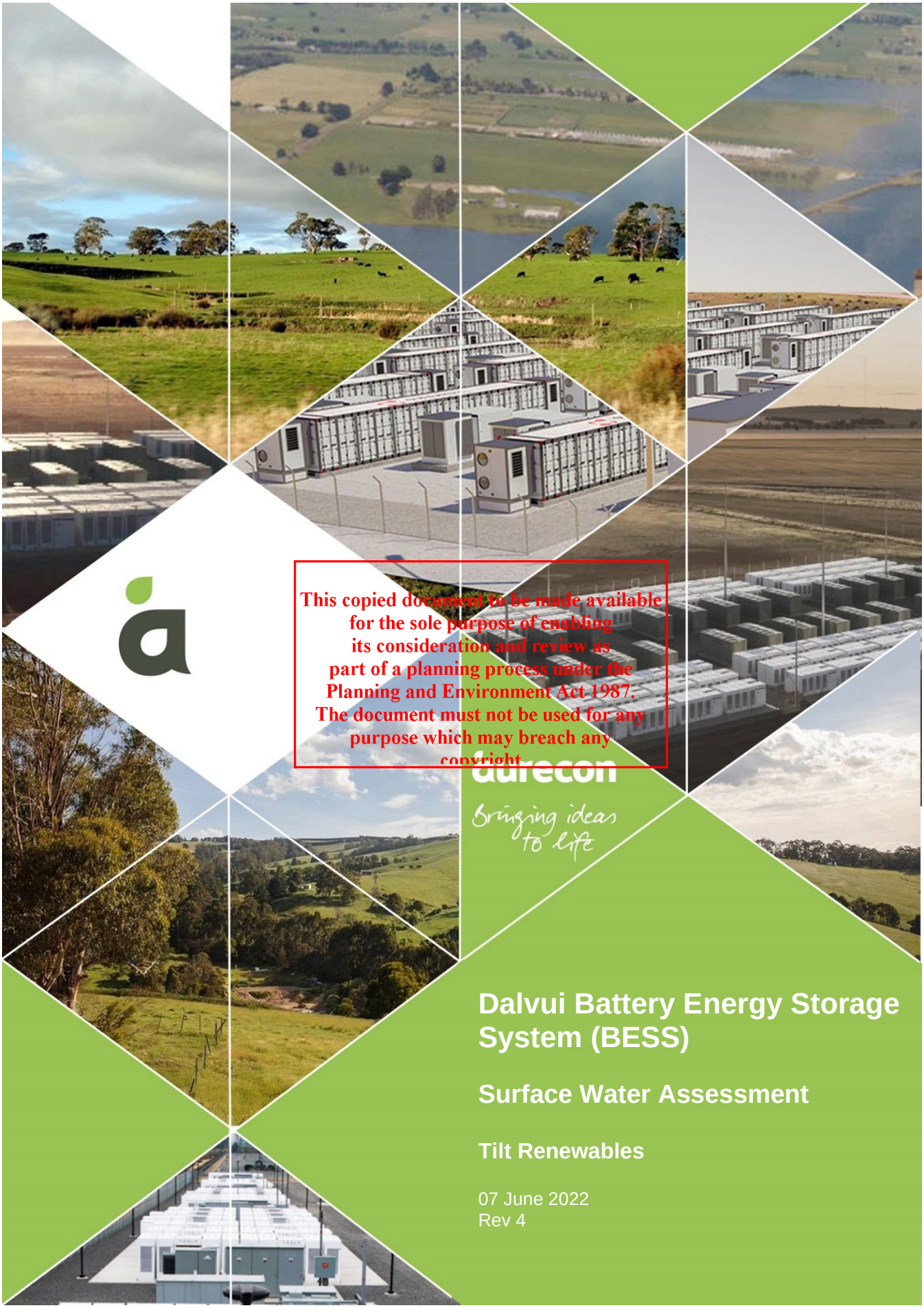

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Bringing ideas to life

Dalvui Battery Energy Storage System (BESS)

Surface Water Assessment

Tilt Renewables

07 June 2022
Rev 4

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Executive summary

Aurecon was commissioned by Tilt Renewables (the Proponent) to undertake a desktop surface water assessment to inform the design and planning approvals for a proposed Battery Energy Storage System (BESS) at Terang in western Victoria (the Project).

The Project is located on historically drained agricultural land within a semi-urban setting of transport corridors to the south of the Project Area and the township of Terang to the south-west of the Project Area. The nearest mapped local watercourse to the Project is an unnamed perennial tributary one km to the east and the nearest named major watercourse is Mount Emu Creek, four km to the south. Mount Emu Creek is a tributary to the Hopkins River and both watercourses have poor water quality.

Due to the distance, lack of direct connectivity of the Project area to the nearest watercourses and poor existing water quality, surface water quality potential impact risks caused by spills leaks, erosion and sediment mobilisation are considered low. Mitigation measures such as stormwater treatment and a Construction Environmental Management Plan (CEMP) are recommended.

Potential drainage and flooding impacts are anticipated due to the Project's location adjacent to a regional Warrnambool passenger trainline and relatively high annual rainfall rates all year round. Existing drainage flows towards the trainline and concept design drainage also directs flows towards the track. This impact could arise in both construction and operational phases of the Project.

Cumulative potential impacts on drainage and flooding were also assessed due to the Terang BESS development located north-west of the Project area. The drainage design for this project also has stormwater outflow to the land adjacent to the trainline.

It is recommended that flood modelling and stormwater quality modelling is undertaken to inform the preparation of a Drainage Management Plan and the plan will be incorporated into the detailed design. The drainage design should consider the infrastructure design manual, *Rail Safety Act 2006* and VicTrack Rail Development Interface Guidelines to divert stormwater flows and provide adequate storage for a 1% AEP flood event.

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1 Introduction

1.1 Project background

Aurecon was commissioned by Tilt Renewables (the Proponent) to undertake a surface water assessment to inform the design and planning approvals for a proposed Dalvui Battery Energy Storage System (BESS) at Terang in western Victoria (the Project).

The Proponent is proposing to install a BESS in Terang to help maintain reliable and affordable energy supply for Victoria. The intention is to combine the operation of the Dalvui BESS with renewable energy generation to support Victoria's transition away from reliance on fossil fuels.

Key scope items of the Project include:

- 66 kV transformer, 33 kV transformers and 3.5 MW inverters on a new concrete slab.
- Operations and Maintenance (O&M) Buildings (that includes storage and site office),
- Access track connecting the BESS Site from McCrae Street via an existing access point.
- Permanent site carparking.

It is anticipated that the construction activities for the Project will occur in the following phases over an 18-month period:

- Site mobilisation
- Site clearing, fencing and establishment of laydown area
- Construction of batteries, inverters and associated infrastructure
- Construction of transmission connection
- Testing and commissioning

1.2 Purpose and scope

The purpose of this surface water assessment was to provide a qualitative high-level review of local surface water conditions at the Project area to include flood, geomorphology, hydrology and water quality conditions using publicly available datasets and study reports applicable to the site.

This assessment provides a desktop review of local surface water conditions, identification of the applicable local and regional approvals / guidance relating to surface water, potential impacts associated with surface water and high-level mitigation measures to address these impacts.

The scope of the surface water assessment was to:

- Collate and evaluate freely available existing surface water information, including contemporary previous studies;
- Characterise the baseline condition of surface water features including drainage, flood, hydrology, meteorology and water quality;
- Carry out information gap analysis and assess information fitness for purpose and recommendations for additional work;
- Identify any constraints or opportunities of significance with regards to surface water features on a qualitative basis, to include, but not limited to:
  - Identification of protected aquatic features (e.g. groundwater dependant ecosystems, wetlands);
  - Flash flooding caused by heavy rainfall and compromise of the stormwater drainage network;
  - Flash flooding from the drainage areas in Terang such as Pejark Marsh and Lake Keilambete;

- Impacts to surface water quality and quantity environmental values such as aquatic ecosystems and recreational activities for waterbodies in the Project area;
- Impacts to fluvial geomorphology (e.g. erosion and sedimentation in waterbodies) due to the Project
- Main arterial network that is liable to flooding that service the proposed site (e.g. Princes Highway and Clyde Road Melbourne - Warrnambool Via Geelong and Colac Rail Line).

- Identify any mitigation measures that can be applied to reduce or eliminate these impacts.

The results of this surface water assessment identifies the potential impacts and mitigation measures in relation to surface water that will be incorporated into the Project's detailed design.

1.3 Limitations

The outcomes of this report are limited to the surface water assessment undertaken for the Project area and immediate surrounds. This report is limited to the scope defined in **Section 1.2**. Should further information become available regarding the conditions at the Project area, Aurecon reserves the right to review the report in the context of the additional information.

A reliance has been placed on existing information and a high-level desktop review has been conducted. Additional work on climate change and groundwater assessment did not form part of this scope.

No numerical flood, drainage, geomorphology, hydrology nor water quality modelling was completed to support this report.

1.4 Location

The Project is located to the north east of the township of Terang, in western Victoria, approximately 184 km west of Melbourne. The Project is proposed to be located within private property at 500 Dalvui Lane, which is situated to the east of the Terang Terminal Station (TGTS). Access to the Project area is proposed via McCrae Street. The location of the Project area is presented in **Figure 1**.

The Study area for the surface water assessment included all land relevant to the Project, specifically:

- The area of private land proposed for the location of the BESS;
- All land within the TGTS (as well as the adjoining AusNet land immediately to the north);
- Both sides of McCrae Street (east of the intersection with Littles Lane); and
- The section of rail reserve where it adjoins the Project area.

1.5 Relevant legislation and guidance

The work in this study will be conducted in accordance with the following guidance:

- Applying the Flood Provisions in Planning Schemes (DELWP, 2015);
- Corangamite Shire Environment and Sustainability Strategy 2014-2019 (or updated version);
- Corangamite Shire Flood Emergency Plan (2020);
- *Environment Effects Act 1978;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Environment Protection Amendment Act 2018;*
- Flood Advice Guidelines for Development from Corangamite Catchment Management Authority;
- Guidelines for Development in Flood Affected Areas (DELWP, 2019); and
- State Environment Protection Policy (Waters) 2018 (SEPP (Waters)).

2 Methods

The following data sources have been used to inform this assessment:

- Corangamite Flood Portal;
- Corangamite Shire Flood Emergency Plan;
- Corangamite Shire Council;
- Groundwater Dependent Ecosystem Atlas (BoM, 2021);
- MapShareVic – IWC2010, ISC2010, Wetlands;
- Protected Matters Search (DAWE, 2021);
- Terang BESS Drainage Management Plan (Spiire, 2020);
- Victoria Flood Database (DELWP, 2021);
- Victoria Unearthed - EPA Data; and
- Water Monitoring Data (DELWP, 2021).

Where conflicting information is presented in these data sources, the following prioritisation will be applied: local-scale, regional scale, state-scale, national-scale.

3 Baseline Site Conditions

This section of the report presents the results of the desktop review of surface water conditions existing on and in close vicinity to the Project area.

3.1 General site layout and topography

The Project is in the Corangamite Shire local government area. The Project area, as well as the area along McCrae Street and the land adjoining the rail corridor, is currently zoned as Farming Zone (FZ1). The TGTS is currently zoned Public Use Zone – Service and Utility (PUZ1).

The Project area is situated in the western volcanic plains of Victoria, and several examples of historic volcanic eruption points are located nearby including:

- Lake Keilambete (5 km to the north west of the Project area);
- Lake Terang (2 km to the south west); and
- Pejark Marsh (350 m to the north).

The latter two sites have since been extensively drained.

The topography of the Project area is gently sloping volcanic plain landform associated with the 'eruption point' (Pejark Marsh). Anecdotal evidence suggests that this area is still subject to regular inundation but the extent of waterlogged soil does not include the Project area. The slope has increased elevation in the north of the Project area of approximately 138 m above Australian Height Datum (AHD) and drops gradually to the southern extent to approximately 135 m AHD (**Figure 3-1a**). There are clear signs of ploughing and historic soil disturbance across the entirety of the Project area but most of the land has vegetative cover and no rill / gully erosion was observed during the site visit (4th February 2021).

This area consists of large paddocks and pugging by livestock was observed in the southern portion of the paddocks (**Figure 3-1**). In pugged soils, the top 4 - 8cm acts as a seal and prevents further rain from dispersing through the soil, reducing rainfall infiltration into the soil and increasing surface water runoff (Agriculture Victoria, 2020).

(a) Evidence of ploughed land and incline towards Pejark Marsh from the Project area (looking north)

(b) Soil pugging

Figure 3-1 Site topography

The Project area is bounded by a high voltage transmission line to the north, by a row of trees to the east, the Warnabool train track to the south with the access road McCrae Street to the south west and the T T S to the west. McCrae Street (east of Littles Lane) comprises an informal, grassed (unmade) road which is proposed to be upgraded to provide access to the Project Area. The TGTS is fenced around the perimeter. The inner

area of the TGTS comprises of hard surfaces and electrical infrastructure, while planted trees occur immediately inside the perimeter fence.

3.2 Meteorology

The site lies within the 'wet winter and low summer rainfall' climate zone and the South West District Forecast Region #9 of Victoria (BoM, 2021). The local meteorology station is Terang (Site ID 090077). Rainfall and evaporation data is summarised below in **Figure 3-2, Figure 3-3 and Figure 3-4**.

The annual total rainfall and pan evaporation for Terang from the 1965 – 2020 monitoring period are shown in **Figure 3-2**. A review of the historical data reveals a slightly variable annual rainfall rate (mean 779 mm). Wetter years may experience rainfall in excess of 780 mm (up to 1050 mm) and drier than average years record less than 780 mm (down to less than 500 mm). There is a visible decrease in annual total rainfall and years exceeding 800 mm in the last 25 years record compared to 1965 - 1995. Annual evaporation has been fairly steady throughout the monitoring period with a mean of 1,290 mm (SILO 2021, **Figure 3-2**). This balance of lower rainfall relative to evaporation explains the lack of permanent watercourses near the Project area.

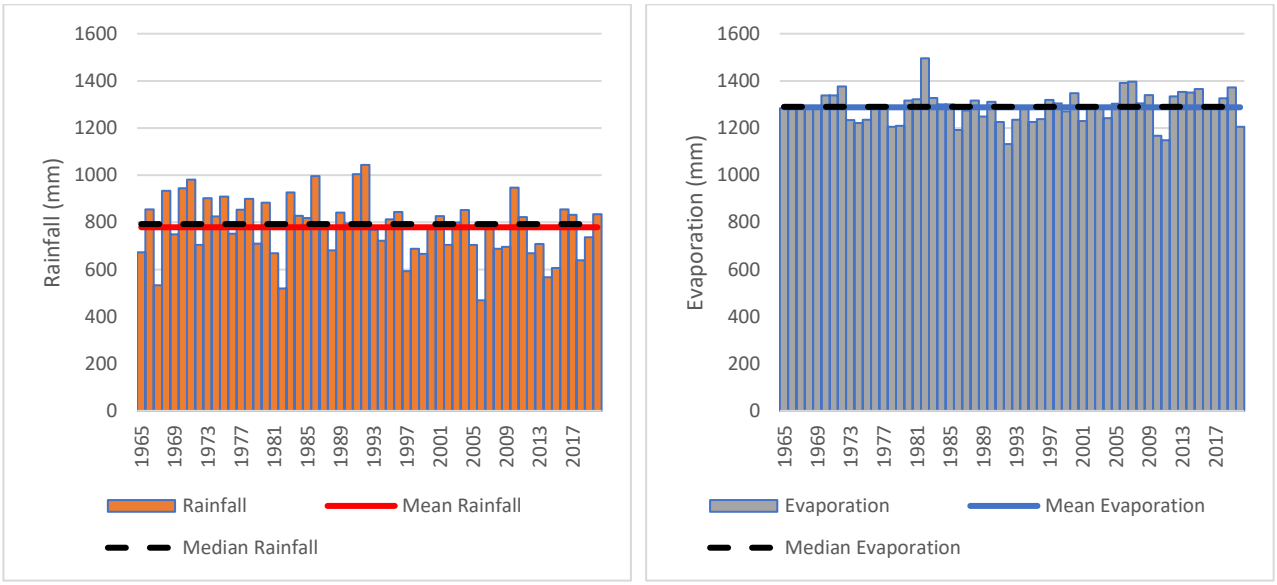


Figure 3-2 Annual rainfall and evaporation for Terang Station from 1965 to 2020 (Station Number: 09077) (BoM 2021, SILO 2021)

To better visualize the distribution of the rainfall and evaporation data for each calendar month, a box and whisker and plot chart was developed (**Figure 3-3**). This monthly breakdown suggests low variability but generally wetter than average conditions from May to October and distinctly drier conditions from November to April with February being the driest month.

Figure 3-3 also indicates that from September to April the average evaporation exceeds the average rainfall. Evaporation shows a strong seasonal trend with highest evaporation rates in January and lowest evaporation rates in June.

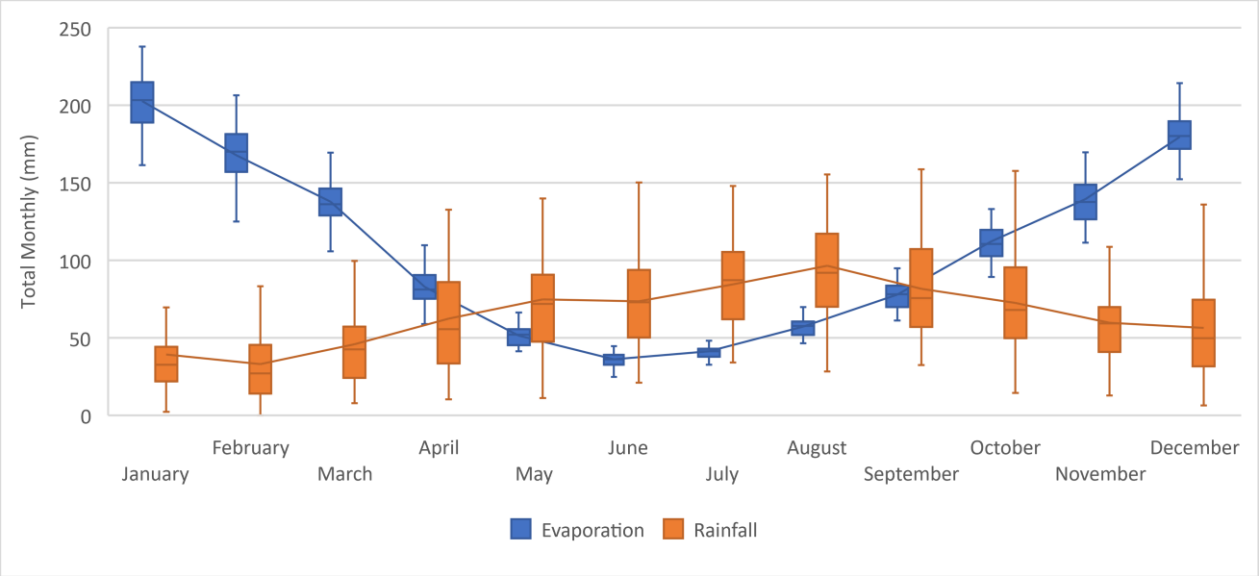


Figure 3-3 Monthly evaporation and rainfall from 1965 to 2020 at Terang Station (BoM 2021, SILO 2021)

Maximum and minimum monthly temperatures are presented in **Figure 3-4**. Analysis of all the climate records indicate a temperate climate with warm summers (average maximum temperatures around 24°C) and cooler winter periods with average maximum temperatures approximately 15°C and minimum temperatures averaging around 6°C.

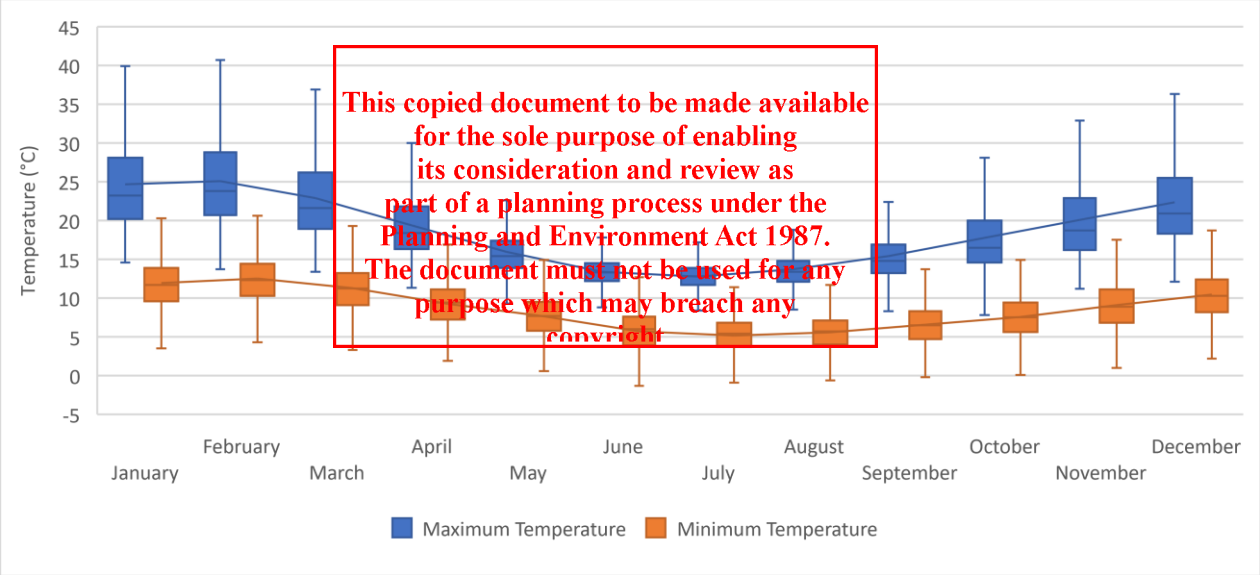


Figure 3-4 Daily maximum and minimum temperatures from 1965 to 2020 at Terang Station (BoM 2021, SILO 2021)

3.3 Site drainage

The Project area is on a gently sloping volcanic plain (**Figure 3-1a**). Any overland flow drainage on site would generally flow in the direction of the sloping topography (North to South) or follow preferential flow pathways created by localised land disturbances such as ploughing.

A site visit undertaken on the 3 February 2021 revealed that there were no apparent drainage systems on the Project area and a Dial Before You Dig Survey response from Corangamite Shire Council indicated that there were no underground storm water drainage systems located in this vicinity to the Project area (**Appendices**

Appendix A).

Directly to the west, between the Project area and the TGTS, there is a visible open channel / swale running from North to South that appears to redirect overland flow around the TGTS (approximate dimensions 130 m length and 2 m width). In addition on Littles Lane and McCrae Street, west and south of the TGTS, there is a residential area with pipes / culverts running under the residential driveways (approximate diameter 30 cm), with a shallow grassy open swale (approximate width 1 m) running parallel to the roads. The swales are fully covered in grass with no evidence of consistent presence of stormwater pooling (e.g. no transition to aquatic / semi-aquatic vegetation types nor sediment deposition).

3.4 Local flood characteristics

A desktop review of the Corangamite Flood Portal and the Victorian Flood Database databases indicated that there were no recorded floods (1 in a 100 year) for the Project area (**Appendix B**). However, Terang is subject to stormwater flooding caused by overland flow from localised rainfall. Terang is located in the "wet winter and low rainfall summer region" as discussed in **Section 3.2** and the area can receive rainfall all year round. When drains, culverts, and channels reach capacity, floodwater from the stormwater drainage system overflows onto adjacent land. Stormwater flooding can develop quickly from heavy localised rainfall, within 1.5 to 6 hours depending on the rainfall intensity (Corangamite Shire Council's Municipal Flood Emergency Management Plan, 2020).

A review of the Corangamite Shire Council's Municipal Flood Emergency Management Plan (**Appendix C**) indicates there were several flood risk areas within Terang due to stormwater and overland flow, however the Project area is not included in the Management Plan. The closest recorded flood risk area to the Project is located at the intersection of High Street / Princess Highway and Little Lane, approximately 380 m south-west of the south-west corner of the Project area. A site walkover conducted on 3February 2021 found no evidence of previous flooding on the Project area (e.g. pooled water, flood level boards, flood warning signs).

3.5 Local water features

The Regional catchment is the Hopkins River catchment. The Hopkins River Catchment covers roughly 968,000 ha and is largely cleared and used for agriculture except for a small area of forest in the north. The Merri River, and the Fiery and Mount Emu Creeks are other significant waterways within the Hopkins River catchment. There is an unnamed drainage channel approximately 1 km to the east of the Project which runs in a north south direction through Terang Harness Racing Club and is culverted under the Princess Highway. It appears to be ephemeral in nature and it is inferred to discharge into Mount Emu Creek during high flow conditions.

The Project is located within the Mount Emu Creek catchment, a sub-catchment of the Hopkins River. Both Mount Emu Creek and the Hopkins River have beneficial uses including water dependent ecosystems and species, agriculture and irrigation, human consumption of aquatic foods, industrial and commercial, water based recreation and spiritual and cultural uses which are protected within the Murray and Western Plains segment as defined by the *State Environment Protection Policy (Waters) (SEPP (Waters))* under the *Environment Protection Act 1970*.

3.5.1 Mount Emu Creek

Mount Emu Creek flows perennially and in a general north to south direction approximately 4 km to 4.7 km from the Project area.

Mount Emu Creek displays environmental values including aquatic ecosystem health, visual amenity, recreation uses including fishing (GHCMA 2021). Mount Emu Creek provides habitat to a number of threatened species including the Platypus (PlatypusSPOT, 2020). Despite this, Mount Emu Creek has been allocated the 'Very Poor' index of stream condition scores in the length closest to the Project area and further downstream a score of 'Poor' (**Appendix D**). Results from a water monitoring station in Mount Emu Creek are presented in **Table 3-1** with chromium, copper, lead, zinc, nitrogen, phosphorus, electrical conductivity and pH presenting outside normal ranges as defined by *SEPP (Waters),* reflecting poor water quality conditions.

3.5.2 Hopkins River

The Hopkins River is a major waterway draining the eastern part of the Glenelg Hopkins region and enters the Southern Ocean at Warrnambool (flowing generally southward). At the river's closest point to the Project area, the Hopkins River is approximately 20 km west. The Hopkins River supports rare and threatened fauna and flora as well as a range of recreational activities. The Hopkins River has been allocated the 'Very Poor' index of stream condition scores of in the length closed the proposal and further downstream a score of 'Poor'. Results from a water monitoring station in the Hopkins River are presented in **Table 3-1** with chromium, copper, zinc, nitrogen, phosphorus, electrical conductivity and pH presenting outside normal ranges as defined by *SEPP (Waters),* reflecting poor water quality conditions.

Table 3-1 Water quality of Mount Emu Creek and Hopkins River (DEWLP 2021)

	Total phosphorus (µg/L)	Total nitrogen (µg/L)	Turbidity (NTU)	Electrical conductivity (µS/cm)	pH (pH units)		Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Zinc (µg/L)
Segment: Lowlands of Glenelg, Hopkins, Portland and Corangamite and Millicent Coast basins	75th percentile	75th percentile	75th percentile	75th percentile	25th percentile	75th percentile	95th percentile	95th percentile	95th percentile	95th percentile
	≤55	≤1,000	≤20	≤2,000	≥7.0	≤8.0	≤1	≤1.4	≤3.4	≤8
MOUNT EMU CREEK @ TAROON (AYRFORD ROAD BRIDGE) Site: 236216 1991 - 2021	290	2,060	9	5,800	7.8	8.2	10	10	10	30
HOPKINS RIVER @ HOPKINS FALLS Site: 236209 1991 - 2021	200	1,975	10	5,180	8.0	8.3	6	7	2	30

Key: Outside range, Equal to range, Inside range

3.5.3 Wetlands and groundwater dependant ecosystems

A search of the Directory of Important Wetlands in Australia showed that there were no nationally important wetlands within a 5 km radius of the Project area. Lake Keilambete is located on the edge of this 5 km search radius to the north west and is a nationally important wetland (as shown in a Protected Matters Report, Appendix E). Lake Keilambete is fed by hypersaline groundwater discharge but it is up-gradient from the Project area and therefore not considered in the Impacts section of this report

Groundwater Dependant Ecosystems within a 5 km radius of the proposal includes Pejark Marsh, which is a low potential aquatic GDE but again is up-gradient of the Project area. Mount Emu Creek, which is a high potential aquatic GDE, has low hydraulic connectivity to the Project area by virtue of an absence of drainage network discharging from the Project area catchment to the creek (Appendix F).

4 Potential impacts and mitigation

This section outlines the potential impacts to surface water based on the Project and outlines the implications under relevant environmental legislation and policy.

As a final design footprint for the Project will be determined once a BESS supplier is confirmed, this section of the report presents the high-level potential impacts of the Project and outlines further investigations / recommendations to minimise surface water impacts.

4.1 Concept Design

The main BESS infrastructure is proposed to be located within the area of land currently used for agricultural purposes, with connection into the adjoining TGTS.

Construction and operational vehicle access is proposed via McCrae Street (currently unmade) which will require some works to provide access to the Project area (culvert and driveway crossover design to be completed in detailed design) (Appendix G). The proposed internal access route starting at the end of McCrae Street runs along the southern extent of the Project area, running parallel to the trainline, north of this is an open drainage channel. The north of the Project area is bounded by the transmission line running in a North-East direction.

The current indicative project layout includes two concrete pads, a western and an eastern pad, where the batteries and infrastructure will be housed. These pads are separated by an open drainage channel running approximately in a north-south direction (Appendix G).

A stormwater concept design has been prepared for the purpose of this assessment with a final plan to be conducted as part of the final design. The stormwater concept design consists of all cross drainage and diversion channels that have been designed for 1% AEP storm event. All earthworks pads are set a minimum 300 mm above 1% AEP flood levels as shown in the BESS Layout Services Civil and Stormwater Site Layout plan (Appendix G). Onsite stormwater pipes that discharge into the water quality devices are designed with diameters of 375 and 450 mm. Pipe drainage and one reinforced concrete box culvert which runs under the surface road on the southern edge of the site boundary are designed to convey 20% AEP flows.
Screening vegetation may be installed on the southern, northern and western boundaries of the Project Area (Appendix G).

4.2 Potential impacts and mitigation measures analysis

This section identifies and then proposes measures to prevent or minimise the adverse impacts of the Project on the surface water environment. Because the impacts of the Project can differ in different phases, the impacts are assessed and measured for both construction and operation phases. The potential impacts of the Project during construction and operation and proposes mitigation measures to reduce surface water impacts are summarised in Table 4-1.

Table 4-1 Potential impacts and proposed mitigations

Discipline	Stage	Activity/Item	Potential Impact	Mitigation Measures
Surface Water	Construction	Earthworks	Mobilisation of sediments into receiving watercourses, deposition of fine sediments impacting aquatic flora and fauna (particulate bound contaminants e.g. metals). Potential for elevated oxygen demand leading to decreased dissolved oxygen.	Any potential impacts are required to adhere to the *Environment Protection Act 1970* and *SEPP (Waters)* to reduce surface water pollution. The Project is considered to pose a minimal-low impact to surface water quality due to the distance and lack of tributaries located in the vicinity of the Project area. It is unlikely that the Project area and Mount Emu Creek are hydraulically connected. It should be considered to avoid earthworks, if possible, during forecast high rainfall events to reduce the risk for large areas of exposed soil during overland flow events. An Erosion and Sediment Plan should be prepared to reduce soil erosion and mobilisation of sediments from the site during earthworks activities. Mitigation measures such as choosing low rainfall periods (Section 3.2) for earthworks should be taken. The Erosion and Sediment Plan should be prepared in accordance with the Environment Protection Authority (EPA) Publication 1894 for additional mitigation measures.
		Disturbance of contaminated land	During earthworks, it is possible to intersect and expose contaminated land. As a result, contaminant-laden runoff could potentially discharge to nearby watercourses.	The Project is considered to pose low impact to surface water quality as no identified contaminated site is located within the Project area and watercourses are not within the immediate vicinity. A Construction Environmental Management Plan (CEMP) should be prepared to identify the steps necessary to reduce the spread of unknown contamination finds. If soil contamination is uncovered, soil sampling should be undertaken to identify the level of contaminated material and adequate disposal methods should be taken in accordance with the EPA Publication 480.

Discipline	Stage	Activity/Item	Potential Impact	Mitigation Measures
		Leaks and Spills	Potentially harmful chemicals and substances (e.g. oils, grease, petrol etc.) accidentally released during construction spills or as result of maintenance works, refuelling and inappropriate storage or handling. This could lead to soil contamination, leaching of contaminants to groundwater or conveyance of contaminants in runoff to waterways. Cement / concrete has a high oxygen demand and high levels of chromium and aluminium, which are highly toxic to aquatic ecosystems. If these materials are not set prior to rainfall events, there is potential for runoff from the site into watercourses. Leakage from construction worker ablation and toilet facilities or wastewater collection points with subsequent runoff into receiving watercourses.	The Project is considered low impact to surface water quality due to the distance and lack of watercourses located in the vicinity of the Project area. Cement and concrete should be laid around dry meteorological conditions to reduce the mobilisation risk to local watercourses. A CEMP should be prepared to reduce the possibility of leaks and spills. Hazardous chemicals should be bunded on site when in storage. Adequate emergency equipment, such as spill kits, should be kept on-site to deal with emergency spills. Refer to EPA Publication 480. Inspection of ablation facilities and wastewater storage systems on a regular basis should be performed. Leakages should be reported immediately and remediated.
		Waste Disposal	Solid waste from construction (e.g. plastic covers, excess materials, bottles, and food wrappers) not disposed of properly can have a negative impact to local watercourses. Impacts include the reduction of environmental values such as visual amenity and aquatic ecosystem health. Solid waste may be ingested by local fauna.	The Project is considered to pose a low impact to surface water quality due to the distance and lack of watercourses located in the vicinity of the Project area. A CEMP should be prepared to outline proper waste management / disposal procedures. Procedures should be constructed in accordance with EPA Publication 1820.
		Water Use	If water is needed for construction uses (e.g. cement mixing), and the wastewater from these activities is not disposed of properly, surface runoff may transport contamination to local watercourses.	The Project is considered to pose a low impact to surface water quality due to the distance and lack of watercourses located in the vicinity of the Project area. A CEMP should be prepared to outline proper wastewater storage and disposal procedures. Procedures should be constructed in accordance with EPA Publication 1820.
		Dewatering	If dewatering is required to remove groundwater from excavated areas and the water is not disposed of properly, surface runoff may transport potential contamination to local watercourses.	The Project is considered to pose a low impact as dewatering is not anticipated. Excavations should be kept shallow, where possible, to avoid the requirement for dewatering and a CEMP should be prepared to outline appropriate water disposal procedures, should dewatering be required.

Discipline	Stage	Activity/Item	Potential Impact	Mitigation Measures
	Operation	Batteries Leak	There is a very low potential for batteries to leak chemicals which would be collected by the drainage system when overland runoff occurs and transport these chemicals to nearby surface watercourses.	The proposal is considered to pose a low impact to surface water quality due to the distance and lack of watercourses located in the vicinity of the Project area. Design should consider the risk of chemical leakage from batteries and provide appropriate mitigation, if required. Water treatment devices on site could attenuate the off-site export of battery chemicals within the drainage system and provide treatment of particulate-bound contamination in runoff from the BESS sites.
		Pesticides Use	If pesticides are used to reduce weeds within the site, runoff could cause the pesticides to be transported to nearby watercourses.	The proposal is considered to pose a low impact to surface water quality due to the distance and lack of watercourses located in the vicinity of the Project area. Possible mitigation measures may include using pesticides during dry periods and the use of lower-risk pesticides. Design should include water treatment devices within the drainage system to treat particulate-bound runoff from the BESS sites. Refer to EPA publication 1226 for WSUD stormwater treatment options.
Drainage	Construction	Stockpiles	Stockpiles would obstruct overland flows. Stockpiles are susceptible to mobilisation of sediments during rain and transported to watercourses.	The Project is considered to pose a low impact as the area of the Project is small and the excavation depths are shallow, therefore, requirement for stockpiles would not be extensive and there are no known watercourses in the immediate vicinity. A CEMP should be prepared to outline stockpile management. Minimising the number of stockpiles and the area / duration that the stockpiles are exposed would reduce risk. Locating stockpiles away from drainage lines and where they will be least susceptible to wind erosion. Refer to EPA Publication 480 for further mitigation measures.
		Earthworks	Earthworks will alter the topography and create changes to local flow paths. It may also cause areas for water to pool and create localised flood impacts.	The Project is considered to pose a low impact as excavations are the only anticipated earthworks and there are no requirements for tunnelling. Foundations are anticipated to be constructed to a depth of 600 mm, excavations should be kept to less than 1 m deep, where possible.
	Operation	Concrete Foundations	An increase of impervious surface area due to construction of the concrete foundations will increase surface runoff.	The Project is considered to pose a medium impact surface runoff and if not managed during storm events, has a potential to be destructive to infrastructure at BESS and the surroundings. Drainage designs should adhere to the Infrastructure Design Manual (2020) in particular, the major drainage system is designed to convey flows resulting from storms with a 1% Annual Exceedance Probability (AEP) and minor drainage system to convey flows from storms of at least 20% AEP.

Discipline	Stage	Activity/Item	Potential Impact	Mitigation Measures
		Concrete Foundations	The construction of the Project has potential to impact drainage and groundwater recharge to the Pejark Marsh (Low Potential GDE – regional study) due to disturbance of sub-surface flow pathways leading to an increase of flow from the saturated zone under the marshland onto the Project area.	The Project is considered to pose a minimal-low impact as Pejark Marsh is up-gradient from the Project area, rarely inundated and its classification is a Low Potential GDE. Thus, no further mitigation measures are proposed.
		Concrete Foundations	An increase of impervious surface area due to construction of the concrete foundations will increase surface runoff. The natural flow pathway flows towards the railway tracks to the south.	The Project is considered to pose a high impact as the natural overland flows are in the direction of the tracks and the proposed designs utilised the natural site slope for gravity drainage. It is a requirement under the *Rail Safety Act 2006* (221ZI) that *"A person must not cause or permit drainage or sewage to flow or empty from any premises occupied by the person onto land or premises the property of Rail Track".* The VicTrack Rail Development Interface Guidelines state that *"the stormwater management system must be designed to divert stormwater runoff from the entire property subject to development (including all pervious and impervious areas) away from the rail corridor."* The drainage design as part of the detailed design should consider the aforementioned guidelines to divert stormwater flows and provide adequate storage for a 1% AEP flood event.
Flood	Construction	Stockpiles	Mobilised sediments from stockpiles during storm events may cause localised flood impacts from blockages of drainage paths.	The Project is considered to pose low impact as the area of the Project is small and therefore requirement for stockpiles are not extensive and there are no known watercourses in the immediate vicinity. A CEMP should be prepared to outline stockpile management. Minimising the number of stockpiles and the area / duration that the stockpiles are exposed would reduce risk. Locating stockpiles away from constructed drainage lines as part of the final stormwater design, and where they will be least susceptible to wind erosion. Refer to EPA Publication 480 for further mitigation measures.
		Earthworks	Earthworks will alter the topography and create changes to local flow paths. It may also cause areas for water to pool and create localised flood impacts.	The Project is considered to pose a low impact as excavations are the only anticipated earthworks and there are no requirements for tunnelling. Foundations are anticipated to be constructed to a depth of 600 mm, excavations should be kept to less than 1 m deep, where possible.

Discipline	Stage	Activity/Item	Potential Impact	Mitigation Measures
	Operation	Concrete Foundations	An increase of impervious surface area due to construction of the concrete foundations will increase surface runoff and possibly cause localised flood conditions.	The Project is considered to pose a medium impact, if surface runoff is not managed, during storm events, flooding may occur and this has potential to be destructive to infrastructure at BESS and the surroundings. Drainage designs should adhere to the infrastructure design manual in particular, the major drainage system is designed to convey flows resulting from storms with a 1% AEP and minor drainage system to convey flows from storms of at least 20% AEP.
		Concrete Foundations	An increase of impervious surface area due to construction of the concrete foundations will increase surface runoff. The natural flow paths flow towards the railway tracks to the south. Potential flooding can occur on the tracks.	The Project is considered to pose a high impact as the natural overland flows are in the direction of the tracks and during storm events this may cause flooding onto the tracks. It is a requirement under the *Rail Safety Act 2006* (221ZI) that *"A person must not cause or permit drainage or sewage to flow or empty from any premises occupied by the person onto land or premises the property of Rail Track"*. The VicTrack Rail Development Interface Guidelines state that *"the stormwater management system must be designed to divert stormwater runoff from the entire property subject to development (including all pervious and impervious areas) away from the rail corridor"*. The drainage design as part of the detailed design should consider the aforementioned guidelines to divert stormwater flows and provide adequate storage for a 1% AEP flood event.

4.3 Cumulative Impacts

Another BESS project (the Terang BESS Project) is proposed to be located approximately 200 m to the north-west of the Dalvui BESS. The Terang BESS involves installing up to 78 BESS containers on 1.4 ha of land at 70 Littles Lane, north of the TGTS. The Drainage Management Plan for the Terang BESS (Spiire 2020) was made publicly available on DELWP Planning Website during the Project's public exhibition period and was assessed to determine cumulative impacts with the Project. These cumulative impacts are summarised below.

4.3.1 Surface water quality

Similar to the Project, the Terang BESS is also located on agricultural land. The construction and operation of the Terang BESS will have similar potential impacts to surface water quality as to the impacts discussed in **Table 4-1** due to the Projects similarities, including reduction of water quality due to leaks and spills during construction and operation and mobilisation of sedimentation during construction. Due to the distance of the Terang BESS to local watercourses, surface water quality impacts are considered low. Mitigation measures for impacts for surface water quality include stormwater treatment system (i.e. swales and a sediment basin) (Spiire 2020).

4.3.2 Drainage

The Terang BESS will also have an increase of impervious surface areas resulting in higher levels of runoff and increase overland flows and reduce recharge to shallow aquifers. It is understood that drainage during construction is planned to be managed through a CEMP for the Terang BESS and drainage during operation is to be managed by the Terang BESS Drainage Management Plan (Spiire 2020). A value of 0.04 m^3/s was adopted for pre-developed flows of the existing drain that drains off the Terang BESS Project area (Spiire 2020). Developed flows are to be maintained at 0.04 m^3/s using a retention basin with a 100-year peak flow maximum of 1 m^3/s. This drain flows towards the train tracks, but this is not considered to pose any additional risk above pre-developed conditions.

4.3.3 Flooding

The drainage management plan for the Terang BESS states that developed flows of the drains will be 0.04 m^3/s with a 100-year peak flow maximum of 1 m^3/s. The destination of the drain flows is the area of land adjacent to the train track, but these potential impacts are not considered to pose any additional risk above pre-developed conditions.

4.4 Residual impacts

4.4.1 Surface water

Due to the distance of the Project and the Terang BESS Projects to local watercourses, lack of sensitivity in nearest water courses and mitigation measures adopted in the form of stormwater treatment for both Projects, surface water quality residual impacts are not anticipated.

4.4.2 Drainage

The drainage management plan for the Terang BESS indicates that there is a drain located adjacent to the Project area which flows towards the train track in the south and current concept drainage designs for the Dalvui BESS also indicated the drainage system discharging water towards the train track. Under the *Rail Safety Act 2006* (221ZI) and instruction from the VicTrack Rail Development Interface Guidelines there are expected to be residual drainage impacts because of combined runoff flows from the two BESS Projects. Drainage impacts can be mitigated through appropriate drainage design as part of the detailed design for the project, as stated in **Section 4.2**.

4.4.3 Flooding

As a result of anticipated residual impacts from drainage there are also considered to be residual localised flooding impacts on the train track due to the outflows of the drainage systems for both Dalvui and Terang BESS projects. Drainage impacts can be mitigated through appropriate drainage design as part of the detailed design for the project, as stated in **Section 4.2**.

5 Conclusions

5.1 Summary of findings

Aurecon undertook a desktop surface water assessment of the Dalvui site proposed for development of a BESS at Terang. The impact assessment and proposed mitigation measures are presented in **Section 4**. The findings are as follows:

- Surface water quality impacts due to sediment mobilisation and possible chemical spills and leaks are considered low due to distance and lack of sensitive water courses. Appropriate management of the identified surface quality impacts will result in minimal residual surface water quality impacts.
- Drainage impacts on the train track to the south are anticipated as the drainage outflows are adjacent to the train track and therefore additional management is required to reduce impacts.
- As a result of predicted drainage impacts, there are also anticipated residual flooding impacts.

Further recommendations for the management of these impacts are discussed below.

5.2 Gap analysis and further recommendations

It is recommended that flood modelling and stormwater quality modelling is undertaken to inform the preparation of a Drainage Management Plan and the plan will be incorporated into the detailed design. The flood modelling and stormwater quality modelling can be undertaken during the detailed design of the Project. The drainage design should consider the infrastructure design manual, *Rail Safety Act 2006* and VicTrack Rail Development Interface Guidelines to divert stormwater flows and provide adequate storage for a 1% AEP flood event.

6 References

Agriculture Victoria (2020) What is Pugging? Available online at: https://agriculture.vic.gov.au/livestock-and-animals/dairy/managing-wet-soils/pasture-recovery-after-pugging-damage/what-is-pugging

Aurecon (2021) Protected Matters Search. Appendix F in Flora and Fauna Assessment Report. Dalvui BEES.

BoM (2021) Regional Water Information. Water Assessments. Available online at: Water assessments: Water Information: Bureau of Meteorology (bom.gov.au).

Corangamite CMA (2021) Corangamite Flood Portal. Available online at: https://www.ccmaknowledgebase.vic.gov.au/flood/

DELWP (2021) MapshareVic. Available online at: https://mapshare.vic.gov.au/MapshareVic/

DELWP (2011) Water Measurement Information. Available online at: https://data.water.vic.gov.au/

GHCMA (2021) Mt Emu Creek. Available online at: https://www.ghcma.vic.gov.au/projects/current-projects/mt-emu-creek

Hydra (2021) Integrated Water Management Search Tool. Available online at: http://mapshare.maps.vic.gov.au/gvh270hydra/

NatureKit (2021) Biodiversity values and investment prospects search tool. Available online at: https://www.environment.vic.gov.au/biodiversity/naturekit

Spiire (2020) Terang BESS Drainage Management Plan

PlatypusSPOT (2021) Latest Sightings. Available online at: https://platypusspot.org/view-sightings

Victoria Unearthed (2021) Land, groundwater, past business listings and contamination search tool. Available online at: https://www.environment.vic.gov.au/sustainability/victoria-unearthed

Appendices

Appendix A

Corangamite Shire Council Stormwater Drainage

DBYD JOB NUMBER: 21011064 **SEQ NUMBER: 106185931**

CORANGAMITE SHIRE

ADVERTISED PLAN

0 300 m

Create Date: 4/2/2021

Disclaimer

Whilst every care is taken by Corangamite Shire Council (CSC) to ensure the accuracy of this data, CSC makes no representation or warranties about the accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and liability for any expenses, losses, damages and costs that may be incurred as a result of the use of this data.

Exact positions of all assets must be confirmed on-site using suitably qualified and licensed contractors.

Dig Site

Drainage Network

Appendix B
Flood Database Searches

Corangamite Flood Portal

500 dalvui lane, ternag

Flood Information | Save | Print | Legend | Tools | Back to website

Flood information

Based on the best available regional flood data, generate a report using a property address.

Simply type an address in the **'Address Search'** box above and hit enter

Alternatively, you can use the advanced selection modes below.

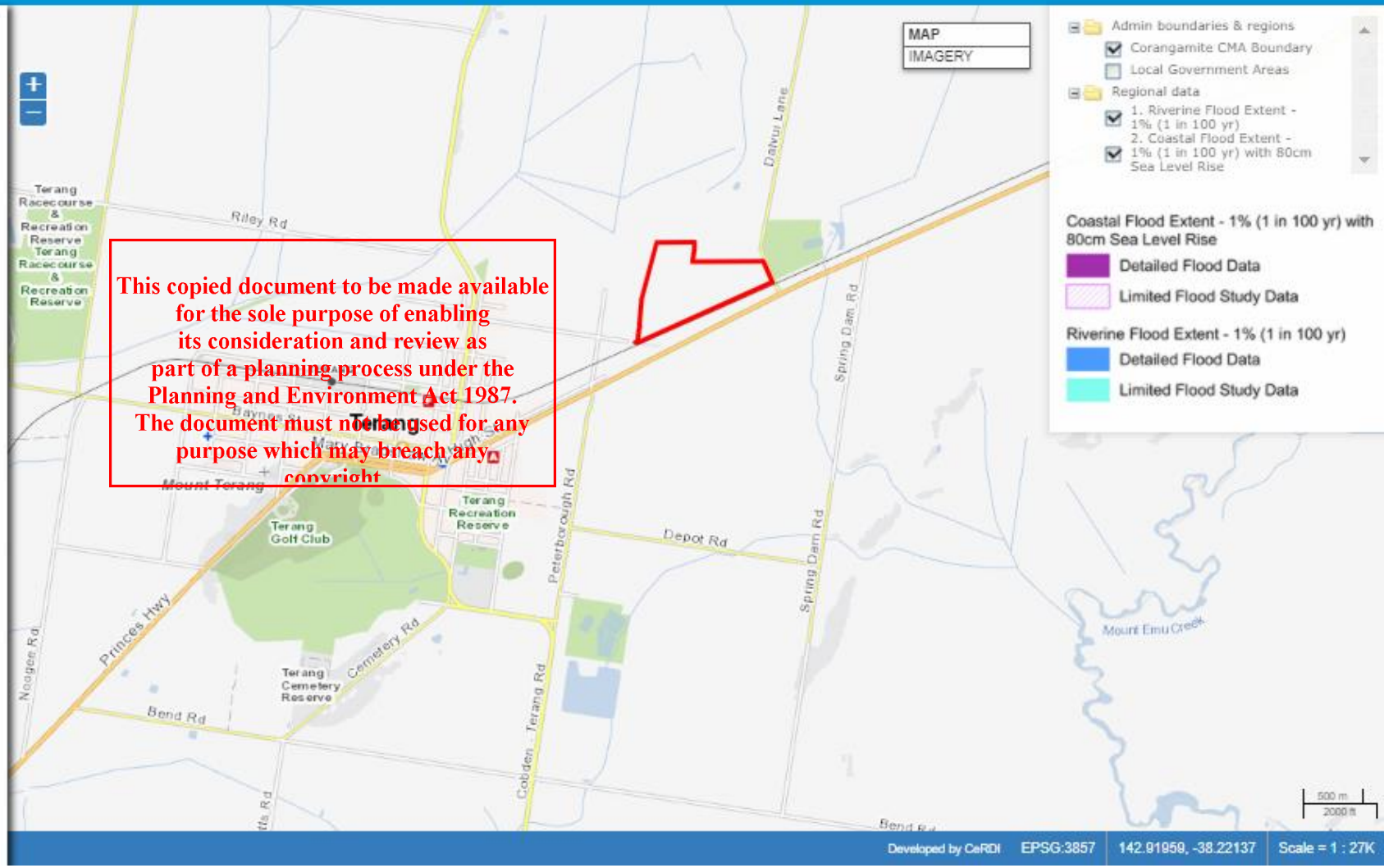
Property selection Mode

1. Use **Zoom / Pan** *(click mouse button and drag)* - Works best when you are at a scale where property boundaries are visible.
   OR
   Use Address Search (above) to key in an address or location - then *hit Enter*
2. Click on the 'Property Summary' button below
3. Click on a property in the map to select it. This step may take a few seconds to complete.
4. Property will be higlighted in red and report summary will be shown in this panel.
5. A full report can be generated using the 'View full Property Flood Information Report' option

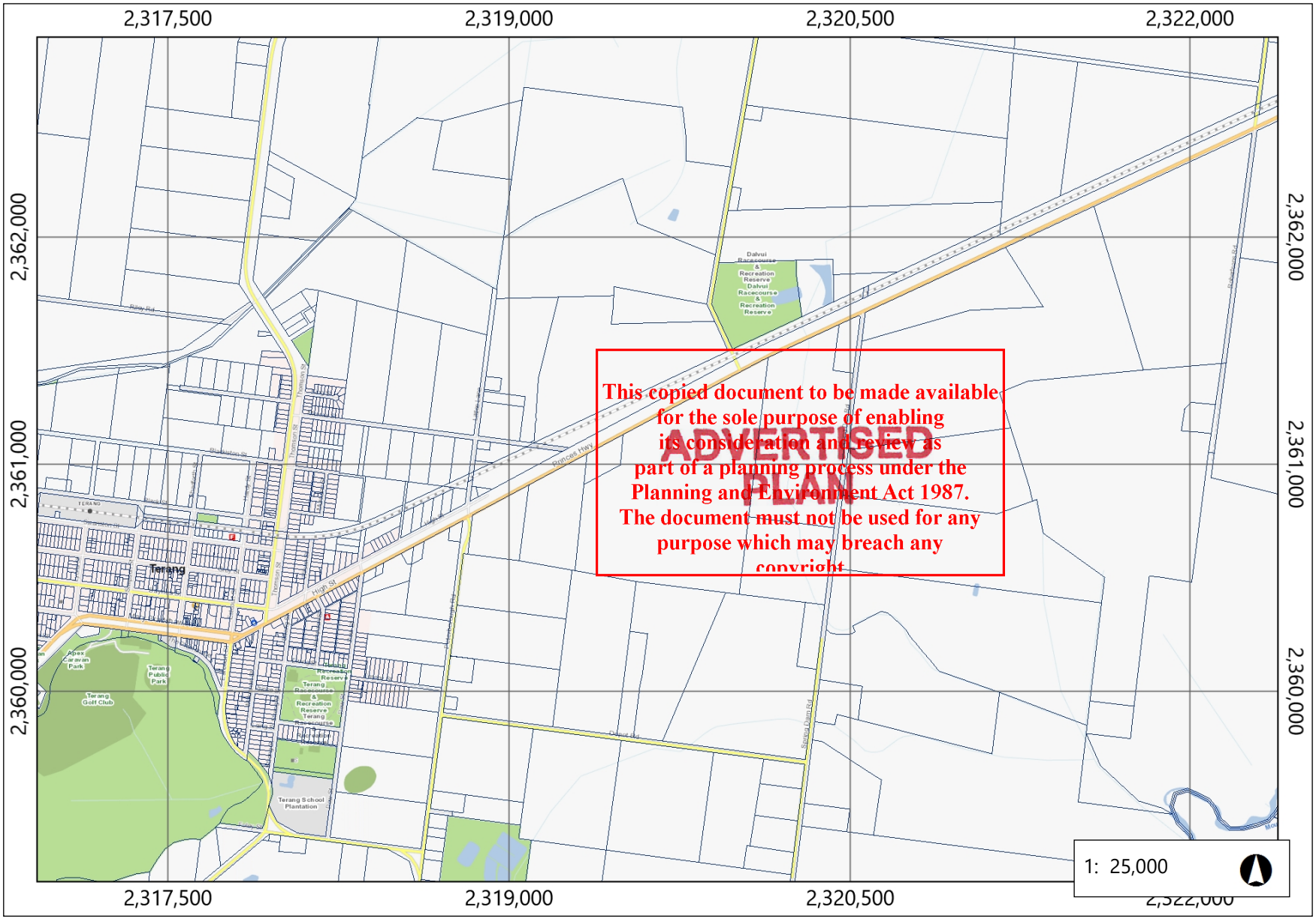
Property summary

Address	500 DALVUI LANE TERANG 3264
Parcel SPI	2\PS543673

No detailed flood study data available for the selected area



1 in 100 year flood map



Legend

- Victoria Flood Database - Statistical extents for 1 to 100 years floods
- Case Studies (View only)

1,270 0 635.00 1,270 Meters

GDA_1994_VICGRID94

Map Created on 04-Feb-2021

VICTORIA State Government | Environment, Land, Water and Planning

Appendix C

Corangamite Municipal Flood Emergency Plan Map

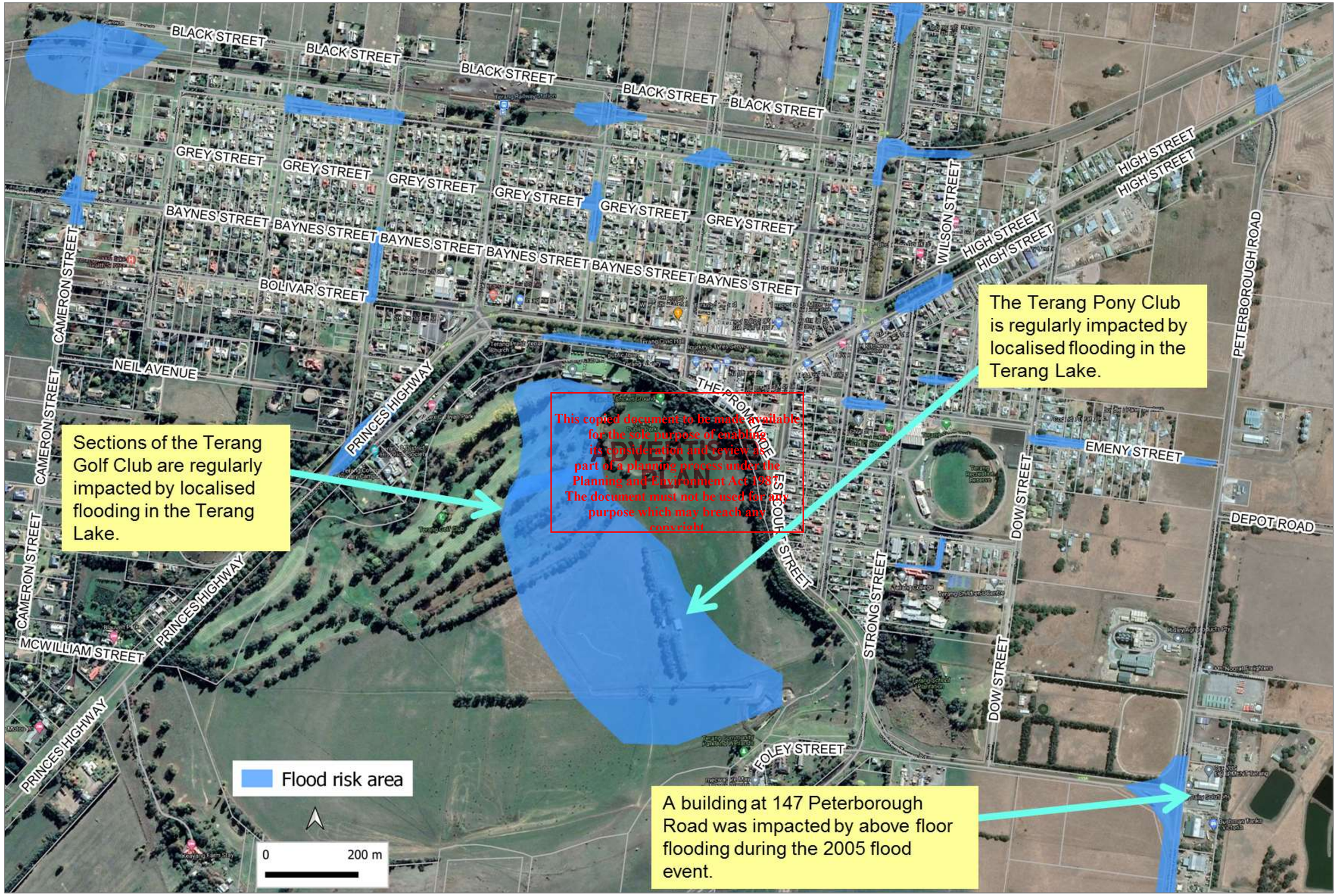
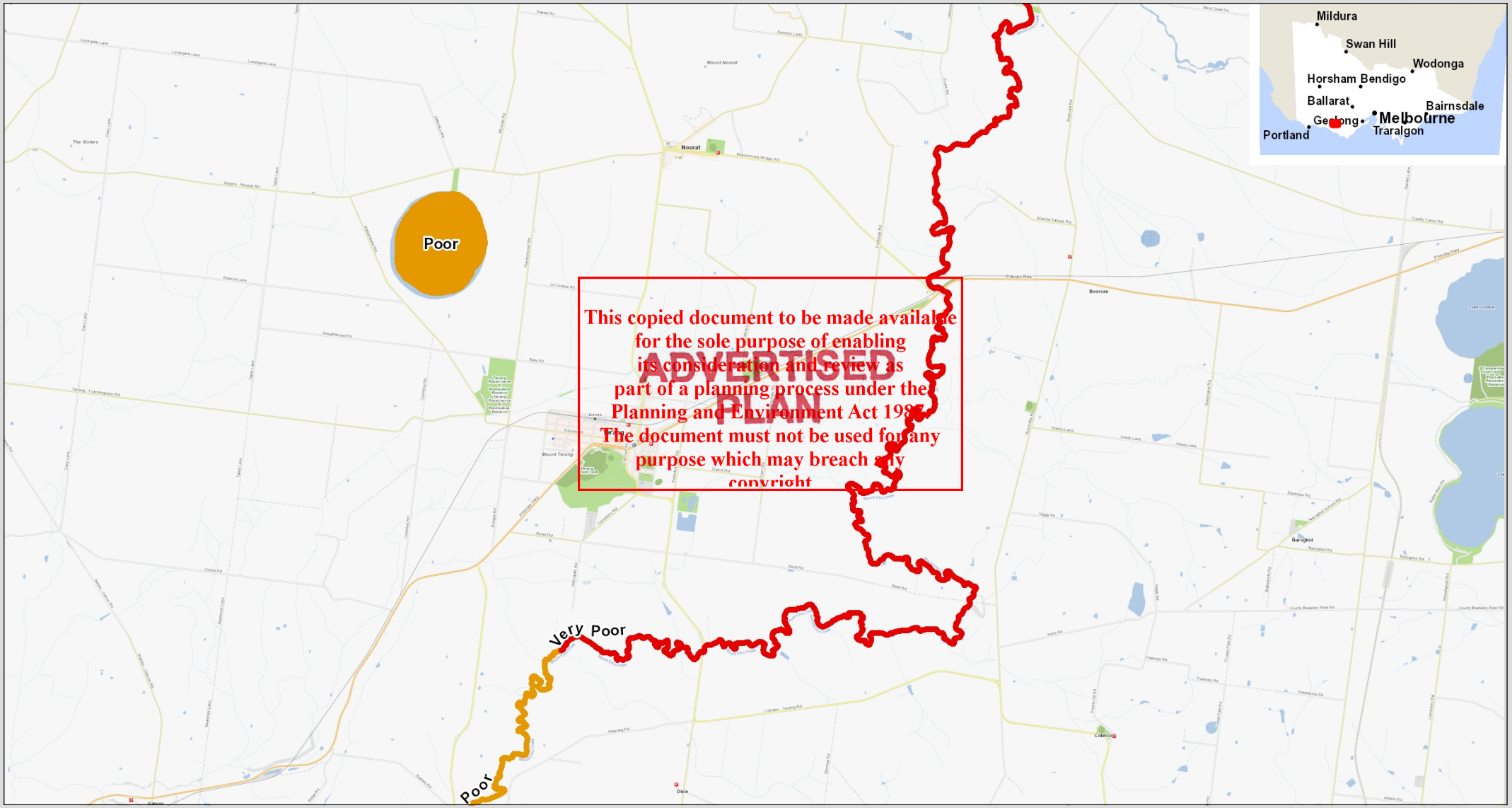


Figure 29. Area at risk of stormwater flooding in Terang (source VICSES Terang Unit).

Appendix D
Vic MapShare ISC2010 and IWC2010 Scores

ISC2010 and IWC2010 Scores

MapShare



5,080 0 2,540 5,080 Meters

GDA_1994_VICGRID94

Map Created on 13-Feb-2021

Scale 1:100,000

ISC2010 and IWC2010 Scores

MapShare

Legend

ISC2010 Scores

- Insufficient Data
- Excellent
- Good
- Moderate
- Poor
- Very Poor

IWC2010 Scores

- Excellent
- Good
- Moderate
- Poor

Estuaries

Appendix E
Protected Matters Search Tool Report

Australian Government

Department of Agriculture, Water and the Environment

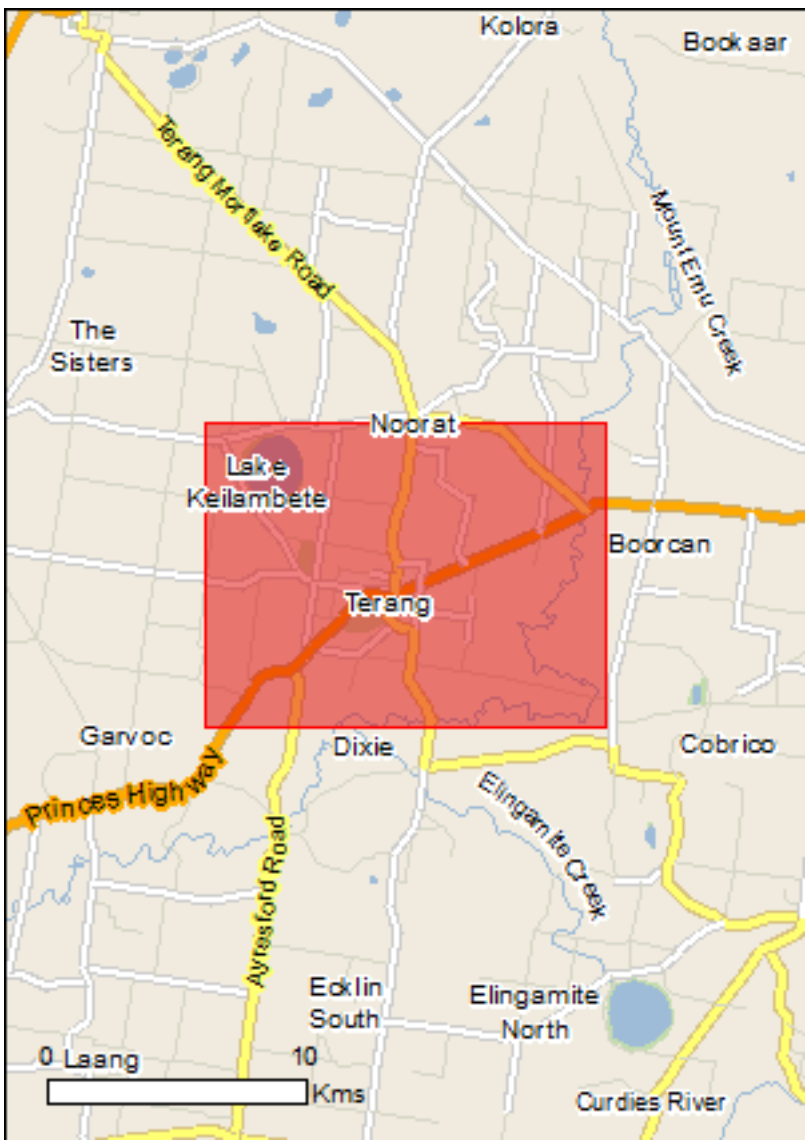
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

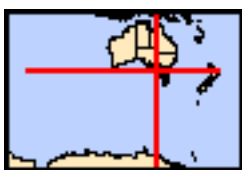
Report created: 13/02/21 17:26:04



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	34
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	28
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
[Litoria raniformis](#) Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Insects		
[Synemon plana](#) Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
[Antechinus minimus maritimus](#) Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
[Isoodon obesulus obesulus](#) Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat may occur within area
[Miniopterus orianae bassanii](#) Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
[Potorous tridactylus tridactylus](#) Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
[Amphibromus fluitans](#) River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
[Dianella amoena](#) Matted Flax-lily [64886]	Endangered	Species or species habitat may occur within area
[Glycine latrobeana](#) Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat likely to occur within area
[Lachnagrostis adamsonii](#) Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat may occur within area
[Lepidium hyssopifolium](#) Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat may occur within area
[Poa sallacustris](#) Salt-lake Tussock-grass [24424]	Vulnerable	Species or species habitat may occur within area
[Prasophyllum frenchii](#) Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
[Prasophyllum spicatum](#) Dense Leek-orchid [55146]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Rutidosis leptorhynchoides Button Wrinklewort [67251]	Endangered	Species or species habitat may occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Taraxacum cygnorum Coast Dandelion [2508]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
Eulamprus tympanum marnieae Corangamite Water Skink, Dreeite Water Skink [64487]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
West Victoria RFA	Victoria

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Cobden-Terang Volcanic Craters	VIC

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-38.19383 142.85583,-38.19383 142.99505,-38.27622 142.99505,-38.27622 142.85583,-38.19383 142.85583

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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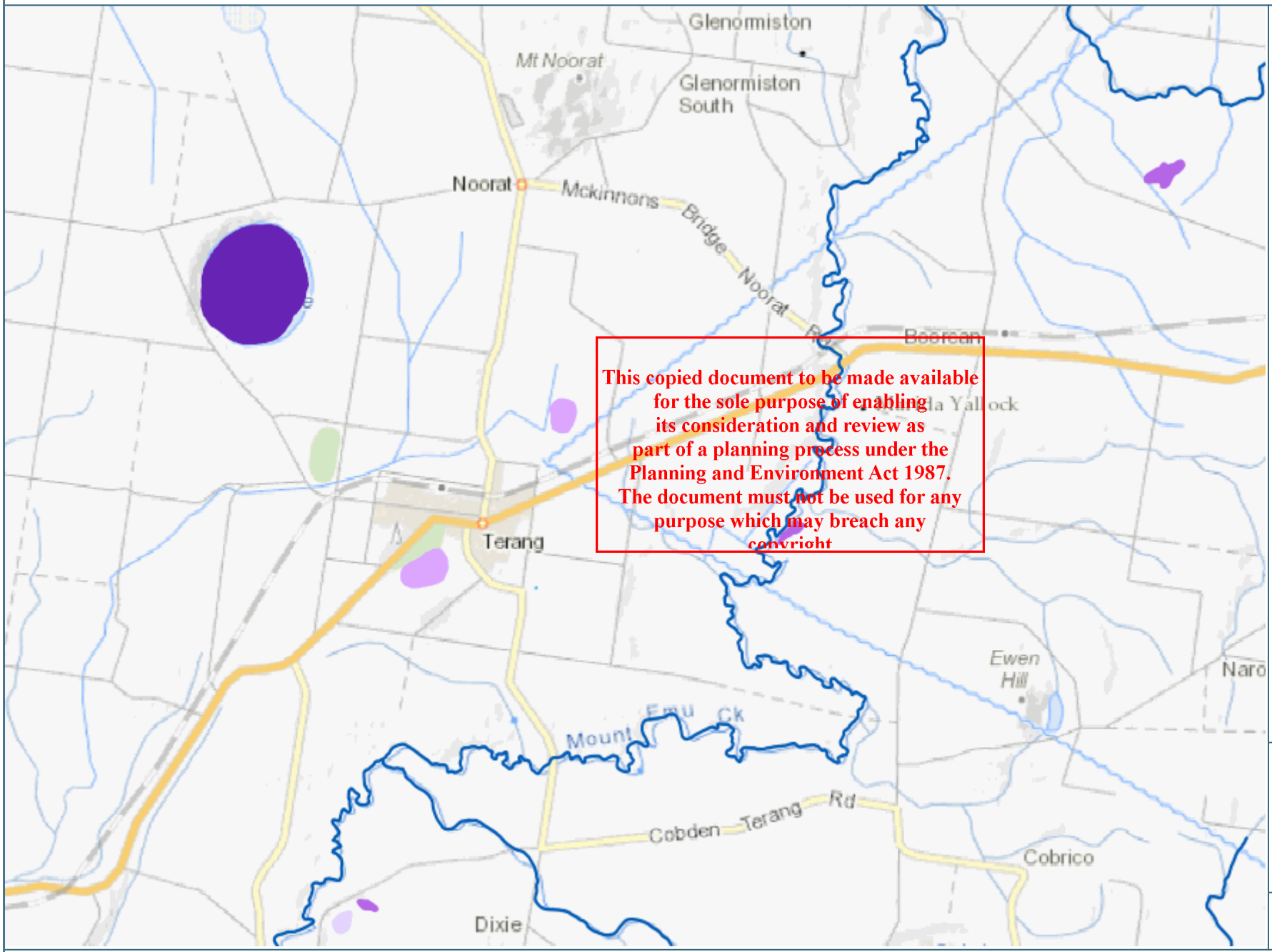
Appendix F
Groundwater Dependent Ecosystem Atlas

Australian Government
Bureau of Meteorology

ADVERTISED PLAN

Groundwater Dependent Ecosystems Atlas - Aquatic GDE



Aquatic GDE

- Known GDE (regional study)
- High potential GDE (regional study)
- Moderate potential GDE (regional study)
- Low potential GDE (regional study)
- Unclassified potential GDE (regional study)
- High potential GDE (national assessment)
- Moderate potential GDE (national assessment)
- Low potential GDE (national assessment)
- Unclassified potential GDE (national assessment)

N

1:110,866

Kilometres 2 4

Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: Click here

Australian Albers GDA94

Date: 3 February, 2021

Appendix G
Concept Design - Stormwater

INSET PLAN
1:500

TERANG BESS SITE
1:500

NOTES:

1. FINAL LAYOUT TO BE CONFIRMED DURING DETAIL DESIGN PHASE.
2. WATER QUALITY DESIGN TO BE UNDERTAKEN AT DETAIL DESIGN PHASE. INDICATIVE DESIGN SHOWN FOR CONCEPT PHASE.
3. ALL CROSS DRAINAGE AND DIVERSION CHANNELS HAVE BEEN DESIGNED FOR 1% AEP STORM EVENT.
4. ALL EARTHWORKS PADS ARE SET A MINIMUM 300mm ABOVE 1% AEP FLOOD LEVELS.
5. FINAL LAYOUT WILL COMPLY WITH 10m FIREBREAK BUFFER FROM SCREEN VEGETATION TO BESS INFRASTRUCTURE AS PER CFA GUIDELINES.
6. WATER TANK WILL COMPLY WITH THE CFA GUIDELINES.

LEGEND

- PROPOSED DRAINAGE CULVERTS
- PROPOSED DRAINAGE CHANNEL
- 4m VEGETATION SCREENING AREA
- WATER TANK (NOTE 6)

5 0 10 20m
SCALE 1:500

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ADVERTISED PLAN

CLIENT

REV	DATE	REVISION DETAILS	APPROVED
1	2021-02-12	REISSUE FOR CONCEPT DESIGN	NW
0	2021-02-01	FINAL ISSUE FOR CONCEPT DESIGN	NW
A	2020-12-18	DRAFT ISSUED FOR REVIEW	SW

SCALE	SIZE
AS SHOWN	A1

DRAWN: J. NICKELS
DESIGNED: J. NICKELS
REVIEWED: A. NADAYAVE

CONCEPT
NOT FOR CONSTRUCTION

APPROVED
DATE
G. THRAVES

PROJECT: DALVUI BESS LAYOUT SERVICES

TITLE: BESS LAYOUT SERVICES
CIVIL AND STORMWATER SITE LAYOUT

DRAWING No.	PROJECT No.	AREA	TYPE	DISC	NUMBER	REV
	510875	0000	DRG	CC	0001	1

Plot Date: 2021-02-11 18:02:00 Office: Sydney Filename: pw:\Designshare.au.aurecon.info.PW_AUDC1.01\Documents\Projects\510xx\510875 - Terang BESS Layout Services\5.Deliver design\S03 Drawing_CC\510875-0000-DRG-CC-0001.dwg

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