Bison Energy Australia Pty Ltd

Agricultural Impact Assessment
Cobden Solar Farm

September 2020

Executive summary

GHD Pty Ltd was engaged by BE Group Pty Ltd (BE Group) to undertake an Agricultural Impact Assessment of the proposed 5 megawatt solar renewable energy facility at Cobden, as part of a planning permit application.

The land that is the subject of the planning proposal has an area of 14 hectares (Lot 1~12 TP601664) and is situated approximately 4km west of Cobden in the Corangamite Council Local Government Area. The site has a history of extensive livestock grazing and the total property size is 131.35 ha. The owners also lease an additional 73 ha as part of their dairy operation. The project site is zoned as Farming Zone (FZ) under the Corangamite Planning Scheme.

A desktop study was undertaken to examine the land, soils, landform and existing land use of the subject site and the broader region, as well as the gross value of agricultural production. The operation of a solar renewable energy facility is an activity that differs from the agricultural activities on surrounding properties, therefore a land use conflict risk assessment (LUCRA) was undertaken to understand and identify measures to avoid and minimise impacts on the neighbouring properties and their ability to undertake ongoing agricultural production.

The Victorian Geomorphology Framework (VGF) incorporates information from geomorphology, pedology and ecology fields, and provides and assessment of both soil and vegetation distribution. The VGF was used to analyse the soils within the subject site and to compare them against the Corangamite LGA. The subject site is located on alluvium terraces and floodplains with poorly developed drainage and shallow regolith.

As expected based on the soils and landform information, land use at the subject site is exclusively 'grazing modified pastures,' representing 0.005% of all grazing modified pasture land use within the Corangamite LGA. The site does not have a history of routine cropping and is not located within an identified irrigation district. As expected, based on the agricultural land versatility classification, land use at the project site is extensive grazing.

It is estimated that the project site generates 0.00002% of the total value of agricultural production within the Corangamtie LGA. The removal of the land from agricultural production would have minimal impact on the relevant agricultural industries within the region as outlined in the *Great South Coast Regional Growth Plan*.

It is expected that there would be limited and short-term earthworks associated with construction and operation of the site and therefore the majority of the soil surfaces would not be impacted by the development of the project site.

The site was selected for a solar farm due to the proximity to an existing 22kV power transmission line, which is adjacent to the north-eastern boundary of the subject site along Cobden-Terang Road. This would minimise the need for additional infrastructure and associated impacts. Connection to this transmission line via a substation located adjacent to the property is possible.

The analysis of the potential for land use conflict to arise should the solar farm be developed indicates that the likelihood of potential conflict is considered low, and current land uses on surrounding land could continue with minimal impact. No significant changes to existing site access points are required and the development is not expected to impact on the current access arrangements of adjoining properties.

The project site has not been identified as ‘strategic agricultural land’ of national, state, regional or sub-regional significance, and is considered unlikely to be classified as such in the future.

The project is anticipated to have an operational life of 30 years. If at some time in the future, the solar farm ceases to operate, infrastructure can be removed and the project site can be rehabilitated to enable agricultural production to resume.

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1. Introduction

BE Pro B Pty Ltd (Bison Energy) is proposing to develop a 5 megawatt solar renewable energy facility at 181 Cobden-Terang Rd, Cobden, Victoria. As part of the project planning, GHD Pty Ltd was engaged by Bison Energy to consider the elements of the sites agricultural land status and the issues surrounding conversion to a solar renewable energy facility. This assessment considers the sites agricultural capability, the regional implications of removing agricultural land use from the site and provides commentary on whether the proposed facility can co-locate with other agricultural activities.

1.1 Project site and project development

The 14 hectare (ha) subject site for the proposed solar renewable energy facility is located in south-west Victoria approximately 4km west of Cobden (Lot 1~12 TP601664). The subject site will be located on the western portion of private freehold property and is on the intersection of the Cobden-Terang Road and the Cobden-South Ecklin Road. The subject site is part of larger agricultural property with dairy operations the core business. The total property size is 131.35 ha with an additional 73 ha leased in the surrounding area. The subject site is separated from the remainder of the property via the Cobden-South Ecklin Road, which has made the regular and safe movement of dairy cattle challenging for the current owners. Land not required for the solar renewable energy facility will remain in agriculture. The subject site adjoins other freehold agricultural land.

The subject site is located in the Corangamite Council Local Government Area (LGA), Corangamite Catchment Management Area and the Victorian Volcanic Plain Riverina Bioregion. Following an extensive search, the site was selected for a solar renewable energy facility due to the proximity of a 22kV power transmission line which extends through the north-eastern part of the subject site adjacent to Cobden-Terang Road. GHD understands that direct connection to this transmission line via a substation located adjacent to Cobden-Terang Road is possible. No offsite connection or infrastructure is required.

In this report, there is reference to both the subject site and the study area. The subject site refers to the entire property, shown in Figure 1. The study area refers to the Corangamite Council LGA.

1.2 Methodology

GHD was engaged to assess the suitability of the land for the proposed solar renewable energy facility and to conduct an agricultural impact assessment.

This report has been compiled based on information obtained following desktop investigations and a review of photos of the subject site and surrounding land. The desktop study has used a range of reports, statistical and mapping data obtained from a number of sources. Knowledge of the site and the broader planning context has also informed the study. GHD has reviewed and referenced a number of State and local government planning reports and guidelines to inform this assessment. These include:

- *Solar Energy facilities – Design and Development Guidelines*, Department of Environment, Land, Water and Planning (DELWP) (August 2019)
- *Great South Coast Regional Growth Plan* (May 2014)
- *Corangamite Planning Scheme*

1.3 Scope and limitations

This report: has been prepared as a desktop study by GHD for BE Group and may only be used and relied on by BE Group for the purpose agreed between GHD and the BE Group as set out in section one of this report.

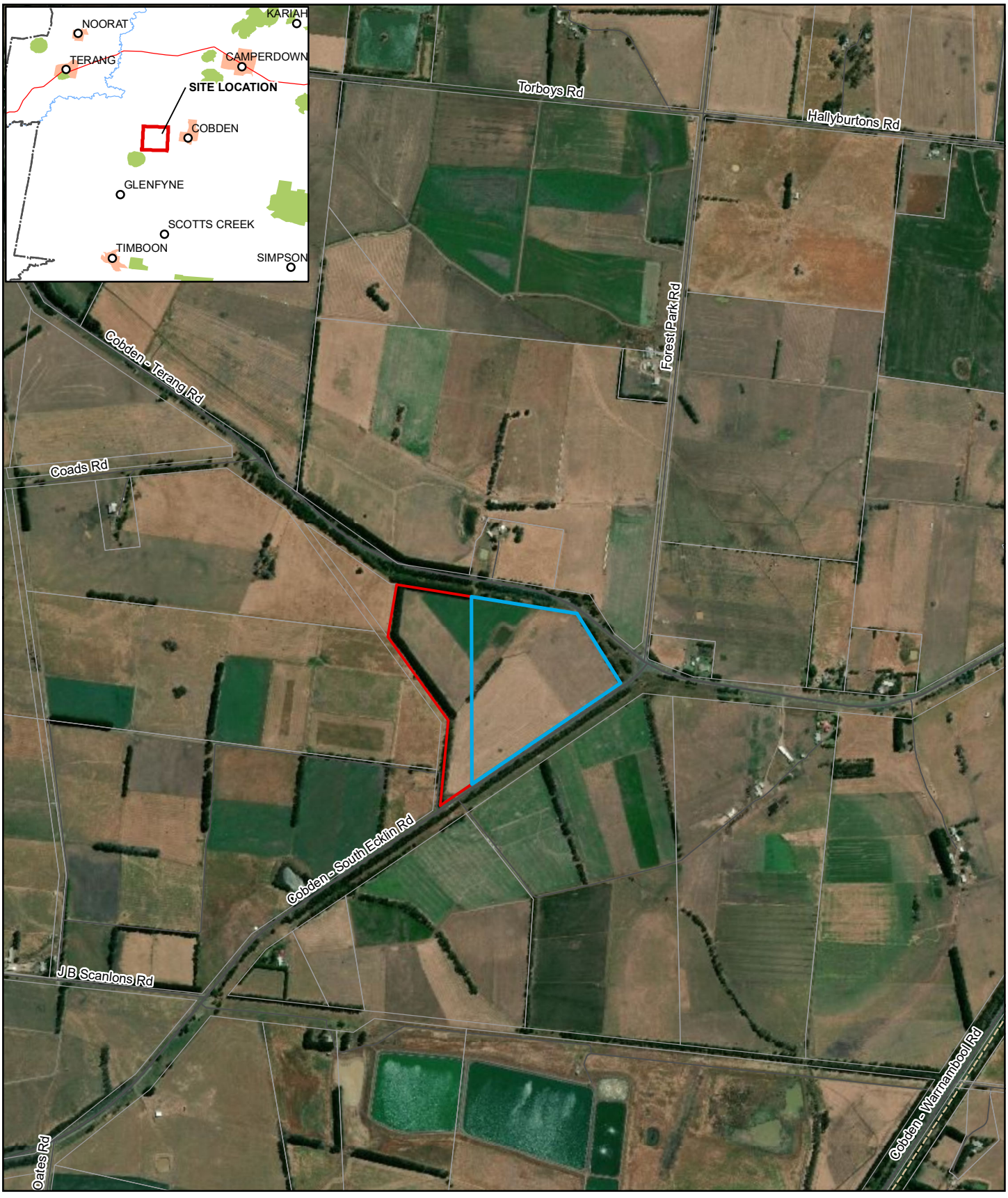
GHD otherwise disclaims responsibility to any person other than BE Group arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section one of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by BE Group and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.



LEGEND

- Lease Boundary
- Site Boundary
- Parcel

Paper Size A4

0 55 110 220 330 440

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Bison Engery Australia
Agricultural Impact Assessment

Cobden
Site Location

Job Number	12434338
Revision	B
Date	29/07/2020

Figure 1

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Data source: DELWP, VicMap, 2020; GHD, 2020; Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Created by: kgardner

2. Land zoning

The subject site comprises a portion of a single allotment (Lot 1~12 in TP601664) and is zoned as Farming Zone (FZ) under the Corangamite Planning Scheme (clause 35.07). The stated purpose and table of uses for land zoned as FZ is shown in Table 1.

As noted below, under clause 53.13 of the Corangamite Planning Scheme, an application is required to use or develop land for a renewable energy facility (other than a wind energy facility) and must meet the requirements of that clause.

Table 1 Farming Zone – Corangamite Planning Scheme

Farming Zone	
Purpose	To implement the Municipal Planning Strategy and the Planning Policy Framework. To provide for the use of land for agriculture. To encourage the retention of productive agricultural land. To ensure that non-agricultural uses, including dwellings, do not adversely affect the use of land for agriculture. To encourage the retention of employment and population to support rural communities. To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision. To provide for the use and development of land for the specific purposes identified in a schedule to this zone.
Permit not required (section 1)	Agriculture (other than Animal keeping, Animal production, Apiculture, Racing dog training, Rice growing and Timber production), Animal keeping (other than Animal boarding), Bed and breakfast, Cattle feedlot, Dependent person's unit, Dwelling (other than Bed and breakfast), Grazing animal production, Home based business, Informal outdoor recreation, Poultry farm, Primary produce sales, Racing dog training, Railway, Rural industry (other than Abattoir and Sawmills), Rural store, Timber production, Tramway, Any use listed in Clause 62.01.
Permit required (section 2)	Abattoir, Animal boarding, Animal production (other than Broiler farm, Cattle feedlot and Grazing animal production), Broiler farm - if the Section 1 condition to Poultry farm is not met, Camping and caravan park, Car park, Cattle feedlot – if the Section 1 condition is not met, Dependent person's unit – if the Section 1 condition is not met, Dwelling (other than Bed and breakfast) – if the Section 1 condition is not met, Emergency services facility, Freeway service centre, Group accommodation, Host farm, Industry (other than Rural industry), Landscape gardening supplies, Leisure and recreation (other than Informal outdoor recreation), Manufacturing sales, Market, Place of assembly (other than Amusement parlour, Night club, Carnival and Circus), Primary school, Racing dog keeping – if the Section 1 condition to Animal keeping is not met, Racing dog training – if the Section 1 condition is not met, **Renewable energy facility (other than Wind energy facility),** Residential hotel, Restaurant, Rice growing, Sawmill, Secondary school, Timber production – if the Section 1 condition is not met, Trade supplies, Utility installation (other than Minor utility installation and Telecommunications facility), Warehouse (other than Rural store), Wind energy facility, Winery, Any other use not in Section 1 or 3.
Prohibited (section 3)	Accommodation (other than Bed and breakfast, Camping and caravan park, Dependent person's unit, Dwelling, Group accommodation, Host farm and Residential hotel), Amusement parlour, Brothel, Child care centre, Cinema based entertainment facility, Education centre (other than Primary school and Secondary school), Nightclub, Office, Retail premises (other than Market, Landscape gardening supplies, Manufacturing sales, Primary produce sales, Restaurant and Trade supplies)

3. Land capability and existing land use

This section has been compiled based on information and data obtained from:

- Photos of the site and surrounding area
- Public sources
- Aerial photographs of the study area and its surrounds, and
- General information regarding the study area known by GHD

This section specifically addresses:

- The agricultural quality of the proposed subject site for the solar farm
- The amount of strategically significant agricultural land in the Council area and the region
- The potential impact of removing this land from agricultural production

3.1 Land use at the project site

The subject site has an area of 14 ha and is a portion of a larger property (total property size 131.35 ha) that has been traditionally used for dairy operations and is fenced to a stock-proof standard (see photographs 1-3). The property that is not subject to the proposed solar renewable energy facility will continue to be used for agricultural purposes with existing agricultural infrastructure not impacted by the proposal (photographs 1-5). The subject site is currently fenced into a number of smaller paddocks to assist with grazing management and livestock handling facilities are located in the centre of the property. The majority of the property is located to the eastern side of Cobden-South Ecklin Road and is run as a dairy operation. All infrastructure located with the dairy operation is co-located in the north-east corner of the property. The subject site is located across the busy Coden-South Ecklin Road and used for calf rearing or growing silage and fodder crops. The movement of livestock across this road can present safety issues to both operators and animals with oncoming traffic (photograph 6).

Topographically the site has an average slope of 0.9% with very minor elevation change and therefore the proposal would avoid the need for unnecessary or excessive earthworks and not result in a change to the natural landscape. The site has an average elevation of 137 metres.

The subject site is largely cleared of vegetation with the exception a tree line that runs through the middle of the subject site and which will not be impacted by the proposal. There are also well-established tree lines used as windbreaks along the northern and western boundary that were likely planted to reduce soil erosion, increase crop yields and offer protection to livestock from hot or cold weather. The subject site has a farm dam located adjacent to the northern boundary (capacity not measured) and there are a number of concrete troughs throughout the site to provide water for livestock. Access to the proposed solar renewable energy facility will be via Cobden-South Ecklin Road (photograph 6) where the current livestock crossing is located.

Adjoining properties appear to be similar in land use to the subject site and predominately used for intensive animal operations (e.g. dairy), extensive livestock grazing or cropping activities. The site is also located close to the electricity grid network and therefore minimises the need for additional infrastructure and associated impacts.

3.1.1 Future agricultural land use

In addition to the solar farm operation, the proponent would maintain an 8ha parcel along the western boundary of the subject site and could also have the option to undertake opportunistic grazing of sheep on the subject site once the solar farm is established. Such grazing could be used to maintain pasture height and ground cover and will allow agriculture to continue on the site, although at reduced capacity. The site is considered suitable for sheep grazing as it is already well fenced, has the availability of stock water (via a farm dam and network of connected water troughs). The current farm property is well configured to continue grazing the

project site in conjunction with existing farm operations, utilizing internal gates connecting adjoining paddocks and livestock handling facilities. Sheep grazing activities also occur throughout the Corangamite LGA (refer Table 5).

Given the relatively small area, GHD believe that opportunistic rather than continuous grazing of the site would be preferable, as this would allow stocking rates to be strategically and regularly adjusted to manage pasture biomass, maintain groundcover, reduce fuel loads/fire risk, allow desirable plants to set seed and germinate, and reduce weed impacts. This type of grazing strategy would be best achieved if the site was managed by a nearby landholder and incorporated into an existing grazing rotation.

To date, there have not been any formal studies conducted to quantify the productivity benefits or costs associated with grazing sheep within solar renewable energy facility sites. While it would be expected that shading would reduce overall pasture growth, anecdotal evidence from a trial in northern NSW found that panels retained more soil moisture during summer months, therefore generating more pasture production during these periods. The panels also had an extra benefit of sheltering lambs from eagles and ravens[1].

3.2 Soils and landform

Most agricultural enterprises depend on the local natural resource base that determines the suitability of a location for a specific enterprise. There are a range of natural resources that need to be considered including soil type, topography, climate and water availability.

The Victorian Geomorphology Framework (VGF) is a three tier hierarchical system of land unit descriptions. This framework describes and defines details of Victoria's landscapes and provides a hierarchy to align past and future soil and land information. The system incorporates information from geomorphology, pedology and ecology fields, and provides and assessment of both soil and vegetation distribution. The VGF was used to analyse the soils for subject site and to compare them against the Corangamite LGA (see Table 2). The majority of soils across the Corangamite LGA are classed as Western Plains.

The Victorian Western Plains are made up of low-lying undulating plains formed on both volcanic and sedimentary lithologies and the landscapes of this geomorphological unit are formed on some of the youngest rocks of Victoria. Soils on the Western Plains reflect the underlying lithology and age of the rocks.

The two main landform units within the Corangamite LGA are volcanic plains (GMU 6.1) and sedimentary plains (GMU 6.2), see Table 2. The subject site is located within the volcanic plains landform unit, which was formed over a period of about 5 million years, with soils built up by sporadic volcanic eruptions. Drainage across these plains is generally poorly developed and grasslands are common on much of the plains lava, and on the many cones, dense trees mark the young stony rises, while large scattered Red gums can be found on the deeply-weathered older flows.

The subject site is located on alluvium terraces and floodplains that are associated with the lake and swamp systems within the volcanic terrain as well as drainage systems (GMU 6.1.5). These geomorphological units cover almost 41,000 ha (9%) of the LGA and associated soil types include include black and grey self-mulching and cracking clays (Vertosols), black (and some red) sodic texture contrast (Sodosols) and dark loam soils (Dermosols).

Sedimentary plains (GMU 6.2) is the largest landform within the Corangamite LGA (29%) and comprise the marine sands deposited by the retreating Pliocene sea including exposing the older underlying Port Campbell Limestone.

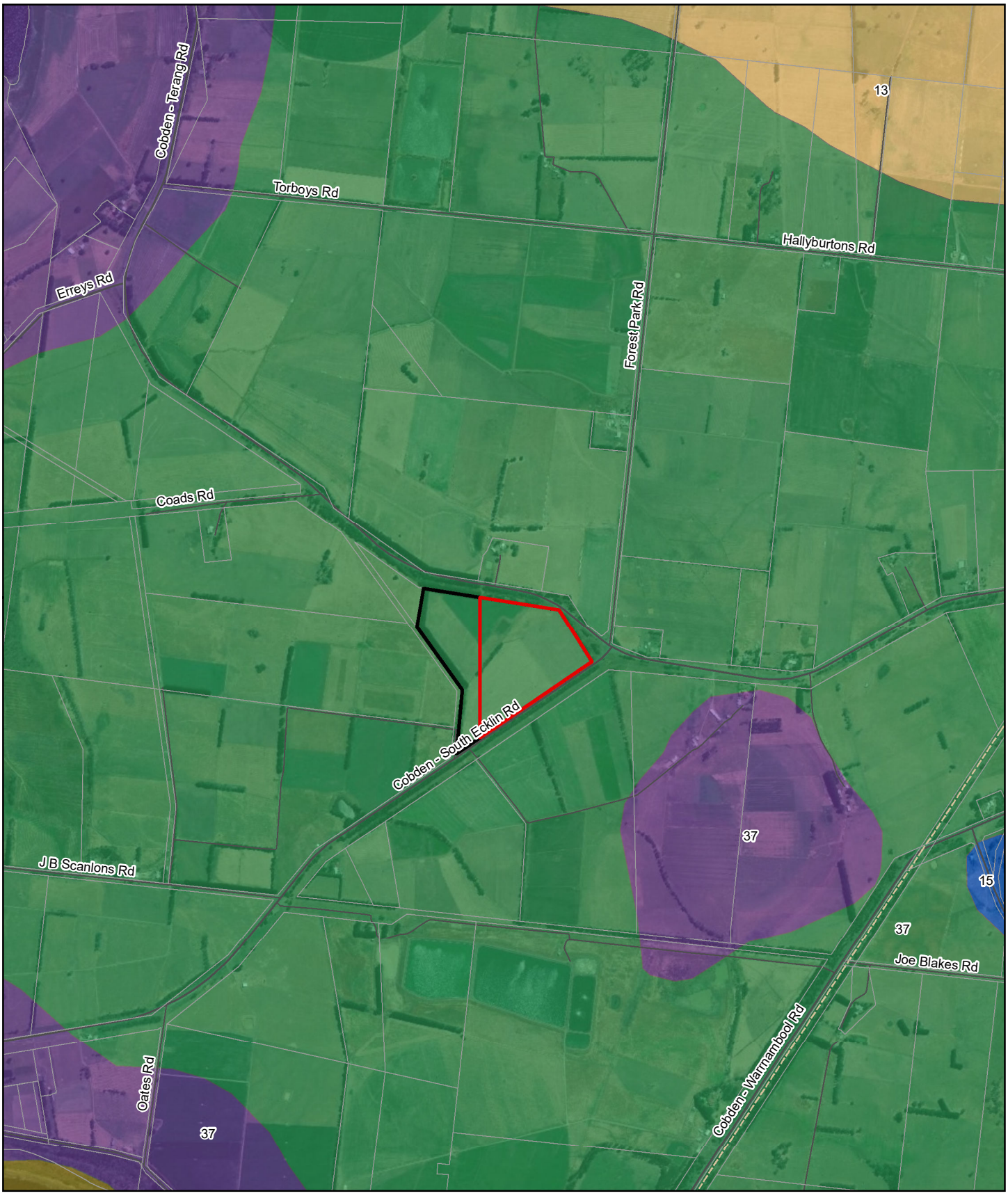
[1] Solar farm offers dual purpose land (The Land) 20 March 2018 [Online] https://www.theland.com.au/story/5256360/can-a-solar-farm-be-a-lambing-paddock/

Table 2 Soils and land information – Victorian Geomorphological Framework

Geomorphological Unit	Subject Site		Corangamite LGA	
	Area (ha)	Percent	Area (ha)	Percent
2.1.4 - Hills, valley slopes and plains on plutonic Palaeozoic rocks			2,105	0.5%
3.1.2 - Ranges			713	0.2%
3.2.2 - Ranges			5,497	1%
3.3.1 - Plateau			3,627	1%
3.3.2 - Hills and low hills			15,645	4%
3.4 - modern floodplains			1,127	0.3%
6.1.1 - Eruption points: maars, scoria cones and lava shields, including associated ash and scoria deposits			13,826	3%
6.1.2 - Stony rises			45,639	10%
6.1.3 - Plains with poorly developed drainage and shallow regolith			77,129	17%
6.1.4 - Plains with well developed drainage and deep regolith			69,907	16%
6.1.5 - Terraces, floodplains and lakes, swamps and lunettes and their deposits	14	100%	40,934	9%
6.2.2 - Dissected plains			85,929	19%
6.2.4 - Plains and plains with low rises			40,990	9%
6.2.5 - Terraces and floodplains, and coastal plains			1,160	0.3%
6.3 - Hills and low hills			1,796	0.4%
8.1.4 - Subaerial dominant processes; without shore platform			83	0.0%
8.5.1 - Cliff top; stranded			325	0.1%
8.5.2 - Sea level			358	0.1%
8.6.1 - Tidal			261	0.1%
8.6.2 - Lagoonal			340	0.1%
Waterbody			34,061	8%
Total	**14**	**100%**	**441,453**	**100%**

Source: Victorian Geomorphological Framework (VGF) (2007) Available [Online]:

http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/landform_geomorphological_framework



LEGEND

- Lease Boundary
- Site Boundary
- Parcel

GMU

- 6.1.1 - Eruption points: maars, scoria cones and lava shields, including associated ash and scoria deposits
- 6.1.4 - Plains with well developed drainage and deep regolith
- 6.1.5 - Terraces, floodplains and lakes, swamps and lunettes and their deposits
- 6.2.2 - Dissected plains
- wbody

Paper Size A4

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

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Agricultural Impact Assessment

Cobden
Soil

Job Number	12434338
Revision	B
Date	29/07/2020

Figure 2

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Data source: DELWP, VicMap, 2020; GHD, 2020; Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Created by: kgardner

3.3 Regionally strategic assets

The Great South Coast Regional Growth Plan (2014) outlines the importance of this region to the Victoria's prosperity and liveability with agriculture, manufacturing and healthcare contributing around 40% of the regions gross regional production. Agriculture is the dominant land use and a significant economic driver and employer in the region due its favourable climatic conditions and strategic transport links. The Plan also discusses the area as a regional hub for alternative energy production (geothermal, natural gas, wave and wind energy) with a number of projects either in operation or currently being planned. Figure 3 outlines some of the strategic assets of the region including dairy as the predominant agricultural enterprise within the broader project study area.

Source: Victorian Government (2014) Great South Coast Regional Growth Plan

Figure 3 Great South Coast Regional Growth Plan – Strategic Assets

3.4 Land use in the study area

Table 3 and Figure 4 below show the land use for the Corangamite LGA and at the subject site respectively, as sourced from Victoria Department of Environment, Land, Water and Planning. As expected based on the soils and landform information (outlined in section 3.2), land use at the subject site is exclusively 'grazing modified pastures.' The area of the subject site (14 ha) represents 0.005% of all grazing modified pasture land use (298,216 ha) within the Corangamite LGA. Grazing modified pastures is the largest land use within the LGA and accounts for almost 67% of total land use. The following sections contains photos of the subject site and adjacent sites

Table 3 Land use – Corangamite LGA

Land use	Area (ha)	Percent	Land use (cont.)	Area (ha)	Percent
Abattoirs	4.6	0.0%	Poultry farms	26.4	0.0%
Bulk grain storage	47.3	0.0%	Production native forests	143.2	0.0%
Cereals	48,571.6	10.9%	Protected landscape	333.0	0.1%
Commercial services	57.4	0.0%	Public services	659.3	0.1%
Cropping	9,452.0	2.1%	Pulses	1,570.1	0.4%
Electricity substations and transmission	6.3	0.0%	Quarries	19.3	0.0%
Extractive Industry not in use	4.7	0.0%	Railways	8.6	0.0%
Food processing factory	34.3	0.0%	Recreation and culture	274.1	0.1%
General purpose factory	228.6	0.1%	Reservoir	25.1	0.0%
Grazing modified pastures	298,215.8	66.9%	Residual native cover	22.3	0.0%
Hardwood plantation forestry	6,138.3	1.4%	River	1.7	0.0%
Lake	33,373.1	7.5%	Roads	12,344.9	2.8%
Lake - conservation	3.4	0.0%	Rural residential with agriculture	3,543.3	0.8%
Landfill	1.1	0.0%	Rural residential without agriculture	1,598.9	0.4%
Manufacturing and industrial	687.8	0.2%	Saleyards/stockyards	10.5	0.0%
National park	5,654.4	1.3%	Sewage/sewerage	155.2	0.0%
Navigation and communication	459.0	0.1%	Softwood plantation forestry	2,268.5	0.5%
Oilseeds	5,411.1	1.2%	Strict nature reserves	4,009.2	0.9%
Other conserved area	9,351.2	2.1%	Supply channel/aqueduct	0.2	0.0%
Other minimal use	8.2	0.0%	Urban residential	899.0	0.2%
Perennial flowers and bulbs	0.4	0.0%	Utilities	146.3	0.0%
Piggeries	5.1	0.0%	Waste treatment and disposal	31.2	0.0%
Plantation forests	13.0	0.0%	Water extraction and transmission	3.9	0.0%
Ports and water transport	0.2	0.0%	Water storage - intensive use/farm dams	31.7	0.0%
Total – Corangamite LGA 445.855 ha					

LEGEND

Lease Boundary	Grazing modified pastures	Rural residential without agriculture
Site Boundary	Public services	Urban residential
Landuse Description	Roads	Parcel
Cropping	Rural residential with agriculture	

Paper Size A4

0 55 110 220 330 440

Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

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Agricultural Impact Assessment

Cobden
Land Use

Job Number	12434338
Revision	B
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Figure 3

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Data source: DELWP, VicMap, 2020; GHD, 2020; Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Created by: kgardner

Photograph 1: Looking south into the subject site from Cobden-Terang Road.

Photograph 2: Looking south from Cobden-Terang Road from the northern boundary and the subject site has an average slope of 0.9% with very minor elevation change and therefore would avoid the need for unnecessary or excessive earthworks and not result in a change to the natural landscape. This gate could also be used as an alternative emergency access point.

Photograph 3: Looking north-east from the southern corner of the subject site adjacent to Cobden-South Ecklin Road. Fences are stock-proof and would minimise stock from straying onto roads should there be an opportunity to undertake strategic grazing in conjunction with the solar renewable energy facility.

Photograph 4: Looking north-west Cobden-South Ecklin Road showing existing concrete water trough located on to the subject site. The water troughs will be removed to facilitate construction, however they could be reconfigured in the future following decommissioning of the megawatt solar renewable energy facility as the water connection points will remain.

Photograph 5: Looking east across the subject site showing existing land use of extensive grazing.

Photograph 6: Looking east from southern corner of subject site. As the property is fragmented by Cobden-South Ecklin Road, this stock crossing is used to move livestock from the main property across to the subject site and can present both logistical and safety issues.

3.5 Value of agricultural production

The importance of agriculture in the region can be demonstrated by considering data for the Corangamite LGA as shown in Table 4. The gross value of agricultural production in the Corangamite LGA was approximately $733 million in 2015-16. The majority of the value of production was from milk production, followed by livestock slaughterings (mainly cattle), with lesser contributions from broadacre crops, hay production and wool production. Hay and silage production would also be undertaken across the LGA to provide supplementary feed to the dairy industry. More detail on livestock production is provided in section 3.5.1 and Table 5.

Table 4 Gross value of agricultural production Corangamite LGA

Commodity	Corangamite LGA
Broadacre crops	$50,199,908
Hay	$30,037,151
Nurseries, cut flowers, or cultivated turf	$442,618
Fruit and nuts	-
Grapes (incl. wine production)	$7,253
Vegetables	$344,353
Livestock products - wool	$24,366,892
Livestock products - milk	$391,977,347
Livestock products - eggs	$37,688
Livestock slaughterings - cattle	$189,053,543
Livestock slaughterings – sheep and lambs	$44,973,049
Livestock slaughterings - other	$1,575,750
Total ($)	**$733,015,550**

Source: ABS (2018) Agricultural Commodities Produced, Australia, 2015-16, Cat. No. 7503.0 (Table 3)

3.5.1 Agricultural production – livestock

As outlined in section 3.3, the dairy sector is the main agricultural industry across the south, with other livestock and grains industry further to the north. The dairy industry is very important to the economy of the region and has resulted in clusters being established across the region. There are almost 240,000 head of dairy cattle across the LGA on 600 farms (average of 400 head per farm). Sheep and lamb production also account for 423,786 head with merinos being bred for wool production and prime lamb production is focused mainly for meat production.

Table 5 Livestock numbers Corangamite LGA

	Total Numbers	No. of Establishments
Dairy cattle	239,226	599
Beef cattle	64,165	353
Sheep and lambs	423,786	204
Poultry - layers	1,092	20
Poultry – meat chickens	-	-
Pigs	1,896	15

Source: ABS (2018) Agricultural Commodities Produced, Australia, 2015-16, Cat. No. 7503.0 (Table 3)

3.5.2 Value of agricultural production at the project site

The Livestock Farm Monitor Project (LFMP) is a long running project managed by Agriculture Victoria, which surveys the productivity and financial performance of a sample of sheep and beef enterprises on an annual basis. The survey collects data from 26 sheep and cattle grazing enterprises located in South West Victoria, which over the past 10 years, in real terms, have returned an average annual gross income of $833 per ha, operating profit (EBIT) of $275 per ha, return on assets of 3.8%, and return on equity of 3.4% (Table 6).

Table 6 Financial performance of sheep and cattle grazing enterprises in South West Victoria.

	Gross income ($/ha in real terms2)	EBIT ($/ha in real terms)	Return on Assets (%)	Return on Equity (%)
2009-10	$788	252	3.2	2.5
2010-11	$917	423	5.7	5.7
2011-12	$795	257	3.7	3.3
2012-13	$610	67	1	-1.2
2013-14	$659	154	2.2	0.8
2014-15	$745	163	2.3	1.8
2015-16	$808	241	3.4	2.9
2016-17	$780	474	6.9	8
2017-18	$1,078	395	5.5	5.8
2018-19	$1,151	321	4	4
10 year average	$833	275	3.8	3.4

GHD consider that the above average gross income per hectare is broadly reflective of the productivity of the subject site. Therefore the indicative value of production from the 14 ha site is estimated at $11,662 per annum, which represents 0.00002% of the total value of agriculture in the Corangamite LGA as described in Table 4. This estimate is based on typical seasonal conditions and assumes the project site is managed as part of a larger commercial agricultural entity with full efficiencies of production.

Table 7 Estimated annual value of production from the subject site

Gross annual income per ha from the subject site (from Table 6)	$833
Project Site Area	14 ha
Indicative annual gross income generated from site	$12,662
Annual value of production from the Corangamite LGA (from Table 4)	733,015,550
Value of agricultural production from the site, as a proportion of total Corangamite LGA production	0.00001591

Source: Agriculture Victoria Livestock Farm Monitor Project 2018-19

It should be noted that gross income from agricultural activities is not a measure of farm profitability as it does not include capital (machinery, land, buildings etc.) or fixed or variable costs (insurance, rates, taxes, variable costs incurred in agricultural enterprises).

The Australian Bureau of Agricultural Economics (ABARES) publishes Farm Financial Performance (2020) which provides an estimate of total farm performance and is also broken down into sectors. This average is across a broader sample set, however these figures have not been incorporated into this project analysis as the subject area is considered below the average farm size for the survey sample. The localised and current results from the Livestock Farm Monitor project (Agriculture Victoria) are considered in this instance to be a reliable indication of grazing enterprises in South West Victoria for the purpose of this analysis.

The ABARES (2020) report outlines that for sheep-beef farms, lower receipts from wool are offset by increased prices from the sale of sheep and lambs with cattle prices also increasing

2 'Real' dollar values are the nominal values converted to present dollar equivalents by the C.P.I. to allow for inflation.

due to higher beef prices. As seasonal conditions across eastern Australia have continued to improve, expenditure on fodder prices will continue to fall. Figure 5 provides an overview of farm cash income for sheep-beef enterprises in Victoria compared to Australia and it projects that average farm cash income is likely to increase by 53% per farm in 2019-20, following a 12% fall in 2018-19.

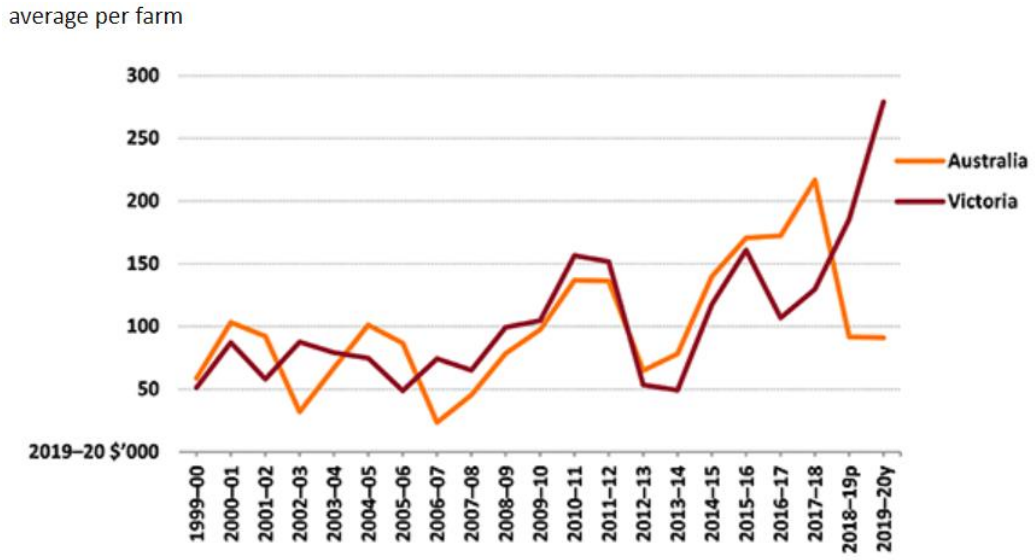

Figure 5 Farm cash income, sheep-beef industry 1999-2020

Source: ABARES (2020) Farm Financial Performance - Victoria

While development of the site would represent a continuing annual reduction in agricultural income over the life of the project, it is expected that this will be offset by the value of future solar energy sales. In addition, the project is expected to have a light impact on land capability such that when it is at the end of its operational life (estimated to be 30 years), the site could be rehabilitated to a state that would allow resumption of agricultural production similar to its current status.

The installation of solar farms on rural properties can also assist in diversifying sources of income for the agricultural sector, allowing financial resilience for farmers and communities. As outlined in section 3.1.1, there is also the option for strategic grazing of sheep in and around the solar panels to manage pasture biomasss and reduce the fuel load which would generate some agricultural activity and additional economic return from the subject site.

3.6 Agricultural employment

As outlined in section 3.5, the agriculture, forestry and fishing sector is a very significant industry within the Corangamite LGA and employs over 2,235 people (32%). Health care and social assistance is the second largest employment sector (11%), followed by retail trade.

Table 8 Employees by industry of occupation (2016)

	Corangamite LGA	% of total
Agriculture, Forestry and Fishing	2,235	32%
Mining	79	1%
Manufacturing	548	8%
Electricity, Gas, Water and Waste Services	55	1%
Construction	334	5%
Wholesale Trade	159	2%
Retail Trade	576	8%
Accommodation and Food Services	416	6%
Transport, Postal and Warehousing	279	4%
Information Media and Telecommunications	29	0.4%
Financial and Insurance Services	43	1%
Rental, Hiring and Real Estate Services	23	0.3%
Professional, Scientific and Technical Services	177	3%
Administrative and Support Services	106	1%
Public Administration and Safety	213	3%
Education and Training	510	7%
Health Care and Social Assistance	756	11%
Arts and Recreation Services	54	1%
Other Services	173	2%
Inadequately described/Not stated	323	5%
Total	7,080	100%

Source Australian Bureau of Statistics (2020) Census 2016, G53 Industry by employment by occupation Corangamite (S)

3.7 Biosecurity impacts

The productivity and profitability of agricultural production depends in part on the management of pests and diseases, including the prevention of incursion of pests and diseases onto properties. Biosecurity is a term that is commonly used for such management and the set of measures adopted to protect a property from the entry and spread of pests, diseases and weeds.

Farm biosecurity plans are often prepared for agricultural enterprises based on industry guidelines such as those available on the website: www.farmbiosecurity.com.au. The guidelines include risk assessments and mitigation options to avoid / minimise impacts. The key biosecurity risks from this project relate to the movement of people, vehicles and machinery, with the risks occurring at both construction and operation phases. Table 9 outlines the potential biosecurity risks and potential measures that may mitigate the risks.

Access to the site during construction and operation will be via an access off Jancourt Road and should have minimal impact on the continuation of agricultural activities on the remainder of the property or adjoining properties. There will be an increase in traffic numbers, particularly during construction, however increased traffic volumes are not expected to have a significant impact on local roads.

Recommended mitigation and monitoring measures will be captured in a project specific Construction EMP.

Table 9 Biosecurity risks and mitigation measures

Biosecurity risk	Potential mitigation measures
Incursion of foreign weeds, pests and diseases during construction	• Limit the number of entry and exit points (one is preferable) • All construction vehicles, equipment and boots should be cleaned upon entering the property in a wash-down bay • Where possible destock the site during production. • Limit worker contact with livestock, crops or plant materials as much as possible and eliminate any unnecessary contact altogether • Maintain vehicle register • Clearly sign and lock restricted access areas • Ensure construction vehicles remain on designated tracks • Record, monitor and manage any chemical use during construction, avoiding any chemicals which may impact or contaminate soil, plants or livestock. • Ensure a complete and thorough clean-up of construction materials on the site
Incursion of foreign weeds, pests and diseases during operation	Most of the biosecurity practices listed above are relevant and should be continued into the operational phase of the project. In addition the following practices should be considered: • Monitor and control any existing or new incursions of pest plants and animals, e.g. through grazing, spraying or baiting. • Establish signage and protocols to ensure gates are closed when vehicles enter and exit the facility. • Maintain good livestock proof fencing.

Source: Adapted from www.farmbiosecurity.com.au website (accessed July 2020)

4. Land use conflict risk assessment

As the operation of the project is an activity that differs from the agricultural activities on surrounding properties, it is important that the solar renewable energy facility does not impact on the continuing ability of neighbouring properties to pursue agricultural production.

As Victoria does not have formal guidelines on how to assess land use conflict affecting existing agricultural developments, GHD applied the NSW land use conflict risk assessment (LUCRA) method to provide a preliminary assessment of potentially negative impacts on surrounding land use and provide options and strategies for mitigation of potential impacts.

Table 10 Land use conflict risk assessment

Issue	Risk of land use conflict	Discussion and mitigation measures
Catchment management and drainage	Low	The subject site is not located on a watercourse or floodplain as mapped in the NRM Planning Portal in the Corangamite Catchment Management Authority.
Dust	Low	While initial construction is expected to generate low levels of dust, once construction is completed there will be minimal dust generation as a result of vehicles accessing the site for maintenance / operational purposes. Post construction dust generation is expected to be similar to that occurring on adjacent agricultural land for routine agricultural activities. A buffer / setback from the site boundary is proposed and existing vegetative buffers along the property boundaries would potentially reduce dust moving beyond the site boundary.
Fencing	Low	Fences with adjoining agricultural land will be maintained in a condition to minimise the possibility of livestock straying onto the site from adjoining properties. The maintenance of shared boundary fencing is the responsibility of all land owners. The maintenance of the boundary fence adjoining roads is the sole responsibility of the proponent.
Lights	Low	Construction of the project would be limited to standard construction hours and therefore it is not proposed that any lighting would be required. During operation there would not be any lighting required on site.
Noise	Low	Construction noise may be audible from adjoining sensitive receivers but is not expected to have significant impacts on adjacent land use. Construction activities would be limited to standard working hours as outlined in the CEMP. No significant operational noise is anticipated.
Odour	N/A	No odour impacts are anticipated.
Pesticides	Low	Pesticide use within the project site will be limited to activities such as weed control to ensure the land can be continue to be utilised for grazing and returned to agricultural use upon decommissioning. Where possible, the proponent could also explore opportunities for the grazing of sheep on the site in order to control pasture growth on site. Accredited and licensed contractors would be used, and any products used would be approved for the proposed use. Herbicides to be used are likely to be similar to those used by surrounding landholders. The distance from neighbouring properties means that potential conflict is assessed as low.
Roads and traffic	Low	Existing access points would be used during construction and operation with access off Cobden-South Ecklin Road. No new access is required. No impacts on access arrangements for adjoining properties are expected. There will be a temporary increase in traffic volume during construction, however no significant impact on local roads

		is anticipated. Construction traffic and access is addressed elsewhere in the planning application. Operational traffic volume for maintenance and supervision of the site is expected to be similar to that currently experienced at the site.
Straying livestock	N/A	Livestock will be removed from the site during construction. During the operation phase, protocols and signage will be established to ensure gates are closed and stock-proof fences will be maintained (see Fencing above).
Visual amenity	Low	The project site has frontage to two public roads. A variety of visual impact mitigation measures are proposed in accordance with the Land Visual Impact Assessment (LVIA) assessment prepared as part of the planning application. Refer to LVIA undertaken as part of this planning permit. Existing established vegetation along the boundary of the subject site will remain.
Weed and pest management	Low	Weed and pest control, including for noxious weed and pests, will be subject to ongoing routine monitoring and management and is the responsibility of the proponent. See also biosecurity (section 3.7).

5. Rehabilitation and decommissioning

The proposed solar renewable energy facility is anticipated to have a lifespan of 30 years (plus a one-year construction period and six months for decommissioning). At the end of its operational life, the project site would be either reconditioned or decommissioned. This development has a reversible nature, so once the solar farm is decommissioned the land can be returned to its former agricultural use.

5.1 Decommissioning

The Decommissioning EMMPs (DEMMP) will focus on site rehabilitation and traffic management. Given that best practice methodologies associated with decommissioning cannot be reasonably foreseen in advance of project construction, it is proposed that the DEMMP will only be prepared towards the end of the solar farm's operational life, though would include the removal of all the solar facilities equipment above and below ground and the sire rehabilitated as close to pre-construction as possible.

To return the site to agricultural production the site is likely to require tillage, application of fertiliser/soil ameliorants followed by sowing of a pasture/crop. Soil testing should be undertaken and advice from a qualified agronomist sought to develop an appropriate plan for agricultural rehabilitation.

6. Conclusion

The proposed conversion of 14 ha of agricultural land to a solar renewable energy facility has been assessed for its impact to adjoining agricultural land and the Corangamite LGA. This assessment has considered the agricultural land, soils, landform and existing land use of the subject site and addresses the strategic site selection assessment criteria outlined in the Solar Energy Facilities, Design and Development Guidelines (DELWP 2019).

The assessment has used a variety of information sources including current land use, Victorian geomorphology framework, gross value of agricultural production and employment statistics. The impact of removal of this parcel of land on the broader agricultural economy within the Corangamite LGA has also been assessed.

Having regard to the information available, including the general knowledge of agriculture in the area by the consultant, it is estimated that the project site represents 0.005% of all grazing modified pasture land use and generates 0.00002% of the total value of agricultural production within the Corangamite LGA. Removal of the land from agricultural production is considered to have minimal impact on relevant industries and employment within the region.

The solar renewable energy facility has been strategically sighted on land that is easily accessible off Cobden-South Ecklin Road and will not impact on the continuation of agricultural production on the balance of the property. The subject site has been selected due to its fragmented and will not result in the fragmentation of agricultural land. There is also the opportunity for the proposed solar renewable energy facility to be used for the strategic grazing of livestock and will help diversify farm income without reducing productivity.

An analysis of the potential for land use conflicts to arise from the solar renewable energy facility has been undertaken. The likelihood of significant conflict is considered low, and current land use on surrounding land could continue with minimal impact. No significant changes to existing site access points are required and the development is not expected to impact on the current access arrangements of adjoining properties. A range of impact mitigation measures have been identified.

Construction impacts are expected to be short term in nature. The limited earthworks associated with construction and operation of the site mean that the majority of the soil surfaces would not be impacted by the development.

The project is anticipated to have an operational life of 30 years. If at some time in the future, the solar renewable energy facility ceases to operate, the project site can be rehabilitated to enable agricultural production to resume.

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