AGRICULTURAL ASSESSMENT

CONSTRUCTION AND OPERATION

of the proposed

HAZELWOOD NORTH SOLAR FARM

Prepared by

A.J. Pitt
B.Ag Sci(hons), M. Ag. Sci

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1. Introduction

1.1 Project Brief

Ag-Challenge Consulting has been instructed by Robert Luxmoore Pty Ltd, project management consultants, to investigate the agricultural impacts of a proposed solar farm and battery storage complex on approximately 1,079 hectares of farming land between Morwell and Traralgon in the Latrobe Valley.

The site has existing high voltage transmission lines traversing the property and is well placed for the export of renewable energy. Site investigations are ongoing and detailed plans are being developed with respect to all physical and cultural considerations and following engagement with communities and authorities.

This investigation describes the existing agricultural use in both a local and regional context. The investigation is to consider the impact of the development of a renewable energy facility on the existing uses of the land, identify any potential impacts on adjacent properties and determine whether the proposal is likely to have any adverse impacts on surrounding land uses and the regional agricultural economy.

The combined area of land is hereinafter referred to as the Project Site and the separate parcels that comprise the Project Site are listed in Table 1. An aerial photomap of the Project Site is shown in Figure 1

Table 1. Title specifications of subject area.

Property Designation on Figure 1	Parcel Identification	Total Approx. Parcel Area (ha)
A	1\TP741402	114
B	1\TP839333	124
C	2\TP839333	2
D	3\TP839333	121
E	4\TP839333	4
F	55\PP3647	70
G	57\PP3647	65
H	57A\PP3647	53
I, J, K, L, M, and N	3A-A, 3B-A, 4A-A, 4B-A, 8-A, and 8A-A\PP36467	197
O	56-A\PP3647	20
P	63-A\PP3647	63
Q	67A-A\PP3647	8
R	68-A\PP3647	56
S	68A-A\PP36467	64

Figure 1. The Project Site – property outline in yellow, letters depicting parcels.

1.2 Experience and Capability of Ag-Challenge Consulting

Ag-Challenge Consulting is an agricultural consultancy company servicing the dairy, beef, and potato industries as well as other high rainfall and irrigated agriculture industries of Southern and Northern Victoria. The company is based at Warragul and the principals of the company have been providing independent farm consultancy advice since 1988 from this location. There are five active consultants within the company that service approximately 200 individual farmer clients with consultancy services from Ag-Challenge Consulting, as well as industry associations, financial institutions, and government. The company is active in vocational training, running focus farms and discussion groups and undertaking farm design work. The recycled water industry is a significant user of Ag-Challenge Consulting for the design and monitoring of recycled water projects. The renewable energy industry has collectively been a significant client of Ag-Challenge Consulting, using the company services for site selection and design, liaison with adjacent farm businesses, agricultural impact assessments, and assistance in satisfying the provisions of planning schemes.

2. Regional Context

2.1 Planning Provisions

The Project Site is all within the Farming Zone of the Latrobe City Planning Scheme. The objectives of the farming Zone are:

- *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.*

A planning permit is required for the development and use of a Renewable Energy Facility within the Farming Zone, and the Planning Scheme states that a condition of approval is that the facility must meet the provisions of Clause 53.13 of the Planning Scheme. Among other provisions, Clause 53.13 states that the applicant must undertake a site and context analysis including a description of the site and surrounding area and examine the impact of the proposal on strategically important agricultural land, particularly within a declared irrigation district This agricultural assessment forms part of the response to the provisions of Clause 53.13.

Parts of the Project Site are subject to a number of planning overlays. An Environmental Significance Overlay (ESO) applies to the western margins of the Project Site and has been created to provide a buffer between urban areas of the City of Latrobe and land that has been identified for future potential expansion of coal mining. A major portion of the of the Project Site is subject to a State Resources Overlay that has been created to protect the brown coal coalfields from development that may compromise the future utilization of this resource.

There are four Design and Development Overlays that protect the flight path for the nearby Latrobe Regional Airport, helicopter access to the Latrobe Regional Hospital and an in-ground pipeline. There is public acquisition overlay for the future construction of the Traralgon Bypass Road that is mostly aligned with the western boundary of the Project Site, but includes a linear tract of land 100 metres to 140 metres in width that traverses the northern section from west to east.

The Solar Energy Facilities Design and Development Guideline (August 2019) specifies a number of factors that also need to be considered during the site selection and decision making process in order that agricultural production is not unduly detrimentally affected. These factors include:

- Protecting strategically important agricultural and primary production land from incompatible land use.
- Protecting productive agricultural land that is of strategic significance to a local area or in a regional context.
- Avoiding the loss of productive agricultural land without considering the impact of the loss on the agricultural sector and its consequential effect on other sectors.

The agricultural values of the land will be assessed in accordance with these guidelines.

The Latrobe City Council Rural Land Use Strategy provides an assessment of the agricultural quality of land within the Latrobe municipality and the potential for further agricultural development, particularly intensive agricultural development. This study attempts to identify and delineate highly productive agricultural land within the Latrobe municipality. The study concluded that there was no Class 1 land within the study area (class 1 land is defined as being able to sustain a wide range of uses including intensive cropping, with very high levels of productivity possible). The study identified the Project Site as being a mix of Class 3 and Class 4 land. Class 3 land was defined as being able to sustain agricultural use with low to moderate levels of land disturbance, such as broadacre cropping in rotation with improved pasture, and moderate to high levels of production possible with specialist management practices. Class 4 land had a low capacity to resist disturbance such as cultivation, moderate production levels possible with specialist management, and is suitable for low disturbance agriculture such as grazing or perennial horticulture.

The Gippsland Regional Growth Plan states that the protection and maintenance of Gippsland's strategic and productive agricultural land is essential for the continued growth of the food manufacturing industry within Gippsland. The Background Report for the Gippsland Regional Growth Plan identifies the Project Site as being within the area of productive agricultural land, but not within the area of strategic agricultural land.

2.2 Climate

Climate records from the Bureau of Meteorology weather station at Latrobe Valley Airport (Site number 085280) are presented in Table 2 below. This climate station is some 2 km north of the Project Site at the closest point and is representative of the prevailing climate for the Project Site. Average annual rainfall from these records is 737 mm per annum and the rainfall is fairly evenly distributed throughout the year. Winter temperatures are cool to cold, and frost occurs regularly each year during the months of May to September and occasionally outside these months in both April and October. The lowest minimum temperatures in dryer

than average winters approach -5^{0}C. Summer temperatures are variable with some summers having no days above 35^{0}C, but other summers having one or more clusters of extreme temperatures with several days above 35^{0}C. The hottest day on record was 46^{0}C on 7th February 2009.

Table 2. Climatic Averages from Bureau of Meteorology at Latrobe Valley Airport

Avalon Airport	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	26.7	26.6	24.5	20.6	16.9	14.2	13.7	14.8	17.0	19.6	22.2	24.5	20.1
Mean minimum temperature (°C)	13.0	12.9	11.4	8.8	6.4	4.3	3.7	4.4	5.9	7.5	9.6	11.3	8.3
Mean rainfall (mm)	50.5	42.6	47.6	56.7	54.5	64.6	63.0	67.5	74.9	70.2	74.8	65.4	736.9
Decile 5 (median) rainfall (mm)	43.6	33.2	42.4	52.4	53.2	59.6	63.4	61.3	67.6	64.6	70.0	57.9	747.0
Mean number of days of rain ≥ 1 mm	6.1	5.6	6.8	8.2	9.1	9.8	11.2	11.8	12.1	10.0	8.9	7.8	107.4
Mean 9am temperature (°C)	17.5	16.9	15.3	13.1	10.2	7.7	7.1	8.5	11.0	13.3	14.6	16.3	12.6
Mean 9am relative humidity (%)	73	79	82	85	89	90	89	85	80	74	76	72	81
Mean 3pm temperature (°C)	24.6	24.8	22.8	19.2	15.7	13.1	12.4	13.5	15.4	17.7	20.2	22.3	18.5
Mean 3pm relative humidity (%)	46	46	48	55	64	68	67	61	59	56	54	49	56

Daily rainfall data show occasional very heavy falls of rainfall up to 50 mm or more in a 24 hour period. The highest fall on record was 70mm on the 12th April, 2011 and the second highest fall was 62 mm on the 6th January 1991. Heavy falls are more common in the summer and early autumn period than during winter months.

The climatic data can be used to assess the growing season for dryland pasture and cropping. Late autumn, winter and spring rainfall for the Project Site would normally be adequate to support evapotranspiration losses from pasture and annual crops, but the average December rainfall and all the months from January till mid April are below estimated pasture requirements for evapotranspiration. The normal growing season would thus extend for about 7 months from mid April to mid December, assuming some carry forward of soil moisture into December each year from the previous month. The pasture plants and crops that are able to grow and persist with this growing season have to be adapted to a 7 month growth cycle, able to persist with prolonged dry periods.

2.3 Regional Land Form

The Project Site is located on a dissected relict depositional surface within the Latrobe Valley. The Latrobe Valley is a broad valley which slopes gently towards the east and contains a number of relict and recent landforms. Foothills of the Great Dividing Range abut the northern side of the valley and the South Gippsland uplands of the Strzelecki Range abuts the south side. The valley is renown for the extensive deposits of brown coal that lie at only a shallow depth beneath the land surface over large parts of the valley. The brown coal has been exploited for power generation but much of the deposit still largely remains intact. There are

several rivers that flow along the valley floor, including the Latrobe River from which the valley gets its name. The Thompson, Tyers, Morwell and Macalister rivers are all substantial rivers that have helped shape the landform known as the Latrobe valley.

2.4 Regional Land Use

Land use within the Latrobe Valley is a mix of agriculture, mining, industrial and urban. Agriculture is the dominant land use by area, but brown coal mining for power generation has been the key wealth generation land use for the region. The industrial and urban land uses have developed to support the mining and power generation capacity of the Valley. Within the agricultural sector, grazing of beef cattle is the dominant form of land use and other major agricultural uses include sheep grazing, cereal cropping, oilseed cropping, dairying, vegetable growing and fodder cropping. There is a diversity of other minor land uses.

There has been on-going pressure on rural land for rural lifestyle blocks and small lot subdivision in the Latrobe Valley. The major urban centres of Traralgon, Morwell, Churchill, Moe and Newborough are all surrounded by peri-urban areas with properties ranging from a few hectares through to 10 or 20 hectares. Agricultural productivity in the peri-urban areas of the Latrobe Valley is often quite low, although this is not always the case and some of the small agricultural properties are highly productive. The pressure for closer development for peri-urban holdings in rural areas is likely to continue.

3 Site Characteristics

3.1 Description of the Land

The Project Site is all located within the Westbury 2 Land System of Aldrich et al[1]. The landscape is best understood in terms of the processes that formed it. Originally part of a Tertiary (early Pleistocene) land surface that consisted of extensive alluvial fans and terraces that covered much of the Latrobe Valley, most of the original landscape has since been extensively modified by the various rivers that actively cross through the valley and carve out new and alternative routes. Over time these rivers have carted most of this landscape away. But there are substantial disconnected remnants of this landscape, the surface of which has been reworked with new creeks and streams. Where these Tertiary deposits are extensive and the relief is mild, Aldrich et al. have identified and delineated the area as either the Westbury 1 (slightly drier) or the Westbury 2 (slightly wetter) land system.

At the Project Site, surface reworking has formed a gently undulating landscape which slopes toward the north with a dendritic drainage pattern. There are some poorly drained areas, particularly along the margins of the small creeks that cross from south to north through the Project Site. There are also some slightly steeper areas, particularly along the eastern margin in Block S where slopes up to 11% occur. But most of the landscape is flat to gently undulating with slopes below 4%.

The original Tertiary deposits were mostly unconsolidated clays, silts, sands and gravels. While originally in depositional beds, theses beds are not parallel to the land surface and have

[1] Aldrick JM et al, 1992, *A Study of the Land in the Catchment of the Gippsland Lakes*, TC-17 Department of Conservation and Natural Resources

been substantially altered over time. The various deposits now outcrop in a somewhat random fashion across this relict landscape, leading to some local variation in the nature of the soils that have formed on the dissected surface.

3.2 Soils

The soils of the Westbury 2 Land System were described by Aldrich et al as mostly yellow podzolic soils after the classification system of Stace et al (1972)[2]. They also provided alternative classifications of Dy3.41, Dy3.21, dy3.42 and Dy3.22 from Northcote (1979). The West Gippsland Catchment Management Authority has also published soil maps for this area and the relevant unit that covers all of the Project Site is the Loy Yang unit which is described as yellow and brown sodosols, as classified by Isbell (2002).[3]

In descriptive terms, these classifications mean that the soils have a sharply contrasting texture between the surface soil (usually a sandy clay loam) and the subsoil (usually a medium clay), a yellow brown colour to the subsoil, often mottled and with quite a deal of variation in the depth of the surface horizons above the clay. The surface soil normally has a well structured A1 horizon to about 15 or 20 cm depth and then an apedal (no natural soil structure) A2 horizon to between 35 and 65 cm depth. The A2 horizon can be prone to liquefaction when very wet, making these soils potentially difficult to navigate with a vehicle in wet conditions. In some areas, the soil may contain significant or abundant gravel, reflecting the nature of the underlying deposits from which the soil has formed. In other areas, the surface soil may be quite deep and the texture a sandy loam, again reflecting variation in the underlying deposits. The soils are invariably of low fertility, as they have been derived from deeply weathered and reworked material. They are generally moderately permeable and do not restrict the vertical movement of water through the profile.

The soil profile was examined at two locations within the Project Site, one site in block R and the other site in block K. Profile descriptions are included in Appendix 1. The two profiles were consistent with the descriptions and the variability outlined by Aldrich et al.

3.3 Vegetation

Pastures occur across most of the northern parts of the Project Site. The pastures are a mix of native grasses and introduced species and would generally be regarded as unimproved. The species recorded as present include perennial ryegrass, medics, cocksfoot, bent grass, flat weed, paspalum, and couch grass. Two separate areas of several hectares each were heavily infested with scotch thistle which is a regionally controlled weed. Tussocks were common in poorly drained areas. These paddocks were all being actively grazed by both sheep and cattle.

In the middle and southern areas many of the paddocks had been recently sown to a mix of millet and perennial ryegrass. It is likely that these paddocks will be harvested for fodder, either as hay or silage, rather than being grazed. The southernmost paddocks were being cropped to canola.

There is very little remnant native vegetation on the Project Site. Blackwoods (Acacia melanoxylon), Black Wattle (Acacia mearnsii) and Tea tree (Leptospermum spp) are present

[2] Northcote KH, 1979. A factual Key for the Recognition of Australian Soils. Rellim Technical Publications
[3] Isbell RF, 2002 *The Australian Soil Classification*, *Revised Edition* CSIRO Publishing.

along the two watercourses that traverse the property. Elsewhere there are very few remnant trees.

3.4 Water Supply

Stock water is supplied from small farm dams that are located in each paddock, or from one of the several creeks that flow through the property. Most of these dams are likely to be at least partially ephemeral. The creeks are also likely to be ephemeral although this has not been confirmed. There is one larger dam in block G in the central west of the property on an unnamed creek and this may be a more secure water supply for prolonged dry periods. However it does not appear to be very deep or of substantial capacity and it is likely that this storage would be insufficient to meet the stock water needs of this large grazing area in a prolonged dry period.

A separate investigation into water resources on the property for future fire fighting purposes is being undertaken as part of the Project proposal. These needs are likely to be separate to future needs for stock water purposes, but may mean that existing storages on the property are not adequate.

The Project site is not located within an irrigation district. There is no private irrigation development or other irrigation infrastructure on the Project Site or on any of the surrounding farms to the Project Site.

3.5 Farm Infrastructure

The Project site has a network of all weather access tracks that permit movement around the property in most weather conditions. In extremely wet periods some of the creek crossings would become impassable due to flood flows over fords and culverts. There is one centrally located set of stockyards in block H that is suitable for both sheep and cattle. It is a portable facility and has been erected on the site by the current tenant. Another derelict set of stockyards is located in block F near the access gate from Walshs Road and these yards are not suitable for use and probably not repairable. There are no buildings, and all on-farm storage is either in portable structures or open to the elements.

3.6 Current Land Use

The current land use is a combination of grazing with sheep, grazing with cattle, fodder production and dryland cropping. At the time of field inspection approximately 400 hectares of the property was being cropped and 700 hectares was in pasture. A single tenant manages the property, although the oilseed cropping is a share cropping arrangement with another farmer. The current stock numbers are around 3000 crossbred ewes, and 100 cows with calves at foot which are grazed on 700 hectares. This equates to a stocking rate of 11dse[4]/ha. In the past, part of the Project Site has also been used for farm forestry. No shearing facilities are present, and the current farm tenant has advised that he transports sheep away to another property for the purpose of shearing.

[4] dse or dry sheep equivalent is a measure of carrying capacity and is defined as the amount of fodder required to maintain the liveweight of a 40 kg wether.

4 Land Capability and Agricultural Production Potential Assessment

4.1 Agricultural Land Capability Classification

Land Capability Rating systems for a series of land uses, including agricultural land uses were developed by Rowe, Howe and Alley[5]. This Land Capability Rating system adopts the highest assessed value across a range of relevant risk factors to determine the overall land capability rating for a particular site and land use. The Project Site consists of a single land type with some variation in surface soil depth from north to south. For the purpose of the land capability assessment the land can be considered to be of the one type. Land capability assessment is instructive in identifying whether there are severe constraints and serious risk factors impacting on a particular land use.

The land capability rating for grazing use in moderate rainfall areas is provided in Table 3 below. For each land feature to be assessed, the appropriate attribute is highlighted in the table. The overall land capability is determined by the highest assessed numerical value, which gives an overall rating of 2. There are some areas where imperfect drainage would require an altered assessment to 3 but these areas are localised in extent and an overall rating of 2 is appropriate. A rating of 2 means that the land is suitable for grazing use and risk factors are low. The risk factors associated with a rating of 3 on the site are soil pugging, loss of soil structure and low productivity due to induced waterlogging from pugging.

[5] Rowe, Howe and Alley, 1981, *Guidelines for Land Capability Assessment in Victoria*, Soil Conservation Authority.

Table 3. Land Capability for Grazing in moderate rainfall areas (750 mm per annum)[6].

	Land Capability Class[6]				
Land Feature	**1**	**2**	**3**	**4**	**5**
Slope	Less than 10%	10% to 19%	20% to 34%	35% to 50%	More than 50%
Aspect	E. SE	S, SW, NE	N, NW, W		
Soil Group (northcote)	Gradational soils, Um soils	Duplex soils with A horizon of 15 to 60 cm thickness	Other duplex soils; Ur & Ug soils, Uc soils with impeding layer within 100 cm	Uc soils with no impeding layer within 100 cm	
Average soil depth	More than 1.0 m	0.6 m to 1.0 m	0.3 m to 0.59 m	0.1m to 0.29 m	Less than 0.1 m
Surface rock	Less than 2%	2% to 14%	15% to 24%	25% to 40%	More than 40%
Site drainage	Well drained	Moderately or excessively well drained	Imperfectly or poorly drained	Very poorly drained	
Nominal DSE/ha rating	More than 15	5 to 15	2 to 5	Less than 2	

A Land Capability rating of 1 or 2 means that the land is suitable for these uses and the hazards associated with such use are low to very low. It means that this is a sustainable form of land for grazing from an environmental risk perspective. A Land Capability rating of 3 indicates that there is a minor hazard and risk of land degradation hazard associated with this use, which can usually be corrected with appropriate prudent management. A Land Capability Rating of 4 indicates that significant land degradation risks are associated with the particular land use, while a rating of 5 indicates that risks are severe and that the land may not be suitable for such use without very significant and potentially expensive intervention.

The Land Capability rating for cropping is presented in Table 4, with the highlighted boxes being the assessed rating for the Project Site for each parameter. The rating criteria for cropping use was based on the production of annual horticultural crops rather than grain and oilseed crops, but it is nevertheless considered to be a relevant assessment tool for this site. The combined land parcel is determined to have a Land Capability rating of 3 for cropping with the limiting attributes being the imperfect drainage and poor aggregate stability. However the imperfect drainage is not widespread, and the southern areas of the site where the surface soil is deeper and soils are well drained would have a cropping capability of 2. The poor aggregate stability is a significant limitation to intensive cropping use, as the soil would not be able to withstand regular cultivation.

Table 4. Land Capability Rating for Intensive Cropping[6].

LAND FEATURES AFFECTING USE	CAPABIITY CLASS[6]				
	1	2	3	4	5
SOIL STRUCTURE Gradient: Apedal – weak	0 - 4%	4% to 8%	8% to 15%	15% to 20%	More than 20%
Moderate, S.G.	0 - 8%	8% to 15%	15% to 20%	20% to 35%	More than 25%
Strong	0-15%	15% to 20%	20% to 35%	35% to 50%	More than 50%
FLOODING RETURN PERIOD	More than 20 years	20 years to 10 years	10 years to 5 years	5 years to 1 year	Several times per year
SOIL DRAINAGE CLASS	Well drained, Moderately well drained	Excessively well drained	Imperfectly drained	Poorly drained	Very poorly drained
ROOTING DEPTH	More than 50 cm	50 cm to 30 cm	30 cm to 20 cm	20 cm to 15 cm	Less than 15 cm
TEXTURE OF A HORIZON	L, SL, CL	SCL, LS, S	C	-	-
AGGREGATE STABILITY OF A HORIZON	1 (stable)	2	3	4.5 (dispersing)	
GRAVELS & STONES	Less than 4%	4% to 10%	10% to 20%	20% to 30%	More than 30%
BOULDERS AND ROCK OUTCROP	Less than 0.01%	0.01% to 0.05%	0.05% to 1%	1% to 10%	More than 10%

4.2 Land Quality & Strategically Important Agricultural Land

Agricultural land may be considered to be high value and strategically important due to a combination of features such as high quality or niche soils, good rainfall, access to irrigation, resilience to climate change, existing infrastructure investment and/or its special role within a specific industry. None of this land fits within these criteria. In particular, the soils are not high quality or niche soils, the rainfall is moderate and variable with a pronounced dry season each year, and there is no specific farm or public infrastructure which makes the land inherently productive or special from an agricultural perspective.

The agricultural attributes of land that identify whether a particular parcel may be strategically important land or strategically significant are presented in Table 5, together with an assessment of how the subject land performs with respect to these attributes. The combined parcel of land can be described as fair quality land for grazing and for broad acre cropping, but it has no special values. The combined parcel of land is not significant agricultural land, in that it is not unique, not highly productive, not highly versatile for a multiple range of uses, and not located within an irrigation district.

The combined parcel of land is productive farmland. The proposed change of primary land use to solar energy production will mean that the current agricultural versatility (cropping or grazing) will be compromised in favour of the alternative primary use for energy production. The design of the solar farm will however enable sheep to be grazed underneath the solar panels, thus retaining some of the current level of agricultural productivity. Agricultural versatility and productivity will be reduced.

Table 5. Assessment of the agricultural values of the Combined parcel land.
Attribute groups adapted from Solar Energy Facilities – Design and Development Guideline (2019).

Attribute Group	Assessment Criteria	Assessment	Comments
Soils and Landscape	Inherent Soil Quality Niche Soil Inherent Soil Versatility	Fair quality soils No Moderate versatility	These soils are moderately well drained, have low natural fertility and have fair water holding capacity. They are not highly productive and have some management constraints with apedal surface horizons and poor aggregate stability.
Water and Climate	Access to modern irrigation infrastructure	No access	Subject land is entirely dependent on natural rainfall. Annual rainfall of the area is 750 mm which is adequate to support a growing season of around 8 months.
Impact of fragmentation	Impact on local and regional productivity	Low	The impact on local and regional productivity is estimated to be a loss of 6% of the dryland cropping land within the within the region. At a state level the loss of cropping land is 0.01% of the dryland cropping area.
Impact of change of land use	Recent reform to update and modernize production or create industry clusters	No	No recent changes to these properties or within the general area.
Specific planning protection for agricultural values	Land set aside or defined for agricultural use and development in a planning scheme or other strategic document	No	The land has no special protection for agricultural values outside of the schedule to the farming zone (FZ).
Government Investment	Government investment to support productivity from the site or the area	No	There is no specific government investment relevant to the agricultural use of this property or this area.
Co-location of solar energy facility with agriculture	Opportunity to co-locate the solar energy facility with agricultural production to diversify farm income without reducing productivity	Yes	The solar farm design will enable the grazing of sheep under the panels, thus mitigating some of the potential loss of agricultural production.

5. Environmental Risks

5.1 Fuel Load and Fire Risk

Fire risk management will be the subject of a separate investigation. However, management of the fuel load from pasture growth beneath the panels requires some mention within an agricultural context. Much of the incident rainfall at the Project Site will be directed by the panels to the soil surface directly below the panel rim. The soil surface beneath the panels will need to be protected from this concentrated rainfall impact, and the growth of the protective ground cover will need to be controlled with planned management. If unplanned, the growth could become a fire hazard.

The growth will be controlled by grazing sheep under the panels. The grazing will enable management of the fuel load from the pasture, preferably to a defined maximum for the duration of the fire risk period, while at the same time also maintaining a soil cover in excess

of 70% to protect the soil surface from rainfall impact during storm events. These objectives should take precedent over any secondary objectives to optimise liveweight gain in ewes and lambs The farming objectives can be quite different from the decisions for fire risk mitigation. The solar arrays will be arranged into fenced paddocks that will enable controlled grazing to manage the fire risk, and the paddock shapes and alignments will be arranged so that under panel mustering can be achieved efficiently.

5.2 Weeds

Scotch thistle (Onorpdum acanthium) is present on the property with two substantial areas of moderate to high density weed infestation along the western side of the property. There are some sporadic infestations elsewhere. This is a regionally controlled weed whereby landholders are required to undertake mitigation measures to restrict and suppress the weed activity. Chemical suppression is being undertaken as part of preparation management for the future use of the site as a solar energy facility. However, it is likely that the presence of this weed on the Project Site will continue for a number of years.

Three other regionally controlled weed species (Blackberry *Rubus fruticosus,* Pampas *Salpichroa origanifolia,* and Gorse *Ulex europaeus)* were recorded as present on the property but confined to the wetlands abutting existing drainage lines and not within the paddock areas. These are also regionally controlled weeds and suppression is required. However, they are common throughout the region and not of major concern. A weed management plan will be prepared as part of the Project design. The weed management plan will aim to suppress the growth of weeds and ensure that any regionally controlled weeds of concern are suppressed as far as practical.

5.3 Soil Erosion

The design and management of surface runoff for the Project Site requires special consideration. There is only minor evidence of degradation across the Project Site, but these soils are potentially susceptible to erosion. The A2 horizon of these soils has virtually no structure and if the soil surface is disturbed or removed, the A2 horizon would be susceptible to rilling and sheet erosion. Once an erosion head is established it can be difficult to contain. The development of the Project Site for solar energy facility will involve substantial changes to the local hydrology, and special consideration of the risks of soil erosion is required.

In the first instance, water runoff from the panels may result in impact damage and dispersion of the soil below the panels where the water falls. The panel will tend to concentrate runoff as both an impact and an increased flow into a relatively small area. The degree of concentration will depend on the size of the panels, with smaller panels providing a lower level of risk than larger panels. It will be necessary to maintain permanent pasture cover of at least 70% of the ground surface to absorb the impact energy of the rain splash.

With impact damage minimized, it will also be prudent to introduce measures that will retard surface runoff and increase infiltration. The total area of panels is substantial and the runoff from storm events will be concentrated well beyond the concentration of runoff from natural pasture. The surface runoff within and across the Project site needs to be dispersed and retarded as far as is practically possible around the property, so that no higher storm runoff occurs within any natural or manmade waterway. These soils will be prone to rilling and gullying along drainage lines where concentrated flows occur during storm events. The

retardation of the surface runoff along stable, slow moving drainage channels will be a key requirement of Project design.

6. Agricultural Impacts of the Proposal

6.1 Impact of Solar Farm on Neighbouring Farms.

There are a number of grazing properties that adjoin the Project Site along the eastern boundary. They operate with beef cattle, sheep and horses. There is no perceived detrimental impact on the continued agricultural use of these properties for grazing as a consequence of the development of the Project Site for a solar energy facility.

The northern boundary of the Project site abuts a major transport corridor. There is no agricultural use in this area.

There is an area of peri-urban development along the western margin and parts of the southern margin of the Project Site. These blocks are quite small, mostly around 2 hectares, and there is very little agricultural use of this land. No highly intensive agriculture has been observed on any of this land.

The southern boundary of the Project Site mostly shares a public road with further grazing and cropping properties on the other side of the road. There is no perceived detrimental impact on the continued agricultural use of these area as a consequence of the development of the Project Site for a solar energy facility.

6.2 The Agricultural Amenity of the Region.

The Australian Bureau of Statistics (ABS) collects and publishes data for agriculture and agricultural production at Statistical Area Level 4 (SA4). SA4 are geographical areas with defined boundaries and broadly similar production systems. The SA4 regions are the largest sub-State regions in the Main Structure of the Australian Statistical Geography Standard and have been designed for the output of a variety of regional data. They are generally representative of regional labour markets, but also tend to represent agricultural groupings as well. The Latrobe Valley sits within the SA4 Latrobe Gippsland region which includes the shires of South Gippsland and East Gippsland and forms a geographical bundle of land in the eastern part of Victoria.

The 2016 ABS data for the Latrobe Gippsland region lists the following

Number of beef cattle	480,000
Number of sheep	626,000
Broadacre crops	6,090 ha

In the regional context the Project Site comprises 6% of the broadacre cropping land in the region. It also provides grazing for 0.5% of the regional sheep flock and less than 0.02% of the regional beef herd. Sheep grazing will continue with development of the solar energy facility with sheep grazing beneath the panels, but the cropping and beef cattle grazing will no longer be possible and will be discontinued.

The loss of 6% of the broadacre cropping land within the region is significant but this has to also be considered within a broader context. Gippsland is only a very minor production area for broadacre crops and is not strategically important for cropping. At a state level, broadacre cropping occurs across 3 million hectares of land each year with gross farm gate value of

around 5 billion dollars. The key production areas are in the northern and western parts of the state, not in Gippsland.

Carrying capacity of the Project Site has been estimated to be around 11 dse/ha. When developed, grazing of sheep under the panels will be part of the on-going management of the facility. Full design details are yet to be determined, but with appropriate watering points, paddock design and pasture management, it is reasonable to expect that the existing carrying capacity of 11 dse/ha could be retained and possibly even improved.

7. Conclusions and Summary

- The Project Site comprises approximately 1,079 hectares of agricultural land in the Latrobe Valley. The land is currently utilised for grazing and cropping.
- There are no inherently unique features about the Project Site that distinguish it from neighbouring farms in the area.
- The climate of the area has a reasonably reliable and moderate annual rainfall of 747mm average, cool to cold winters with a significant frost incidence from May to September, and a growing season of about 7 months.
- The landform is a flat to gently undulating plain and is a remnant of a relict landscape that once covered much of the Latrobe Valley.
- The soil types present are noted for their duplex profiles (contrasting texture between surface soils and subsoils), absent soil structure in the A2 horizon and medium to heavy clay subsoils.
- The dominant agricultural use of the land is grazing with sheep and cattle. A significant use is broadacre cropping for wheat and oilseeds (canola).
- The land is neither highly productive nor highly versatile. It is not considered to be significant land or strategically important land from an agricultural perspective.
- The development of a solar energy facility on the combined property will alter the nature of the farm. Cropping will no longer be practical. With appropriate design of the panels and improvement of stock water availability, sheep will be able to graze beneath the panels.
- Heightened wildfire risk may occur if attention is not given to how fuel loads are managed. Flexible fuel load management needs to be considered as part of the Project design. Under panel grazing with sheep is to be part of that management
- There are no perceived detrimental impacts of the development of the solar energy facility to the surrounding farm businesses. The impacts to the agricultural amenity of the Region are not significant.
- The concentration of runoff from the panels onto the soil surface may initiate soil erosion. Consideration needs to be given to minimizing this risk in the design stage.

Appendix I – Soil Profile Descriptions

Soil Inspection Site 1
Location : Block R
500 metres west of the property access gate on Walshs Road
S38^0 13' 03.00
W146^0 29.29

Soil type consistent with Yellow Podzolic soils of Stace et al, and
Yellow and Brown Soloths of

A1 0 -11cm	Sandy clay loam Dark grey 10 YR3/1 Moderate crumb structure Diffuse and transitional boundary to;
A2 11-46cm	Sandy clay loam Dark greyish brown 10YR4/2 Apedal but porous Mild mottling reddish brown and grey Sharp boundary to:
B1 46 cm onwards	Light clay Brown 10Y5/3 Moderate angular blocky structure Mottled with dark grey, yellow and orange mottles Inspection hole terminated at 75 cm:

This soil is well drained internally. The site is an upper slope, and the local drainage is good. The soil has good porosity and no indication of any waterlogging or a perched watertable.

Similar soils are believed to occur throughout the landscape, but some are in low positions with poor site drainage.

The A2 horizon has a slightly silky feel and is likely to have a high proportion of silt sized particles. The A2 horizon will be subject to liquefaction if disturbed when wet.

Soil Inspection Site 2

Location : Block K
1800 metres north of the property boundary along Firmins Lane, and
100 metres from the eastern property boundary
S38^0 14' 26.60
W146^0 26.40

Soil type consistent with Yellow Podzolic soils of Stace et al, and
Yellow and Brown Soloths of

A1 0 -22cm	Sandy loam Black 10YR 2/1 Weak crumb structure Diffuse and gradual boundary to;
A2 22-78cm	Sandy loam with gravel Pale brown 10YR 6/3 Apedal abrupt boundary to:
B1 78 cm onwards	Medium clay Yellowish brown 10YR 5/4 Strong angular blocky structure Hole terminated at 98cm due to excessive free water.

This soil has fair drainage. The site is an upper slope, and the local drainage is good. The soil has only fair porosity and a perched watertable can form in periods of prolonged wet weather. The deep surface soils enable good root penetration and minimises the waterlogging problem in minor rainfall events.

Similar soils are believed to occur in the southern areas of the Project Site where the parent material has a higher sand content

The A2 horizon has a slightly silky feel and is likely to have a high proportion of silt sized particles. The A2 horizon will be subject to liquefaction if disturbed when wet.