AGRICULTURAL ASSESSMENT

CONSTRUCTION AND OPERATION

of the proposed

GIPPSLAND BESS

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1. Introduction

1.1 Project Brief

Ag-Challenge Consulting has been instructed by Accent Environmental Pty Ltd to assess the agricultural impacts of a Battery Energy Storage System (BESS) on ~33 ha of farming land on Tramway Road, between Morwell and Churchill in the Latrobe Valley.

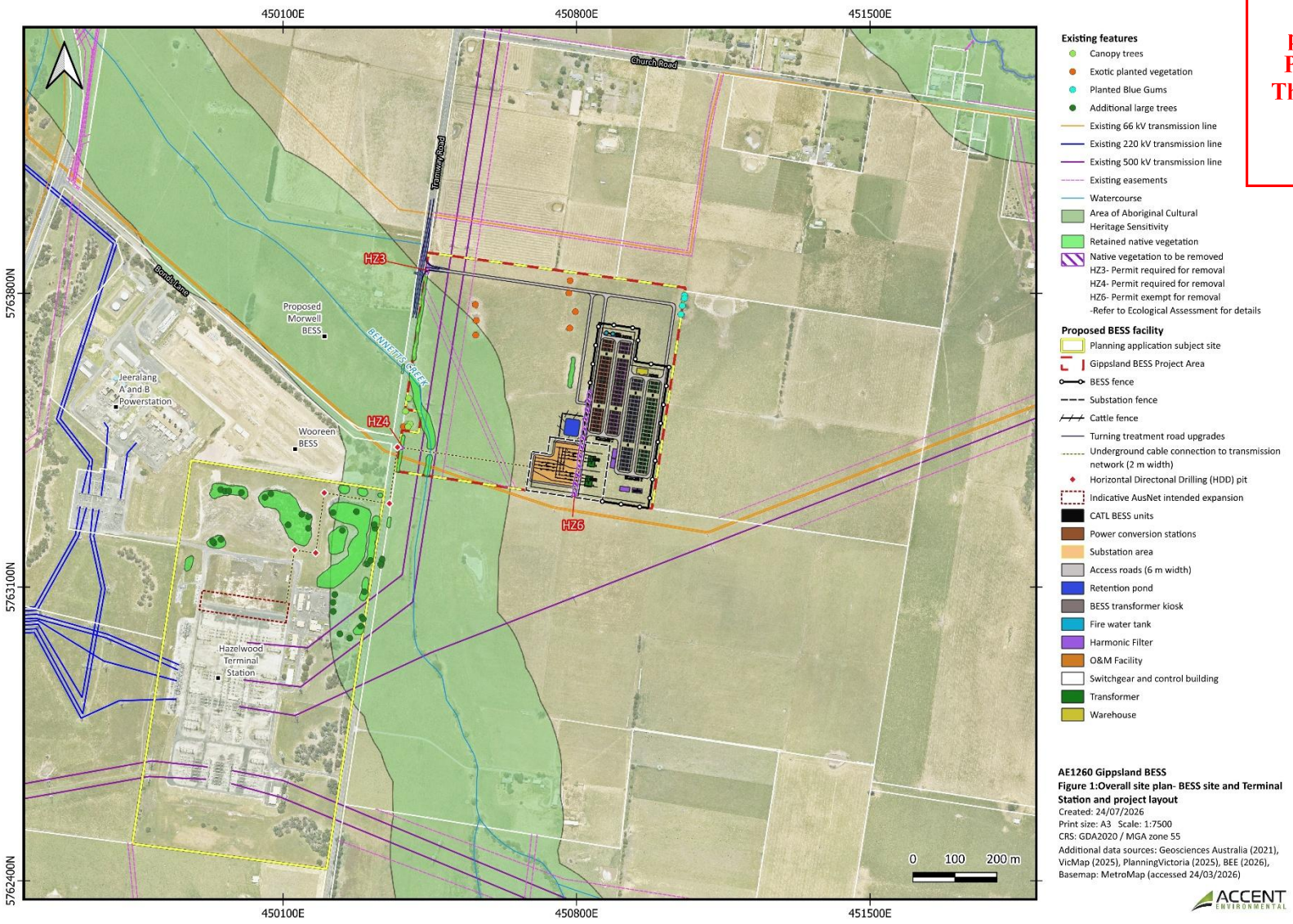
The site has existing high voltage transmission lines traversing the property. Site investigations are ongoing and detailed plans are being developed with respect to all physical and cultural considerations following engagement with communities and authorities.

This Agricultural Impact Assessment describes the existing agricultural use in both a local and regional context. The assessment is to consider the impact of the BESS 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 proposed development site is hereinafter referred to as the Project Site An aerial photomap of the Project Site is shown in Figure 1, and the proposed development area is shown in Figure 2.

Figure 1. The Project Site – property outline in yellow

Figure 2. The Project Site – Proposed Gippsland BESS Infrastructure area shaded purple



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 in 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 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 utility installation within the Farming Zone.

The site is also subject to a State Resources Overlay subject to Schedule 1. The State Resources Overlay has been created to protect areas of mineral, stone and in this instance the brown coal coalfields from development that may compromise the future development of this resource.

The agricultural values of the land will be assessed in accordance with these guidelines, including an assessment of the agricultural significance of the land and the location of agriculturally significant land within the shire and the region.

2.2 Climate

Climate records from the Bureau of Meteorology weather station at Latrobe Valley Airport (Site number 085280) are presented in Table 1 below. This climate station is approximately 7 km to the north east of the Project Site at the closest point and is considered representative of the prevailing climate for the Project Site. Average annual rainfall is 728 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°C. Summer temperatures are variable with some summers having no days above 35°C, but other summers having one or more clusters of extreme temperatures with several days above 35°C.

Table 1. Climatic Averages from Bureau of Meteorology at Latrobe Valley Airport

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	26.7	26.7	24.6	20.6	16.9	14.1	13.8	15.0	17.1	19.6	22.1	24.5	20.1
Mean minimum temperature (°C)	13.0	12.9	11.4	8.9	6.4	4.3	3.7	4.3	5.9	7.5	9.6	11.4	8.3
Mean rainfall (mm)	50.7	40.8	47.4	57.1	53.5	64.0	63.0	64.6	73.3	74.3	75.0	65.0	727.9
Decile 5 (median) rainfall (mm)	43.8	30.6	42.5	52.8	53.0	58.6	64.8	59.4	64.7	65.6	70.2	59.2	-
Mean number of days of rain ≥ 1 mm	6.1	5.5	6.7	8.3	8.9	9.9	11.1	11.6	11.7	10.2	9.2	7.8	-
Lowest temperature	1.8	1.9	1.9	-0.5	-3.9	-3.6	-4.8	-3.4	-2.6	-2.3	0.6	1.7	-

These 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 96 mm on the 4th October 2023. Heavy falls are more common in the late spring and summer 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 April are below estimated pasture requirements for evapotranspiration. The normal growing season would thus extend for about 8 months from April to late November, assuming some carry forward of soil moisture into November each year from the previous month (Water Balance in Appendix II).

2.3 Regional Landform

The Project Site is located 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 (Figure 3). 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 renowned for the extensive deposits of brown coal that lie at only a shallow depth beneath the land surface over large parts of the valley.

Figure 3. Aerial Image of Project Site in White – contour in orange, watercourses in blue

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 generating land use for the region.[1] 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. [2]

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 these closer development rural holdings is likely to continue.

[1] Latrobe Planning Scheme – Economic Development, Section 21.07-1
[2] Rural Land Use Strategy, May 2019, Latrobe City Council.

3 Site Characteristics

3.1 Description of the Land

The Project Site is located within the Yinnar Land system with small pockets of the Westbury 2 Land System surrounding the sloping plains towards the east of the Project Site, as mapped by Aldrick *et al*[3]. The landscape is best understood in terms of the processes that formed it:

The Yinnar landscape was formed during the Pleistocene period, consisting of broad flat, alluvial terraces, and minor drainage depressions, derived from cretaceous sediments, with deposits of silts and clays, with minor additions of sand. Resulting in diverse soils with variations in drainage, ranging from very poor to somewhat poor, due to variations in local relief, permeability of the horizons, and differences in seepage and run-off from adjacent higher land. Minor erosion hazards include periodically high-water tables which can result in impaired soil structure by trampling and trafficking. Some subsoils are fluid when wet.

The Yinnar landscape consists primarily of cleared plains, for grazing of beef and dairy cattle on improved pastures.[4]

The Project Site is a flat to gently undulating landscape, which slopes gently towards the north west and north east by 1.5% from the slight rise in the centre of the property. There are some poorly drained areas, particularly along Bennetts Creek, and the flats along the western and eastern margin of the Project Site respectively.

3.2 Soils

The soils of the Yinnar Land System were described by Aldrick *et al* as Yellow podzolic, Wiesenboden or Solodic Soils, while the soils of the Westbury 2 land system are mostly yellow podzolic soils and Soloths after the classification system of Stace *et al* (1972)[5]. The Project Site has also been mapped by Sargeant & Imhof in 1997[6], as mapping unit Yinnar described as a stagnant alluvial plain.

The Yinnar Land System soils were described in descriptive terms by Alrich et al as:

The surface soil normally has a fine sandy loam to light clay topsoil to about 10 cm of depth until a sporadically bleached A2 horizon to between 40 and 60 cm depth. There is a clear to abrupt change to the B1 light to medium clay subsoil, dominated by brown and brownish yellow. Pale coloured medium clays then continue to at least 1 m depth. The soils within the slight depressions in plains are typical darker and greyer, with the extent of mottling being indicative of the severity of poor drainage. Drainage on these soils ranges from poor to very poor, and some subsoils can be prone to becoming liquid when wet.

The pockets of soils on the rises within the Westbury 2 Land System were described by Aldrich *et al* as yellow and brown sodosols, as classified by *Isbell, 2016*.[7] In descriptive terms, these

[3] 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

[4] Indirect quote: 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

[5] Northcote K, 1979. A factual Key for the Recognition of Australian Soils.

[6] Ian Sargeant & Mark Imhof, 1997, Soils and Landforms of West Gippsland, Moe 1: 100, 000 mapsheet, accessed from VRO

[7] The Australian Soil Classification, Isbell, R, 2016, CSIRO Publishing.

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 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.

The soil profile was examined at three locations within the Project Site. Profile descriptions are included in Appendix 1. The three profiles were consistent with the descriptions and the variability outlined by Aldrick *et al*.

3.3 Vegetation

Pastures occur across most parts of the Project Site. The pastures are predominantly an improved pasture mix of perennial ryegrass and clover. Along the river flats, flatweeds increased, namely cats ear, as well as sweet vernal and Yorkshire fog grass. These species decreased along the slopes and ridgelines. Along fence lines sporadic infestations of barley grass and cape weed occurred. Scotch thistles were occasionally spotted across the site.

The Project Site was being actively grazed by 100 angus weaner cattle, with no fodder or hay for this season planned to be cut from these areas. Annual fertiliser applications of 3 in 1 at 300 kg/ha occur in autumn, with no other fertiliser applied throughout the year.

Along the western property boundary abutting Tramway Road and Bennetts Creek various native species have been planted as a revegetation project by the local landcare group. As per Figure 4 below.

Figure 4. Image of Planting sign along the Bennetts Creek – accessed from Google Maps.

Additionally, towards the western half of the Project Site a plantation of mixed native tree species has been planted in a windrow from north to south. These have been fenced off to restrict stock access. Elsewhere there are very few trees.

3.4 Water Supply

Stockwater is supplied from a rainfed farm dam (54 x 80 m) located outside of the Project Area to the north east. The dam does not appear to be very deep, such that during prolonged dry periods the storage may be insufficient to meet stock water needs for this large grazing area. Bennetts Creek is not accessible for a stockwater drinking source. Town water is connected to the property and could be used as a stockwater source, however there is no current infrastructure, such as stock water troughs, pipelines or pumps, in the Project Site for this use.

3.5 Farm Infrastructure

All infrastructure which is used for the beef cattle operation is located outside of the Project Site. There are no buildings, stockyards, farm-storage or any infrastructure other than fencing and gates. No all-weather tracks or laneways were within the Project Site, which would restrict movement across the property during prolonged wet weather conditions.

3.6 Current Land Use

The current land use is grazing of angus weaner cattle and cutting supplementary fodder based on seasonality.

The ~33 ha Project Site is used in addition to ~16 ha to the west. At the time of field inspection (14/11/2025) ~49 ha were being used for grazing with 100 angus weaner cattle, equating to a stocking rate of 2 cows/ha. On the ~33 ha Project Site this equates to a carrying capacity of 66 angus weaners. At 250 kg with a liveweight gain of 0.5 kg/day, this equates to a stocking rate of 12 DSE[8]/ha.[9] No stock handling facilities are present within the Project Site.

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[10]. 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 primarily of a single land type with some variation in slope and site drainage 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.

[8] 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 = 7.6 MJ

[9] Maintenance for a 250 kg cattle = 27.5 MJ + 17.5 MJ for additional 0.5 kg LW/day

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

The land capability rating for grazing use in moderate rainfall areas is provided in Table 2 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 3. This is due to majority of the site having poorly imperfect drainage and poorly drained areas, demonstrated by the grey heavily mottled soils, and alluvial plain landscape. A rating of 3 means that the land is suitable for the current use as grazing, with the risk factors of pugging and loss of soil structure. Low productivity due to induced waterlogging from pugging can be minimised with appropriate management.

Table 2. 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	0.1 m 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 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.

Table 3. Land Capability Rating for Intensive Cropping[6].

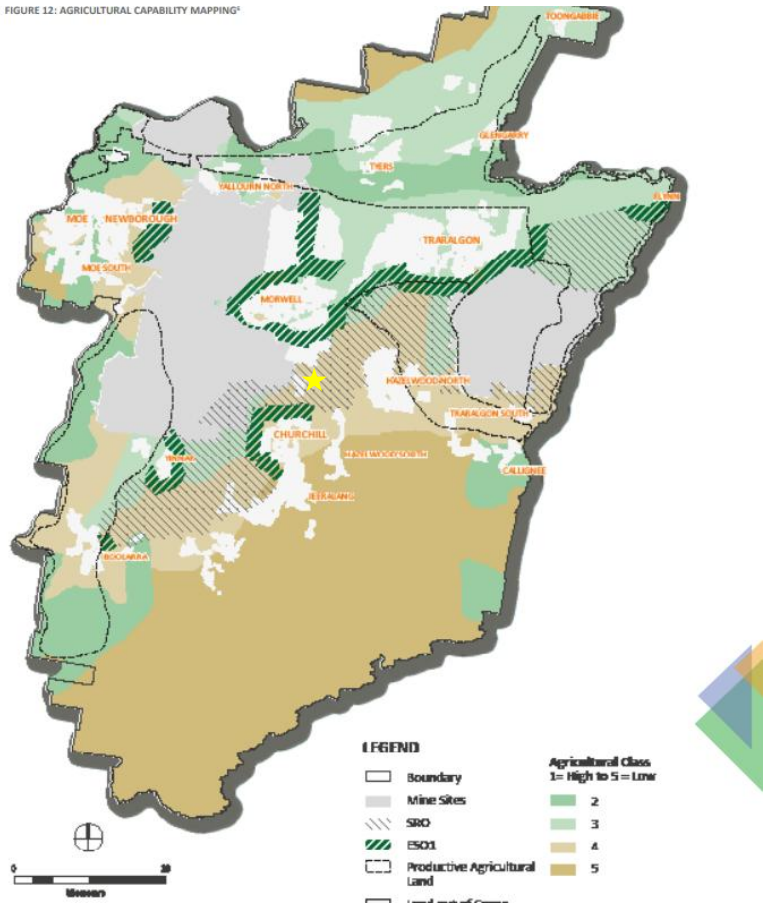
LAND FEATURES AFFECTING USE	CAPABIITY CLASS[6]				
	1	**2**	**3**	**4**	**5**
<u>SOIL STRUCTURE</u> Gradient: Apedal – weak	0 - 4%	4% to 8%	8% to 15%	15% to 20%	More than 20%
Moderate, S.G.	0 - 8%	8% to 15%	15% to 20%	20% to 35%	More than 25%
Strong	0-15%	15% to 20%	20% to 35%	35% to 50%	More than 50%
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%

The Land Capability rating for cropping is presented in Table 3, 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 4 with the limiting attributes being the imperfect drainage. However, the imperfect drainage is not widespread. The central areas of the site where the land slopes upwards to a small crest, and the surface soil is deeper, would have a cropping capability of 3, due to better drainage.

The land capability ratings for both grazing and cropping, align with previous land capability mapping for the Latrobe Valley completed in 2016, *which map the Project Site as Class 4, or Poor capability land, with low capacity to resist land disturbance such as cultivation. Moderate production levels possible with specialist management such as improved pasture establishment with minimum tillage techniques. Recommended for low disturbance agriculture such as grazing or perennial horticulture.*[11]

Figure 5. Land Capability Mapping Latrobe Valley – accessed from Rural Land Use Strategy May 2019 – Latrobe City. Yellow star indicates approximate location of Project Site.



[11] Excerpt from Rural Land Use Strategy, May 2019. Table 4. Latrobe City (2016) Submission to the Animal Industries Advisory Committee – Productive Agricultural Land, p. 26

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 4, together with an assessment of how the subject land performs with respect to these attributes.

The Project Site 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 proposed change of primary land use to Battery Energy Storage System (BESS) will mean that the current agricultural versatility (grazing) will be substituted in favour of the alternative primary use for energy production storage.

Table 4. Assessment of the agricultural values of the Combined parcel land.
Attribute groups adapted from Solar Energy Facilities – Design and Development Guideline (2022). These have been extrapolated for the use of a BESS in this instance, as the guidelines still appear relevant.

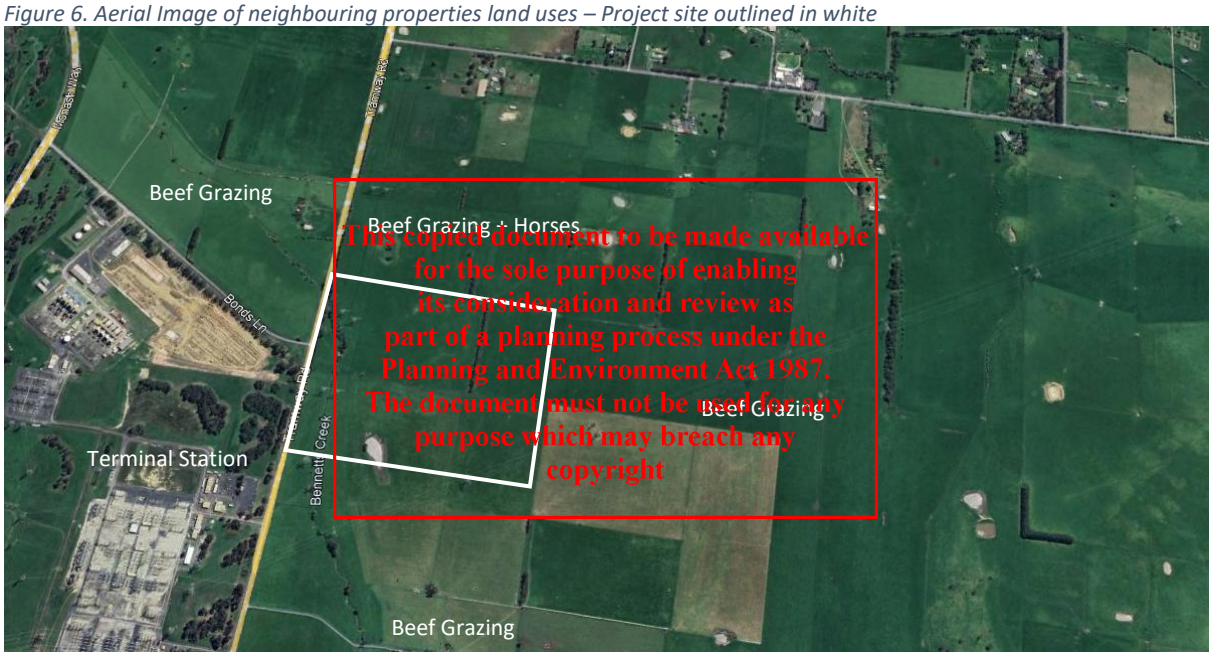
Attribute Group	Assessment Criteria	Assessment	Comments
Soils and Landscape	Inherent Soil Quality	Poor - Fair quality soils.	These soils are very poor to somewhat poorly drained but have fair water holding capacity. They are not highly productive and have some constraints with apedal surface horizons, fluid subsoil horizons and poor aggregate stability.
	Niche Soil	No	
	Inherent Soil Versatility	Moderate versatility	
Water and Climate	Access to modern irrigation infrastructure	No access currently – potential in future (see - Appendix III)	Subject land is entirely dependent on natural rainfall. Annual rainfall of the area is 730 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 0.013% of the beef herd within the Latrobe statistical area as defined by the Australian Bureau of Statistics.
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	No	The land has no special protection for agricultural values outside of the schedule to the farming zone (FZ).

	scheme or other strategic document		
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	NA	NA

6 Agricultural Impacts of the Proposal

6.1 Impact of BESS on Neighbouring Farms.

Figure 6. Aerial Image of neighbouring properties land uses – Project site outlined in white



There are a number of grazing properties that adjoin the Project Site along the northern, eastern and southern boundary.

The surrounding land to the east and south of the Project Site are grazed by the current property owner of the Project site for the purpose of grazing cattle and cutting fodder when seasonality permits. The properties to the north and west are used for animal grazing, primarily cattle 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 as a BESS.

The south western boundary of the property across Tramway Road is the Hazelwood Terminal Station, and no agriculture occurs on this site.

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 Areas 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 often formed around regional labour markets, but also tend to represent agricultural groupings 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 2021 ABS data for the Latrobe Gippsland region lists the following:

Number of beef cattle	526,386
Number of sheep	652,078
Broadacre crops	12,212 ha

In the regional context the ~33 ha Project Site which currently grazes 66 angus weaner cattle, comprises 0.013% of the regional beef herd.

7. Conclusions and Summary

- The proposed Tramway Road Battery Energy Storage System (BESS) will occupy approximately 33 hectares of farmland currently used for grazing Angus weaner cattle.
- The local climate has a reasonably reliable and moderate annual rainfall of 728 mm average, cool to cold winters, and a growing season of about 8 months.
- The landform is a flat to gently undulating alluvial plain and is a remnant of a relict landscape that once covered much of the Latrobe Valley.
- The site consists of fair quality grazing land with imperfect to poor drainage, moderate rainfall, improved pastures, and no access to irrigation (See Appendix III). While the land is productive, it does not display characteristics of strategically important agricultural land, nor does it contain niche soil types, specialised infrastructure, or unique features that would classify it as high-value or particularly versatile within the regional agricultural context.
- Land Capability Assessments indicate the Project Site is suitable for grazing (Class 3) with manageable constraints related primarily to soil drainage. Its capability for cropping is more limited (predominantly Class 4), with only the central, better-drained areas achieving Class 3. The Project Site represents typical Latrobe Valley grazing land rather than high-performing or versatile agricultural land.
- At a regional scale, the removal of this land from agricultural production represents approximately 0.013% of the Latrobe beef cattle population. The impacts to the agricultural amenity of the Region are not considered significant, however still represent a loss.
- There is no perceived impact on the surrounding agricultural grazing enterprises, from the development of the BESS.

Appendix I – Soil Profile Descriptions

Soil Inspection Site 1 – Flats Closest to Tramway Road (Western portion of site). In pasture.
Soil type consistent with Brown Sodosols

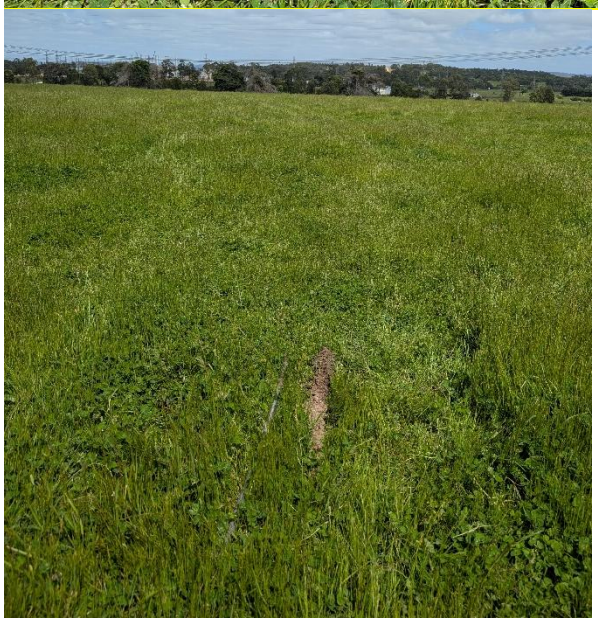
A1 0 -10cm	Sandy clay loam Brown 10 YR5/3 Moderate crumb structure Diffuse boundary to;
A2 10-45cm	Sandy clay loam Increasing clay content Dark greyish brown 10YR4/2 Mild mottling reddish yellow and yellowish brown Clear boundary to:
B1 46 cm onwards	Medium clay Dark Grey 10 YR 3/1 Moderate angular blocky structure Mottled with yellowish brown, grey and reddish yellow mottles Increasing mottling with depth Inspection hole terminated at 80 cm.

This soil is indicative of poor drainage, particularly through out the B1 horizon with increasing mottling and grey colour.

Soil Inspection Site 2 – Crest of slope, central to Project Site. In pasture.
Soil type consistent with Yellow Podzolic soils of Stace et al, and
Yellow and Brown Soloths of

A1 0 -10cm	Silty loam Pale brown 10YR 6/3 Moderate crumb structure Diffuse and gradual boundary to;
A2 10-35cm	Clay loam Pale brown 10YR 6/3 Minor yellowish brown and reddish yellow mottles Weak structure abrupt boundary to:
B1 35 cm onwards	Silty Clay Loam Yellowish brown 10YR 5/4 Strong white, grey and yellowish brown mottles Apedal structure Increasing clay with depth Hole terminated at 70 cm

This soil has somewhat poor drainage. The site is an upper slope and the deep surface soils enable good root penetration and minimises the waterlogging problem in minor rainfall events.

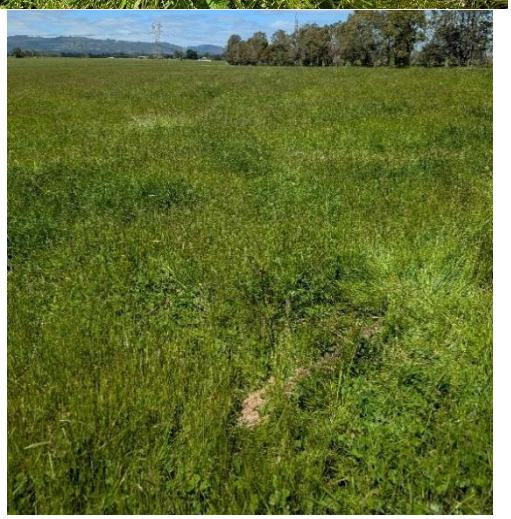


Soil Inspection Site 3 – Eastern facing mid-slope just downslope of mixed native tree plantings, east side of Project Site. In pasture.

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

A1 0 -10cm	Sandy clay loam Brown 10YR 5/3 Moderate structure Diffuse and gradual boundary to;
A2 10-50cm	Silty Clay loam Pale brown 10YR 6/3 Minor yellowish brown mottles Weak structure abrupt boundary to:
B1 50 – 70cm	Light Clay Pale brown 10YR 6/3 Strong white, grey and yellowish brown mottles Increasing mottles with depth Diffuse boundary to:
B2 70 – 90cm	Light Clay Yellowish brown 10YR 5/4 Increasing mottles of white, grey and yellowish brown Hole terminated at 90 cm

This soil has poor drainage.



Appendix II – Water Balance

Mean Rainfall													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
BOM	51	41	47	57	54	64	63	65	73	74	75	65	729

Evaporation data	January	February	March	April	May	June	July	August	September	October	November	December	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	
Mean Evaporation Daily	6	6	4	3	2	1	1	2	2	3	4	5	
Mean Monthly Evaporation (Yallourn)	182.9	156.8	120.9	81	52.7	36	40.3	49.6	72	102.3	132	155	

Water Balance for Pasture	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Ave Rainfall	51	41	47	57	54	64	63	65	73	74	75	65	729
Evaporation	183	157	121	81	53	36	40	50	72	102	132	155	1182
Crop factor	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	
Evapotransporation	146	125	97	57	37	25	28	35	50	82	106	124	
Water deficit/excess	-96	-85	-49	0	17	39	35	30	23	-8	-31	-59	
Growing season with 30 mm soil water	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partly	No	

Appendix III – An Analysis of Groundwater Irrigation Potential

The groundwater resources of the Gippsland region have been monitored and subject of technical studies. The available information has been compiled into a review by Southern Rural Water. This review and information from Visualising Victorias Groundwater have been relied upon for the assessment of potential groundwater at the area to be developed.

The area to be developed is a part of the Rosedale and wider Stratford Groundwater Management Area (GMA).[12] The Rosedale and Stratford GMA cover a similar area with the exception of the East of Sale to South of Bairnsdale which is covered only by the Stratford GMA.

The Stratford GMA predominantly uses groundwater for power generators, with only 3% used for irrigation purposes. The development of groundwater for irrigation is regulated by Southern Rural Water (SRW) in this part of Victoria and the Rosedale and Stratford GMA's are capped at 22,372 ML and 27,645 ML/year respectively.[13]

In order to prove the existence and extent of the groundwater resource at the property, the developer first needs to acquire a groundwater irrigation licence. This could be by leasing an existing unused licence, but more commonly the developer would purchase an existing licence or enter into an agreement to purchase the licence subject to approval by SRW.

With the licence secured, the applicant for the transfer would need to undertake test pumping to prove the extent of the groundwater resource. This commonly requires the drilling of one or several exploratory bores in the vicinity of where the irrigation bore is to be located. Testing the aquifer is the task of a qualified hydrogeologist and a positive outcome from the tests is never guaranteed. Assuming the test results are satisfactory, the applicant would then need to proceed to apply to transfer the licence to the new site.

Movement of groundwater licenses is subject to approval by SRW, and movement of a groundwater licence may not receive approval. SRW at its discretion will notify other licence holders within the vicinity to where the licence is to be transferred and give nearby users the right to question and/or object to such movement. SRW has the final right to allow or disallow the movement of licence from one area to another within a GMU. Approval is sometimes granted with conditions which restrict pumping times and daily drawdown. Sometimes these restrictions mean that balancing storage is also required.

The process of licence transfer to an unproven resource is expensive and not without risk.

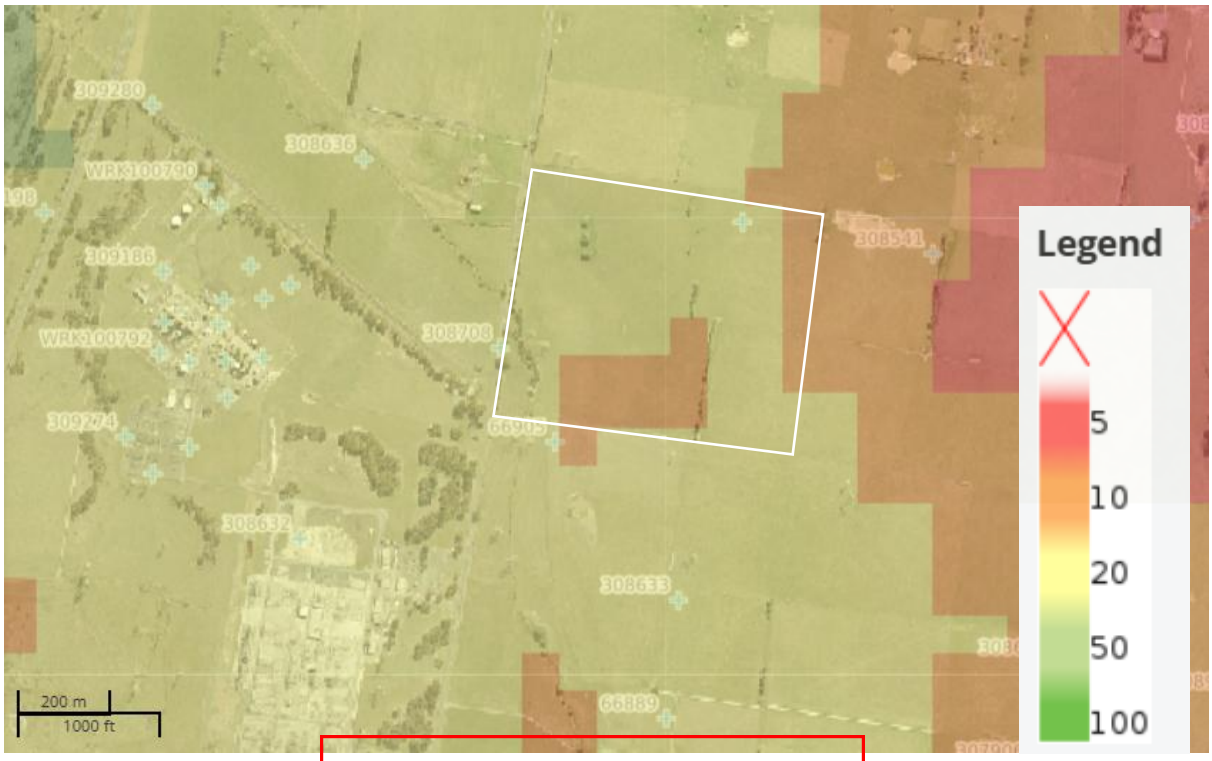
Using Visualising Victoria's Groundwater Data (Figure 7), the groundwater is relatively shallow within the area to be developed at 10 – 20 m depth, with salinity ranging between 500 – 1000 mg/L.[14]

[12] https://www.srw.com.au/water-and-storage/groundwater-and-bores/groundwater

[13] Stratford & Rosedale Groundwater Management Area, Local Management Plan Version 1, April 2023, Southern Rural Water.

[14] Visualising Victorias Groundwater - https://www.vvg.org.au/vvg_map.php?agreement=Agree+and+Continue#

Figure 7. Visualising Victoria's Groundwater – Mapping of Groundwater Depth, Project Site shown as white outline.



To provide an indication of the groundwater quality and if irrigation is a viable option for the property Table 5 has been provided below to summarise the water quality in nearby monitored bores in relation to salinity levels. The spatial distribution of these bores is included in Figure 8 below.

Figure 8. Aerial Image of measured bores in surrounding properties (white outline indicates Project Site

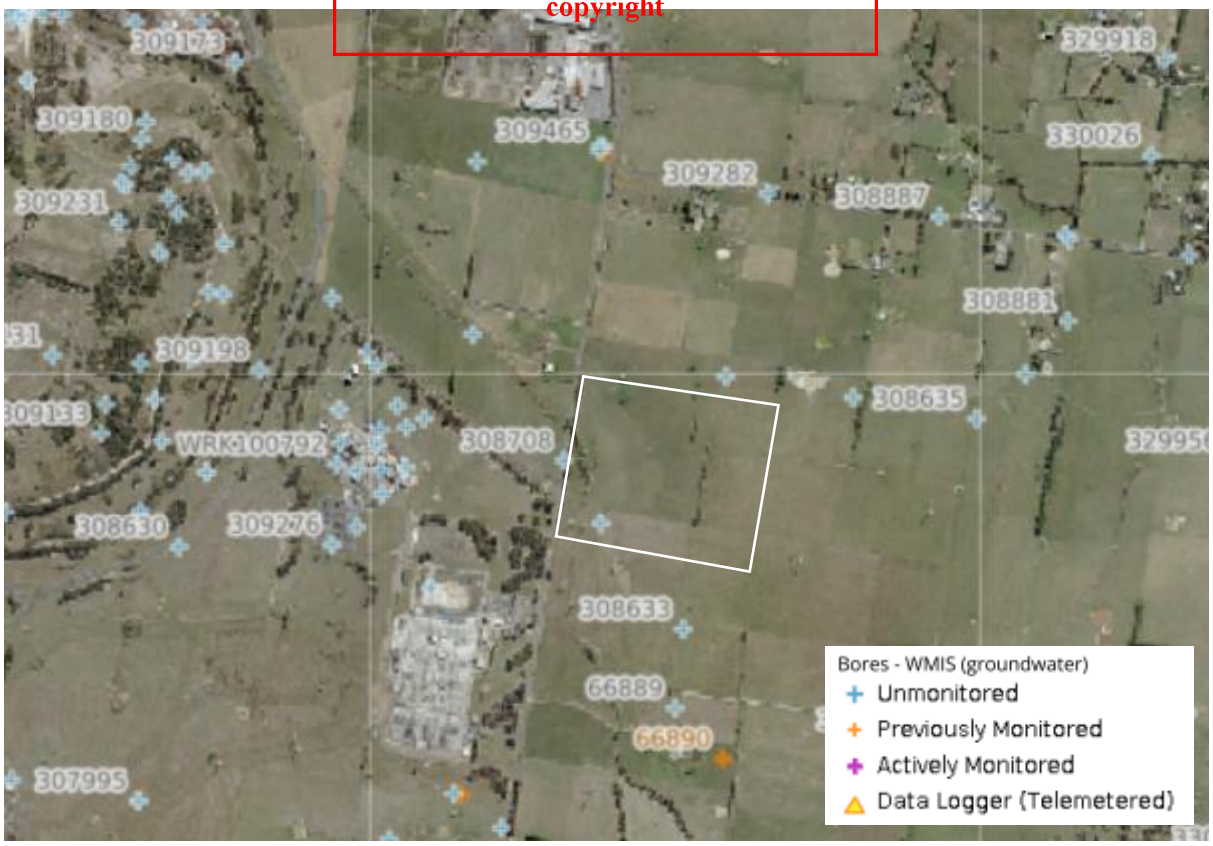


Table 5. Quality of Groundwater Measured in Bores surrounding the property[15]

Bore Number	Conductivity (mS/cm)	Total Dissolved Solids (TDS) (mg/L)	Chloride (mg/L)	Sodium (mg/l)
309177	795	*509*	192	118
66890	3730	*2387*	1228	-
309192	760	*486*	188	115
Average	**1,762**	***1,127***	**536**	**116**
Salinity Risk Assessment Category[16]	**High**	**High**	**High**	**Medium**

Italicised Values calculated – Approximately EC 1000 µS/cm = TDS 640 mg/L[17]

This groundwater is classified as medium to high salinity and as Class 3, which should only be used on soils that are permeable with adequate drainage, which for the most case represents the surface soils on this property, however not the subsoils, which show some restrictions to permeability, which could result in accumulation of salts without careful management. Special management for salinity control would be required, and the salt tolerance of plants irrigated must be considered.[18]

The potential to develop and use the groundwater resource on this property for irrigation involves considerable risk and uncertainty. The quality appears to be relatively acceptable with strict management decisions and appropriate crops, but the extent of the resource is not proven. Any potential yield of the aquifer is unproven. Whether or not a water licence can be identified and transferred to the property is unproven. Overall, the potential for irrigation using the groundwater resource is an unproven entity with considerable risk.

[15] Accessed from Visualising Victorias Groundwater - https://www.vvg.org.au/vvg_map.php?agreement=Agree+and+Continue#
[16] EPA Doc 168.3, Figure 6-1 Recycled Water Salinity Risk Assessment, p. 54
[17] EPA Document 168.3, p. 53
[18] EPA Doc. 168, Table 4. Salinity Classes of Irrigation Waters.