows the total agricultural value for the Rural City of Wangaratta as $168,287,283. Therefore, the production from this property of $533,548 represents approximately 0.32% of the Council's agricultural production.

At a state context the economic output from this property represents approximately 0.003%[11] of the state's agricultural value of output. Further ABS data shows that there is a total of 127,855 ha of agricultural land in the Wangaratta Shire. Therefore, the site represents less than 0.5% of this land.

In conclusion, the economic output from the site is considered to be economically insignificant at a regional and state level.

It is noted that it is planned to run an agri-solar facility at the site which will mean there will still be agricultural output from the site after the installation of the solar facility. This is further assessed in Section 6 of this report.

5.4 ASSESSMENT OF STRATEGICALLY SIGNIFICANT AGRICULTURAL LAND

The Solar Energy Facilities - Design and Development Guideline to support the siting, design, and assessment of large-scale solar energy facilities in Victoria outlines the Victorian Planning Provisions (VPP) Clause 53.13 Renewable energy facility on what should be considered by responsible authorities before deciding on an application. Those considerations for agriculture and comments relative to this site are outlined Table 5-2.

[11] ABS, Victoria agricultural output $16,450,753,047

Table 5-2: Solar Energy Facility Guideline Considerations – Strategically Important Agricultural Land

SOLAR ENERGY FACILITY DECISION GUIDELINES	COMMENTS RELATIVE TO THIS SITE
▪ 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 site is classified as having low capability with moderate quality soils. The soils are suitable for grazing or pasture which will be an ongoing intended use once the solar facility is in place. The waterlogging on the site would deem it unsuitable for any niche agricultural activities or cropping.
▪ The potential loss of reliable, accessible water (such as irrigated areas) and its impact at a local or regional scale	There is no irrigation capability at the site as it is not serviced by irrigation infrastructure. The water found at the site is only used for stock and domestic use.
▪ The impact of fragmentation and a change of land use to non-agriculture activity on local and regional productivity and output	Agricultural activity is intended to continue at the site. The productivity and output is not significant and will not have a notable impact on the region.
▪ The impact of a change of land use on recent and/or current efforts to modernise and reform agricultural activity in the area	There is no 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	The Wangaratta Planning Scheme[12] identifies the site location as being within an area of Strategic agricultural land as outlined in the Hume Regional Growth Plan. But it is noted that the classifications are at a broad scale and do not take into account specific characteristics down to a farm and paddock scale. As outlined in section 3.3 of this report, the site has areas that are prone to waterlogging and require careful management during the wetter months. This reduces the sites versatility and lowers its suitability for cropping. These characteristics of the site would not make it strategic agricultural land. The planning scheme outlines that the strategic agricultural land should be protected and as there is an intention to introduce sheep grazing, the site will continue to be used for agriculture. The scheme also indicates support for *compatible land uses in rural areas to help develop a more diverse regional economy* which would be delivered with this project.
▪ 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	There has not been any other investment or support for this site or area from the Governments that would experience a detrimental effect
▪ Whether the proposed solar energy facility can co-locate with other agricultural activity to help diversify farm income without reducing productivity.	The proposed solar energy facility intends to continue with the agricultural activity of grazing and will likely move from cattle grazing to sheep grazing. Productivity will continue and the solar facility will diversify the farm income.
▪ The impact of the proposal on the protection of declared irrigation districts	The site is not in an irrigation district therefore not relevant to this site

[12] Wangaratta Planning Scheme – Planning Scheme – Planning Scheme last updated by VC201 on 16/12/2022

6 Agri-Solar Options

6.1 SOLAR-GRAZING - SHEEP

Sheep grazing on solar farms is the highest utilisation of agri-solar across Australia with 13 large-scale solar farms grazing sheep[13]. The integration of sheep grazing and solar energy allows the opportunity to maximise the productivity of rural land and has been beneficial to both the farmers and the renewable energy operators.

The most common form of utility-scale solar is the ground-mounted PV. Ground mounted PVs are typically grouped panels in rows on steel frames. The panels can be either fixed or motorised to track the sun throughout the day. The solar panels are tilted with a clearance from the ground of as low as 20cm and up to 3m on the high side. Sheep are able to graze underneath the panels without causing damage and use the panels for protection from the weather. The height of the ground-mounted PV panels does not allow enough room for cattle to graze. In addition, cattle as a larger animal are also more prone to cause damage to the solar infrastructure and are less suitable as an agri-solar option.

Elevated PV panels are increasing in distribution across the globe, particularly in areas with limited land area and where innovation is required for farming practices. Elevated PV panels are raised on stilts or reinforced structures and can be made to allow for tractors and farming machinery to move easily underneath. The panels could be spaced to allow sufficient sunlight through to plants below. The height would allow for crops to be grown and either harvested or grazed by cattle. The limiting factor of elevated PV panels is that they are more complex structures and can have increased equipment costs. The suitability of sheep grazing means that the requirement for elevated panels is not needed.

Benefits of solar grazing for farmers include:

- Diversity of income with additional agricultural production to complement the income from the solar development
- Higher quality pasture due to water running off solar panels, even during drought events
- Protection from predators due to high fencing
- Protection for sheep from weather events, like heat, hail, rain, wind
- High quality wool from less dust and higher quality feed resulting in better wool.

Benefits of solar grazing for proponents include:

- Less weed and grass control required due to grazing
- Reduction in damage to solar panels from mowing equipment
- Avoiding the loss of agricultural land from the region thus still contributing to the regional and state agricultural production
- Reduction in fire risks
- Increased solar intake through cooler panels due to surrounding vegetation[14].

6.2 OTHER OPTIONS

There are other methods of Agri-Solar farming. These include Viticulture made possible with elevated PV panels. Bee farming is also possible with a biodiverse flower population planted to encourage bee populations and pollination from bee colonies. Cropping is also possible with the correct configuration of solar panels. However, with the likelihood of water-logging cropping and Viticulture are not suitable options at this site.

The owner's knowledge in livestock production, access to shearing facilities and the capacity to relocate sheep to another property when grazing conditions are not suitable (i.e. during wet winters), unsuitable soils for viticulture, all combine to support sheep grazing as the most appropriate Agri-solar option at the site.

[13] Australian Guide To Agri-solar For Large-Scale Solar. For proponents and farmers – March 2021 – Clean Energy Council.
[14] Australian Guide To Agri-solar For Large-Scale Solar. For proponents and farmers – March 2021 – Clean Energy Council.

7 Recommendations for Implementation of Agri-Solar

7.1 LAND AVAILABILITY

The current land owner has additional land at Greta approximately 15 km from the Meadow Creek site. This property consists of approximately 600 ha. This property will complement a grazing option at the Meadow creek property as it:

- Is within close proximity and will allow for the movement of stock between the two properties to assist with grazing management (i.e. removal of stock from the Meadow Creek property during the wetter months to the Greta farm which is less prone to water logging)
- Has shearing facilities.

7.2 SHEEP GRAZING OPTIONS

There are a number of sheep grazing options that could be considered at the property and include:

- Merino sheep for wool production
- Prime lamb production with a breeding ewe flock
- Dorper lamb production with a breeding ewe flock
- Prime lamb finishing enterprise.

It is considered that any of the above options could be implemented at the site but RMCG would recommend a prime lamb finishing enterprise for the following reasons:

- Provides the highest level of flexibility in terms of stocking rate as the owner can buy and sell depending on seasonal conditions and feed availability at the site
- Has less management requirement in terms of dealing a breeding ewe flock (joining, lambing, marking)
- Less management time will allow the current owner to continue to focus on their beef operation to be run on their Greta property
- More common than a dorper operation which has less market opportunities and less stock access
- Has access to shearing facilities (on the Greta property) which will be required for a prime lamb enterprise.

7.3 PRIME LAMB FINISHING ENTERPRISE

A prime lamb finishing enterprise would consist of purchasing store lambs from the market at a liveweight (LWT) of approximately 20 to 25 kg and finishing those lambs to a target weight of 50 to 55 kg LWT. Growth rates in the range of 250 to 300 g/day are achievable and would have the lambs reach their target LWT over a 3-to-4-month period.

Lambs can be purchased in the early to late spring period and grazed on the property until they reach their target weights. During the late summer, autumn and winter periods more opportunistic grazing could be considered and the prime lamb finishing enterprise can accommodate that flexibility. However, the key focus will be to purchase the required stock to utilise the key growing period of spring and early summer.

Additional feed in the form of grain or pellets can be considered and fed in automatic feeders that can help reach target growth rates to meet the needs of the market. The extent of the additional feeding will be determined by seasonal conditions, the quality of the pasture feed on offer and the cost of the additional feed.

The property is currently supporting 450 beef breeders which is equivalent to a stocking rate of 12.7 DSE/ha[15]. The average rainfall at the property is 604 mm per annum. Typically, grazing properties have stocking rates of 1.5–2 DSE/ha per 100 mm of rainfall. Thus, the stocking rate is around 2 DSE/ha per 100 mm at this property represents an average stocking rate (based on RMCG data over many years). This is also comparable to the Victorian Livestock Monitor Report published by Agriculture Victoria[16] that has the average stocking rate for prime lamb properties in northern Victoria at 12.9 DSE/ha.

It is RMCG's opinion that it would be unrealistic to assume that the property would be able to support an average stocking rate with the presence of the solar facility. The area containing the BESS energy storage system could not support livestock and will be a small area of roughly 7ha of lost grazing land. While there could be some benefits of the solar panels for the sheep (improved shade and protection), a conservative stocking rate of 33% of average would be recommended in the first instance until an improved understanding of the carrying capacity of the site can be determined over time.

Table 7-1: Calculated economic value of site

GROSS FARM INCOME POTENTIAL	PRICE FACTORS[17]
Stocking rate (DSE /ha)	4.3
Total area (ha)	566
Lamb meat sold (kg CWT/ha)	66
Av lamb sale price ($ kg CWT)	$8.54
Stock sales $/ha	$561.01
Total Gross Income	$317,531

This stocking rate would mean purchasing in order of 1500 to 1600 store lambs per annum.

If an agri-solar operation is implemented at the site, there is the potential for an agricultural output in the order of $320,000. The current agricultural output of the site as assessed in Section 5.2 of $530,000 means the reduction in agricultural output would be in the order of $210,000. This represents only 0.12 % total agricultural value for the Rural City of Wangaratta and considered to be insignificant. At a state level it represents 0.0013% of total agricultural value.

7.4 GRAZING MANAGEMENT

Grazing management with cattle on the subject site is already constrained due to the waterlogging properties of the land. Mitigation techniques have been implemented at the site with lasering of sections of the property, the creation of drainage channels, and the rotation of stock to higher paddocks during wet seasons.

It will be important to continue to maximise the site to enable a suitable sheep grazing rotation to be implemented. Figure 3-2 indicates areas that are prone to waterlogging and should be avoided during wet periods with sheep moved to higher ground paddocks. The owner's additional property at Greta will complement the operation. This will allow for the adoption of an on-off strategy with the sheep, relocating them

[15] Based on a total land area of 566 ha assuming a DSE rating of a cow with a calf at foot – up to 8 months of 16.
[16] Livestock Farm Monitor Report Victoria Annual Report 2020-21 – Agriculture Victoria
[17] Price factors based on 33% of the average stocking rate for Prime lamb production in northern Victoria sourced from Livestock Farm Monitor Report Victoria Annual Report 2020-21 – Agriculture Victoria

to the Greta property during wet periods. A drainage management plan should also be implemented to further improve the productivity of the site.

There will be refinements over time but there will need to be the capacity to be able to implement grazing rotations on the site. It is recommended that initially to have a minimum of 6 grazing blocks of an area 95 ha per block.

Each grazing block will need to have multiple stock watering sites and have the connecting laneways to enable effective stock movement throughout the site. It is likely that the tracks that will be formed as part of the solar facility will be able to be utilised for stock movement requirements negating the need for any additional tracks to be constructed.

7.5 AGRI-SOLAR RECOMMENDATIONS

It is recommended that a prime lamb finishing operation be implemented at the site. This will involve the purchase of store lambs for fattening on the property. The adoption of the Agri-solar operation will mean the loss of agricultural production from the site will be minimised thus still contributing to the regional and state agricultural production.

The farmer has access to another property within 15 km of the site that will be an important risk management option for the operation. It has shearing facilities which will be required for a prime lamb finishing enterprise as well as providing the opportunity for the movement of stock between the two properties to assist with grazing management (i.e. removal of stock from the Meadow Creek property during the wetter months to the Greta farm which is less prone to water logging).

Further investigation will be required on the development of the appropriate number of grazing blocks to be implemented which will be influenced by the final design of the solar facility at the site.

8 Transmission Line

The installation of a transmission line is planned for construction as part of the Meadow Creek solar farm site to link the collector substation to the existing 220kV Ausnet services network. The line is proposed to travel from a substation at the north east corner of the property 1033 Oxley-Meadow Creek Road and cross Docker-Carboor Road across 3 parcels of land (1/TP753880, 3/TP753880, 2~42\PP3359) to join the proposed docker 220kV terminal substation located on Whorouly-Bobinawarrah Rd (see Figure 9-1).

The ground on which the towers stand and the area under the conductors (the wires) that cross between the poles are known as transmission line easements.

The easement will typically be 40 m wide along the length of the transmission line with the footprint of the poles typically covering an area of 10 m by 10 m. While the terminal substation and the footprint of the poles will not be able to be farmed, the land area under the wires can be used and most farming activities can continue.

Easements are created to provide a party access, occupy and/or use part of land owned by another person or party for a specific purpose. The landholder retains ownership and use of the land subject to easement terms.

The terms of the easement for transmission lines are set to allow the owner of the infrastructure to install, maintain and decommission the power lines but more importantly to protect public safety. The terms set out what you can and cannot do within the easements.

In Victoria there are already 6,500 km of transmission lines crossing a total area of approximately 17,500 hectares of easements[18] that brings electrical energy to the millions of Victorian homes and businesses. A large proportion of those already existing easements go across private agricultural land which have been actively farmed for decades.

The proposed transmission line is located on land that is currently utilised for cattle grazing. The impacts of transmission lines on this agricultural use is minimal as grazing can continue in and around the transmission line easements. Grazing will be able to continue without any major impost to the operations.

[18] A guide to living with transmission line easements – AusNet services

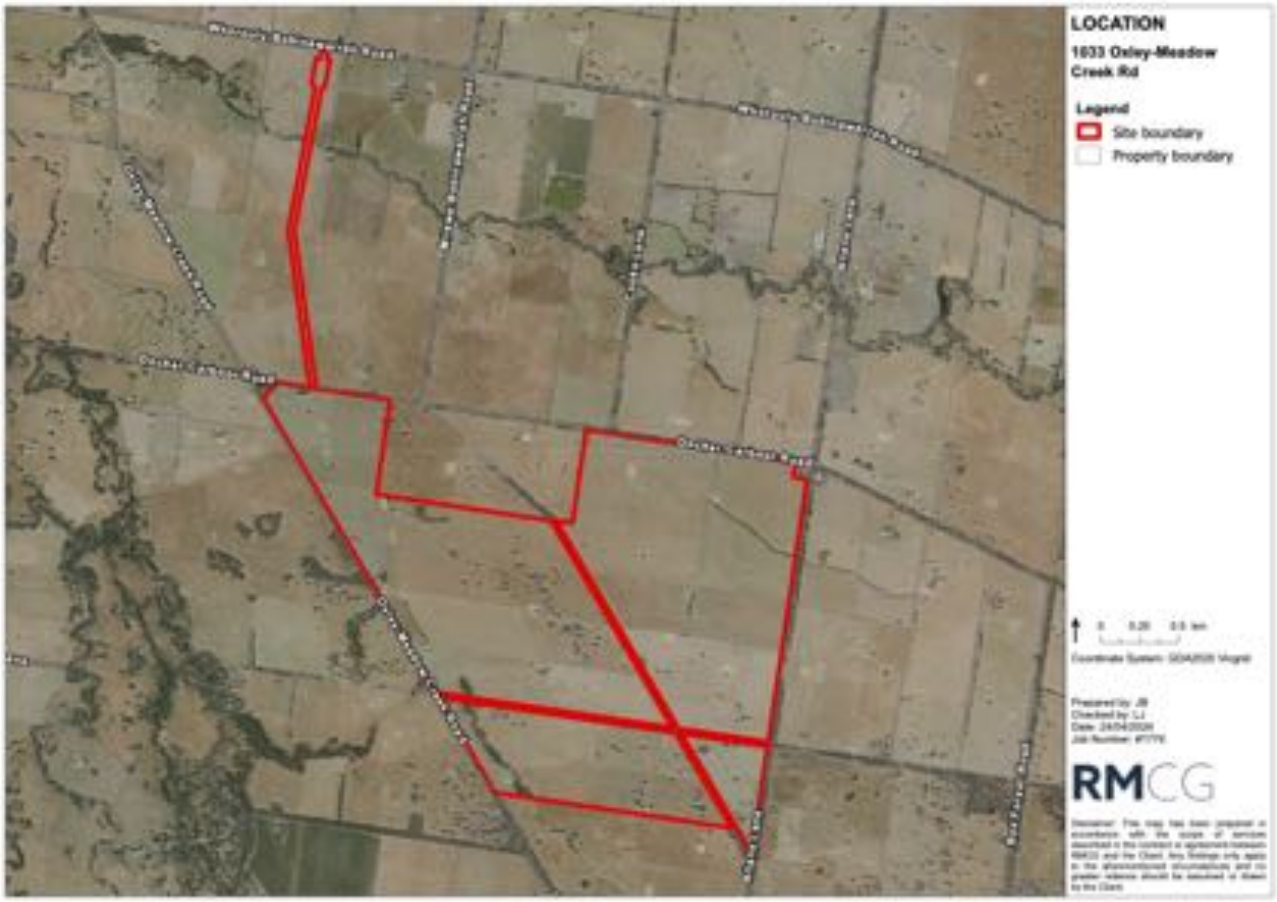

Figure 8-1: Location of proposed solar energy facility and transmission line

The line is estimated to be approximately 2.25km long from Docker-Carboor Rd to Whorouly-Bobinawarrah Road. The current plans indicate that there may be approximately 5 single steel towers, and two locations where triple steel towers will be placed, totalling 11 single steel towers. It is assumed that the footprint of the towers would be in the order of 10m by 10m and would be an area that would be taken out of production.

The area that would be required for the towers on the three parcels of land is estimated at 0.11 hectares[19]. The total area of the three parcels of land is 159 ha and the area lost due to the towers supporting the transmission lines represents 0.07% of the total land area. The impact of the transmission lines on the land area affected is considered to be negligible and the farming operations on the land parcels will be able to continue.

[19] 11 towers multiplied by 100m^2

9 Conclusion

There is a solid argument that the application for a solar energy facility at 1033 Oxley-Meadow Creek Rd, Meadow Creek would meet the required criteria from the Victorian Government's VPPs. It is RMCG's view that there are no material reasons that would prevent the approval of a solar facility at the site.

The property is not considered high quality productive land due to the water logging properties of the site, the moderate soil quality, and no access to irrigation. This is supported by the property area also being rated as low agricultural capability by the NECMA. It is not deemed as strategically significant agricultural land with regards to the considerations of the Solar Energy Facilities – Design and Development Guideline which outlines the Victorian Planning Provisions (VPP). The soil type is considered not suitable for niche agricultural activities, is not located in an irrigation district and there will not be a detrimental effect to government or other agricultural activities in the area.

The loss of agricultural output of the site is considered insignificant at a regional and state level (0.32% and 0.003% respectively) and this impact is further reduced if the proposed prime lamb agri-solar enterprise is implemented on the site (0.12% regional and 0.0013 % of state agricultural production).

It is recommended that a prime lamb operation be implemented at the site with a conservative stocking rate of 4.3 DSE/Ha to begin with until a further understanding of the requirements is acquired over time. A prime lamb operation with the ability to have an on-off grazing strategy implemented will be beneficial for agriculture and reduce risks at the solar farm.

Appendix 1: Erosion maps

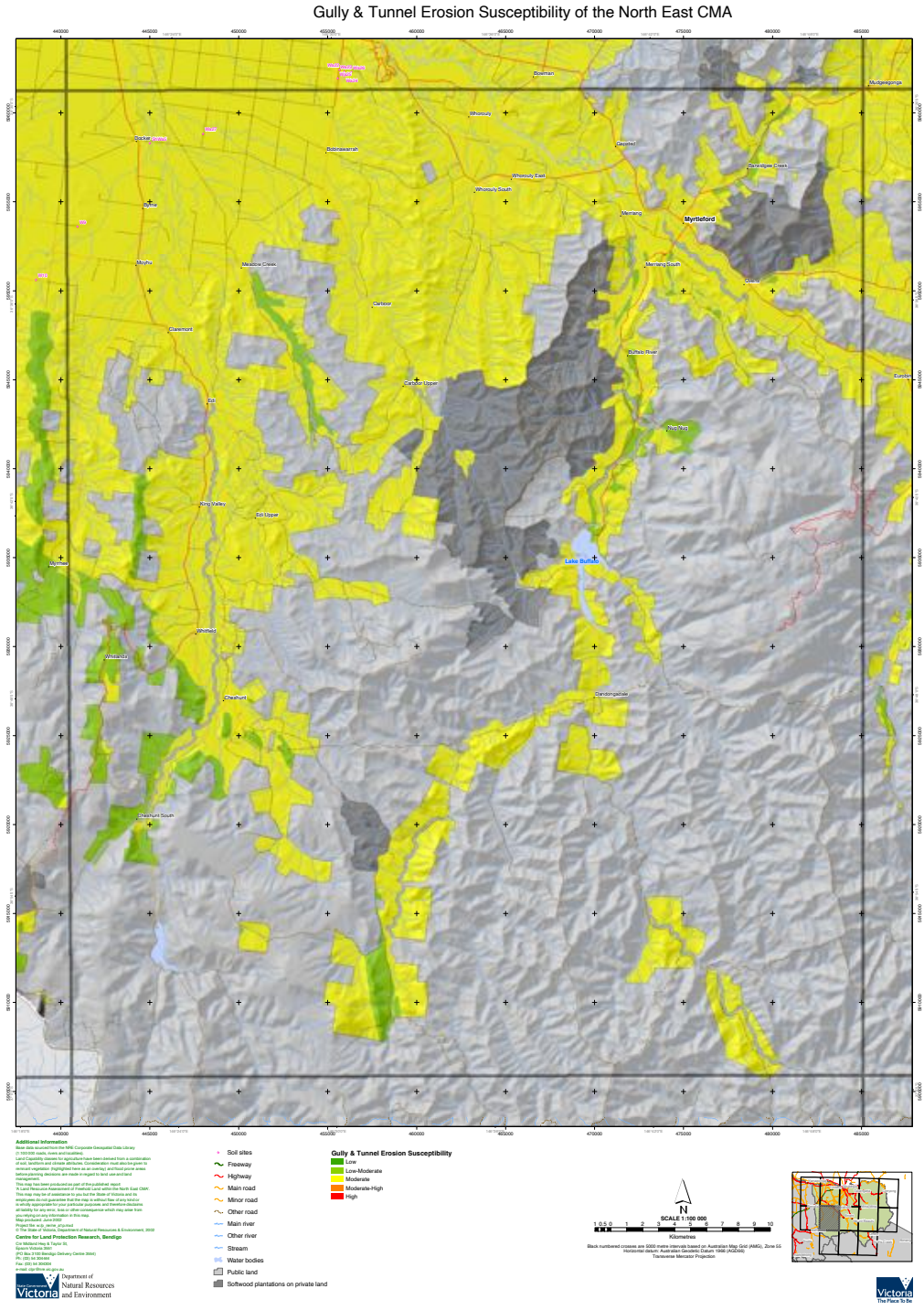

Figure A1-1: NECMA Gully & Tunnel Erosion Susceptibility Map showing moderate susceptibility of the subject site

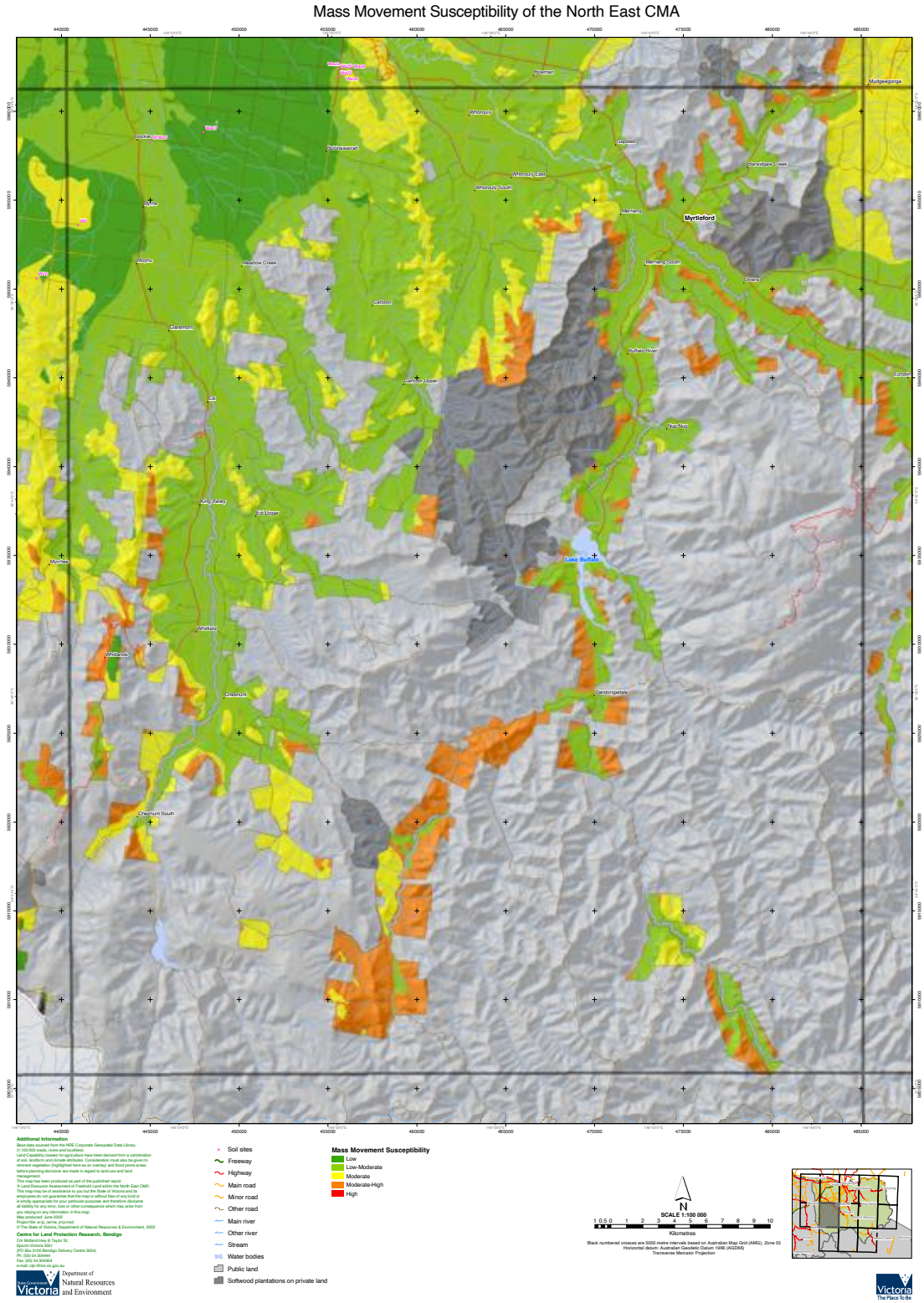

Figure A1-2: NECMA Mass Movement Susceptibility Map showing Low susceptibility of the subject site

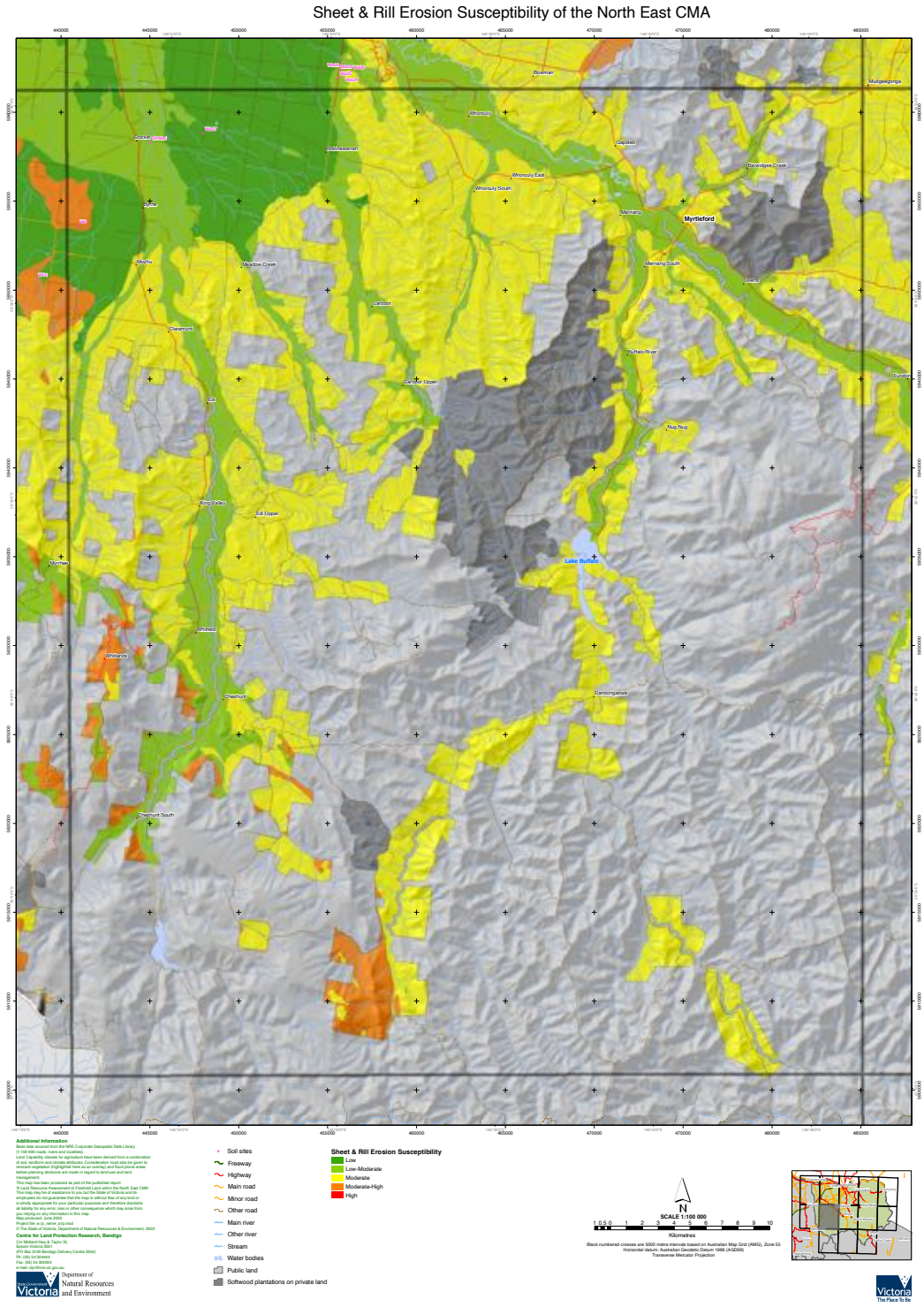

Figure A1-3: NECMA Sheet & Rill Erosion Susceptibility Map showing Low susceptibility of the subject site

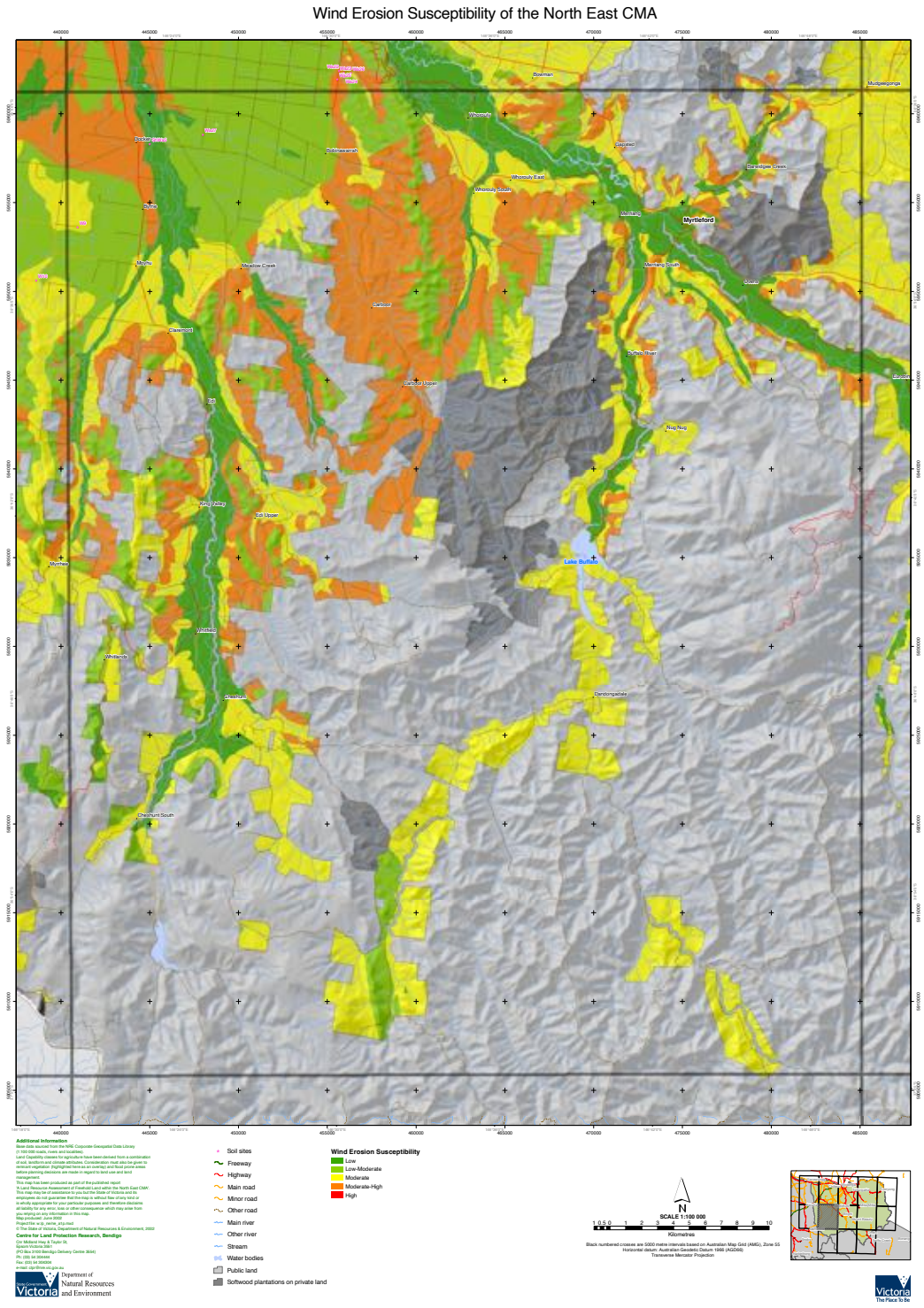

Figure A1-4: NECMA Wind Erosion Susceptibility Map showing Low-Moderate susceptibility of the subject site

Appendix 2: Waterway map

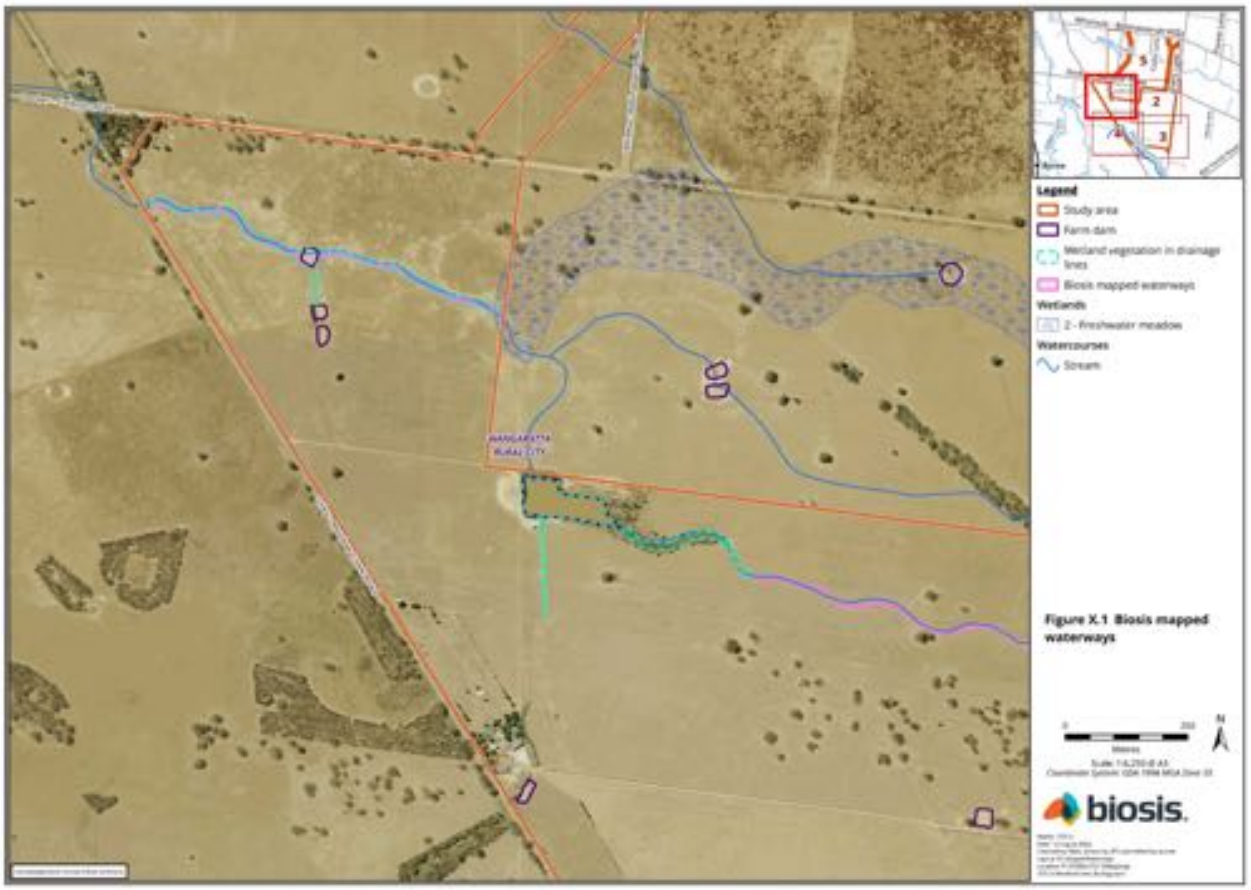

Figure A2-1: Biosis Mapped Waterways – Section 1

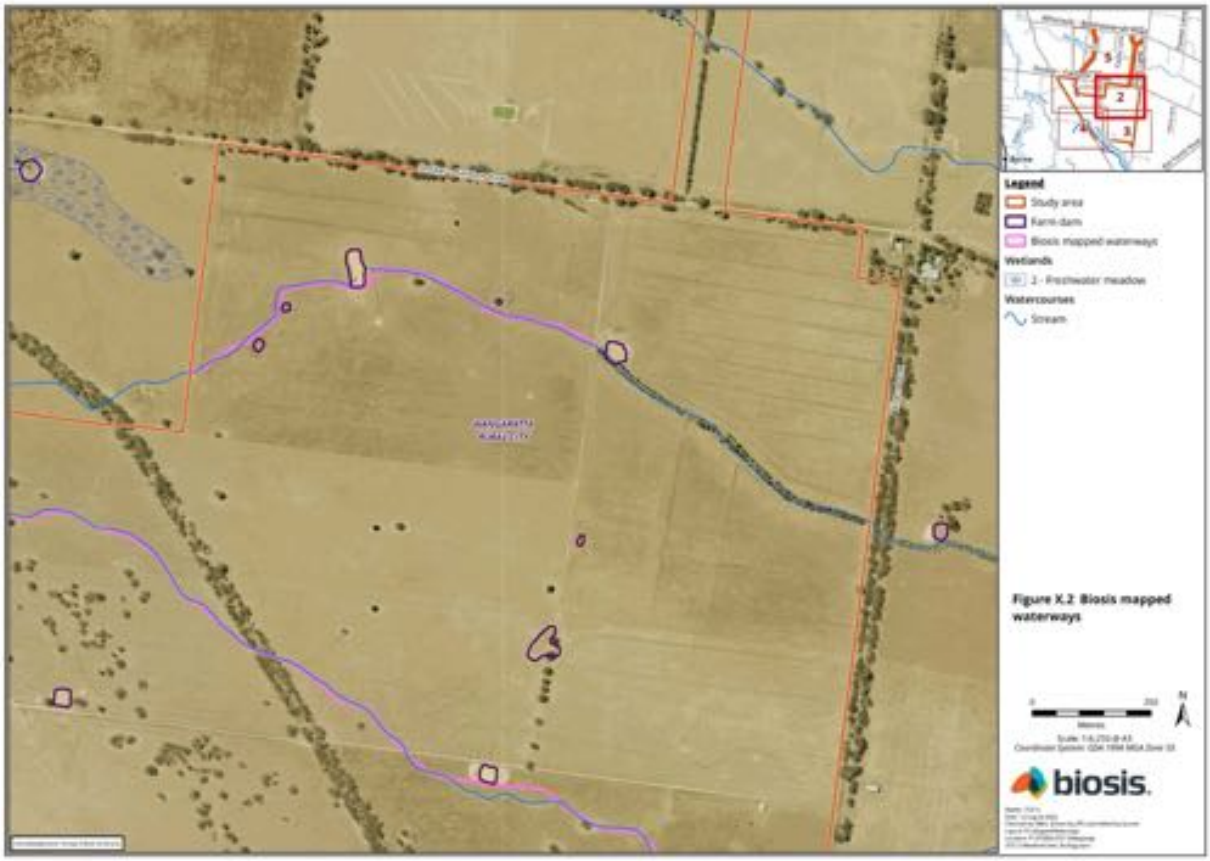

Figure A2-2: Biosis Mapped Waterways – Section 2

Figure A2-3: Biosis Mapped Waterways – Section 3

Figure A2-4: Biosis Mapped Waterways – Section 4

Appendix 3: Assessment of the versatility of agricultural land

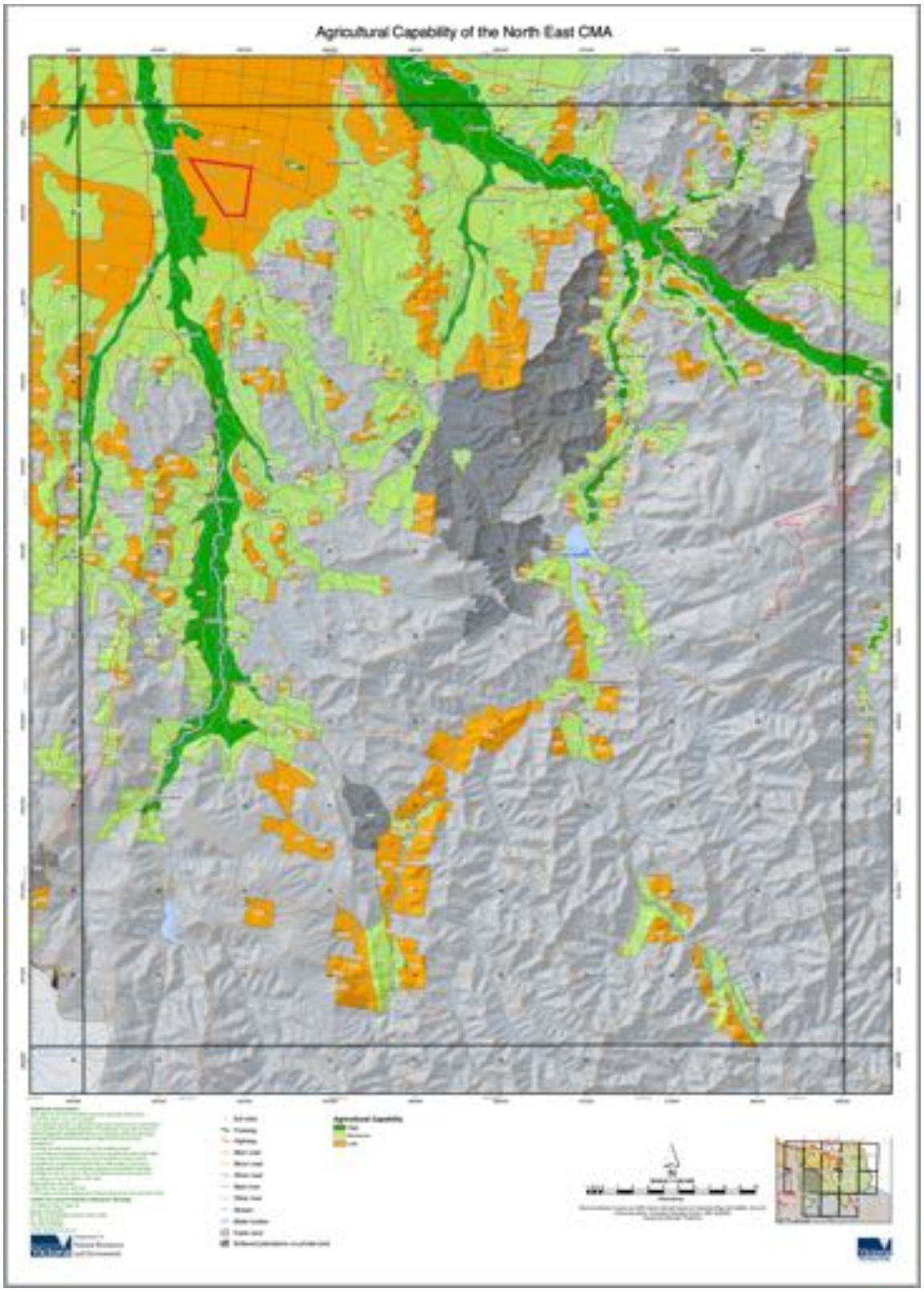

Figure A3-1: Agricultural Versatility of NECMA Buffalo Region including approximate marking of the property at Meadow Creek

Appendix 4: ABS for Rural City of Wangaratta 2020/21

Table A4-1: Rural City of Wangaratta ABS Data 2020/21

Description	Value
Total Agricultural value	$168,287,283
Total Agricultural area (ha)	127,885
Livestock products - Wool	$4,968,849
Livestock products - Milk	$15,886,484
Livestock slaughtered and other disposals - sheep and lambs	$11,801,478
Livestock slaughtered and other disposals - cattle and calves	$72,667,446
Land use - land mainly used for grazing - total area (ha)	114,944
Livestock - sheep and lambs - total no.	110,978
Livestock - cattle - total cattle no.	109,180
Livestock - dairy cattle - total no.	10,778
Livestock - meat cattle - total no.	98,402

Appendix 5: Solar Farm and Transmission Line Plans

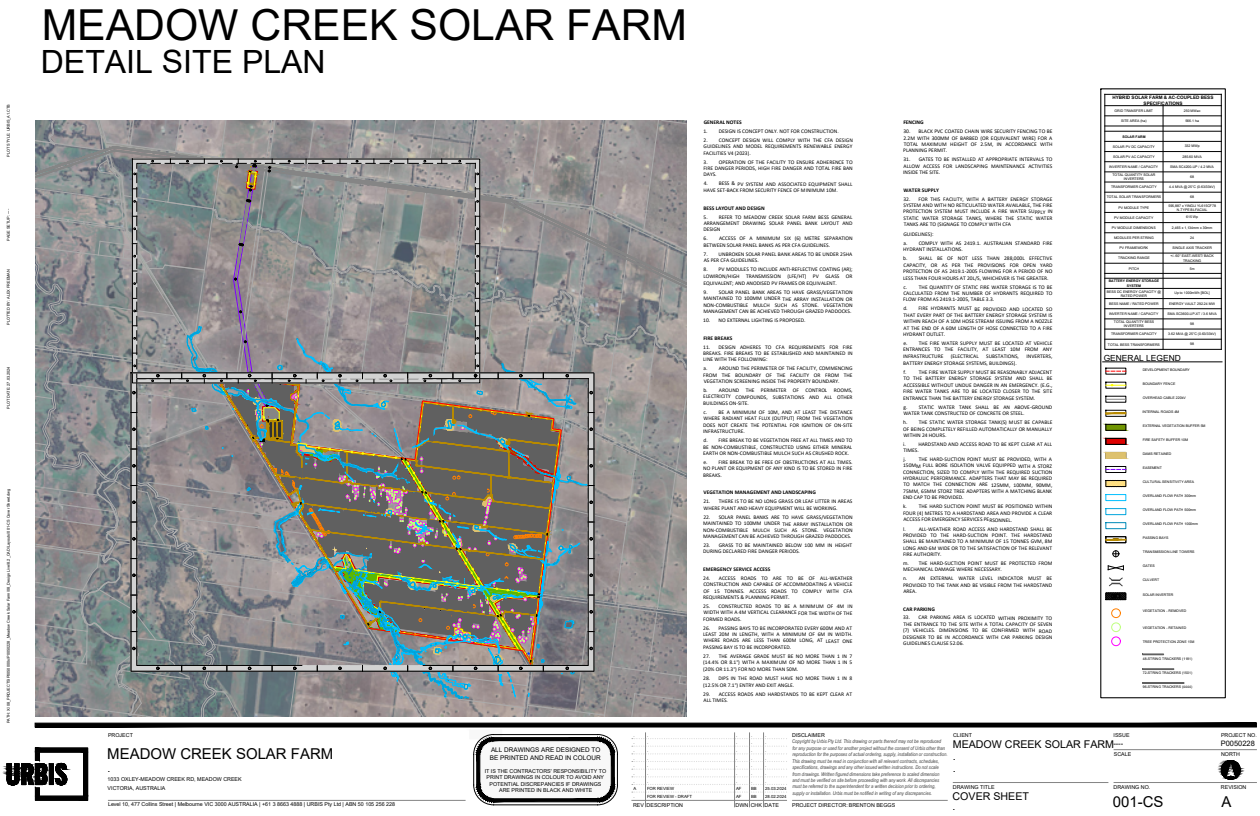

Figure A5-1: Meadow Creek Solar Farm Detail Site Plan

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