AGRICULTURAL ASSESSMENT

CONSTRUCTION AND OPERATION

of the proposed

Battery Energy Storage System

Tragowel, Victoria

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for

Potentia Energy

Ag-CHALLENGE CONSULTING pty. ltd.

April 2026

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1. Introduction

1.1 Project Brief

The proposed BESS, along with its associate transmission line connection (overall development footprint), covers an area of approximately 15 hectares of farmland, located 6 kilometres south of the Kerang township in Gannawarra Shire.

The BESS site is pat of a larger landholding (best identified as 1/TP 601295) of about 23 hectares, divided into four paddocks. The proposed BESS area will be situated in the northernmost paddock, which spans approximately 12.3 hectares. Within this paddock, the proposed BESS area will utilise 7 hectares. For the purpose of this report the 12.3 ha paddock will be referred to as the Project Site, the main area studied as part of this assessment. The Project Site layout is shown in Figure 1, and an aerial image of the Project Site is shown in Figure 2.

The proposed transmission line will be installed underground, beginning at the northeast corner of the proposed BESS area. It will run north across private land (including areas that host the Kerang Solar Farm) towards Old Echuca Road. At that point, the line will turn west, running underneath Loddon Valley Highway and north across Old Echuca Road, before turning west again to connect to the Kerang Terminal Station. The transmission corridor will occupy approximately 8 hectares and will extend about 2.5 kilometres in length and 30 meters in width.

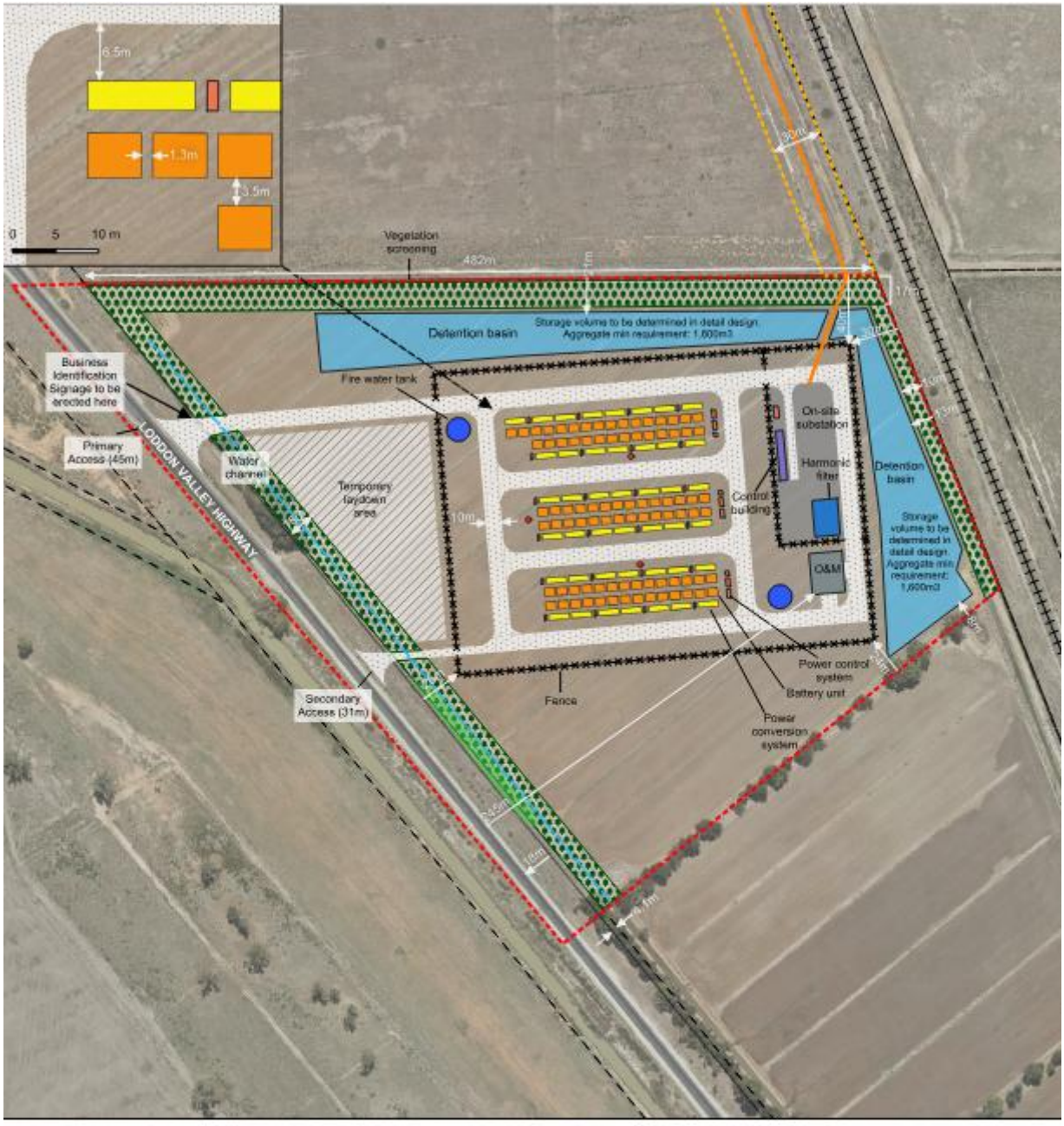
Ag-Challenge Consulting has been engaged to investigate the agricultural impacts of the proposed development. Site investigations are ongoing and detailed plans are being developed with respect to all physical and cultural considerations, following engagement with communities and authorities.

This investigation describes the existing agricultural use in both a local and regional context. The investigation is to consider the impact of the BESS development and transmission corridor 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.

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 four 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.

Figure 1. Bess Site and Project Site Concept Layout Plan



BESS Concept Layout Plan

0 50 100 m

2405 - Tragowel BESS

LEGEND

Project Site
- BESS Development Area
- Transmission Development Area

Proposed Infrastructure
- Underground transmission line
- Battery unit
- Power conversion system
- Power control systems
- Harmonic filter
- Control building
- Operations and maintainance
- On site substation
- Water tanks
- Vegetation screening
- Fire Hydrants
- Fence
- Temporary laydown area
- Access roads

Existing Features
- Impacted native vegetation
- Roads
- Rail line
- Water channel
- Surveyor title boundary
- VicPlan title boundary

Version: 1.3

Date: 15/04/2026

Disclaimer: This plan is preliminary and subject to detailed studies and approval.

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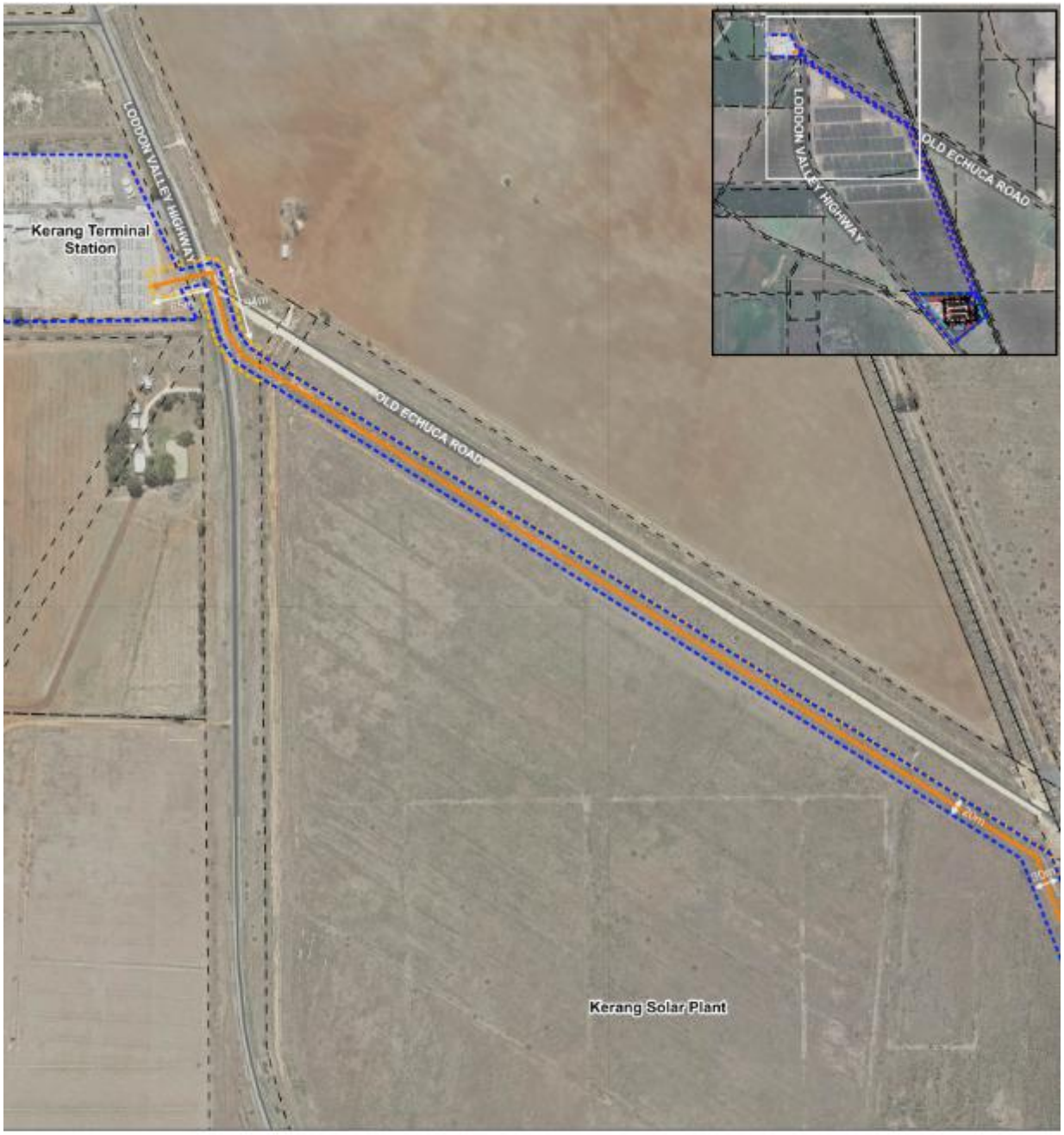

Transmission route - northern extent

0 100 200 m

2405 - Tragowel BESS

LEGEND

Proposal
- Project Site
- Transmission Development Area
- Transmission Cable Route

Existing Features
- Roads
- Rail line
- Cadastre

Version: 1.3

Date: 14/04/2026

Disclaimer: This plan is preliminary and subject to detailed studies and approval.

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Transmission route - southern extent

0 100 200 m

2405 - Tragowel BESS

LEGEND

- Project Site
- Transmission Cable Route
- BESS Development Area
- Transmission Development Area

Proposed Infrastructure

- Vegetation Screening

Existing Features

- Impacted Native Vegetation
- Roads
- Rail line
- Cadastre

Version: 1.3

Date: 14/04/2026

Disclaimer: This plan is preliminary and subject to detailed studies and approval.

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Figure 2. Aerial Image of property with Project site outlined in orange, balance of irrigation areas outlined in white and soil profile investigation locations denoted by yellow stars (Appendix 1). Irrigation channel shown as blue dashed lines.

2. Planning Provisions

2.1 Farming Zone Provisions

Lot1\TP601295 is located within the Farming Zone of the Gannawarra 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.*

In a Farming Zone a utility installation is classified as a Section 2 use and therefore requires a planning permit.[1] The Decision Guidelines in relation to the construction of a Renewable Energy Facility (other than wind energy facility) state that the responsible authority must consider, as appropriate[2]:

- The impact of the proposal on strategically important agricultural land.
- The impact of the proposal on the protection of declared irrigation districts.

The associated earthworks and construction activity will be part of this permit. The Decision Guidelines from the Farming Zone which relate to these works include[3]:

- Whether the use or development will support and enhance agricultural production.
- Whether the use or development will adversely affect soil quality or permanently remove land from agricultural production.
- The potential for the use or development to limit the operation and expansion of adjoining and nearby agricultural uses.
- The capacity of the site to sustain the agricultural use.
- The agricultural qualities of the land, such as soil quality, access to water and access to rural infrastructure.

2.2 Overlay Provisions

The Land Parcel 1\TP601295 is subject to two overlays

- Specific Controls Overlay (SCO) subject to the provisions of Schedule 2 of this Overlay.
- Environmental Significance Overlay (ESO) and is subject to the provisions of Schedule 2 and Schedule 4 of the Environmental Significance Overlay.

[1] Gannawarra Planning Scheme. Table 35.07-1 Section 2 Permit Required. Accessed from <https://planning-schemes.app.planning.vic.gov.au/Gannawarra/ordinance/35.07>.
[2] Gannawarra Planning Scheme. Section 53.13-3 – Decision Guidelines. Accessed from <https://planning-schemes.app.planning.vic.gov.au/Gannawarra/ordinance/53.13>.
[3] Gannawarra Planning Scheme. Section 35.07-6 – Decision Guidelines. Accessed from <https://planning-schemes.app.planning.vic.gov.au/Gannawarra/ordinance/35.07>.

The Specific Controls Overlay applies to the proclaimed irrigation districts of the Murray Basin and seeks to protect the significant public investment in irrigation infrastructure by identifying agricultural use as priority land use. The Specific Controls Overlay gives planning recognition to the document *Goulburn-Murray Water: Connections Project and Water Efficiency Project Incorporated Document, November 2021.* This document recognizes utility installations as part of the mix of land uses in the irrigation district and no specific permit is required for a utility installation under this section of the planning scheme.

Schedule 2 of the Environmental Significance Overlay relates to protecting existing highway vegetation and maintaining and enhancing the safety and visual amenity of highway corridors.[4]

Schedule 4 relates to areas of poor drainage or land that is potentially subject to inundation and seeks to ensure that any development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and with local drainage conditions and will not cause any significant rise in flood levels or flow velocity.[5]

3. Regional Context

3.1 Climate

Monthly rainfall and climatic data from the Bureau of Meteorology (BOM) weather station at Kerang (Station No. 80023) have been recorded since 1881. The average long-term monthly and annual rainfall are provided in Table 1, and a more complete set climatic data are reproduced in Appendix III. The weather station at Kerang is slightly to the north of the Project Site and is considered indicative of the rainfall and general climate of the Project Site. The Project Site has a temperate climate with mild winters, hot summers, and a low average annual rainfall of 373 mm. Rainfall is distributed relatively evenly throughout the year

Table 2. Monthly average rainfall (mm) for Kerang (Station No. 80023).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Kerang	25	23	27	26	36	36	34	37	35	37	30	28	373

The rainfall data for Kerang (Station No. 80023) has been entered into a water budget spreadsheet that can be used to predict seasonal surpluses and deficits (Appendix II).
Allowing for a 15 mm carry forward of soil moisture from the slightly wetter months into the drier period of the year, and a pasture crop factor ranging from 0.6 in mid-winter through to 1.0 in summer, the growing season for pasture is predicted to be for about 3-4 months each year, with soil moisture being a significant restriction to growth from October through to May.

The BOM meteorology station at Kerang (Station No. 80023) records daily maximum and minimum temperatures as well as humidity and wind speed. A summary of the temperature data is provided in Appendix III. Frost is likely to have occurred if the screen temperature at the meteorology station falls to 2°C or less and a severe frost is likely to have occurred if screen temperature drops to 0°C or less. Frost will restrict the growth of pasture and crops, increase risk of livestock mortality (especially in young or susceptible stock), and out of season

[4] Gannawarra Planning Scheme. Schedule 2 to Clause 42.01 Environmental Significance Overlay. Accessed from < https://planning-schemes.app.planning.vic.gov.au/GANNAWARRA/ordinance/42.01-s2>
[5] Gannawarra Planning Scheme. Schedule 4 to Clause 42.01 Environmental Significance Overlay. Accessed from < https://planning-schemes.app.planning.vic.gov.au/GANNAWARRA/ordinance/42.01-s4>

frosts have the potential to damage pastures and crops at sensitive growth stages. The data in Appendix III identifies frosts commonly occur throughout winter and the months either side with 2-7 frosts expected per month. Importantly severe frosts do occur throughout winter with up to two severe frosts expected in June and July, and out of season frosts occasionally occur during May, August and September.

3.2 Regional Land Form

The landscape is best understood in terms of the processes that formed it (Figure 3). The Project Site is an alluvial terrace (Nws) formed during the Quaternary Pleistocene period, from alluvial floodplain deposits of silt, sand and minor gravel. The abutting geological formation on the south western edge of the Project Site is a comprised of Lunette deposits (Qi) through aeolian processes, consisting of sand, silt and clay, deposited during the Quaternary Holocene to Pleistocene period.

Figure 3. Geology – with Project Site in black – Accessed from Geovic[6]

3.3 Regional Land Use

The Project Site lies within the Tragowel Plains Irrigations Area, in the Lower Loddon catchment area of Northern Victoria. The Irrigation Area has been in operation since the 1980's.

Agriculture is the dominant land use by area, and within the agricultural sector the grazing for dairy or fat lamb production under irrigation is the dominant farm enterprise.[7]Other current major agricultural uses include fodder cropping. There is a diversity of other minor land uses.

[6] Geovic - https://gsv.vic.gov.au/sd_weave/registered.htm

[7] Department of Agriculture Victoria, General Information about the North Central Area – accessed from VRO https://vro.agriculture.vic.gov.au/dpi/vro/nthcenregn.nsf/pages/nthcen_soil_mid_loddon_pdf/$FILE/mid%20loddon%20general%20info.pdf

4 Site Characteristics

4.1 Description of the Land

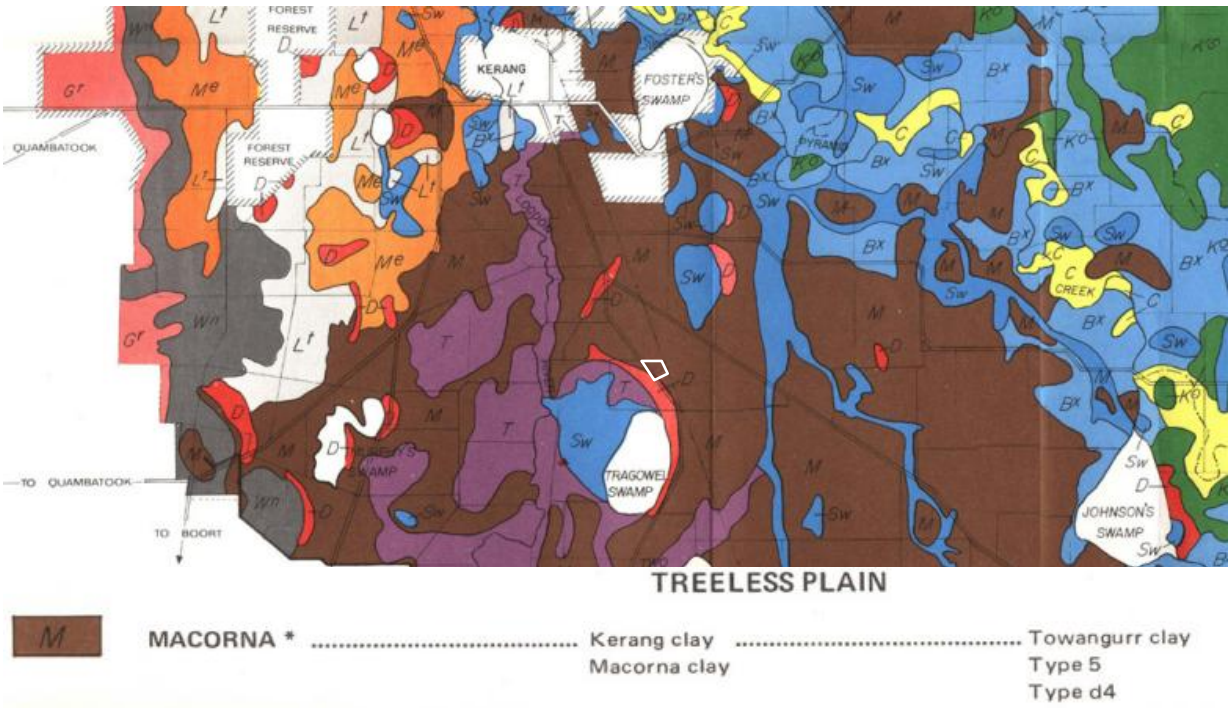
The Project Site is a flat plain within the landscape, with approximately 8 flood irrigation bays running south west to north east. It is located within the river terraces of the lower Loddon river.

There are two farm dams within the Project site, one in the north western corner, the other in the southern corner, which was empty at the time of the site visit (6/12/2024).

4.2 Soils

Sargeant, Newell and Walbran (1978) have published soil maps (Figure 4) and classifications for this area, and the relevant major units that cover the area being, Macorna and Kerang Clay.[8] The features of these units have been summarised below.

Figure 4. Soil Mapping of the Torrumbarry Irrigation District - 1978



Macorna clay is described as a light clay to heavy clay, dark red brown to grey brown surface soil, with medium to heavy clay subsoils, ranging from yellowish brown to reddish brown. Deposits of gypsum and calcium carbonate can be found from 25 cm onwards. These soils have historically been used for irrigation of annual and perennial pastures. The soils drainage is considered better then the Kerang clay, although the low surface soil infiltration frequently abates this improvement.

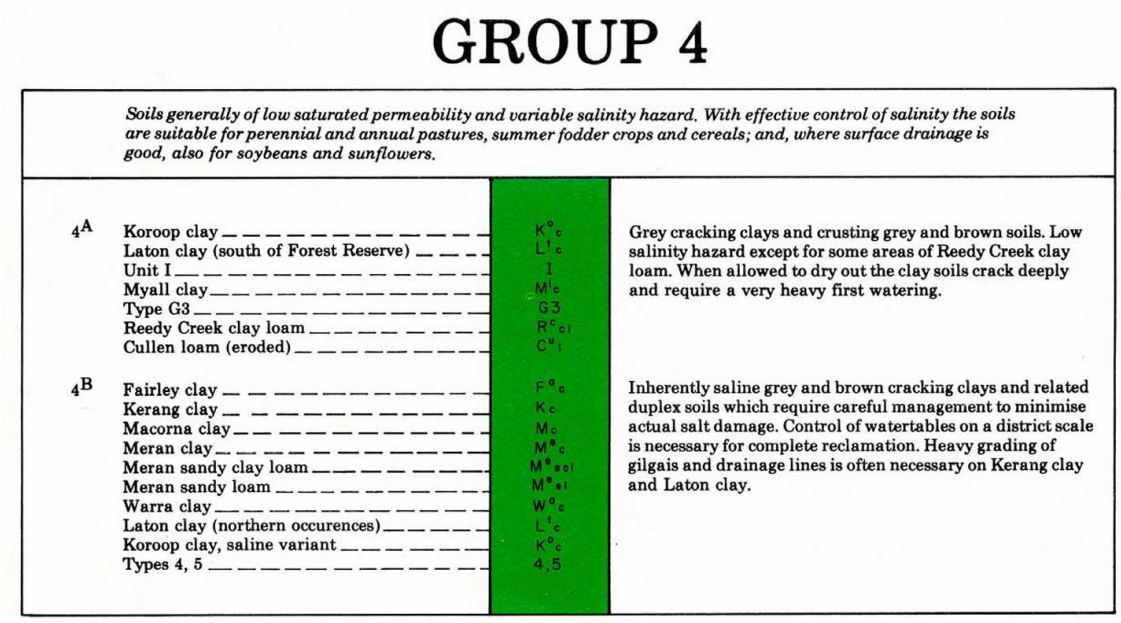
Kerang Clay is described as moderate to weakly structured heavy clay throughout the soil profile ranging from grey-brown to yellowish grey in colour, with deposits of gypsum and calcium carbonate from 45 cm onwards. These soils have historically been used for irrigation of annual and perennial pastures for fat lambs raising and dairying. Careful management of irrigation is

[8] Sargeant, I, Sargeant, J. (2005) Sustainable soil management: a reference manual to the major agricultural soils of the Bairnsdale and Dargo regions. Department of Primary Industries, Melbourne.

required on these soils given their inherent low soil permeability and difficulty leaching salts.

The Macorna and Kerang clay were both assigned Group 4 out of 5 Groups, 1 being the most versatile with least risks, while 5 having the most limitations and requirements of management controls as is shown in below. Group 4b is characterised by low saturated permeability, brown cracking clays which require careful management. [9]

Figure 5. Soil category groups as delineated by Sargeant et al (1978)



GROUP 4

Soils generally of low saturated permeability and variable salinity hazard. With effective control of salinity the soils are suitable for perennial and annual pastures, summer fodder crops and cereals; and, where surface drainage is good, also for soybeans and sunflowers.

4A	Koroop clay	K^{o}_{c}	Grey cracking clays and crusting grey and brown soils. Low salinity hazard except for some areas of Reedy Creek clay loam. When allowed to dry out the clay soils crack deeply and require a very heavy first watering.
	Laton clay (south of Forest Reserve)	L^{t}_{c}	
	Unit I	I	
	Myall clay	M^{l}_{c}	
	Type G3	G3	
	Reedy Creek clay loam	R^{c}_{cl}	
	Cullen loam (eroded)	C^{u}_{l}	
4B	Fairley clay	F^{a}_{c}	Inherently saline grey and brown cracking clays and related duplex soils which require careful management to minimise actual salt damage. Control of watertables on a district scale is necessary for complete reclamation. Heavy grading of gilgais and drainage lines is often necessary on Kerang clay and Laton clay.
	Kerang clay	K_{c}	
	Macorna clay	M_{c}	
	Meran clay	M^{e}_{c}	
	Meran sandy clay loam	M^{e}_{scl}	
	Meran sandy loam	M^{e}_{sl}	
	Warra clay	W^{a}_{c}	
	Laton clay (northern occurences)	L^{t}_{c}	
	Koroop clay, saline variant	K^{o}_{c}	
	Types 4, 5	4,5	

Clay soils with low permeability are difficult to cultivate. The soil has a very narrow range of moisture content whereby cultivation can be undertaken with no damage to soil structure and ability to produce a fine surface tilth. Generally, these soils are not favoured for cropping due to the difficulty in cultivation, although there are cereal and fodder crops grown in the area.

These soils are also prone to salinity. The low permeability of the soil profile restricts natural leaching events and salts tend to accumulate in the soil surface. Care is required in irrigating these soils to avoid any accumulation of salinity, as they are difficult to rehabilitate if toxic levels of salt accumulate. With effective management to control salinity, the soils are suited to perennial and annual pastures. Summer fodder crops and cereals can be grown with care but cultivation to produce a good seedbed is difficult.

Soils inspected at multiple locations within the Project Site consisted of dark brown light clays at the surface soils, overlying heavy clay at depth.

The surface soils are shallow, moderately structured cracking clays, generally leading to a medium clay at around 10 cm. See Figure 6 below for the cracks across the surface soils.

[9] Sargeant, I, Newwll, J, Walbran, W. (1978). Soils and Land Use in the Torrunbarry Irrigation District Victoria. Department of Agriculture.

Figure 6. Image of surface soils cracking clays (West side of property – Kerang Clay)

Two soil profiles were examined across the Project site, with the locations shown in Figure 2 and described in Appendix I. Site 1 examined towards the eastern end of the Project Site was more consistent with the Macorna Clay, while Site 2 examined to the west of the site was more consistent with the Kerang Clay.

4.3 Vegetation

Ground cover at the time of the site visit (6/12/2024) was essentially dried and dead pasture, with incident scotch thistles which have germinated due to rain in the previous three weeks. In talking to the property owner, the Project Site is resown to an oat, ryegrass and clover mix each autumn as an annual pasture.

Between each paddock there are environmental plantings for windbreaks, and some scattered plantings lining the Loddon Valley Highway roadside.

4.4 Water Supply

Stock water for the grazing operations is primarily supplied through small dams throughout the paddocks.

The Project Site has access to irrigation water from Goulburn Murray Water, which runs through a farm channel along the western margins of the Project Site with the offtake approximately 600 m south. A reuse tailwater collection system runs along the eastern margin of the property, which can then be pumped and used again for irrigation.

4.5 Farm Infrastructure

Infrastructure including a machinery shed and pump shed which service the Project Site are located on adjacent land approximately 600 m to the south. The property has essentially been used for extensive grazing and therefore infrastructure present within the Project Site is limited to fencing and water supply. Boundary and subdivisional fencing is in fair condition.

4.6 Current Land Use

The current land use for the Project Site is grazing with Polled Dorset lambs and a White Suffolk sheep stud. At the time of field inspection, the property was being grazed by multiple mobs of sheep. Annually between 200 – 300 rolls of hay are cut from the whole property, of

which approximately half of these would have been cut from the Project Site.

The landowner currently stocks the property at approximately 7 DSE/ha, and given the inherent heavy clay soil type, climatic constraints and the limited irrigation entitlements for approximately 4 flood irrigations, this is a realistic carrying capacity.[10]

5 Land Capability and Agricultural Production Potential Assessment

5.1 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.[11] 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 little variability in soils throughout the property. For the purpose of the land capability assessment the land can be considered to be of 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[12] rainfall areas is provided in Table 3 below. The average annual rainfall of the Project Site is relatively low, but this is boosted by the access to water for irrigation, and the Land Capability Rating for grazing provided below is considered indicative of the agricultural use. 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. A rating of 3 means that the land is suitable for this use, and risk factors are relatively low.

Table 3. Land Capability for Grazing in moderate rainfall areas.

	Land Capability Class[13]				
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	-

[10] 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 45 kg wether.

[11] Rowe, Howe & Alley. (1981). *Guidelines for Land Capability Assessment in Victoria*, Soil Conservation Authority. p. 40.

[12] Note Moderate rainfall is the lowest land capability range developed.

[13]Rowe, Howe & Alley. (1981). *Guidelines for Land Capability Assessment in Victoria*, Soil Conservation Authority.

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 and is considered relevant as crops could potentially be grown on this land type with access to commercial irrigation water.

Table 4. Land Capability Rating for Intensive Cropping.[14]

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%

The Project site is determined to have a Land Capability rating of 3 – 4 and is considered relatively unsuitable for cropping, given the relatively poor soil structure, imperfectly to poorly drained soils and medium clay surface soil.

5.2 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.

While there is relatively little infrastructure present, the access to irrigation water and the irrigation infrastructure present (earthen irrigation channel and pump shed), are highly valuable assets (Figure 7).

The ~7 ha of the proposed Bess Area will no longer be flood irrigated nor grazed. The limitation to the farm production on the property is the quantity of irrigation water available, rather than the availability of land. The proposed development will not restrict the ability to

[14] Rowe, Howe & Alley. (1981). *Guidelines for Land Capability Assessment in Victoria*, Soil Conservation Authority.

irrigate the balance of land on the property. Such that, the water resources currently held on the farm can be effectively re-allocated to other parts of the farm enterprise to effectively mitigate the loss of agricultural land and production on the Project Site.

Figure 7. Image of Irrigation channel running south east to north west along the roadside boundary

Despite access to reliable irrigation water the soils that are present are not highly regarded, nor considered versatile by the broadacre cropping industry, given the inherent poor surface soil drainage in the Macorna clay and internal poor drainage in the Kerang clay. The predominant soil type across the property is not suitable for intensive uses and the land is mostly limited to grazing and fodder production pursuits.

The property is considered suitable for its current purpose of grazing, with management controls in place when irrigating to avoid increases in soil salinity.

The proposed underground transmission line should be adequately rehabilitated, so as to prevent long-term impacts on crop productivity. The strict implementation and oversight of the following land rehabilitation measures on transmission line are considered critical to prevent ongoing impacts on agricultural output:

- Stripping topsoil (A1 soil horizon) to an adequate depth, along with the A2 soil horizon, and stockpiling soil horizons in separate piles if required.
- Adequate preparation of subsoil prior to replacement of A1 and A2 soil horizons, including deep ripping to a suitable depth and gypsum application at a suitable rate.
- Replacement of soil to similar depths as recorded in survey prior to construction.
- Reestablish pasture/crop to standard documented prior to construction.

6. Agricultural Impacts of the Proposal

6.1 Impact of BESS on Neighbouring Farms.

The property to the North is currently under operation as the Kerang Solar Plant. There are plans for this area to be grazed by sheep under a lease arrangement from the current landowner of the Project Site.

The properties to the east, west and south adjoining the Project Site support low to moderate intensity livestock grazing. There is no perceived detrimental impact on the continued agricultural use of these properties for grazing operations as a consequence of the development of the Project Site for a BESS.

7. Conclusions and Summary

- The overall development foodprint (including the BESS and transmission corridor) covers approximately 15 hectares of agricultural land in the Gannawarra Shire. The ~12.3 ha north eastern most paddock, represented as the Projects Site is currently utilised for grazing.
- The climate of the area has a low annual average rainfall of 373 mm, mild winters with a significant frost incidence from June and July, a pasture growing season of about 3 – 4 months without irrigation, and a partially extended growing season to 5 – 6 months with approximately 4 flood irrigations a year. Further irrigation is not currently available through current irrigation licences.
- The landform is a flat plain system within the Tragowel Irrigation District.
- The soils are relatively consistent across the Project Site, with cracking clay surface soils, overlying heavy clay subsoils. These soils are suited to grazing operations, with low soil permeability and low soil infiltration rates. Cereal and fodder crops can be grown with assistance from irrigation, but there is a salinity hazard and achieving a good result from cultivation can be difficult.
- The main economic drivers of agricultural production within the Tragowel Irrigation District have been dairying and, fat lamb grazing, where irrigation is available.
- The land proposed for BESS development at the Project Site is currently used for rearing polled dorset sheep and is operating at a current carrying capacity of ~7 DSE/ha. At the time of site visit (6/12/2024) the pasture was dormant and will be resown in the autumn to a clover, oat and ryegrass mix. While the ability to flood irrigate the property is a valuable commodity and asset, the limited versatility of the soils, reduce the value of the agricultural land.
- The development of a BESS on the property will alter the agricultural use of this land, with the 12.3 ha of the Project Site no longer used for animal grazing. Given the valuable commodity of irrigation, to minimise agricultural losses, the irrigation water allocations which originally occurred on the Project Site should be used on the balance of land, to extend the pasture growing season.
- There are no perceived detrimental impacts of the development of the BESS facility to the surrounding farm businesses.

Appendix I – Soil Profile Descriptions

Site 1: Plateau near eastern boundary

Depth (cm)	Horizon	Description
0 – 10	A1	Dark Brown 7.5 YR 3/2, moderate crumb structure **Light clay** *Gradual transition to:*
10 – 30 cm	A2	Brown 7.5 YR 4/3, moderate structure Strong reddish brown mottles **Medium Clay** *Abrupt transition to:*
30 – 50 cm	B1	Brown 7.5 YR 4/4 Strong reddish brown mottles **Medium Clay** *Gradual transition to:*
50 – 90 cm	B2	Strong Brown 7.5 YR 5/6, poor structure **Heavy Clay** *No Auger refusal hole terminated at 100 cm.*

In dead pasture mix of shaftal clover, oats and ryegrass. Incident green artichoke thistle. Shelter belt of trees planted on the eastern fence line.

Site. 2: Plateau near western boundary and south of dam.

Similair soils to Site 1, however with yellowish brown mottles in place of reddish-brown mottles.

Appendix II – Water Balance

Table 6 Water balance for the Project Site based on records from Kerang Station

Mean Rainfall													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
BOM No. 80023 Kerang	25	23	27	26	36	36	34	37	35	37	30	28	373

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 (Kerang)	249.5	200.0	162.4	95.4	54.1	35.8	40.6	62.0	96.4	143.9	184.3	233.1	**1558**

Water Balance for Pasture	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Ave Rainfall	25	23	27	26	36	36	34	37	35	37	30	28	373
Evaporation	250	200	162	95	54	36	41	62	96	144	184	233	1558
Crop factor	1.0	1.0	1.0	0.8	0.7	0.6	0.6	0.6	0.7	0.8	1.0	1.0	
Evapotransporation	250	200	162	76	38	21	24	37	68	115	184	233	
Water deficit/excess	-225	-177	-135	-50	-2	15	10	0	-33	-78	-154	-205	
Growing season with 50 mm soil water	No	No	No	No	No	Yes	Yes	Yes	Partly	No	No	No	

Appendix III – Climate Data

Table 7 *Mean Temperature data from BOM station at Durdidwarrah (87021).*

Durdidwarrah (87021)													
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Maximum temperature													
Mean maximum temperature (°C)	31.8	31.2	27.9	22.8	18.1	14.7	14.1	16.1	19.2	22.9	26.8	29.8	23
Highest temperature (°C)	47.6	46.9	42.1	39.1	28.7	25.6	25.7	28.1	36.6	40	44	46.6	47.6
Date	25-Jan	7-Feb	7-Mar	11-Apr	5-May	4-Jun	29-Jul	30-Aug	23-Sep	25-Oct	29-Nov	20-Dec	25-Jan
	2019	2009	2016	2018	1978	1957	1975	1980	2017	1914	2012	2019	2019
Lowest maximum temperature (°C)	16.2	11.7	12.5	12.8	8.8	5.6	1.6	7.3	7.8	11.1	13.1	14.3	1.6
Date	5-Jan	2-Feb	29-Mar	7-Apr	30-May	15-Jun	18-Jul	2-Aug	13-Sep	2-Oct	15-Nov	1-Dec	18-Jul
	1991	2005	1973	1977	1913	1939	1918	1917	1969	1967	1970	1969	1918
Decile 1 maximum temperature (°C)	24.9	24.9	21.7	17.8	14.3	11.9	11.5	12.8	14.9	17.3	20	23.1	
Decile 9 maximum temperature(°C)	38.8	37.9	34.3	28.7	22.7	17.7	17.1	20.3	24.7	29.6	34.2	36.7	
Mean number of days ≥ 30 °C	17.5	16.1	10.1	1.4	0	0	0	0	0.4	2.8	7.8	13.4	69.5
Mean number of days ≥ 35 °C	8.1	6.7	2.4	0.1	0	0	0	0	0	0.4	2.5	5.2	25.4
Mean number of days ≥ 40 °C	2	1.3	0.2	0	0	0	0	0	0	0	0.3	0.9	4.7
Minimum temperature													
Mean minimum temperature (°C)	15.3	15.2	12.9	9.4	6.7	4.6	4	4.9	6.6	8.8	11.4	13.5	9.4
Lowest temperature (°C)	5.6	5.6	3.3	0.6	-3.1	-3.9	-4.6	-3.2	-1.1	-1.1	2.6	-6.7	-6.7
Date	9-Jan	27-Feb	21-Mar	29-Apr	16-May	27-Jun	17-Jul	1-Aug	2-Sep	13-Oct	4-Nov	15-Dec	15-Dec
	1937	1946	1933	1952	1946	1944	1982	1929	1957	1953	1980	1958	1958
Highest minimum temperature (°C)	30.9	29.1	26.1	24.2	18	14.2	13.3	14	20.1	22.9	26.1	30	30.9
Date	26-Jan	5-Feb	1-Mar	12-Apr	5-May	7-Jun	1-Jul	30-Aug	24-Sep	31-Oct	27-Nov	20-Dec	26-Jan
	2003	2000	1963	2018	1988	2001	1966	1969	2001	1914	1919	2015	2003
Decile 1 minimum temperature (°C)	10.3	10.4	8.3	5.4	2.8	0.6	0.4	1.3	2.8	4.4	6.6	8.9	
Decile 9 minimum temperature (°C)	21.1	20.9	18.3	14.2	11.1	8.7	7.5	8.5	11	14	17.1	19.4	
Mean number of days ≤ 2 °C	0	0	0	0.1	1.7	5.6	7.2	4.5	1.6	0.2	0	0	20.9
Mean number of days ≤ 0 °C	0	0	0	0	0.3	1.7	2.2	0.9	0.1	0	0	0	5.2

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