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Darnum BESS Project Surface Water Assessment



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Executive Summary

Introduction

Darnum BESS Pty Ltd (ACN 694 489 828) as trustee of the Darnum BESS Trust (ABN 84 694 489 828) (the Applicant), owned by Samsung C&T Renewable Energy Australia (SREA) (ABN 74 661 046 331), is proposing the development of the Darnum Battery Energy Storage System (the Project) at 875 Darnum Shady-Creek Road, Shady Creek, Victoria (the Project Site). The Project would involve the construction, operation and decommissioning of a Battery Energy Storage System (BESS) with a delivery capacity of up to approximately 200 Megawatts (MW) / 800 MWh (4 hr).

This Surface Water Assessment has been prepared as part of the Planning Permit Application for the Project which will be assessed by the Minister for Planning as the responsible authority. GreenSmart Consulting has been engaged to prepare the Surface Water Assessment.

Regulatory Framework

The surface water management framework applicable to the project site is governed by various Victorian legislation and relevant industry guidelines. Key regulatory instruments include:

- *Planning and Environment Act 1987* (Victoria), along with its associated instruments, including the Victoria Planning Provisions and the Baw Baw Planning Scheme.
- *Environment Protection Act 2017* (Victoria), including the subsidiary *Environment Protection Regulations 2021* and its associated Environment Reference Standards.
- *Water Act 1989* (Victoria) and *Planning and Environment Act 1987* (Victoria) which govern the management of waterways and floodplains, including the approval of works on designated waterways administered by the relevant Catchment Management Authority.
- Various applicable industry best practice guidelines relevant to water quality and environmental management.

These instruments collectively establish the statutory context for surface water management during the planning, construction, and operational phases of the project.

Existing Surface Water Environment

The Project Site, which is currently used for grazing, is located within the Latrobe Basin, a key sub catchment of the West Gippsland Catchment, extending from the forested uplands of the Baw Baw Plateau and Strzelecki Ranges to the Gippsland Plains. The Latrobe River and its tributaries, including the Tanjil, Tyers, Morwell and Moe rivers, which flow generally southeast, provide vital inflows to storage reservoirs, support irrigation and power generation.

The Project Site contains an unnamed designated ephemeral waterway in the north-western portion of the site, which conveys runoff toward a downstream designated waterway located approximately 400 m to the west. This broader drainage system flows in a south-westerly direction and ultimately discharges to the Moe River approximately 8 km to the south.

In addition, two DEECA-mapped wetlands associated with existing farm dams are present in the north-western portion of the Project Site and represent localised surface water features within the site.

Site elevations indicate that Shady Creek, located approximately 2.2 km to the north-east, is hydrologically disconnected from the Project Site.

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Grazing and other agricultural land uses have influenced the condition of local waterways, with Shady Creek and the Moe River classified as being in “moderate” and “poor” condition, respectively (Index of Stream Condition Scores, 2010). Flood advice (Appendix I) received from West Gippsland Catchment Management Authority (WGCMA) suggests that riverine flooding is not a likely issue at the Project Site. In addition, a review of the Baw Baw Planning Scheme mapping confirms that the site is not affected by flood-related overlays, including the Land Subject to Inundation Overlay (LSIO), Floodway Overlay (FO) or Special Building Overlay (SBO).

Proposed Water Management Approach

A conceptual stormwater management strategy has been developed in accordance with Victorian best practice principles and will be refined at detailed design stage. The strategy incorporates:

- Diversion of clean external catchment runoff around the facility to maintain existing drainage patterns;
- Collection and conveyance of developed-area runoff via graded surfaces, swales and localised drainage infrastructure;
- Treatment of runoff through a dedicated bioretention and detention storage system designed to achieve best practice pollutant load reduction targets;
- Provision of detention storage to attenuate peak flows prior to controlled discharge at the nominated legal point of discharge;
- Inclusion of an outlet isolation mechanism to enable temporary containment of runoff in the event of an emergency spillage or water incident;
- Targeted at-source controls for areas with higher contamination risk (e.g. transformer/substation areas);
- Measures to minimise impervious area and promote infiltration where feasible; and
- Inspection and maintenance procedures to ensure ongoing system performance.

Hydrologic and hydraulic modelling is recommended to be undertaken at detailed design stage to demonstrate no adverse flood impact at the site boundary or downstream receiving environment.

During construction, temporary erosion and sediment controls will be implemented through a Construction Environmental Management Plan (CEMP).

Residual Impacts and Mitigation Measures

Predicted residual impacts to surface water resources have been assessed in relation to stormwater flow, water quality, and potential effects on nearby watercourses and downstream receiving environments, based on the implementation of the proposed water management strategy.

Construction Phase Risks

During construction, primary risks to surface water arise from vegetation clearing, ground disturbance, earthworks, soil compaction, and infrastructure installation. These activities may increase runoff potential, expose soils, and elevate the risk of erosion and sediment mobilisation into adjacent watercourses. Additionally, accidental spills of fuel, lubricants, herbicides, and other construction-related chemicals could pose a risk to surface water quality.

These impacts are expected to be minor and readily manageable through the application of temporary soil and water management measures incorporated within the Construction Environmental Management Plan (CEMP) and use of industry best practice.

Operational Phase Risks

Operation of the facility will introduce areas of increased imperviousness, which has the potential to elevate runoff volumes and pollutant loads relative to the existing grazing condition.

However, the proposed stormwater management strategy incorporates diversion of external flows, dedicated water quality treatment, detention storage and controlled discharge. Subject to confirmation through detailed hydrologic and hydraulic modelling, the development is intended to limit peak discharge rates at the site boundary to pre-development conditions and avoid deterioration of discharged water quality.

The conceptual stormwater management strategy has been developed to maintain existing drainage patterns, including the location of discharge points. While minor modifications to internal drainage and flow paths will occur within the Project Site, no material changes to external discharge points are currently proposed. Confirmation of discharge locations and flow characteristics will be undertaken during detailed design.

Accordingly, no significant residual operational impacts to surface water quantity or quality are anticipated.

Downstream Considerations

Given the implementation of diversion, treatment, detention and controlled discharge measures, the Project is not expected to result in adverse impacts to downstream watercourses, including the unnamed ephemeral designated watercourse or the Moe River.

Overall, the proposed development is considered capable of meeting relevant Victorian water management objectives during both construction and operation.

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Abbreviations

AEP	annual exceedance probability
ARI	average recurrence interval
ASL	above sea level
BBPS	Baw Baw planning scheme
BESS	battery energy storage system
CEMP	construction environmental management plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DO	dissolved oxygen
EC	electrical conductivity
EPA	Environment Protection Authority
EP Act	<i>Environment Protection Act 2017</i> (Victoria)
ERS	Environment Reference Standard
ESCP	erosion and sediment control plan
EV	environmental value
GP	gross pollutants
Ha	hectares
ISC	index of stream condition
Km	kilometres
L	litre
LGA	local government area
m	metres
mBGL	metres below ground level
MNES	matters of national environmental significance
MW	megawatt
MWH	megawatt hour
O&M	operations & maintenance
P&E Act	<i>Planning and Environment Act 1987</i>
Syn-Con	synchronous condenser
TDS	total dissolved solids
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
SREA	Samsung C&T Renewable Energy Australia
USBPEMG	<i>Urban Stormwater- Best Practice Environmental Management Guidelines</i> (Victorian Stormwater Committee 1999)

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VPP

Victoria Planning Provisions

WGCMA

West Gippsland Catchment Management Authority

WQO

water quality objective

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1. Introduction

Darnum BESS Pty Ltd (ACN 694 489 828) as trustee of the Darnum BESS Trust (ABN 84 694 489 828) (the Applicant), owned by Samsung C&T Renewable Energy Australia (SREA) (ABN 74 661 046 331), is proposing the development of the Darnum Battery Energy Storage System (the Project) at 875 Darnum Shady-Creek Road, Shady Creek, Victoria (the Project Site). The Project would involve the construction, operation and decommissioning of a Battery Energy Storage System (BESS) with a delivery capacity of up to approximately 200 Megawatts (MW) / 800 MWh (4 hr).

This Surface Water Assessment has been prepared as part of the Planning Permit Application for the Project which will be assessed by the Minister for Planning as the responsible authority. GreenSmart Consulting has been engaged to prepare the Surface Water Assessment. The key objectives of this Surface Water Assessment are to:

- Describe the regulatory framework relevant to the Project.
- Describe and characterise the existing surface water environment relevant to the Project using publicly available mapping and data bases.
- Identify and assess potential qualitative surface water impacts of the Project construction and operation.
- Identify appropriate mitigation and management measures, as well as any residual impacts on the surface water environment for the Project.

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I. Site Location and Context

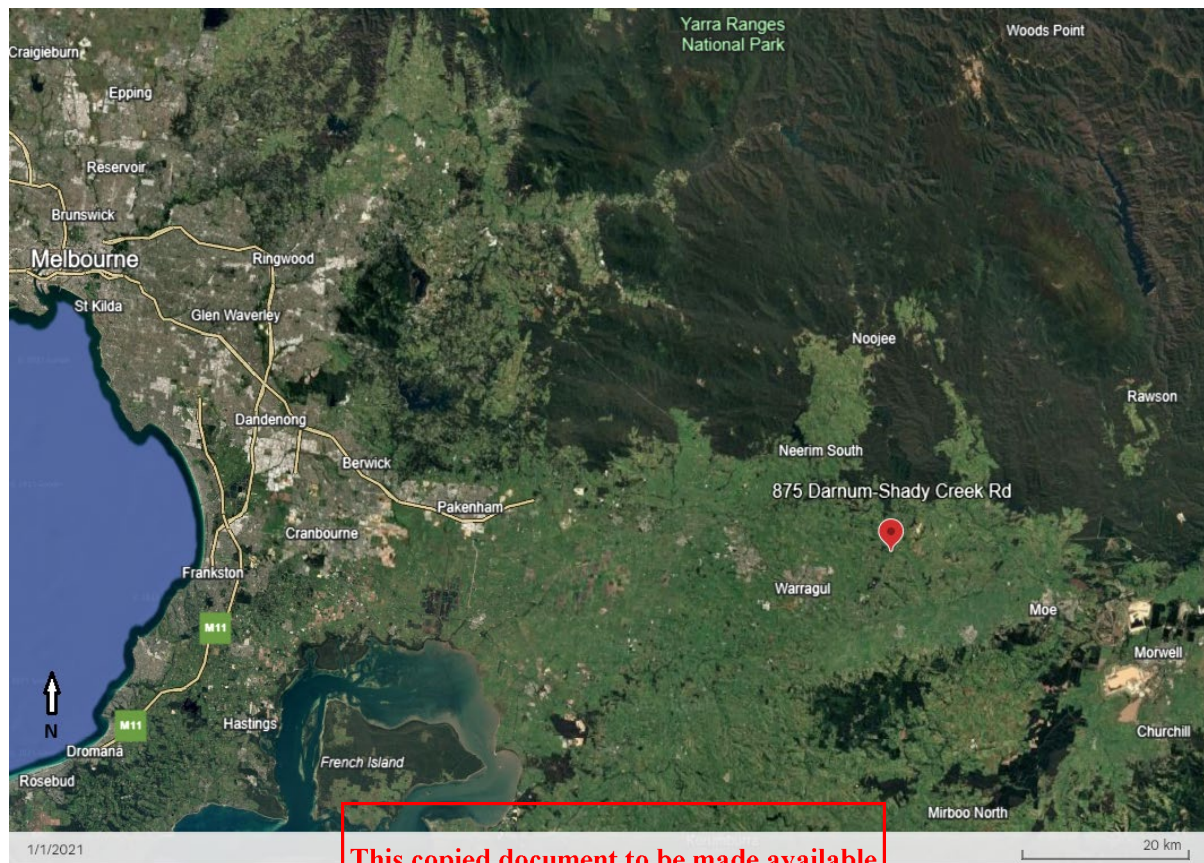
The Project Site is located at 875 Darnum Shady-Creek Road, Shady Creek within the Gippsland region of Victoria approximately 70 km north of Darnum and 18 km north-east of Warragul. The Project Site comprises a single parcel of privately owned freehold land having a total area of approximately 51.2 ha and is located in the Baw Baw Shire Local Government Area (LGA) and falls under the jurisdiction of the West Gippsland Catchment Management Authority (WGCMA) (Figure 1).

The Project Site primarily comprises an open, agricultural landscape which has been largely cleared of native vegetation and is used for grazing. Patches of native vegetation and some scattered trees are present in the north-west, north-east, and south-east parts of the site. There are three shelterbelts of planted trees (Monterrey Cypress) within the central parts of the Project Site and two water bodies (farm dams) near the northern and western site boundaries.

The Project Site currently contains a dwelling, large shed and cattle yard which are located on the eastern part of the site and are accessed off Darnum-Shady Creek Road. The existing dwelling, large shed and cattle yard will remain on site during the operation of the BESS. The closest dwelling to the proposed Project is the host dwelling located approximately 160 m east of the BESS compound, with the closest neighbour dwellings located approximately 450 m west and approximately 480 m north of the BESS compound.

The existing 220 kV overhead transmission line (Yallourn Power Station to Rowville Terminal Station) into which the Project would connect, runs across the southern part of the Project Site within an easement held by Ausnet.

Figure 1: Project Site in Regional Context



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II. Assessment Methodology

The Surface Water Assessment was undertaken using a structured approach comprising the following key components:

- A desktop review of existing publicly available spatial data, site survey information, and other relevant resources to establish the regulatory framework and characterise existing surface water conditions.
- Identification of potential impact pathways related to both construction and operational phases of the Project.
- Development of a water management strategy, including a concept stormwater design, aligned with current industry best practices; and
- A qualitative assessment of residual impacts to surface water resources, aimed at evaluating the significance of potential effects and identifying any additional mitigation requirements.

III. Proposed Development

The Project would comprise the following key components:

- A 200 MW / 800 MWh BESS compound, including 196 battery modules, 49 x 6.36 MVA step-up transformers and associated cabling.
- An onsite 33/220 kV Project substation, including a 240 MVA HV transformer, switchgear / control rooms, harmonic filters and associated infrastructure.

- A switchyard to facilitate Project connection into the National Electricity Market (NEM) via the existing 220 kV overhead transmission line (Yallourn Power Station to Rowville Terminal Station) that runs across the southern portion of the Project Site.
- Ancillary infrastructure and works including site access, internal access roads and parking, operations and maintenance facilities, stormwater infrastructure, noise walls and radiant heat walls, fire water tanks and systems, asset protection zones, lightning protection, lighting, signage, security devices and fencing, landscaping/screening.

The Project would have a total development footprint of approximately 7 ha, inclusive of approximately 2.5 ha for the BESS compound and approximately 3.0 ha for the Project substation, switchyard and grid connection including asset protection zones, along with approximately 1.5 ha for ancillary infrastructure external to the main infrastructure compounds.

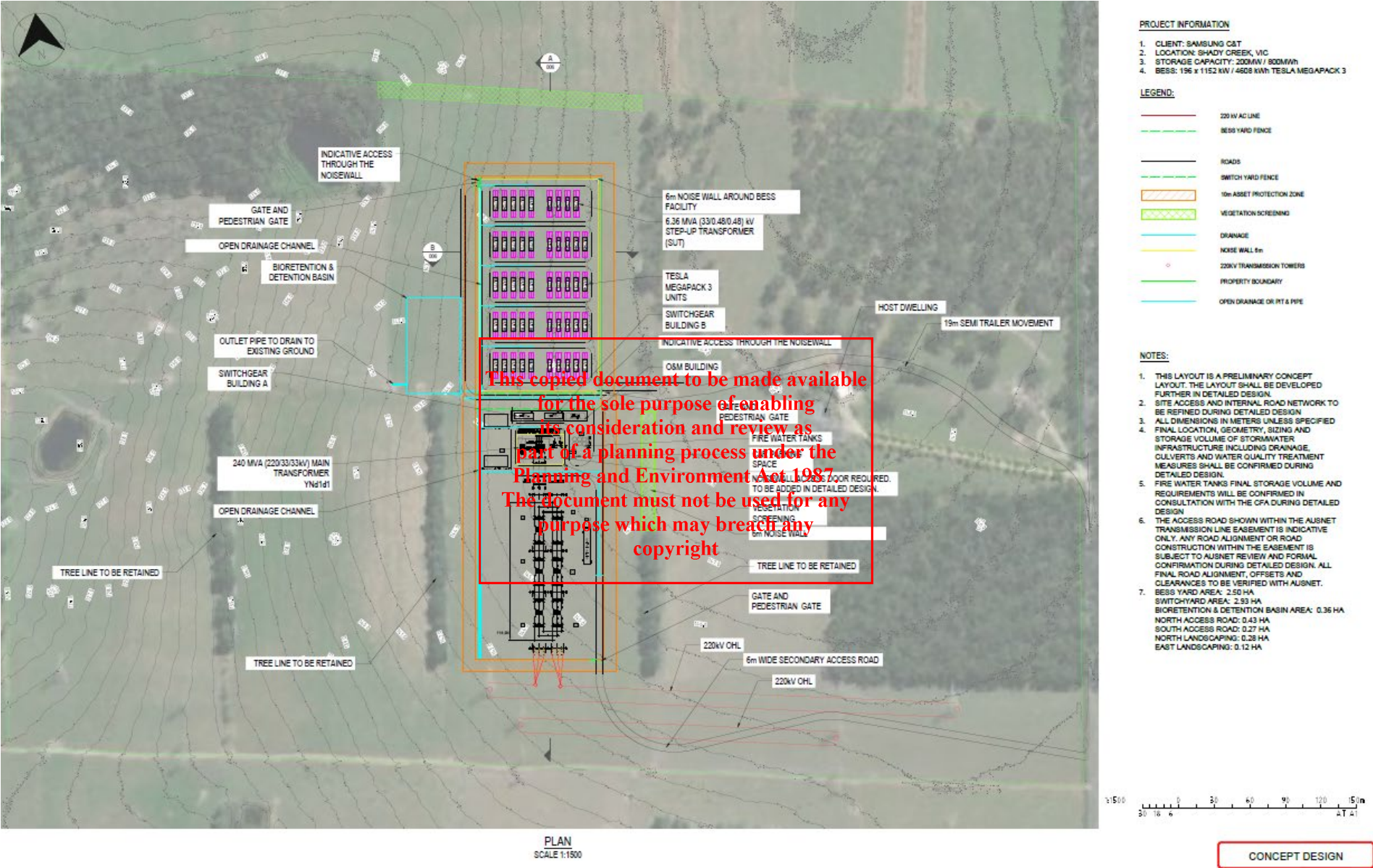
Access to the Project is planned directly from Darnum-Shady Creek Road via a modified version of the existing crossover which currently provides access to the host dwelling and associated farm infrastructure and operations. A secondary access is also proposed off Darnum-Shady Creek Road near the southern site boundary and would function primarily as an emergency access.

The proposed Project concept layout plan is shown in Figure 2.

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Figure 2: Project Concept Design



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IV. Potential Sources of Impact

The key potential sources of impact to surface water resources include the following:

Construction Stage

- Disturbance of soil during bulk earthworks and infrastructure installation, potentially leading to increased erosion and sediment mobilisation into nearby drainage lines and designated watercourses.
- Risk of surface water contamination due to accidental spills of fuels, lubricants, herbicides, and other construction-related chemicals.
- Physical disturbance to watercourses, waterbodies, and associated riparian zones during construction works, potentially resulting in bank instability, degradation of aquatic habitat, and downstream water quality impacts.
- Increased site runoff potential arising from vegetation clearance, earthworks, soil compaction, and the introduction of impervious surfaces, which may result in elevated volumes of surface water discharge affecting downstream receptors, and,
- Obstruction or redirection of natural surface flows due to inadequately planned construction activities, temporary fencing, or placement of stockpiles, increasing the risk of localised flooding, damage to infrastructure and equipment, and associated work health and safety hazards.

Operational Stage

- Continued erosion of exposed soils and subsequent mobilisation of sediment into nearby drainage systems and receiving watercourses.
- Contamination of surface waters from accidental spills of fuels, lubricants, herbicides, fire water, and other chemicals associated with operational activities, or because of inadequate site and vegetation management practices.
- Increased surface runoff due to the presence of permanent site infrastructure and impervious surfaces, potentially altering drainage patterns and increasing the volume of runoff discharged from the site, with downstream impacts to properties and receiving environments; and,
- Obstruction or redirection of overland floodwaters by permanent infrastructure not appropriately designed or located, potentially resulting in localised flooding, damage to site assets and equipment, and elevated work health and safety risks.

These potential sources of impact are described and assessed in Section 4.

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2. Regulatory Framework

This section outlines the legislation and local planning provisions relevant to this surface water assessment. It also identifies applicable best practice guidelines that inform the approach to surface water and stormwater management for the Project.

I. State Legislation

Environment Protection Act 2017

The *Environment Protection Act 2017* (Victoria) (EP Act 2017) is the cornerstone of environmental regulation in Victoria, replacing the 1970 Act. It shifts the focus from pollution response to prevention, introducing a *General Environmental Duty* requiring all Victorians to prevent harm to human health and the environment. The EP Act strengthens EPA Victoria's powers to regulate waste, noise, pollution, and industry practices, including new permissions and licensing schemes. It enhances accountability, enforcement, and community engagement. The Act aims to modernise environmental protection, encourage proactive risk management, and ensure that businesses and individuals take responsibility for reducing environmental harm before it occurs.

Environment Protection Regulations 2021

The *Environment Protection Regulations 2021* were introduced to support the *Environment Protection Act 2017*, which emphasises a prevention-based approach to environmental protection. These regulations aim to prevent or minimise risks of harm to human health or environment from pollution or waste. The regulations include various provisions to ensure compliance and effective environmental management.

Environment Reference Standard

The *Environment Reference Standard* (ERS) is a tool made under the *Environment Protection Act 2017* in Victoria. It identifies environmental values that the Victorian community want to achieve and maintain and provides a way to assess those environmental values in locations across Victoria. The ERS sets out environmental values of air, noise (acoustic), land and water environments to be achieved or maintained in the whole or any part of Victoria. Standards for the environmental values are comprised of objectives for supporting different uses of the environment and indicators that can be measured to determine whether those objectives are being met.

Environmental Values

The ERS establishes the Environmental Values of surface waters that must be protected and defines the corresponding water quality objectives (WQOs) required to maintain these values. Environmental Values and WQOs are identified for various surface water environments, including aquatic reserves, inland rivers and streams, lakes and wetlands, and marine and estuarine systems.

The ERS categorises Victoria's surface waters into specific "segments" based on geographic location and existing water quality or condition. The applicable surface water segments and associated Environmental Values for the Project Site are outlined in Table 1.

Table 1: Applicable ERS surface water segments and Environmental Values

Segment	Sub-segment	Default Prescribed Environmental Values
Central Foothills & Coastal Plains	N/A	Water dependent ecosystems and species that are slightly to moderately modified
		Human consumption after appropriate treatment
		Agriculture and irrigation
		Human consumption of aquatic foods
		Aquaculture (where environmental quality is suitable and aquaculture is licenced under the Fisheries Act 1995)
		Industrial and commercial
		Water-based recreation (primary contact)
		Water-based recreation (secondary contact)
		Water-based recreation (aesthetic enjoyment)
		Traditional Owner cultural values

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Management of Construction Runoff and Flow

The *Environment Protection Act 2017*, the *Environment Protection Regulations 2021* and the *Environment Reference Standards (ERS)* establish a framework for the protection of receiving waters and environmental values, including through the application of the *General Environmental Duty (GED)*.

Under this framework, duty holders are required to minimise risks of harm to the environment, including those associated with stormwater runoff during construction, so far as reasonably practicable.

In practice, this involves the implementation of appropriate erosion and sediment control measures consistent with established industry best practice, including relevant EPA guidance such as EPA Publication 1739 – *Urban Stormwater Management Guidelines* (2021), where applicable.

Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) provides the statutory framework for land use planning and development in Victoria. Under the P&E Act, a range of subordinate instruments guide planning decisions, including local planning schemes and Ministerial directions.

For this Project, planning requirements are governed by the Baw Baw Planning Scheme (*Baw Baw Planning Scheme*) in accordance with the P&E Act.

Baw Baw Planning Scheme

The Project Site is located in the Farming Zone under the Baw Baw Planning Scheme (BBPS). The Project Site is not subject to overlays subject to flooding (i.e. Land Subject to Inundation Overlay, Floodway Overlay, Special Building Overlay) or Environmental Significance Overlays (e.g. for catchment or waterway protection) under the Baw Baw Planning Scheme.

Key clauses of the Planning Policy Framework relevant to this Surface Water Assessment are:

- Clause 12.03-1S (River and riparian corridors, waterways, lakes wetlands and billabongs)
- Clause 14.02-1S (Catchment planning and management)
- Clause 14.02-1L (Protecting Baw Baw's water catchments)
- Clause 14.02-2S (Water quality)

Relevant strategies from these policies and the relevant decision guidelines applying to development under Clause 35.07 (Farming Zone) and Clause 53.13 (Renewable Energy Facility [Other than a wind energy facility]) have been considered in this Surface Water Assessment.

Clauses 12.03-1S and 14.02-1S of the Baw Baw Planning Scheme set out the specific objectives and standards that new developments must consider to protect and enhance waterway systems including river and riparian corridors, rivers, creeks, lakes, wetlands, groundwater, billabongs and the wider catchment. These provisions are designed to:

- Protect the environmental, cultural, and landscape values of all waterway systems as significant economic, environmental and cultural assets.
- Protect the ecological values, indigenous vegetation, and terrestrial and aquatic habitats.
- Design and site new developments and maintain and enhance the ecological, hydrological and cultural values of the waterway systems and general landscape.
- Protect the geomorphology, bank stability and flood management capacity of the waterways system.
- Ensure all appropriate measures are taken to restrict sediment discharges from development sites.

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Water Act 1989

The Water Act 1989 (Victoria) provides the legal framework for managing Victoria's water resources, including rivers, groundwater, and water infrastructure. It establishes water entitlements, licensing, and allocation systems, separating water ownership from land ownership to support trading and sustainable use. The Act enables the creation of Water Corporations and Catchment Management Authorities, which manage supply, delivery, and planning. It promotes equitable access, environmental sustainability, and integrated water management. The Act also includes provisions for Aboriginal cultural values and public health. It is a central tool for ensuring long-term, responsible water use across urban, agricultural, and environmental sectors.

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Designated Waterway

A designated waterway is a waterway that has been formally declared as designated under Section 188 or 188A of the Water Act 1989 by an appropriate authority, usually a Catchment Management Authority or, for greater Melbourne, Melbourne Water. The designation of a waterway provides the legal basis to ensure activities do not harm the hydraulic function, health, or ecological values of the waterway.

Designated waterways:

- Are listed on official maps (gazetted) for a specific catchment region.
- May be named or unnamed, permanent or ephemeral, and can vary in size from major rivers to small natural depressions where water flows regularly.
- Do not mean the waterway is more natural or valuable in terms of ecology — it means it's subject to specific regulation and management controls under the Act.

II. Best Practice Guidelines

Best Practice Stormwater Management Guidelines

Stormwater quality and flow performance objectives for the Project have been developed with reference to established Victorian best practice principles (*EPA Victoria 2021*), as well as those historically outlined in the Urban Stormwater Best Practice Environmental Management Guidelines (USBPEMG, 1999), where relevant. While these USBPEMG were originally developed for urban applications, the pollutant load reduction targets they define are widely adopted as a benchmark for stormwater treatment performance across a range of development types.

This assessment applies these principles in a manner proportionate to the scale and nature of the Project, and consistent with the contemporary regulatory framework established under the *Environment Protection Act 2017*, the *Environment Protection Regulations 2021* and the *Environmental Reference Standards* (ERS).

Table 2 presents the stormwater performance objectives adopted for the Project, informed by these established best practice benchmarks. While the USBPEMG provides the basis for commonly applied pollutant load reduction targets, it is not available for the now-superseded *State Environment Protection Policy* (Water and Victoria, 1988). Accordingly, this assessment aligns these performance objectives with the current policy framework under the *Environment Protection Act 2017*, the *Environment Protection Regulations 2021* and the ERS, ensuring consistency with contemporary regulatory requirements and water quality objectives (WQOs).

Table 2: Stormwater Quality and Flow Objectives (USBPEMG)

Indicator (Pollutant Type)	Receiving Water Quality Objective (WQO)	Best-Practice Stormwater Objective
Construction Phase		
Total Suspended Solids (TSS)	n/a- no ERS objectives apply to TSS ^a	Effective treatment of 90% of daily run-off (e.g. <4 months Average Recurrence Interval (ARI))
Litter	No litter in waterways	Prevent litter from entering the stormwater system
Other Pollutants	Comply with ERS	Limit the application, generation and migration of toxic substances to the maximum extent practicable.
Operations Phase		
Total Suspended Solids (TSS)	n/a- no ERS objectives apply to TSS ^a	80% reduction of the typical urban annual load
Total Phosphorus (TP)	ERS WQOs	45% reduction of the typical urban annual load

Total Nitrogen (TN)		45% reduction of the typical urban annual load
Litter	No litter in waterways	70% reduction of the typical urban annual load
Flow	Maintain flow at pre-urbanisation levels	Maintain discharges for the 1.5-year ARI at pre-development rates.

^aNo WQOs for TSS apply to “inland waters and streams” in the ERS. Turbidity objective would apply.

Best practice stormwater quality objectives serve as key performance benchmarks for determining the adequacy of stormwater treatment measures and the suitability of treated runoff for discharge to receiving environments. Compliance with these objectives may be demonstrated through one or more of the following approaches:

- Monitoring of existing stormwater discharge quality.
- Predictive modelling of stormwater quality and its potential impact on receiving waters using tools such as the MUSIC (Model for Urban Stormwater Improvement Conceptualisation) software, ideally supported by site-specific monitoring data where available; or
- Use of representative, averaged values for typical urban stormwater quality in similar development contexts.

It is recommended that detailed stormwater quality modelling be undertaken during future stages of design development to verify compliance with relevant performance objectives and inform appropriate treatment measures.

Applicable Best Practice Guidelines

A range of best practice guidelines are relevant to both the construction and operational phases of the Project. These guidelines address key aspects of stormwater management, erosion and sediment control, and the bunding and containment of hazardous materials (pollutants). They provide essential design principles, assessment criteria, and recommended management measures to support the effective control of stormwater quality and flow impacts throughout the life of the Project.

Stormwater Management

- EPA Publication 1739- *Urban Stormwater Management Guidelines* (EPA Victoria 2021)

Erosion and Sediment Control

- *Best Practice Erosion and Sediment Control* (IECA 2025)
- EPA Publication 275- *Construction Techniques for sediment Pollution Control* (EPA Victoria 1991).
- EPA Publication 1834- *Civil construction, building and demolition guide* (EPA Victoria 2025).
- EPA Publication 1893- *Erosion, sediment and dust: treatment train* (EPA Victoria 2020).
- EPA Publication 1894- *Managing Soil Disturbance* (EPA Victoria 2020)

- EPA Publication 1895- *Managing Stockpiles* (EPA Victoria 2020).
- EPA Publication 1897- *Managing Truck and other Vehicle Movement* (EPA Victoria 2020).

Leaks and Spills Prevention

- EPA Publication 1698- *Liquid Storage and Handling Guidelines* (EPA Victoria 2018).
- EPA Publication 1700- *Preventing Liquid Leaks and Spills from Entering the Environment* (EPA Victoria 2018).

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3. Existing Surface Water Environment

I. Overview

This section describes the existing surface water environment and related aspects of the Project Site and regional context as relevant to this surface water assessment.

II. Hydrology

Regional Hydrologic Context

The Project Site is found in the Latrobe sub-catchment that forms part of the West Gippsland catchment (Figure 3). The Project Site is not located within a Special Water Supply Catchment Area or a Declared Irrigation District.

The Latrobe sub-catchment is a key component of the West Gippsland catchment, extending from the forested uplands of the Baw Baw Plateau and Strzelecki Ranges to the Gippsland Plains. The Latrobe River and its tributaries, including the Tanjil, Tyers, Morwell and Moe rivers, flow generally southeast. These waterways provide vital inflows to storage reservoirs, support irrigation and power generation, and ultimately discharge into Lake Wellington within the Gippsland Lakes. The Latrobe River and lower Latrobe wetlands are an important component of the internationally recognised Gippsland Lakes Ramsar site, and provide habitat for waterbirds of state, national and international conservation significance. The sub-catchment's hydrology is strongly influenced by steep upland rainfall, broad alluvial floodplains, and land uses such as forestry, agriculture and energy production, which together shape flow regimes and water quality.

The West Gippsland catchment encompasses the river systems draining to the Gippsland Lakes and Bass Strait, including the Latrobe, Thomson and Macalister rivers, as well as numerous smaller coastal streams. Its rivers typically flow south or southeast from the Great Dividing Range and Strzelecki Ranges across the Gippsland Plains. The system ultimately converges into Lake Wellington and the broader Gippsland Lakes, which discharge eastward to Bass Strait at Lakes Entrance. Hydrologically, the catchment is characterised by high rainfall headwaters, extensive irrigation districts, regulated rivers and storages, and lowland floodplains, making it a critical region for water supply, agriculture, ecosystems and flood management.

At a site scale, the Project Site contains two DEECA-mapped current wetlands associated with existing farm dams located in the north-western portion of the site. These features contribute to local drainage characteristics and represent minor surface water receptors within the Project area.

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Figure 3: Project Site (marked by red dot) is in the Latrobe Basin



Approximate location of Project Site is indicated by a red circle

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As depicted in Figure 4 the Project Site is located approximately 2 km to the west of Shady Creek which is a small tributary in West Gippsland that flows southward through farmland near Neerim. Assessment of Google Earth™ imagery indicate that the reaches of Shady Creek to the east of the Project Site sustain a riparian edge that range in width from sparse vegetation to a tree buffer of approximately 60 m in width. The creek discharges directly into the Moe River, which continues east before joining the Latrobe River upstream of Lake Narracan. From there, the Latrobe flows southeast across the Gippsland Plains, eventually feeding into Lake Wellington, the westernmost of the Gippsland Lakes. These interconnected lakes then drain eastward through Lake Victoria and Lake King before discharging to Bass Strait at Lakes Entrance. This sequence of connections places Shady Creek within the broader Latrobe River and Gippsland Lakes catchment system, contributing to regional surface water flows.

In the north-west corner of the Project Site there is an unnamed designated waterway which discharges into another unnamed designated waterway that lies to the west of Project Site approximately 1.1 km away and which drains water in a southerly to south-westerly direction (Figure 4). Assessment of recent aerial imagery indicates that these waterways exhibit little to no riparian vegetation. The waterways are ephemeral and appear to be influenced by surrounding agricultural land uses.

The presence of farm dams, modified drainage lines and surrounding grazing activities indicates that these waterways have been substantially altered from their natural condition and function primarily as managed drainage features.

Figure 4: Surface Water Environment of Project Site



The direction of waterflow is indicated by the yellow arrows. The two DEECA mapped wetlands associated with the farm dams on the Project Site are indicated by the pink arrows

As depicted in the elevation map (Figure 5) (topographicmap.com, 2025), the Project Site has a gentle incline from 130 m ASL to 135 m ASL from the south-western edge to the north-easterly edge of the Site. This indicates that surface runoff discharges in a south-westerly direction into the unnamed designated waterway found within the Project Site which drains into the waterway to the west of the Site and flows in a south to south-westerly direction into the Moe River (Figure 4).

Figure 5: Project Site Elevations



There is no publicly available water quality or flow data for the surface water environment within or in the vicinity of the Project Site (Figure 6) (DEECA 2025a). The monitoring points closest to the

While publicly available surface water quality and quantity data is not available, the Index of Stream Condition Report (*Index of Stream Condition Scores 2010*) indicates that the overall stream condition of Shady Creek is “moderate” whereas that of Moe River, which lies downstream, is “poor”.

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Water Quality

As indicated in Figure 6 there is no surface water quality data for the designated watercourses within or in the immediate vicinity of the Project Site. The water quality data for monitoring point at Moe River (Site ID No 226209; Long 146.0023; Lat: -38.2039) which lies approximately 10 km downstream of the Project Site is most relevant in terms of providing an indicative baseline condition of water quality in the vicinity of the Project Site.

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Table 3: Water Quality at Moe River (Site ID 226209)

Parameter	Moe River at Site ID No 226209			Water Quality Objective ¹		
	25 th %ile	75 th %ile	Max	25 th %ile	75 th %ile	Max
TP (µg/L)		130			≤55	
TN (µg/L)		900			≤1100	
DO (% sat)	78		142	≥75		130
Turbidity (NTU)		41			≤25	
TSS (mg/L)		30			n/a	
EC (µS/cm)		358			≤250	
pH	7.0	7.3		≥6.7	≤7.7	

¹WQOs are derived from Table 5.8 for the lowlands of the Latrobe basins (Central Foothills and Coastal Plains) in the Environment Reference Standard ([consolidated-ERS.pdf](#))

Water Quality and Stream Flow Objectives

The ERS ([consolidated-ERS.pdf](#)) indicates that the environmental values of the designated waterways within and in the vicinity of the Project Site are slightly to moderately modified. The water quality data in Table 3 is consistent with this classification.

The water flow and quality objectives associated with these waters are those listed in Table 4.

Table 4: Water Flow and Quality Objectives for Project Site Surface Water Environment

Water Quality Objectives	Watercourse Flow Objectives
Aquatic Ecosystems	Protect pools in dry times
Visual Amenity	Protect natural low flows
Secondary Contact Recreation	Maintain natural flow variability
Primary Contact Recreation	Maintain wetland and floodplain inundation
Aquaculture (where environmental quality is suitable and aquaculture is licenced under the Fisheries Act 1995)	Minimise effects of buildings, plant and other infrastructure
Industrial and Commercial	
Water based recreation (aesthetic enjoyment)	
Agriculture and Irrigation	
Traditional Owner Cultural Values	
Non-Indigenous Cultural & Spiritual Values	

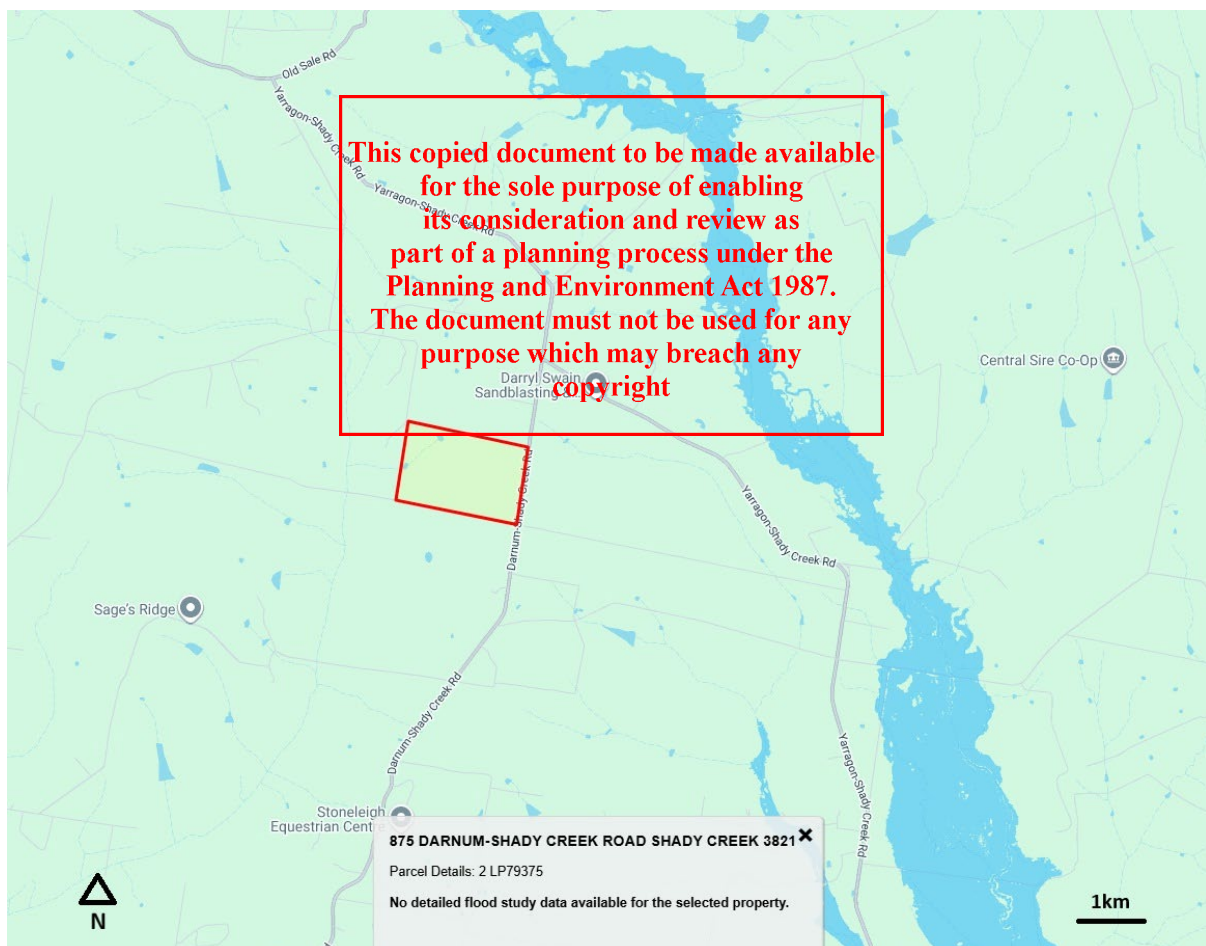
¹Water Quality and flow objectives are derived from the EVs in Table 5.5 for the lowlands of the Latrobe basins (Central Foothills and Coastal Plains) in the Environment Reference Standard ([consolidated-ERS.pdf](#))

Stream flow objectives suggest that the natural and existing regime of flows from the Project Site should be retained as far as practically possible compatible with other requirements, mimicking natural flow patterns as closely as possible.

Flooding

The WGCMA Flood Portal (*West Gippsland Catchment Management Authority 2025*) and consultation with the CMA (Appendix 1) indicates that while no detailed flood study data is available for the Project Site the information available indicates that the Project Site has low risk of riverine flooding during a 1% AEP rain event (Figure 7). Note that it is probable that this flood extent does not consider the impact of climate change on current rainfall and hence flood impacts (*Australian Government 2025*). While the risk from riverine flooding is low the risk of the Project Site from localised flooding from the designated waterway during periods of high rainfall is unknown. Flood modelling is recommended at detailed design stage to understand the flood risk from the designated waterway within the Project Site, thereby enabling Project infrastructure to be constructed with sufficient flood immunity.

Figure 7: Flood Map for Project Site Showing 1% AEP Flood Event



Project Site location is indicated by the red square

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III. Climate

Rainfall

The closest Bureau of Meteorology (BOM) station to the Project Site recording daily rainfall is Nilma North (Warragul) (Site No 085313) (*BOM 2025a*) but this site has only been recording weather data since 2014. The weather data from the BOM Morwell (Larrobe Valley Airport) (Site No 085280) was selected as it is the closest BOM station to the Project Site (34 km southeast of Site), with a similar elevation as the Project Site and which has a statistically significant set of weather data.

The mean annual rainfall at Morwell is 728.3 mm. However, there can be significant fluctuation in the depth of rainfall from year to year. The lowest recorded rainfall was 464.0 mm, and the highest recorded rainfall was 947.4 mm (Table 5).

Table 5: Mean Rainfall Depths at Morwell (Larrobe Valley Airport)

Month	Average Rainfall (mm)	Lowest Rainfall (mm)	Highest Rainfall (mm)
January	50.7	0.0	200.0
February	40.8	1.4	145.0
March	47.4	8.8	125.0
April	50.1	0.2	132.6
May	54.0	11.4	138.0
June	64.6	8.4	151.2
July	62.4	17.4	119.2
August	65.4	24.8	137.2
September	73.9	25.6	162.8
October	73.7	13.0	186.8
November	75.0	26.8	135.8
December	65.0	9.8	203.2
Annual	728.3	464.0	947.4

Climate Change and Effect on Rainfall

There is now broad scientific consensus that human activities are contributing to observed climate change. Climate change, particularly global warming, is expected to increase the frequency and intensity of extreme rainfall events, which must be considered in flood risk assessments for long-term infrastructure planning.

The State of the Climate 2024 report (*BOM 2025b*), jointly published by CSIRO and the BOM, highlights key Projections for southeastern Australia:

- There is very high confidence in ongoing substantial increases in mean, maximum, and minimum temperatures, accompanied by a decline in average annual rainfall.

- There is high confidence in the likelihood of more intense extreme rainfall events in the future.

In a warming climate, the increased capacity of the atmosphere to hold moisture is anticipated to lead to greater rainfall depths during extreme events. Given the long design life of the facility, the potential impacts of climate change are a critical consideration.

IV. Topography

The Project Site is situated within gently undulating terrain characteristic of the West Gippsland lowlands. The landform comprises subdued ridges and shallow valleys with modest relief, draining toward the Latrobe River system. Soils are fertile alluvials and colluvials, supporting pastoral use. Geomorphologically, the site lies within the Strzelecki foothill transition to the Latrobe alluvial plains.

The Project Site topography is relatively flat to gently sloping. The highest elevation occurs along the north-easterly boundary at 155 m ASL and the lowest along the south-western boundary at 130 m ASL. The site drains surface water runoff in a south-western direction into the unnamed designated watercourse. The surrounding country is similarly characterised by gently rolling hills and low ridgelines, interspersed with shallow drainage depressions. Slopes are gradual, with local relief rarely exceeding 20 m. Land use is predominantly pasture, reflecting fertile soils and the subdued topography of the Shady Creek district.

V. Soils

Soils in the West Gippsland region (including the Darnum/Darnum with Warragul mapping unit) soils are often texture-contrast loam to clay-loam surface horizons above more clayey subsoils. Surface soils tend to be dark grey-brown to brown in colour, moderate organic matter content, with pH usually mildly acidic to near neutral (roughly pH 5.5–6.5) in surface horizons. Subsurface layers often exhibit higher clay content, which reduces permeability, increases water holding capacity but may result in slower drainage in wetter periods. Bulk density is likely moderate in the surface (loamy) layers but increasing with depth in clay subsoils; soil structure is expected to have distinct horizons, good aggregation in surface, possibly more compacted or denser subsoil.

Based on the regional soil surveys for the West Gippsland and Strzelecki foothill transition (which covers the Darnum–Shady Creek area), the subsoils are generally not strongly sodic, meaning dispersive behaviour is less common than in inland catchments. However, some clay horizons may show moderate sodicity and dispersive tendencies when exposed or disturbed, especially in the deeper subsoil. This is most likely along drainage lines or cuttings where B horizons are exposed.

No soil testing has been undertaken in the Project Site. Extensive desktop research failed to find any soil survey data specific to Project Site. Further investigation and soil testing as part of future design development is warranted to confirm local soil types/ characteristics to further inform Project design, construction and management requirements.

VI. Groundwater

At a regional level the local Groundwater Resource Report (*DEECA 2025b*) indicates that the depth to water table at the Project Site (VICGRID94 Easting: 2592210 Northing 2374477) is approximately 20 to 50 m below natural surface (Table 6). The shallow alluvial aquifer is estimated to extend to a depth of 33 m and contain low salinity groundwater (salinity <500 mg/L). This water is suitable for human consumption, stock watering, irrigation, industry, ecosystem protection and buildings and structures.

Further research of registered groundwater bores in Australia (www.bom.gov.au/weave/explorer and www.vvg.org.au) indicated that one registered bore (Bore ID 353849) exists within the Project site, one adjacent to the Project site eastern boundary (Bore ID 353850), and two others at approximately 349 m to the north and 250 m to the south of the Project site (Figure 8). Details of these registered bores are included in Table 7.

Table 6: Groundwater Resource Report for the Project Site

Groundwater Resource Report		
Groundwater catchment: Moe		VICGRID94 Easting: 2592210 Northing: 2374477
Depth to water table: 20 - 50m		Water table salinity (mg/L): < 500
Groundwater layers (Aquifers and Aquitards)	Depth below surface (m)	Groundwater salinity (mg/L)
UTQA Upper Tertiary / Quaternary Aquifer layered clay, sands and silt	0 - 33	Unknown
LTBA Lower Tertiary Basalts basalt (fractured rock)	33 - 96	501 - 1000
BSE Mesozoic and Palaeozoic Bedrock (basement) sedimentary (fractured rock): Sandstone, siltstone, mudstone, shale. Igneous (fractured rock): includes volcanics, granites, granodiorites.	96 - 296	501 - 1000
Groundwater management unit (GMU)	Depth below surface (m)	PCV (ML/yr)
MOE GMA	>25	8,200

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Figure 8: Locations of Registered Groundwater Bores within and around Project Site



Table 7: Details of Registered Groundwater Bores Within and Near Project Site

Bore ID	Position	Agency	Bore Depth (m)	Elevation (m AHD)
353847	-38.120366, 146.049146	Department of Energy, Environment & Climate Action	4	153.6
353849	-38.127296, 146.046505	Department of Energy, Environment & Climate Action	8	142.5
353850	-38.125258, 146.052978	Department of Energy, Environment & Climate Action	12.5	149.3
353854	-38.13081, 146.04910	Department of Energy, Environment & Climate Action	8	141

4. Proposed Water Management and Mitigation Plan

There is a low risk of potential water quality impacts associated with the Project. The relatively flat terrain and ephemeral nature of waterways strongly suggest that the main vectors for transport of pollutants to the waterways are limited. Any residual risk to waterways during the construction phase of the Project will be further mitigated as described below.

I. Construction Phase

An Erosion and Sediment Control Plan (ESCP), together with a Construction Environmental Management Plan (CEMP), will be prepared to manage temporary and site-specific risks to water quality and drainage during the construction phase. These plans will be designed to meet industry best practice standards and will address, at a minimum, the following objectives:

- Land Disturbance and Erosion Management: Manage land disturbance activities and associated soil erosion hazards to minimise potential impacts on downstream water quality.
- Best Practice Erosion and Sediment Control: Implement control measures in accordance with the International Erosion Control Association (IECA, 2025) guidelines and relevant EPA Victoria standards.
- Minimisation of Soil Exposure: Restrict the extent and duration of exposed soils at any one time to reduce the risk of erosion and sedimentation.
- Progressive Revegetation and Stabilisation: Rehabilitate disturbed areas progressively through revegetation or stabilisation to restore site integrity and support environmental outcomes.
- Topsoil Management: Apply effective topsoil management practices to enable successful revegetation and minimise erosion risks.
- Hazardous Material Management: Establish procedures for the safe storage, handling and spill response of hazardous materials in accordance with EPA Victoria requirements.
- Weather Preparedness and Response: Develop contingency measures to manage construction activities under adverse weather conditions.
- Monitoring and Maintenance: Implement ongoing monitoring and maintenance of erosion, sediment and drainage controls to ensure their continued effectiveness and long-term environmental protection.

The implementation of the above measures will also provide incidental protection to groundwater by minimising the potential for contaminant mobilisation, infiltration and uncontrolled discharge.

II. Operational Phase

Proposed Stormwater Management Strategy

A conceptual stormwater strategy has been developed to manage stormwater during the operational stage of the Project. The proposed conceptual stormwater strategy includes the following features:

- Detention basin
- Bioretention basin including a sediment forebay

- Culverts under site access tracks
- External stormwater diversion drains
- Drains at toe of batter to capture site runoff
- Internal drainage to ensure flood immunity to BESS megapacks

Stormwater within the BESS facility will be managed through a combination of:

- Clean flow diversion to prevent external catchment runoff entering the developed footprint;
- Controlled conveyance of internal runoff via surface drains and localised piped drainage (where required), and
- Treatment and attenuation prior to discharge.

External runoff management

Diversion drains will be constructed up-gradient of the developed footprint to intercept runoff from surrounding catchments and convey it around the facility. Culverts beneath access roads will maintain existing drainage continuity and prevent road embankments from creating unintended ponding. As external runoff is not exposed to operational activities, it is managed primarily for hydraulic performance and erosion control rather than treatment.

Internal drainage and flood immunity

Runoff generated within the Project footprint (equipment bunding, access roads and hardstands) will be directed via finished surface grading and drainage channels toward the treatment and storage system. Positive drainage away from critical infrastructure will ensure appropriate flood immunity and prevent nuisance ponding.

Localised pit-and-pipe drainage may be incorporated at low points where required (to be confirmed during detailed design). Toe drains or lined swales will manage runoff from cut batters and protect adjacent infrastructure such as noise walls and fencing.

Water quality treatment

Developed-area runoff will be treated to address gross pollutants, sediment and nutrients prior to discharge. A bioretention and detention-based system is proposed and will be sized in accordance with Victorian best practice requirements, with MUSIC modelling undertaken if required by the responsible authority.

Areas with potential for contaminants beyond typical stormwater pollutants (e.g. hydrocarbons or transformer-related risks) will incorporate at-source controls, such as bunding, sumps, shut-off mechanisms and/or proprietary treatment devices, to prevent uncontrolled discharge.

Detention and controlled discharge

A detention basin will provide on-site storage to attenuate peak flows and support the objective of no adverse flood impact at the site boundary and downstream. The outlet structure will regulate discharge to the legal point of discharge and will incorporate an isolation mechanism (e.g. valve) to enable temporary containment of runoff in the event of an emergency incident.

The basin geometry, outlet configuration and overflow arrangements will be refined at detailed design to ensure stable operation under both minor and major storm events.

Design verification

It is recommended that the concept be confirmed through detailed earthworks modelling, hydrologic/hydraulic assessment to verify detention performance and flood impact, and water quality modelling (if required).

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Overall, the proposed system provides a robust stormwater strategy that protects critical BESS infrastructure, preserves external drainage patterns, treats developed-area runoff, and controls discharge from the site.

The stormwater concept strategy has been formulated with consideration of several key objectives, outlined in Table 8, and is aligned with the objectives of the Baw Baw Planning Scheme objectives, as well as best practice stormwater management methodologies as defined by USBPEMG and the *EPA Stormwater Management Guidelines* (2021). These approaches are widely recognised and can be seamlessly integrated with the proposed site infrastructure and stormwater design plans.

Table 8: Water Management Objectives and Approach

Water Management Objectives		Approach
WM1	Site stormwater will discharge from the site at the legal point of discharge.	Stormwater from developed areas will discharge at the nominated legal point of discharge. The legal point of discharge and discharge conditions will be confirmed at detailed design.
WM2	Avoid uncontrolled discharge from site of stormwater generated on developed areas	Site grading will direct runoff from developed areas toward the internal drainage system and detention basin prior to discharge at the legal point of discharge. Defined overland flow paths will be maintained for exceedance events.
WM3	Minimise the extent of new hardstand/impervious areas to reduce the additional volume of stormwater generated on site.	Retain existing grassed areas where practicable. Use gravel or permeable surface treatments in low-risk areas where infiltration is appropriate; however, impervious or contained surface treatments will be adopted in areas with potential contamination risks (e.g. near battery infrastructure or substations) to prevent uncontrolled seepage and support effective containment.
WM4	Provide stormwater collection and conveyance systems to control stormwater generated on developed areas.	Surface swales and diversion drains will intercept and convey runoff. Localised pit-and-pipe drainage will be provided at low points where required to maintain flood immunity of BESS infrastructure. All developed-area runoff will be directed to the water quality treatment system and detention basin prior to discharge. External catchment runoff will be intercepted and conveyed around the facility via diversion drains and culverts.
WM5	Promote on-site filtration of stormwater where feasible and practical, to minimise the need for flow and water quality management measures.	A Stormwater Management System with a dedicated bioretention and detention basin will be provided to treat developed-area runoff prior to discharge. System sizing will be confirmed through MUSIC modelling (if required). Feasibility of infiltration will be confirmed through

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		geotechnical investigation at detailed design stage.
WM6	Provide water quantity controls to ensure peak flow rates discharging from site are not increased for all events up to and including 100-year ARI.	A detention basin will provide attenuation storage prior to controlled discharge at the legal point of discharge. Basin volume and outlet configuration will be confirmed through hydrologic and hydraulic modelling to demonstrate no adverse flood impact at the site boundary and downstream. Surface grading and exceedance flow paths will safely manage major storm events.
WM7	Provide water quality controls that collectively meet industry standard pollutant load reductions as follows: 70% reduction in gross pollutants. 80% reduction in total suspended solids. 45% reduction in total phosphorus. 45% reduction in total nitrogen.	The bioretention system will be designed to achieve best practice pollutant load reduction targets consistent with Victorian guidelines (70% GP, 80% TSS, 45% TP, 45% TN). Treatment performance will be verified through MUSIC modelling where required.
WM8	Specific stormwater management measures will be provided for high-risk oil contaminated areas (e.g. substation).	Clean runoff will be diverted away from potentially contaminated areas. Bunding, sumps, and/or proprietary treatment devices (e.g. oil-water separators) will be provided where required. The detention basin outlet will incorporate an isolation valve to enable containment of runoff in the event of an emergency spill or firewater incident. Measures will align with relevant EPA Victoria guidance.
WM9	Minimise site water requirements Maximise reuse of stormwater and other water sensitive strategies to lower demand from external sources.	Stormwater reuse will be maximised where practicable. Water tanks will capture roof and/or runoff for operational reuse. Potable supply will be limited to minor operational and amenities demand.
WM10	Maintain condition and functionality of water management infrastructure.	An inspection, monitoring and maintenance plan will be prepared at detailed design stage, covering diversion drains, culverts, bioretention system, detention basin, outlet control structures and proprietary treatment devices.

Water management would be further refined and finalised during detailed design consistent with the above objectives, including considerations of objectives specified by the Baw Baw Planning Scheme (e.g. Clause 53.13-3) and any additional planning permit requirements.

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5. Impact Assessment

I. Overview

Section 4 outlines the proposed conceptual approach to water management for the Project. This section evaluates the anticipated residual impacts on surface water resources, assuming full implementation of the proposed water management measures at the Project Site mentioned in Section 4. The assessment focuses on the following key aspects:

- Water quantity: specifically addressing peak flow management to mitigate potential increases in surface runoff;
- Water quality: evaluating the effectiveness of management measures in maintaining or improving water quality standards; and
- Impacts on watercourses and receiving environments: assessing the potential effects on nearby watercourses, water bodies, and downstream receiving environments.

II. Water Quantity

Construction Phase

During the construction phase, there is potential for a temporary increase in site runoff due to vegetation clearance, earthworks, soil compaction, and the installation of impervious surfaces. These activities may result in elevated runoff volumes leaving the site, with potential downstream impacts on adjacent properties and sensitive receptors.

Additionally, construction-related activities such as the placement of fencing, storage areas, and material stockpiles may cause partial blockage or unintended redirection of surface flows. This can lead to localised flooding within construction areas, potential inundation of downstream properties, damage to construction equipment and infrastructure, and, in extreme cases, risks to personnel safety.

However, the anticipated impacts to runoff volumes and flow rates during construction are considered minor and readily manageable. This assessment is based on the temporary nature of construction activities, the relatively small disturbance footprint in the context of the broader catchment, the generally low likelihood of significant off-site impacts, and the proven effectiveness of standard erosion and sediment control measures in managing runoff and maintaining existing flow paths. These measures will be incorporated into the Erosion and Sediment Control Plan (ESCP) and the Construction Environmental Management Plan (CEMP) (refer to Section 4.I) and will form part of the permit requirements following planning approval.

Furthermore, available flood information provided by the WGCMA should be considered during detailed design, including appropriate setbacks from the on-site designated waterway.

Operational Phase

During operation, the introduction of hardstand and semi-impervious surfaces will increase runoff generation relative to the existing grassed condition. However, the conceptual stormwater strategy incorporates a combination of diversion, conveyance and detention measures to ensure that post-development discharge conditions do not adversely impact downstream environments.

External catchment runoff will be intercepted via diversion drains and conveyed around the facility to maintain existing overland flow paths and prevent additional flows entering the developed footprint. This ensures that the stormwater management system is designed primarily to manage runoff generated from the developed area only.

Runoff from developed areas will be directed via surface grading, swales and localised piped drainage (where required) to a dedicated detention basin prior to discharge at the nominated legal point of discharge along the western boundary.

The detention basin will attenuate peak flows and regulate discharge through a controlled outlet structure. Final basin sizing and outlet configuration will be confirmed through hydrologic and hydraulic modelling at detailed design stage to demonstrate:

- No increase in peak discharge rates at the legal point of discharge for events up to and including the 1% AEP event; and
- No adverse flood impact to downstream properties or waterways.

Accordingly, subject to detailed modelling verification, no significant residual operational impacts to peak flow rates are anticipated.

III. Water Quality

Construction Phase

The principal risk to water quality during the construction phase arises from ground disturbance associated with earthworks and other on-site activities. These include material handling, installation of battery infrastructure and associated facilities, construction of new buildings and a substation, trenching for utilities, and grading for access roads. Such activities have the potential to expose underlying soils, thereby increasing the risk of erosion and subsequent sediment transport into nearby watercourses.

Additionally, there is a risk of surface water contamination resulting from accidental spills of construction-related substances, such as fuels, lubricants, herbicides, and other chemicals.

However, no construction activity, including parking, will be within 50 m of the designated waterway on the Project Site, which is consistent with the recommendation that all works be located at least 30 m from the top of the bank of a waterway. In addition, with the implementation of appropriate temporary water and soil management controls to be outlined within the Erosion and Sediment Control Plan (ESCP) and the Construction Environmental Management Plan (CEMP) (refer to Section 4.1), these residual risks are considered minor and can be effectively mitigated, thereby fulfilling the objectives laid in Clause 53.13-3 of the BBPS (see Section 2.1).

Operational Phase

During operation, increased imperviousness has the potential to elevate stormwater pollutant loads relative to the existing condition. Pollutants of concern include gross pollutants, suspended sediments (TSS), nutrients (TN and TP), and—within specific operational areas—hydrocarbons and oil/grease.

The conceptual design incorporates a dedicated bioretention and detention storage system to treat runoff generated from developed areas prior to discharge. The system will be designed to achieve best practice pollutant load reduction targets consistent with Victorian guidelines, including:

- 70% reduction in gross pollutants
- 80% reduction in total suspended solids
- 45% reduction in total phosphorus
- 45% reduction in total nitrogen

Performance will be verified through MUSIC modelling where required by the responsible authority.

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Areas with potential for contamination beyond typical urban stormwater pollutants (e.g. transformer or substation areas) will incorporate at-source management measures including diversion of clean runoff, bunding, sumps and/or proprietary treatment devices such as oil-water separators.

In addition, the detention basin outlet will incorporate an isolation mechanism (e.g. valve), enabling temporary containment of runoff in the event of an emergency spill or firewater incident.

With implementation of these measures, no significant residual impacts to the quality of water discharged from the site are anticipated.

IV. Downstream Surface Water Receiving Environment

Adverse water quality and quantity impacts to downstream watercourses such as the designated unnamed watercourse draining the Project Site and the downstream receiving environment of the Moe River are not anticipated, given that the proposed water management measures for both the construction and operational phases have been specifically developed to mitigate potential effects on receiving waterways and downstream environments.

Subject to confirmation through recommended detailed hydrologic and hydraulic modelling, the proposed development is not expected to result in:

- Increased peak flow rates downstream;
- Increased flood risk at or beyond the site boundary; or
- Deterioration in downstream water quality.

Accordingly, no significant adverse impacts to downstream watercourses are anticipated during either the construction or operational phases.

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6. Conclusions

The purpose of this report is to provide a desktop Surface Water Assessment for the Project Site to support a planning permit application under the *Victorian Planning and Environment Act 1987*.

This assessment has indicated that:

- The Project Site drains into a nearby ephemeral unnamed designated waterway, which subsequently drains into the Moe River approximately 8 km downstream. No surface water quality and quantity data is available for the Project site and immediate surroundings, but Stream Index Report rate both Shady Creek and the Moe River as “moderate” and “poor” respectively. Water quality data for the Moe River gathered 10 km downstream of the Project Site indicates exceedances over the relevant WQOs for TP, turbidity and EC.
- Flood advice provided by the West Gippsland Catchment Management Authority indicates that while no detailed flood study data is available for the Project Site the information available suggests that the Project Site has low risk of riverine flooding.
- Flood advice from the West Gippsland Catchment Management Authority (WGCMA) (Appendix I) indicates that, while no detailed flood study data is available, the Project Site is located more than one kilometre from the nearest mapped 1% AEP flood extent and is therefore unlikely to be subject to riverine flooding. A designated waterway is present within the site, which may result in localised flooding during high rainfall events and has set a requirement for works being set back a minimum of 30 m from the top of the bank. Planning scheme mapping confirms the site is not affected by flood-related overlays (LSIO, FO or SBO), supporting a low risk of riverine flooding.
- Without mitigation, the Project has the potential to temporarily affect water quantity and quality during construction through vegetation clearing, earthworks, soil disturbance and accidental spills. During operation, increased imperviousness could elevate runoff volumes and pollutant loads relative to the existing grazing land use.
- A water management strategy and a conceptual stormwater management strategy have been proposed for both the construction and operational phases of the Project.
- The conceptual stormwater management strategy includes:
 - Diversion of clean external catchment runoff around the developed footprint to maintain existing overland flow regimes;
 - Collection and conveyance of developed-area runoff via surface grading, swales and localised drainage infrastructure;
 - Treatment of runoff through a dedicated bioretention and detention storage system designed to achieve Victorian best practice pollutant load reduction targets;
 - Provision of detention storage to attenuate peak flows prior to controlled discharge at the nominated legal point of discharge;
 - Inclusion of an outlet isolation mechanism to enable temporary containment of runoff in the event of an emergency spill or firewater incident; and
 - Implementation of inspection and maintenance procedures to ensure ongoing system performance.
- Predicted residual impacts to surface water resources have been assessed in relation to stormwater flow, water quality, and potential effects on nearby watercourses and downstream receiving environments, based on the implementation of the proposed mitigation measures.

- During the construction phase, impacts are expected to be minor and readily manageable through the application of temporary soil and water management measures incorporated within the Construction Environmental Management Plan (CEMP).
- During the operational phase, subject to confirmation through recommended detailed hydrologic, hydraulic and water quality modelling, the development is not expected to:
 - Increase peak discharge rates for storm events up to and including the 1% AEP event;
 - Increase downstream flood risk; or
 - Result in deterioration of discharged water quality.

Accordingly, the proposed Project is unlikely to adversely impact natural flood flows, downstream hydraulic conditions, or the quality of the receiving surface water environment, provided the recommended stormwater management measures are implemented and verified at detailed design stage.

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[WGCMA | My flood risk](#)

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Appendix 1

Flood Advice from West Gippsland Catchment Management Authority

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WGCMA Ref: WGCMA-F-2025-00697
Document No: 1
Date: 6 October 2025

adrian@greensmartconsulting.com

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Adrian Zammit
GreenSmart Consulting

Dear Adrian,

Application Number (CMA Ref): WGCMA-F-2025-00697

Property: **Street:** 875 Darnum-Shady Creek Road Shady Creek Vic 3821
Cadastral: Lot 2 LP79375, Parish of Darnum

Thank you for your enquiry received at the West Gippsland Catchment Management Authority ('the WGCMA') on 17 September 2025. The WGCMA understands you require flood advice for a proposed battery energy storage system.

The WGCMA does not have any information regarding whether this property would be subject to flooding during a 1% Annual Exceedance Probability (AEP) flood event (commonly known as the 1 in 100 year flood). Mapping in the explanatory report shows that the property:

- is more than a kilometre from the nearest known 1% AEP flood extent
- has a designated waterway located within the property as shown in Figure 1.

Based on this, the property is unlikely to be subject to riverine inundation during a 1% AEP flood event.

Refer to Figure 1 in the explanatory report for nearest designated waterways and flood extent.

If you apply for a planning permit, the WGCMA would be **unlikely to object** to the proposal subject but not limited to the following:

1. All works must be located at least 30 metres from the top of the bank of the waterway.

Please note: The WGCMA has provided this advice as preliminary information only, which has been based on the information you have provided. Any flood level advice provided is based on the most accurate information currently available and may change if new information becomes available.

The WGCMA can provide further information regarding any proposed development of the property in response to a planning permit application referred by the Baw Baw Shire Council in accordance with the *Planning and Environment Act 1987*.

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Please refer to the attached **explanatory report** for further detail.

Should you have any queries, please do not hesitate to contact Erin Marslen on 1300 094 262 or email planning@wgcma.vic.gov.au. To assist the WGCMA in handling any enquiries please quote **WGCMA-F-2025-00697** in your correspondence with us.

Yours sincerely,



Adam Dunn
Executive Manager – Statutory Planning

Cc: Baw Baw Shire Council

The information contained in this correspondence is subject to the disclaimers and definitions attached.

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EXPLANATORY REPORT

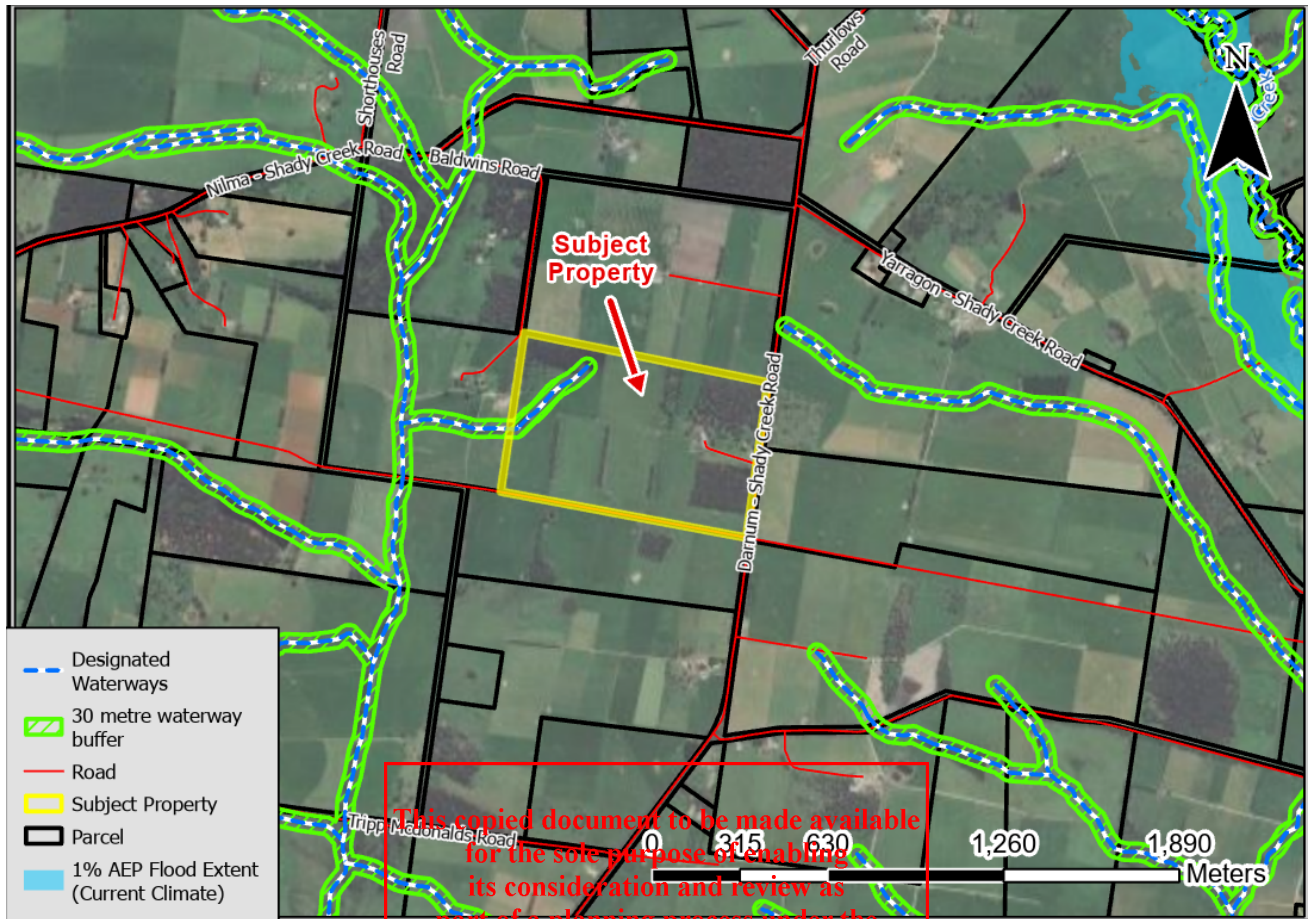


Figure 1 – Designated waterways and 1% AEP flood Extent

1% AEP Flood Level Determination

Floods are classified by the frequency at which they are likely to occur. In Victoria, all proposals for development on floodplains are assessed against a flood that, on average, will occur once every 100 years. A flood of this size has a 1% chance of occurring in any given year and is known as either the 100 year Average Recurrence Interval (ARI) flood or the 1% AEP flood.

Please note that the 1% AEP flood is the minimum standard for planning in Victoria and is not the largest flood that could occur. There is always a possibility that a flood larger in height and extent than the 1% AEP flood may occur in the future.

The WGCMA does not have any information regarding whether this property would be subject to riverine inundation during a 1% AEP flood event. A designated waterway is located within the property as shown in Figure 1. The property may be subject to localised flooding from this designated waterway during periods of high rainfall. However, the WGCMA does not have any information about the level and extent of this flooding.

The WGCMA holds no information in relation to the arrangement and capacity of stormwater drainage infrastructure in the area and recommends that you contact Council for more information.

Flood Hazard Assessment

A proposed battery energy storage system is unlikely to increase the flood risk at the site. Because of this, the proposed development is viable.

The WGCMA's criteria can be found in the *Flood Guidelines: Guidelines for development in flood prone areas* (WGCMA, 2020).

Waterways and Buffers

Several designated waterways are located in the area and a designated waterway is located within the property.

Clause 14.02-1S 'Catchment planning and management' of the Planning Policy Framework (PPF) seeks to assist the protection and restoration of catchments, water bodies, groundwater and the marine environment through the following strategies:

- ensure the continued availability of clean, high-quality drinking water by protecting water catchments and water supply facilities
- consider the impacts of catchment management on downstream water quality and freshwater, coastal and marine environments
- retain natural drainage corridors with vegetated buffer zones at least 30 metres wide along each side of a waterway to:
 - maintain the natural drainage function, stream habitat and wildlife corridors and landscape values
 - minimise erosion of stream banks and verges
 - reduce polluted surface runoff from adjacent land uses
- undertake measures to minimise the quantity and retard the flow of stormwater runoff from developed areas
- encourage measures to filter sediment and wastes from stormwater prior to its discharge into waterways, including the preservation of floodplain or other land for wetlands and retention basins
- ensure that works at or near waterways provide for the protection and enhancement of the environmental qualities of waterways and their instream uses
- ensure land use and development proposals minimise nutrient contributions to water bodies and the potential for the development of algal blooms
- require appropriate measures to restrict sediment discharges from construction sites
- ensure planning is coordinated with the activities of catchment management authorities

Any proposal for a battery energy storage system should ensure appropriate measures are in place to protect nearby waterways and restrict discharges from the development site. All works must be located at least 30 metres from the top of the bank of the waterway.

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Decision Guidelines

The WGCMA assesses all applications against the following national, state, and local policies, guidelines, and practice notes:

1. [Australian Disaster Resilience Guideline 7-3 Flood Hazard](#) (AIDR, 2017)
2. [Victorian Floodplain Management Strategy](#) (Victoria State Government, 2016)
3. [Council Planning Schemes](#) including the:
 - i. Planning Policy Framework
 - ii. Local Planning Policy Framework
 - iii. Relevant Zones and Overlays
4. [Guidelines for Coastal Catchment Management Authorities: Assessing development in relation to sea level rise](#) (DSE, 2012)
5. [PPN11: Applying for a Planning Permit under the Flood Provisions](#) (DELWP, 2015)
6. [Flood Guidelines: Guidelines for development in flood prone areas](#) (WGCMA, 2020)
7. [West Gippsland Waterway Strategy](#) (WGCMA, 2014-2022)
8. [West Gippsland Regional Catchment Strategy](#) (WGCMA, 2021-2027)
9. [West Gippsland Floodplain Management Strategy](#) (WGCMA, 2018-2027)

Definitions

1. **Annual Exceedance Probability (AEP)** is the likelihood of occurrence of a flood of given size or larger occurring in any one year. AEP is expressed as a percentage (%) risk and may be expressed as the reciprocal of Average Recurrence Interval.

Please note that the 1% probability flood is not the probable maximum flood (PMF). There is always a possibility that a flood larger in height and extent than the 1% probability flood may occur in the future.

2. **Australian Height Datum (AHD)** is the adopted national height datum that generally relates to height above mean sea level. The elevation is in metres.
3. **Average Recurrence Interval (ARI)** is the likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as, or larger than, the design flood event. For example, floods with a discharge as large as, or larger than, the 100 year ARI flood will occur on average once every 100 years.

4. **Finished Floor Level** is the level of the top layer of the floor. This is the layer of floor that you will see and walk on.
5. **Flood Resistant Materials** are materials used in building construction that are capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage. Some examples of this are concrete, metal, brick and some timber. Avoid using materials like carpet, plaster and some timber.
6. **Nominal Flood Protection Level (NFPL)** is the minimum height required to protect a building or its contents, which includes a freeboard above the 1% AEP flood level.

Disclaimers

1. The area referred to in this letter as the 'proposed development location' is the land parcel(s) that, according to the WGCMA's assessment, most closely represent(s) the location identified by the applicant. The identification of the 'proposed development location' on the WGCMA's GIS has been done in good faith and in accordance with the information given to the WGCMA by the applicant(s) and/or the local government authority.
2. While every endeavour has been made by the WGCMA to identify the proposed development location on its GIS using VicMap Parcel and Address data, the WGCMA accepts no responsibility for, or makes no warranty regarding, the accuracy or naming of this proposed development location according to its official land title description.

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3. No warranty is made as to the accuracy or liability of any studies, estimates, calculations, opinions, conclusions, recommendations (which may change without notice) or other information contained in this letter and, to the maximum extent permitted by law, the WGCMA disclaims all liability and responsibility for any direct or indirect loss or damage which may be suffered by any recipient or other person through relying on anything contained in or omitted from this letter.
4. This letter has been prepared for the sole use by the party to whom it is addressed, and no responsibility is accepted by the WGCMA regarding any third-party use of the whole or of any part of its contents. Neither the whole nor any part of this letter or any reference thereto may be included in any document, circular or statement without the WGCMA's written approval of the form and context in which it would appear.
5. The flood information provided represents the best estimates based on currently available information. This information is subject to change as new information becomes available and as further studies are carried out.
6. Please note that land levels provided by the WGCMA are an estimate only and should not be relied on by the applicant. Prior to any detailed planning or building approvals, a licensed surveyor should be engaged to confirm the above levels.
7. The flood information provided in this letter is generally more up to date than the Flood Overlay (FO) or Land Subject to Inundation Overlay (LSIO). This is because the WGCMA continually updates its flood information whenever new information becomes available. The overlays mentioned above are maintained by Council and are often out of date (by years in some areas).

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