Surface Water Assessment

Mornington Battery Energy Storage System

Prepared for Maoneng Australia Limited
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Mornington Battery Energy Storage System

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Prepared by	Approved by
	
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Executive Summary

ES1 Introduction

Maoneng Australia Limited (Maoneng) is proposing to develop the Mornington battery energy storage system (BESS) (the project) at 17 Thornells Road, Tyabb, Victoria (the site[1]). The project aims to improve electricity grid reliability and network stability by drawing energy from the electricity grid during off-peak periods for battery storage and dispatching energy to the grid during peak periods. The Mornington BESS would have capacity to store up to 240 megawatts (MW) of energy.

EMM Consulting Pty Limited (EMM) has been engaged by Maoneng to prepare a planning permit application for the project under the Victorian Planning and Environment Act 1987 (P&E Act). This surface water assessment (SWA) has been prepared by EMM to support the planning permit application.

Flooding is not specifically considered in this SWA. A Flood Prone Land Application has been submitted to Mornington Peninsula Shire Council (MPSC) by Maoneng that will inform flood-related requirements for the project.

ES2 Regulatory context

The regulatory framework and context established for the site and project with respect to surface water management includes several Victorian and Commonwealth statutes, as well as applicable guidelines. These include:

- *Planning and Environment Act 1987* (Victoria) and subsidiary instruments including the Victoria Planning Provisions and the Mornington Peninsula Planning Scheme;
- *Environment Protection Act 1970* (Victoria) and the subordinate State Environment Protection Policy (Waters);
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act); and
- a range of applicable industry guidelines.

ES3 Existing surface water environment

The site was previously used for horticultural activities (fruit orchard) and is now grassed and largely cleared of native vegetation. The site has an approximate footprint of 6.6 hectares.

The majority of the site drains towards the north-east corner adjacent to Thornells Road. An unnamed drainage line (herein referred to as Watercourse A) runs along the eastern boundary of the site grading from south to north and directs runoff into a roadside drain along the southern side of Thornells Road. Watercourse A also receives runoff from the adjacent property to the east. A smaller portion of the site drains generally to a vegetated depression that runs the length of the western site boundary. This depression would appear to first spill from the site in its south-west corner, discharging into the adjacent property to the south. There are three existing dams located in the south-eastern portion of the site, which will not be impacted by the project.

[1] The BESS would be located at 17 Thornells Road, Tyabb and the associated overhead transmission line would traverse a portion of the adjoining allotment at 21 Thornells Road, which is the Tyabb substation (Figure 1.1 and Figure 3.1). The scope of this surface water assessment does not specifically include the adjoining substation site at 21 Thornells Road. The proposed works on the 21 Thornells Road site are limited to the installation of an overhead transmission line, which would have no material impact on surface waters. Throughout this report, the term 'site' refers to the proposed BESS site at 17 Thornells Road.

The site is located within the Olivers Creek catchment, which ultimately drains to Western Port (WBM 2000) located approximately 1.7 km east of the site. Western Port contains a wetland that is listed under the Convention of Wetlands of International Importance (Ramsar Convention).

Key site constraints relevant to water management include the low topographic relief, potentially shallow depth to groundwater and soils that are potentially dispersive and prone to waterlogging.

ES4 Proposed water management approach

A conceptual approach to water management for the site has been developed to inform this SWA. This will be subject to further design development as part of future detailed design. The proposed water management approach has been developed with consideration of several key objectives that are consistent with best practice stormwater management and MPSC approach to stormwater management. This comprises a comprehensive suite of measures including:

- discharge from the site at a legal point of connection, and avoiding uncontrolled discharge;
- retention of the existing dams on the site;
- minimising the extent of new hardstand/impervious areas;
- promotion of stormwater infiltration, subject to feasibility;
- provision of water quantity controls to ensure peak flow rates discharging from site are not increased;
- provision of water quality controls that collectively meet industry standard pollutant load reduction targets;
- provision of specific stormwater management measures for the substation area;
- minimising site water requirements; and
- monitoring and maintenance of water management infrastructure.

It is noted no changes to existing water management on 21 Thornells Road would be required to facilitate the proposed overhead transmission line connection to the Tyabb substation.

Prior to construction, temporary soil and water management measures would be detailed and documented as part of the overall construction environmental management plan (CEMP) to address temporary risks to water quality and drainage during the construction phase. This will also reflect industry best practice. The CEMP would primarily address construction works on the site, but would also address minor works within 21 Thornells Road that are required to facilitate the proposed overhead transmission line connection to the Tyabb substation

ES5 .Residual impacts and mitigation measures

Predicted residual impacts to surface water resources are described in terms of stormwater flow management, water quality, and impacts to watercourses, water bodies and the downstream receiving environment. This assumes implementation of the proposed water management approach.

During construction the key risks to surface water are associated with clearing, ground disturbance, earthworks, compaction of soils and installation of infrastructure. This may lead to an increase in site runoff potential and exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. Contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities could also adversely impact water quality.

Potential impacts during construction are considered minor and manageable with implementation of temporary water and soil management measures that would form part of the CEMP.

During operation the key risks to surface water are associated with an increase in site runoff potential and stormwater pollutant loads. This may lead to an increase in peak flow rates leaving the site and reduction in water quality in receiving watercourses.

However, a range of measures to mitigate potential increases in peak flow rates and pollutant loads form part of the proposed water management approach for the project. On this basis, potential adverse impacts during operation are not anticipated.

If necessary a stormwater basin could be provided in the north-east corner of site to assist in achieving the required level of peak flow attenuation and/or stormwater pollutant removal. This area is not required for other site infrastructure and is understood to otherwise be relatively unconstrained. The preferred stormwater infrastructure configuration, and need for a stormwater basin, will be determined as part of detailed design.

Potential adverse impacts to watercourses and water bodies further downstream of the site, including Western Port and the associated Ramsar wetland, are not anticipated. Referral of the project under the EPBC Act with respect to potential impacts to the Ramsar wetland is not warranted.

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1 Introduction

1.1 Background

Maoneng Australia Pty Limited (Maoneng) is proposing to develop the Mornington battery energy storage system (BESS) (the project) at 17 Thornells Road[2], Tyabb, Victoria (the site). Figure 1.1 shows the regional context of the site, which is located within the Mornington Peninsula Shire local government area (LGA).

EMM Consulting Pty Limited (EMM) has been engaged by Maoneng to prepare a planning permit application for the project under the Victorian *Planning and Environment Act 1987* (P&E Act). This surface water assessment (SWA) has been prepared by EMM in support of the planning permit application.

1.2 Project description

The project aims to improve electricity grid reliability and network stability by drawing energy from the electricity grid during off-peak periods for battery storage and dispatching energy to the grid during peak periods. The Mornington BESS would have capacity to store up to 240 megawatts of energy.

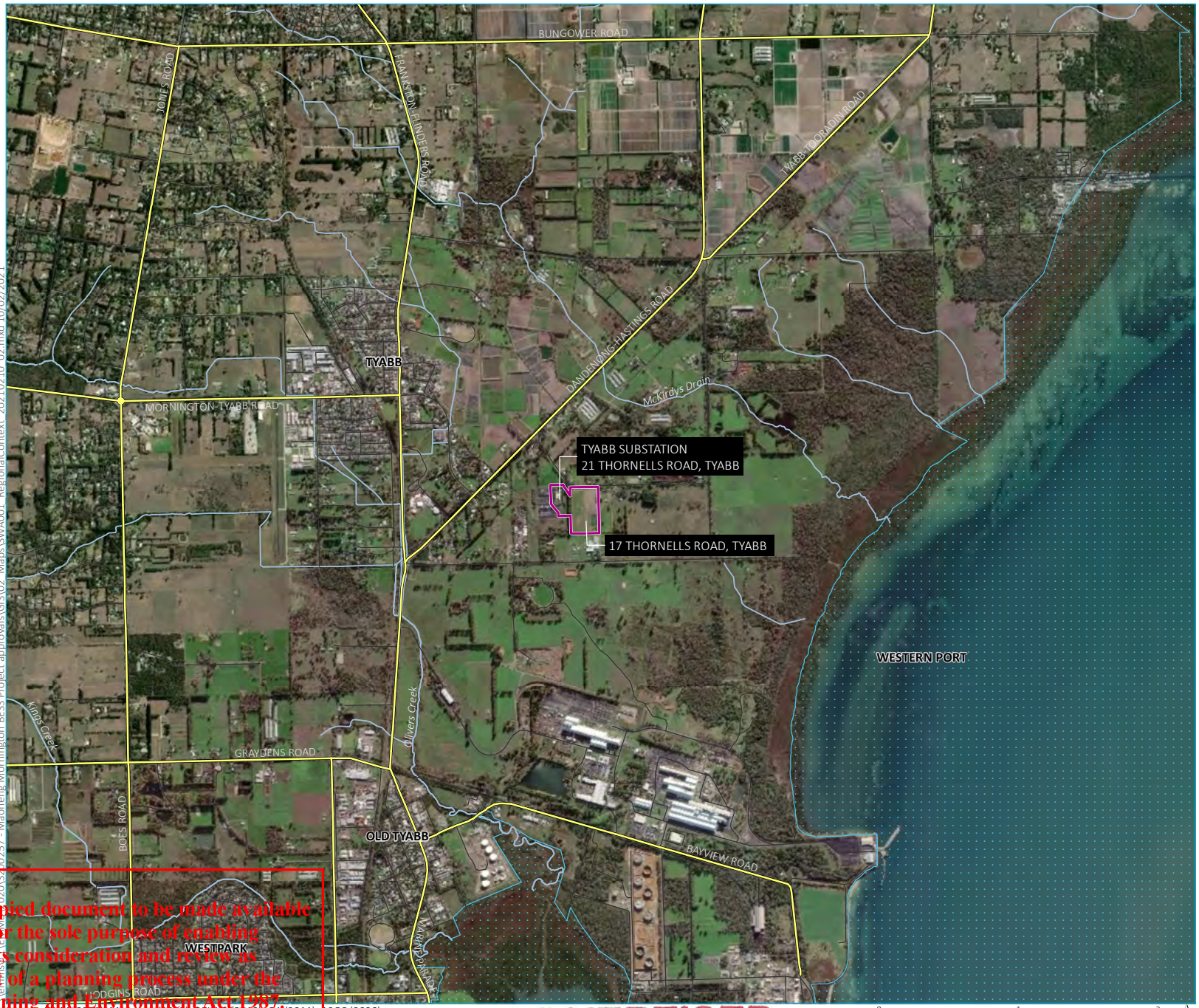
Australia's energy market is undergoing significant changes and utility scale batteries are pivotal to enabling the shift from a fossil fuel energy baseload to renewable energy. The Mornington BESS would connect to the electricity network via the existing AusNet Services Limited Tyabb substation, which is located immediately west of the site at 21 Thornells Road (Figure 1.1).

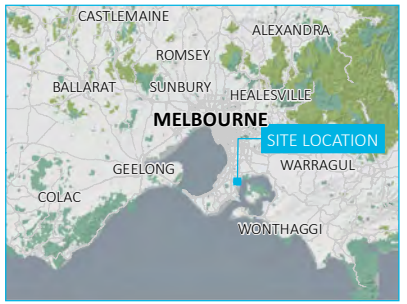
The project conceptually comprises the following key components:

- Batteries housed within fully enclosed battery containers, with associated inverters and transformers and an underground cable network.
- An onsite 220 / 33 kilovolt (kV) or 66 / 33 kV substation.
- A switchroom.
- A control room.
- An underground or overhead transmission line connecting the proposed on-site substation to the adjacent Tyabb substation.
- Internal access roads.
- A temporary construction laydown area.
- An operations and maintenance building.
- Security fencing and fire safety equipment.

[2] The BESS would be located at 17 Thornells Road, Tyabb and the associated overhead transmission line would traverse a portion of the adjoining allotment at 21 Thornells Road, which is the Tyabb substation (Figure 1.1 and Figure 3.1). The scope of this surface water assessment does not specifically include the adjoining substation site at 21 Thornells Road. The proposed works on the 21 Thornells Road site are limited to the installation of an overhead transmission line, which would have no material impact on surface waters. Throughout this report, the term 'site' refers to the proposed BESS site at 17 Thornells Road.

Stormwater drainage works would be required to facilitate the above infrastructure. The proposed water management approach for the project, including stormwater drainage, is described in Section 4.





KEY

- Subject site
- Major road
- Minor road
- Named watercourse
- Watercourse/drainage line
- Ramsar wetland

INSET KEY

- Major road
- National park/reserve
- State forest

Source: EMM (2021); Maoneng (2020); DELWP (2019); GA (2011); ASGC (2006)

Regional context

Maoneng Australia Pty Limited
Mornington BESS
Surface water assessment
Figure 1.1

EMM
creating opportunities

1.3 Site selection and description

The site is located off the unsealed Thornells Road on land previously used for horticultural activities (fruit orchard) and was selected by Maoneng primarily due its proximity to the existing Tyabb Substation. The site is relatively flat and grassed, having been cleared of most native vegetation, and has an approximate area of 6.6 hectares (ha).

The surrounding land use is a mixture of rural residential dwellings on large allotments, several of which operate as 'hobby' farms, smaller tracts of agricultural land and a variety of commercial/industrial activities. Tyabb town centre is located approximately 2 kilometres (km) to the north-west of the site.

Existing site infrastructure includes three dams located in the south-eastern portion of the site. These dams control a small catchment including part of the site and adjacent property to the south and have also been used to store extracted groundwater. Water stored in the dams was previously used on-site for irrigation. Other existing site infrastructure includes a shed, a pump shed and an access road.

The site is located within the broader Olivers Creek catchment (WBM 2000), which ultimately drains to Western Port approximately 1.7 km east of the site. The majority of the site drains towards the north-east corner adjacent to Thornells Road. From this point surface water runoff drains generally to the east via a series of roadside drains and watercourses that discharge into McKirdys Drain and then to Western Port. A small portion of the site drains towards the south-west corner and then to Olivers Creek via a series of agricultural and roadside drains, ultimately draining to Western Port.

Western Port contains a wetland that is listed under the Convention of Wetlands of International Importance (Ramsar Convention). The wetland is valued in particular for its significance as waterbird habitat, but also for its terrestrial and marine flora and fauna, cultural heritage, recreational opportunities and its scenic values. Ramsar wetlands are protected in Australia under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) (refer to Section 2.3.1).

1.4 Objectives of this report

The key objectives of this SWA are to:

- describe the regulatory framework relevant the project;
- describe and characterise the existing surface water environment relevant to the project;
- identify and assess potential surface water impacts of the project construction and operation; and
- identify appropriate mitigation and management measures for the project.

Flooding is not specifically considered in this SWA. A *Flood Prone Land Application* has been submitted to Mornington Peninsula Shire Council (MPSC) by Maoneng that will inform potential flood-related requirements for the project.

1.5 Assessment approach

The assessment approach adopted for this SWA comprised:

- desktop review of existing available information and spatial data, site survey data and other relevant online resources to summarise the regulatory context and characterise existing surface water resources;
- site inspection undertaken during September 2020 to ground-truth the existing site topography and drainage arrangements, and consult with the existing landowner regarding the use of the three on-site dams;
- identification of potential surface water impact mechanisms associated with project construction and operation;
- development of a water management approach consistent with industry best practice; and
- review and assessment of residual impacts to surface water resources on a largely qualitative basis to understand the significance of potential impacts and consider the need for any further mitigation or management.

1.6 Potential sources of impact

Key potential sources of impact to surface water resources comprise the following:

- Construction stage impacts, including:
  - ground disturbance during bulk earthworks and installation of site infrastructure, leading to exposure of soils and potential erosion and mobilisation of sediment into receiving drainage systems and watercourses;
  - contamination of surface waters as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities;
  - disturbance of watercourses and/or water bodies and associated riparian zones to support construction activities, leading to instability and/or other poor health outcomes and associated downstream impacts to water quality;
  - increase in site runoff potential as a result of clearing, earthworks, compaction of soils and installation of impervious surfaces, leading to additional runoff leaving the site and impacting downstream properties; and
  - partial blockage or redirection of site runoff as a result of poorly considered construction activities, fencing or storage/stockpile areas, leading to potential stormwater inundation of construction areas or downstream properties, damage to plant and equipment, and potential work health and safety risks.
- Operational stage impacts, including:
  - potential ongoing erosion of soils and mobilisation of sediment into receiving drainage systems and watercourses;

- contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support operational site activities, or through poor site and vegetation management practices;

- increase in site runoff potential as a result of proposed site infrastructure and installation of impervious surfaces leading to additional runoff, or changes in the proportional distribution of drainage contributions, leaving the leaving the site and impacting downstream properties; and

- partial blockage or redirection of floodwaters as a result of poorly considered permanent facilities resulting in inundation of facilities or downstream properties, damage to plant and equipment, and potential work health and safety risks.

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

2 Regulatory framework and context

2.1 Overview

This section describes legislation and local planning provisions that have been considered in this SWA. Relevant best practice guidelines for surface water and stormwater management are also described.

2.2 State legislation

2.2.1 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) establishes a framework for planning the use, development and protection of land in Victoria.

The P&E Act enables subsidiary instruments which provide the specific direction and rules for planning decisions in Victoria, principally the Victoria Planning Provisions (VPP), local government planning schemes and Ministerial directions.

Pursuant to the P&E Act, planning requirements for the site fall under the Mornington Peninsula Planning Scheme (MPPS) (DELWP 2020a). Other specific requirements under the VPP also apply.

i Mornington Peninsula Planning Scheme

The site is zoned as *Special Use Zone 1 (SUZ1) – Port Related Uses* under the MPPS. Under the MPPS, a planning permit application is required on the basis that:

- per Clause 73.03, the project is classified as a 'utility installation' (land used to transmit, distribute or store power, including battery storage); and
- under Schedule 1 (Section 1.0 – Use of Land) to SUZ1, utility installations require a planning permit.

Per Schedule 1 (Section 2.0 – Use of Land) to SUZ1 in the MPPS, and relevant to this SWA, the planning application must include the likely effects (if any) on emissions to land and water.

Schedule 1 to SUZ1 outlines the decision guidelines to be considered by the Department of Environment, Land, Water and Planning (DELWP) and MPSC in their assessment of the planning application. Those relevant to this assessment include:

- the effect that the use may have on the waters and intertidal areas of Western Port and the environmental values of adjoining land;
- the need for and adequacy of risk assessment and environmental response plans;
- the effect that the use may have on nearby existing or proposed residential areas or other uses which are sensitive to industrial off-site effects; and
- the drainage of the land.

Under Clause 37.01 of the MPPS, DELWP and MPSC will also consider the impacts on soil stability (erosion hazard) arising from the clearing of native vegetation.

ii Victoria Planning Provisions

Amendment VC154 of the VPP introduced new stormwater management provisions for urban development. The amendment, through the introduction of Clause 53.18 (Stormwater management in urban development), expanded the planning scheme objectives for integrated water management to include non-residential developments in several land use zones including special use zoned land.

Clauses 53.18-5 and 53.18-6 prescribe the objectives and standards that must be met for 'buildings and works' developments. The stormwater objectives generally concern protecting site and surrounding drainage infrastructure and receiving waterers from environmental degradation, maximising retention and re-use of stormwater on-site, reducing water quality impacts of off-site discharges, and that any discharge of commercial and industrial pollutants/toxicants is prevented. The performance standards to be met and demonstrated as part of the planning application are:

- Clause 53.18-5 – Standard W2 – the design of a stormwater management system that:
  - meets the current best practice performance objectives for stormwater quality as contained in the *Urban Stormwater – Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee 1999) (USBPEMG) (refer Section 2.4.1);
  - minimises the impact of chemical pollutants and other toxicants including by, but not limited to, bunding and covering or roofing of storage, loading and work areas; and
  - contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.
- Clause 53.18-6 – Standard W3 – An application should describe how the site will be managed prior to and during the construction period and may set out requirements for managing:
  - erosion and sediment;
  - stormwater;
  - litter, concrete and other construction wastes; and
  - chemical contamination.

Proposed water management is described in Section 4, and is generally consistent with the intent of the VPP stormwater objectives and USBPEMG.

2.2.2 Building Act 1993

The site is not located within a floodway or estuary zone however some parts of the site are mapped as being a designated flood prone area on MPSC Flood Prone Map No. 32 (MPSC 2017), including the western boundary line and the existing site dams, although other available mapping (MPSC 2020a) suggests this relates primarily to the existing dams.

In accordance with the 'Report and Consent' mechanism under the *Building Act 1993* and *Building Regulations 2018*, developments proposed on flood prone land are assessed by an MPSC Flood Officer (MPSC 2020b), with the following matters considered:

- Rising waterways.
- Overland flow from adjoining land.
- The affect the proposal may have on neighbouring properties.

As existing flooding conditions/risks and potential impacts are to be assessed by MPSC, no dedicated food assessment is provided in this SWA. However, it is noted that the scope of the flood assessment shares similar assessment requirements with those under the MPPS in terms of considering site drainage and impacts of the development on neighbouring land.

2.2.3 State Environment Protection Policy (Waters)

The primary legislation relevant to the management of risks to surface waters is the *Environment Protection Act 1970* (EP Act) and the subordinate *State Environment Protection Policy (Waters)* (Government of Victoria 2018) (SEPP (Waters)).

i Beneficial uses

The SEPP (Waters) identifies the beneficial uses of surface waters that are to be protected and defines the water quality objectives (WQOs) for key indicators that need to be met and maintained to protect these uses. Beneficial uses and WQOs are defined for aquatic reserves, inland rivers and streams, inland lakes and wetlands, and marine and estuarine receiving waters.

Schedule 1 of the SEPP (Waters) divides surface waters in Victoria into "segments" based on their geographic region and quality/condition. With reference to Schedule 1(2) of the SEPP (Waters) and the SEPP (Waters) Monitoring, Evaluation and Reporting Framework (DELWP 2018), the surface water segments and prescribed beneficial uses for local receiving waters (McKirdys Drain and Olivers Creek) are given in Table 2.1.

Table 2.1 Applicable SEPP (Waters) surface water segments and beneficial uses

Segment [1]	Sub-segment	Default prescribed beneficial uses
Inland waters – Rivers and streams	Urban (highly modified) – Lowlands of Dandenong Creek, Mornington Peninsula, Western Port catchment and tributaries of the Yarra River [2]	• Water dependent ecosystems and species that are highly modified. • Human consumption after appropriate treatment (if in a special water supply catchment area). • 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. • Cultural and spiritual values.

1. Based on segment maps in Schedule 1 (2) of the SEPP (Waters) and DELWP (2018).

2. Project site falls within the urban growth boundary for metropolitan Melbourne under the P&E Act (see SRO 2020).

On review of the specific local context to the site and receiving environment, the beneficial uses considered relevant to the McKirdys Drain and Olivers Creek receiving environments are:

- water dependent ecosystems and species that are highly modified;
- agriculture and irrigation; and
- industrial and commercial use.

Implementation of stormwater best practice guidelines, such as the UPBPEMG, would be appropriate to mitigate potential project-related impacts and maintain water quality for these beneficial uses.

ii Management of construction runoff quality and flow

Clause 34 of the SEPP (Waters) defines responsibilities for local councils, catchment management authorities and water corporations to ensure that measures are undertaken to manage risks to receiving waters and beneficial uses arising from urban stormwater discharge. Consistent with Clause 53.18 of the VPP, Clause 34 of the SEPP (Waters) requires local councils to ensure that all new development meet the objectives for environmental management of stormwater as set out in the USBPEMG.

The performance objectives defined in the USBPEMG for the management and mitigation of stormwater quality and flow impacts are detailed in Section 2.4.1.

Clause 42 of the SEPP (Waters) requires construction works be managed so that impacts to receiving waters and beneficial uses due to land disturbance, soil erosion and discharge of sediments and other pollutants is minimised as far as reasonably practicable. This is to be achieved through application of best-practice erosion and sediment controls, as defined in relevant EPA guidelines (Section 2.4.2).

2.3 Commonwealth legislation

2.3.1 Environment Protection and Biodiversity Conservation Act 1999

Ramsar wetlands are recognised as a Matter of National Environmental Significance (MNES) under the EPBC Act. Referral to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for assessment and approval is necessary when a proposed action is considered likely to have a significant impact on the ecological character of a Ramsar wetland. Significant impact criteria are described in *Matters of National Environmental Significance: Significant Impact Guidelines 1.1 – Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia 2013) (Significant Impact Guidelines).

This is addressed further in Section 5.4, which concludes that the project will not have a significant impact on the Western Port Ramsar wetland.

2.4 Best practice guidelines

2.4.1 Urban Stormwater Best Practice Environmental Management Guidelines

As described above, both the VPP and SEPP (Waters) point to the USBPEMG for stormwater quality and flow objectives to be achieved by building/construction developments.

The performance objectives for stormwater runoff quality and flow defined in the USBPEMG and relevant to the project (construction and post-construction/operations phase) are presented in Table 2.2. It is noted that the USBPEMG (c. 1999) is outdated and references requirements of the former SEPP (Waters of Victoria 1988). The current SEPP (Waters) objectives (c. 2018) have thus been applied.

Table 2.2 Stormwater quality and flow objectives (USMPEMG)

Indicator (pollutant type)	Receiving water objective	Best-practice stormwater objective
Construction phase		
Total suspended solids (TSS)	n/a – no SEPP (Waters) objectives apply to TSS) [1]	Effective treatment of 90% of daily run-off events (eg <4 months Average Recurrence Interval (ARI))
Litter	No litter in waterways	Prevent litter from entering the stormwater system
Other pollutants	Comply with SEPP (Waters)	Limit the application, generation and migration of toxic substances to the maximum extent practicable
Post-construction (operations) phase		
Total suspended solids (TSS)	n/a – no SEPP (Waters) objectives apply to TDS) [1]	80% reduction of the typical urban annual load
Total phosphorus (TP)	SEPP (Waters) 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 flows at pre-urbanisation levels	Maintain discharges for the 1.5-year ARI at pre-development rates

1. No WQOs for TSS apply to 'inland waters and streams' in the SEPP (Waters). Turbidity objective would apply.

The best practice objectives for stormwater quality are the benchmarks to be met for stormwater treatment, where required, and suitability for off-site discharge.

Referring to Section 2.3 of the USBPEMG, compliance with these objectives can be demonstrated through:

- monitoring of existing stormwater discharge quality; or
- modelling of stormwater quality and its potential impact on receiving waters using mathematical models (eg MUSIC software) to determine treatment requirements, supported by monitoring data if/where available; or
- reference to averaged, generic values for typical urban stormwater quality.

Modelling of stormwater quality is recommended to be undertaken as part of future detailed design to confirm compliance as required.

2.4.2 Other guidelines

The following best practice guidelines are also relevant to the construction and operational phases of the project.

These guidelines relate to stormwater management, erosion and sediment control and bunding and containment of hazardous materials (pollutants) and provide key design and assessment guidelines and recommendations where stormwater quality and flow impacts are the focus for assessment and management.

i Stormwater management (water sensitive urban design)

- EPA Publication 989 – *Water sensitive urban design* (EPA Victoria 2005).
- EPA Publication 1226 – *Maintaining water sensitive urban design elements* (EPA Victoria 2008).
- *Water sensitive urban design* (Melbourne Water 2020).

ii Erosion and sediment control

- *Best Practice Erosion and Sediment Control* (IECA 2008).
- EPA Publication 275 – *Construction techniques for sediment pollution control* (EPA Victoria 1991).
- EPA Publication 1893 – *Erosion, sediment and dust: treatment train* (EPA Victoria 2020a).
- EPA Publication 1894 – *Managing soil disturbance* (EPA Victoria 2020b).
- EPA Publication 1895 – *Managing stockpiles* (EPA Victoria 2020c).
- EPA Publication 1897 – *Managing truck and other vehicle movement* (EPA Victoria 2020d).

iii Prevention of leaks and spills

- EPA Publication 1698 – *Liquid storage and handling guidelines* (EPA Victoria 2018a).
- EPA Publication 1700 – *Preventing liquid leaks and spills from entering the environment* (EPA Victoria 2018).

3 Existing environment

3.1 Overview

This section describes the existing surface water environment and related aspects of the site and regional context as relevant to this SWA.

3.2 Land use and infrastructure

i 17 Thornells Road

The site has been historically used as a fruit orchard however the majority of the fruit trees have now been removed. A large proportion of the site has recently been cut for hay. This historic and current land use is consistent with the mixed land use in the area which consists of mixed urban and semi-rural (peri-urban) use with the latter including grazing, viticulture, poultry farming and market gardens (WBM 2000).

Existing site infrastructure includes three dams located in the south-eastern portion of the site (refer Section 3.3.1 for details). Other site infrastructure includes a large metal shed in the middle of the site, a smaller metal pump shed near the dams, and an access road.

ii 21 Thornells Road

21 Thornells Road is currently used as a substation (known as the Tyabb substation) which supplies electricity to the Mornington Peninsula region via 220 / 66 kV transmission lines. Whilst this property is currently used for the transmission and distribution of electricity, surrounding semi-rural/market gardening land uses suggest it has historically been used for agricultural purposes.

3.3 Hydrology

3.3.1 Local context and site drainage

i 17 Thornells Road

Figure 3.1 provides an overview of existing site drainage features and catchment areas that are described in this section.

Site survey (refer Appendix A) was used to assist in understanding existing local site drainage, in combination with site inspection undertaken in September 2020.

Several photographs of the site and its drainage features are provided in Appendix B for reference purposes.

The majority of the site drains towards the north-east corner adjacent to Thornells Road. An unnamed drainage line (herein referred to as Watercourse A) runs along the eastern boundary of the site grading from south to north and directs runoff into a roadside drain along the southern side of Thornells Road. Watercourse A also receives runoff from the adjacent property to the east. The total catchment area (Catchment A) discharging from the site along Watercourse A is about 5.0 ha.

A smaller portion of the site drains generally to a vegetated depression that runs the length of the western site boundary. This depression would appear to first spill from the site in its south-west corner, discharging into the adjacent property to the south. The total area of Catchment B where it discharges from the site is about 2.1 ha and includes part of the adjacent Tyabb Substation at 21 Thornells Road.

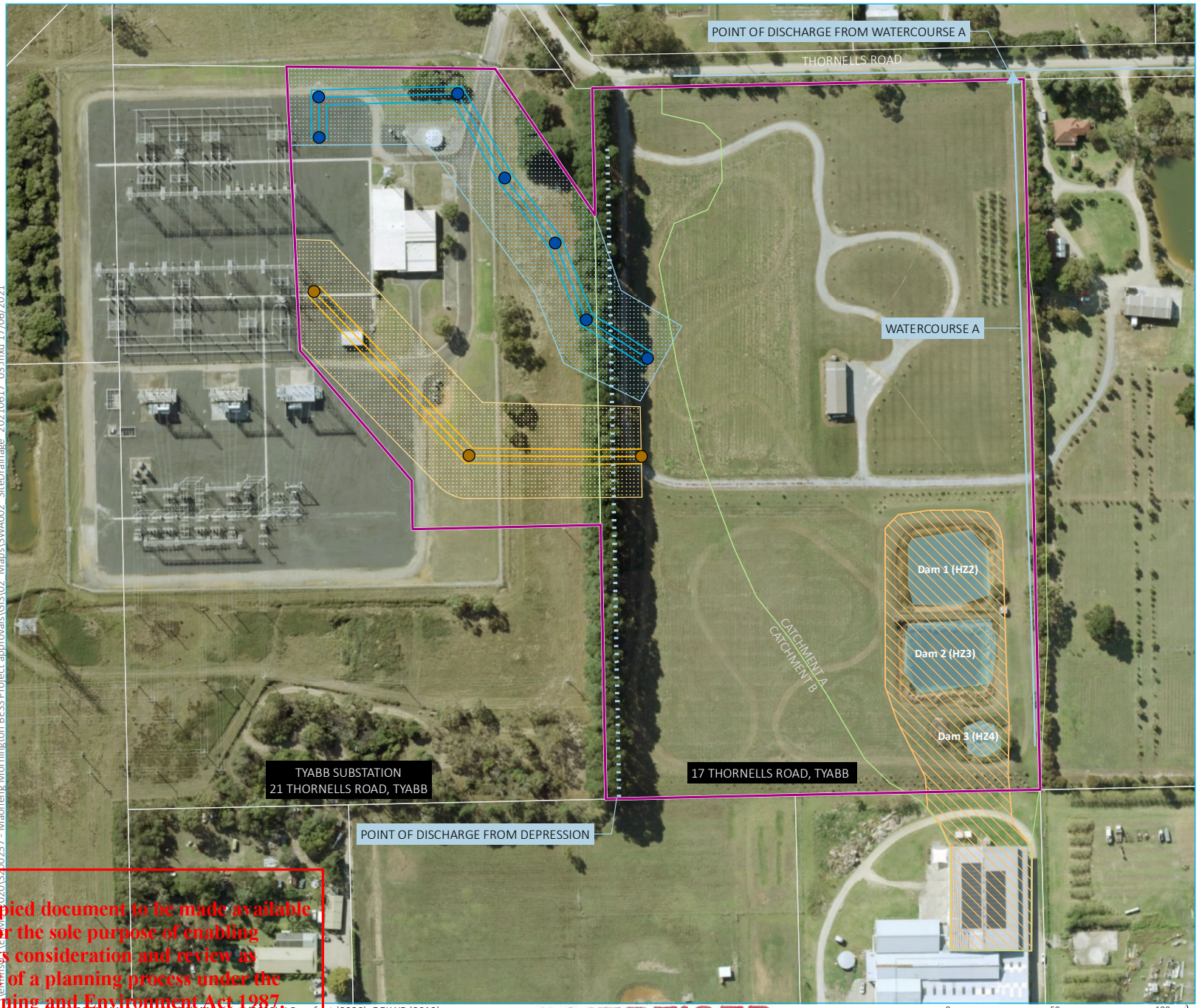
Stormwater runoff generated within the site occurs generally as uncontrolled overland flow across currently grassed areas and existing access tracks within the site. There are several minor trapped low points within the site where runoff is likely to pool at shallow depth after small, frequent rainfall events.

There are three existing dams located in the south-eastern portion of the site. The dams control a small sub-catchment within Catchment A, which includes part of the site along the southern boundary and the adjacent property to the south, including the roof of an existing shed. The dams are hydraulically connected by small diameter piped drainage, and spillways would direct overtopping flows towards Watercourse A. Historically runoff captured by the dams has been used for irrigation. The dams have also been used to store groundwater from a bore on the adjacent property to the east.

ii 21 Thornells Road

The eastern portion of this property where the proposed overhead transmission lines are located falls generally to the west towards the existing substation. There are no discernible surface drainage features in this portion of the property, with surface runoff expected to flow overland towards the substation. It is anticipated that an existing stormwater drainage system would control overland flow approaching and within the substation and discharge generally to the west.

The majority of this property is gravelled/bitumen.



KEY

- Subject site
- Transmission pole
- Transmisison tower
- Existing watercourse
- Depression along western boundary
- Dam
- Existing catchment
- Catchments controlled by existing dams
- Cadastral boundary

Transmission line

- Option 1 - 66 kV transmission line
- Option 2 - 220 kV transmission line
- Option 1 - 66 kV transmission line easement
- Option 2 - 220 kV transmission line easement

Source: EMM (2021); Metromap (2021); Maoneng (2020); LCrowfoot (2020); DELWP (2019)

0 50 100 m

GDA 1994 MGA Zone 55

N

Existing site drainage

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Surface water assessment
Figure 3.1

EMM
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3.3.2 Regional hydrologic context

Downstream of the site, stormwater runoff generated within the site will follow one of two drainage paths:

- From the north-east corner of the site at Thornells Road, stormwater runoff will flow generally to the north-east towards McKirdys Drain (refer Figure 1.1), which ultimately flows into Western Port.
- From the south-west corner of the site, stormwater runoff will flow generally to the south towards Olivers Creek (refer Figure 1.1), which also ultimately flows into Western Port.

Runoff from 21 Thornells Road will also flow generally to the south towards Olivers Creek and ultimately into Western Port.

Both McKirdys Drain and Olivers Creek are comprised of highly modified natural and constructed drainage lines (WBM 2000).

Western Port is a large, semi-enclosed bay located about 1.7 km east of the site. It is situated on an exposed coastline which opens into Bass Strait and two islands, namely Phillip Island and French Island. Western Port is subject to a moderately-high tidal range and hosts inter-tidal mudflats (cut by deep channels), mangrove and saltmarsh fringes, and seagrass meadows (Melbourne Water 2011).

Western Port is host to several conservation and environmental reserves including 13 Victorian Marine National Parks and the adjacent Mushroom Reef Marine Sanctuary. The entire bay is a designated Ramsar wetland, valued in particular for its significance as waterbird habitat, but also for its terrestrial and marine flora and fauna, cultural heritage, recreational opportunities and its scenic values.

3.3.3 Water quality

No known water quality monitoring data is available for surface water runoff generated within the site. Whilst some limited analysis of water quality has been undertaken on samples taken from within the existing dams, this is unlikely to be representative of general site runoff.

Available water quality data for Olivers Creek (DELWP 2020b) for the period 2007 to 2018 shows the background water quality of Olivers Creek exceeds relevant WQOs for nutrients (TP and TN), salinity and dissolved oxygen. Elevated nutrient levels likely reflect the land uses in the wider catchment (eg agricultural production, unsealed local roads and existing degraded streambank conditions) with inputs from older, unregulated private septic systems also a potential cause (WBM 2000). These elevated nutrient levels typically encourage undesirable algae and other aquatic plant growth and a reduction in oxygen levels. Online mapping (DELWP 2020c) indicates several points of groundwater salinity discharge in or near to Olivers Creek which is likely influencing the elevated salinity along with broader catchment inputs.

Overall, the condition of Olivers Creek is consistent with the characterisation of local waterways as highly modified (WBM 2000) and is likely representative of general background water quality in McKirdys Drain given the similar environmental setting.

3.3.4 Flooding

The site is identified as a designated flood prone area (MPSC 2017). MPSC will provide further details of flood affectation in their response to the *Flood Prone Land Application* lodged by Maoneng.

3.4 Climate

The climate of the region is described as having mild summers and cool winters, with mean minimum and mean maximum temperatures consistently differing by approximately 10 degrees Celsius throughout the year (BoM 2020a).

Average annual rainfall is approximately 720 mm/year and average annual pan evaporation rates are approximately 1000–1200 mm/year (BoM 2020a; BoM 2020b).

Mean monthly rainfall and mean maximum temperature data for the BoM stations at Mornington (086079) and Cerberus (086361) are presented in Table 3.1 and Figure 3.2[3].

Average monthly 9 am windspeeds generally range between 10–20 km/h and average monthly 3 pm windspeeds between 15–25 km/h. Greater month-to-month variation in 9 am and 3 pm windspeeds is observed in the data for Cerberus (086361) compared to Mornington (086079) given the former has a more southerly aspect and is likely more exposed to winds off Bass Strait. Although no data exists, windspeeds at the project site may more closely reflect those for Cerberus given its similar position on the eastern side of the Mornington Peninsula.

3.5 Topography

The Mornington Peninsula is host to the Southern Uplands geomorphological unit with generally very low relief. Relevant to the site, the northern Mornington Peninsula consists of plateau and broad ridges described as being weakly dissected by drainage lines resulting in a landform of low relief with very gentle (1–3%) to gentle (3–10%) slopes and gently undulating plain (Agriculture Victoria 2020a).

The site topography is relatively flat. The highest elevation occurs along the southern boundary at about 23.6 m relative to Australian Height Datum (m AHD) and the lowest along the northern boundary at the point of discharge of Watercourse A from the site at about 20.0 m AHD. Site relief is low, and generally west to east/north-east, with the south-west corner of the site tending east to west/south-west. The surrounding area is similarly flat with hillslopes of approximately 1% with no distinguishing paths for concentrated water flow apart from the major drainage lines forming Olivers Creek and McKirdys Drain.

[3] Average of data from the Mornington (086079) and Cerberus (086361) BoM stations.

Table 3.1 Mean annual rainfall and mean maximum temperature

Month	Mornington (Station 086079)		Cerburus (Station 086361)	
	Mean rainfall (mm)	Mean max. temp (°C)	Mean rainfall (mm)	Mean max. temp (°C)
Jan	44.2	25	38.8	24.6
Feb	43	25	37.7	25
Mar	48.7	23.3	44.3	23.2
Apr	62.6	19.4	61.2	19.9
May	70.1	16.2	71	16.6
Jun	71.1	13.5	72.6	14.2
Jul	69	12.8	70.8	13.7
Aug	71.3	13.8	76.4	14.6
Sep	71.6	15.9	67.4	16.5
Oct	68.4	18.1	65.3	18.7
Nov	59.9	20.3	55.1	20.6
Dec	54.1	23.1	53.9	22.5
Annual	**733.9**	**18.9**	**714.3**	**19.2**
Data years (n)	*133*	*44*	*30*	*29*

Data source: BOM (2020)

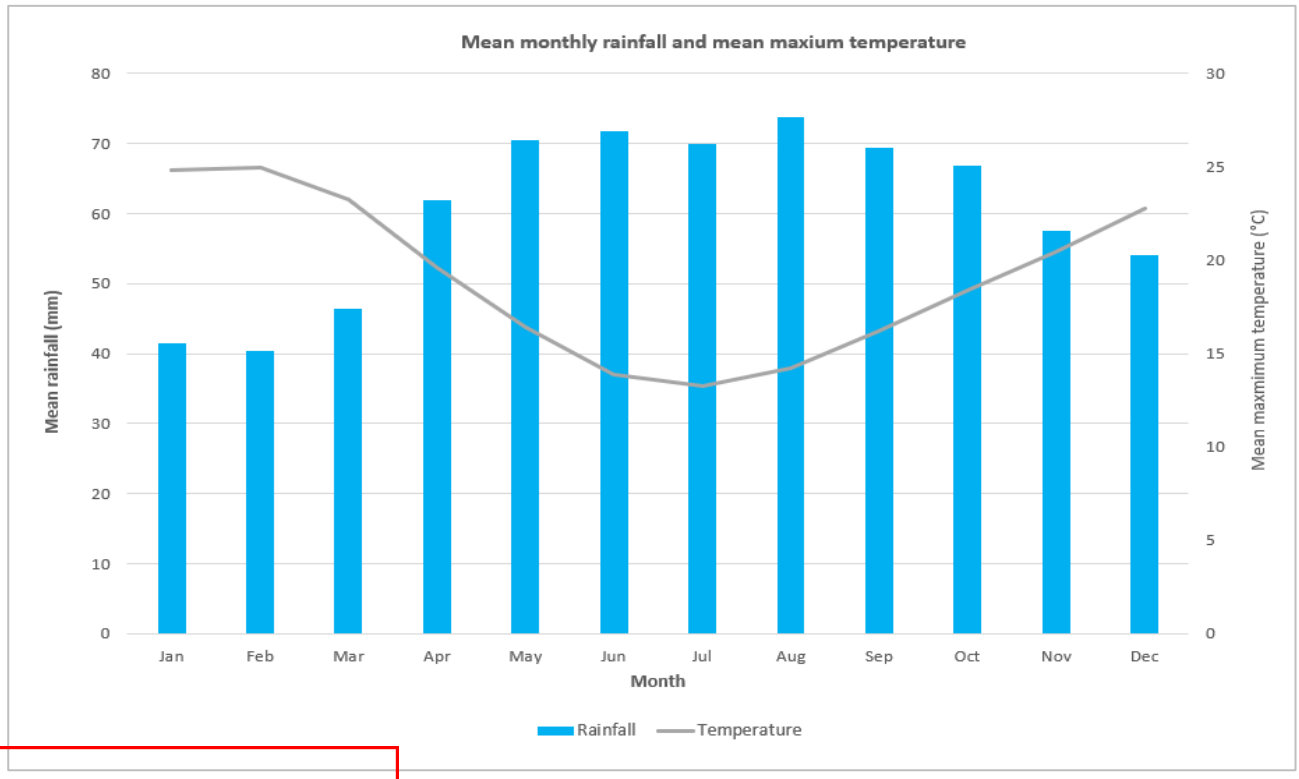


Figure 3.2 Mean monthly rainfall and maximum temperature

3.6 Groundwater

The site falls within the Western Port groundwater catchment, with a local depth to groundwater of approximately 5–10 m below ground level (mBGL) and low-to-moderate groundwater salinity (measured as Total Dissolved Solids; TDS) ranging from 1,001–3,500 mg/L (DELWP 2019a). This TDS range places the groundwater in beneficial use segments A2 to C per the SEPP (Waters) with groundwater uses generally suitable for most uses other than for potable (drinking) water supply.

Two main aquifer units are mapped for the site, with basement rock starting at approximately 55 mBGL:

- upper tertiary aquifer (fluvial) comprised of sand, gravel and clay (0–5 mBGL); and
- upper mid-tertiary aquifer comprised of fractured limestone, sand, gravel and clay (5–55 mBGL).

With reference to the Australian Groundwater Explorer (National Groundwater Information System; BoM 2020c) eight registered groundwater bores are recorded within a 1 km radius of the site. Consistent with the SEPP (Waters) groundwater salinity and beneficial use categories the recorded uses are varied and include water supply (although not further specified), monitoring, irrigation and commercial and industrial use (Table 3.2).

It is noted the site falls within a recognised salinity province (Salinity Province 80 – Mornington) which are regions mapped as having, or showing symptoms of, dryland soil salinity. Salinity risk is generally very localised and limited to locations with locally high groundwater table, where underlying bedrock restricts groundwater flow and/or where groundwater discharges at surface as springs (Agricultura Victoria 2020c; PPWCMA 2010). Soil and groundwater salinity are associated with elevated salinities in creeks and waterways in the area (Agriculture Victoria 2020d).

Table 3.2 Registered groundwater bores within 1 km

Bore ID	Bore depth (m)	Drilled date	Purpose
97233	53.3	31-12-1967	Unknown
97282	84.0	15-03-1988	Water Supply
114123	19.5	20-07-1992	Monitoring
97260	50.2	01-04-1981	Irrigation
WRK032939	58.0	24-08-1998	Commercial and Industrial
WRK032248	44.2	30-06-1994	Irrigation
97256	48.8	06-03-1980	Water Supply
WRK042966	123.0	14-05-1997	Irrigation

3.7 Soils

The soil mapping unit (SMU) for the project site is Toomuc with Cranbourne (To/Cr) based on 1:100,000 soil/landform mapping for the Mornington Peninsula (Agriculture Victoria 2020b). This is a complex SMU between the Toomuc (To) and Cranbourne (Cr) SMUs which indicates that two or more soil types are present and cannot be distinguished at the survey mapping scale used.

The dominant soil types associated with these SMUs, based on the Australian Soil Classification (ASC) (Isbell 1996), are described in Table 3.3.

Table 3.3 Project site soil mapping units and soil types

Soil mapping unit (SMU)	Geology	Landform	Dominant soils [1]	SMU description [2]
Toomuc (To)	Dunefield	Aeolian sediments over Tertiary sediments	Yellow and Grey Chromosols and Sodosols	• Surface soils are grey to dark grey loamy sands to sandy loams about 250 mm deep, overlying a bleached layer of similar texture. • The surface soils are naturally strongly acidic, pH 4.5–5.5 with the pH of the subsoils around 5.5–6.5. • The zone just above the clay generally contains ferruginous nodules (ie 'buckshot'). • Mottled pale yellowish grey, grey and yellowish-brown medium to heavy clays occur from about 600 mm depth. • With increasing depth, the clays may become sandier.
Cranbourne (Cr)	Dunefield	Early Pleistocene aeolian sediments	Aeric Podosols	• Cranbourne sand is the main soil type. • Cranbourne sand typically has a dark grey sand surface becoming light grey by about 300 mm depth. • Surface soils typically strongly acidic with a pH around 4.5–5.0, and the subsoils around pH 4.5–5.5. • Dark brown and yellow brown cemented sands (termed 'coffee rock') usually occur at about 1 m depth. Coffee rock layer can impede the deeper infiltration of water. • Mottled light yellowish brown and light grey sands occur under the coffee rock, and mottled yellow-brown and light grey clays occur at greater depths, generally below 1 m. • Soils have poor water retention due to high sand content.
Toomuc with Cranbourne (To/Cr)	Dunefield	As per To and Cr (complex)	As per To and Cr (complex)	• As per the Tooluc (To) and Cranbourne (Cr) SMUs described above, where about 15-35% of the area is comprised of sands deeper than 1 m. • Where soils of the Tooluc (To) and Cranbourne (Cr) SMUs occur together the soils are very prone to waterlogging.

1. As per the Australian Soil Classification (ASC; after Isbell 1996).
2. Adapted from Agriculture Victoria (2020b).

The properties and constraints of the soil types likely to occur on the site based are described in Table 3.4 (after Isbell 1996, and Gray & Murphy 2002).

Table 3.4 Soil properties

ASC soil type	Description [1]
Chromosols (CH)	• Strong texture-contrast between the A and B soil horizons. • Not strongly acidic or sodic in the upper B horizon. • Parent material ranges from highly siliceous, siliceous to intermediate in composition. • Found in imperfectly drained sites (eg yellow and grey Chromosol) where rainfall is between 250–900 mm. • Can be susceptible to soil acidification and soil structure decline.
Sodosols	• Strong texture contrast between the A and B soil horizons. • The B horizon is highly sodic but not highly acidic (pH >5.5). • Parent materials range from highly siliceous, siliceous to intermediate in composition. • Sodosols are generally only found in poorly drained sites with rainfall between 50–1100 mm. • Generally, sodosols have very low agricultural potential with high sodicity leading to high erodibility, poor structure and low permeability. • Low to moderate chemical fertility and can be associated with soil salinity.
Podosols (PO) **Suborder:** **Aeric (AL)**	Podosols • B horizon dominated by compounds of organic matter, aluminium (Al) and/or iron (Fe), and generally highly sandy and acidic. • Parent material is extremely quartz rich. • Found where rainfall is >700 mm and are either well-drained (mid and upper slopes) or poorly drained (footslopes and flats). • Generally, very low agricultural potential with very low chemical fertility, structure, and water-holding capacity. • High permeability (infiltration capacity) although this can increase the risk of contaminants entering groundwater. Aeric Podosols: • B horizons are weakly coherent and porous with no restriction on drainage. • No perching of water within the B horizon or saturation due to a high ground water table. • Often brightly coloured and lack evidence of seasonal reduction.

1. Adapted from Isbell (1996) and Gray & Murphy (2002).

The soil types mapped pose a variety of potential risks to the proposed project development activities. Sodosols typically pose a high erosion hazard due to their sodic and, commonly, dispersive subsoils which when exposed are readily erodible. Preservation of topsoil and other surface cover on these soil types is key to avoid loss of soil material through erosion such as tunnelling and gullying. Both the Chromosols and Sodosols can present waterlogging hazard due to the abrupt textural boundaries between the topsoils and subsoils, which often results in poor permeability through the subsoils and consequent waterlogging in the topsoils. Ponding observed on site in September 2020 some days following rainfall also suggests there is potential for waterlogging on parts of the site. Podosols have limitations mainly for agriculture due to their well-drained nature resulting in poor water retention.

3.7.1 Acid sulfate soils

Based on acid sulfate soils (ASS) distribution mapping (Agriculture Victoria 2019) the project site is unlikely to host ASS, with prospective ASS distribution limited to the immediate coastline and shoreline of Western Port bay to the east of the site.

3.8 Vegetation

The site is largely cleared of native, remnant vegetation and is dominated by exotic grasses and herbs. Large pine trees line the western boundary of the site and screen the adjoining Tyabb Substation. Trees, mostly planted eucalypts, are located on the eastern boundary of the site, the majority of which are rooted in the adjoining property to the east. Plantings of native trees and shrubs (many are non-indigenous) are located along the northern and southern boundaries of the site and also in the mid-section of the site adjoining the access road.

The highest biodiversity values for the site are associated with the three existing dams, which support a number of native macrophyte species and provide habitat that is potentially suitable for some threatened flora and fauna species (EMM 2020a). The dams also support several high-threat weed species including blackberry, gorse and boneseed.

4 Proposed water management

4.1 Overview

4.2 This section describes the proposed water management approach for the project.Site constraints

Based on the characterisation of the existing environment described in Section 3, the following provides a summary of key site constraints and considerations relevant to water management for the project:

- Topography and drainage

  Relatively low relief and flat grades across the site and extending downstream of the site may limit the depth to which stormwater management infrastructure can be installed and how these can feasibly be integrated and linked to existing drainage systems. The topography potentially constrains and influences the type and sizing of collection, conveyance and management systems that can be practically constructed and maintained.

- Groundwater

  Relatively shallow depth to groundwater may limit stormwater management strategies based on infiltration. Further investigation as part of future design development is warranted to confirm local groundwater levels and related constraints.

- Soils

  Mapped soil types and site observations suggest the presence of soils that may:

  - be prone to waterlogging – these soils are potentially unsuitable for stormwater management strategies based on infiltration; and/or
  - be dispersive and therefore present a high erosion hazard when exposed – these soils may require special consideration during construction.

  Further investigation and soil testing as part of future design development is warranted to confirm local soil types/characteristics and related constraints to project design and construction requirements.

Land use, existing infrastructure, climate and vegetation are unlikely, based on available information, to present significant constraints to water management.

4.3 Proposed water management approach

4.3.1 Operational phase

A conceptual approach to water management for the BESS site has been developed to inform this SWA. This will be subject to further review and design development as part of future detailed design.

It is noted no changes to existing water management on 21 Thornells Road would be required to facilitate the proposed overhead transmission line connection to the Tyabb substation.

The proposed water management approach has been developed with consideration of several key objectives, described in Table 4.1, consistent with best practice approaches and methods for stormwater management as defined by USBPEMG and MPSC. The proposed approaches are widely adopted for site water management and can therefore be effectively integrated with proposed site infrastructure and designs.

Table 4.1 Water management objectives and approach

Water management objectives		Approach
WM_1	Site stormwater will discharge from the site at a legal point of connection.	• The legal point of connection is assumed to be along the northern boundary of the site at the location where Watercourse A discharges from the site. This will need to be confirmed with MPSC as part of future detailed design.
WM_2	Avoid uncontrolled discharge from site of stormwater generated on developed areas.	• Adopt a site grading that falls generally to the north-east towards the assumed legal point of connection (refer WM_1). • Avoid concentration of stormwater runoff draining across southern and western site boundaries.
WM_3	Retain the existing dams in their present form and function.	• No proposed works that would impact on the existing dam structures, contributing catchment area and discharge arrangements.
WM_4	Minimise the extent of new hardstand/impervious areas to reduce the additional volume of stormwater generated on site.	• Maximise retention of existing grassed areas. • Maximise use of gravel and/or other more permeable surfaces in lieu of hardstand/impervious treatments (eg for access road and areas surrounding battery infrastructure).
WM_5	Provide stormwater collection and conveyance systems to control stormwater generated on developed areas.	• All drainage systems to direct runoff to the assumed legal point of connection (refer WM_1). • Grassed swale drains to be used to the extent practicable. • Piped drainage systems and/or concrete lined open drains to be used only where necessary.
WM_6	Promote on-site infiltration of stormwater where feasible and practical, to minimise the need for flow and water quality management measures.	• Feasibility of stormwater infiltration to be confirmed based on further soil investigation/testing at detailed design stage.

Table 4.1 Water management objectives and approach

Water management objectives		Approach
WM_7	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.	• Where feasible, the following measures would be implemented to minimise changes to peak flow rates: – maximise retention of grassed areas and minimise increase in imperviousness (WM_4); – grassed swale drainage systems promoting physical screening of mobilised sediments and infiltration of stormwater into soils (WM_5); – infiltration of stormwater (WM_6); and – use of localised depression storages in site grading to attenuate flows. • If necessary, additional stormwater detention could be provided in the form of an onsite stormwater detention (OSD) basin in the north-east corner of site to attenuate flows for events up to 100 year ARI. The need for a basin, and associated sizing, would be confirmed during detailed design.
WM_8	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 phosphorous; and • 45% reduction in total nitrogen.	• Where feasible the following measures would be implemented to work towards pollutant load reduction targets: – maximise retention of grassed areas and minimise increase in imperviousness (WM_4); – grassed swale drains to be used to the extent practicable (WM_5); and – infiltration of stormwater (WM_6). • If necessary, a bioretention basin could be provided in the north-east corner of site to achieve further pollutant load reductions. This could be configured as a dual purpose basin (ie combined with OSD functionality per WM_7) if required. The need for a basin, and associated sizing supported by MUSIC modelling, would be confirmed during detailed design.
WM_9	Specific stormwater management measures will be provided for the substation area	• Measures, based on relevant EPA Victoria guidelines (EPA Publication 1698 and 1700 - refer Section 2.4.2), would include: – diversion of clean runoff away from potentially oil-contaminated areas; – bunding of potentially oil contaminated areas; and – provision of appropriate stormwater treatment devices to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge.
WM_10	Minimise site water requirements. Maximise reuse of stormwater and other water sensitive strategies to lower demand from external sources.	• Water demand for operational purposes is negligible. Potable connection to mains supply is assumed for minor/incidental use. • Stormwater harvesting for reuse is therefore not practical and will not be considered.
WM_11	Maintain condition and functionality of water management infrastructure.	• Monitoring and maintenance plan to be developed as part of future detailed design.

Key aspects of the proposed water management approach are presented conceptually in Figure 4.1, in particular:

- assumed legal point of discharge from the site on Watercourse A (refer WM_1 in Table 4.1);
- proposed catchment areas draining to points of discharge from the site; and

- an indicative location for a stormwater basin in the north-east corner of the site that could provide both additional attenuation of stormwater to achieve both flow management and water quality control objectives (refer WM_7 and WM_8, respectively, in Table 4.1).

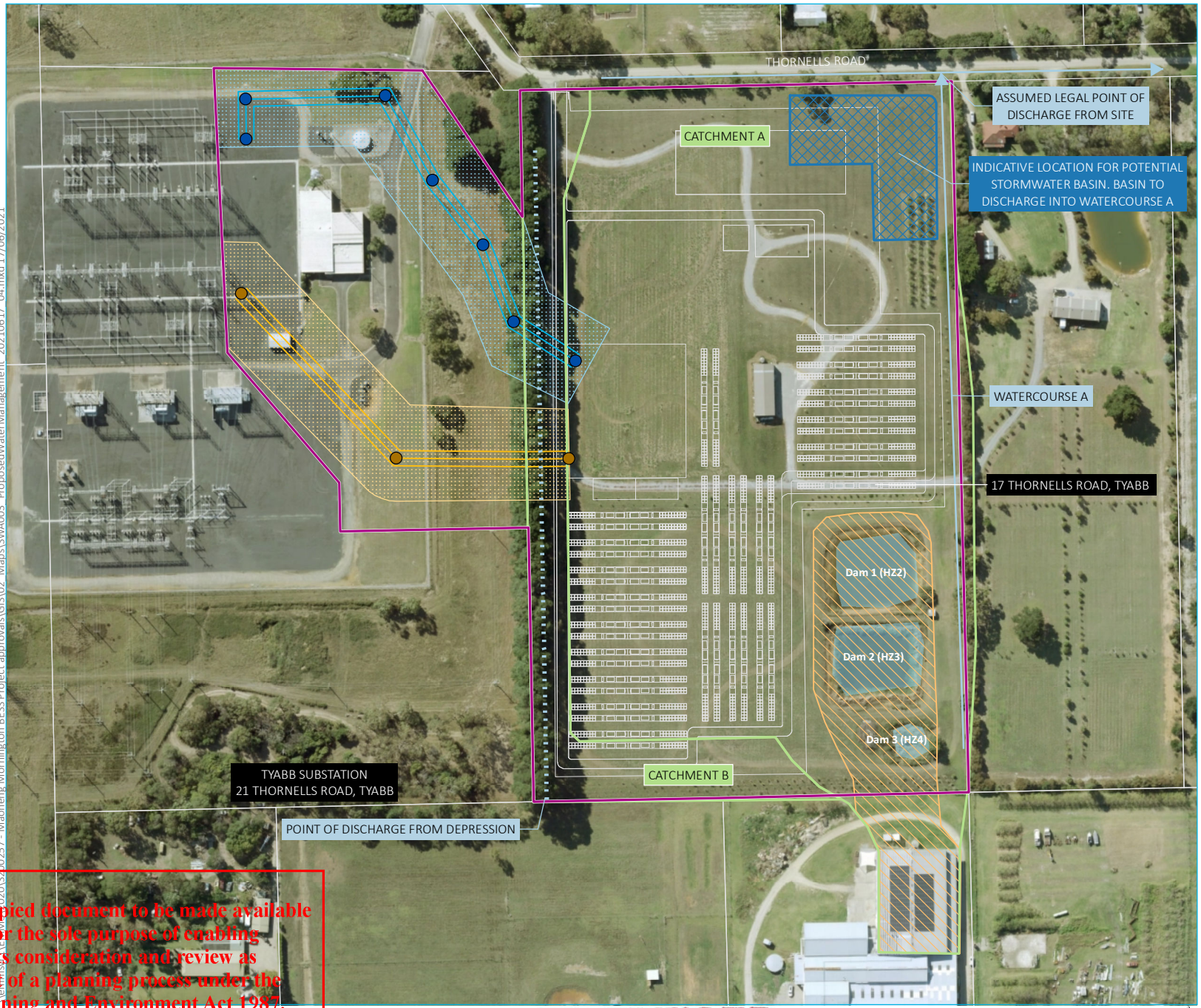
Water management would be further refined and finalised during detailed design consistent with the above objectives, including consideration of any additional MPSC planning permit requirements and advice in relation to the submitted *Flood Prone Land Application*.

4.3.2 Construction phase

Prior to construction, an erosion and sediment control plan (ESCP) would be developed as part of the overall construction environmental management plan (CEMP) to address temporary and site-specific risks to water quality and drainage during the construction phase. This will:

- address land disturbance activities, soil erosion hazard and subsequent risks to downstream water quality;
- apply best practice erosion and sediment controls as defined in IECA (2008) and relevant EPA Victoria guidelines (refer Section 2.4.2);
- aim to minimise the extent of disturbance and soil exposure at any time;
- encourage progressive revegetation or stabilisation of disturbed areas;
- consider methods for topsoil management to assist revegetation;
- implement procedures for hazardous material storage and spill management as defined in relevant EPA Victoria guidelines (refer Section 2.4.2);
- consider weather preparedness and response planning; and
- identify requirements for monitoring and maintenance of water management and drainage systems.

The ESCP and CEMP would primarily address construction works on the site, but also address minor works within 21 Thornells Road that are required to facilitate the proposed overhead transmission line connection to the Tyabb substation.



Source: EMM (2021); Metromap (2021); Maoneng (2020); LCrowfoot (2020); DELWP (2019)

Proposed water management concept

Maoneng Australia Pty Limited
Mornington BESS
Surface water assessment
Figure 4.1

EMM
creating opportunities

5 Impact assessment

5.1 Overview

Section 4 describes the proposed conceptual water management approach for the project.

This section describes predicted residual impacts (ie assuming the proposed water management approach for the BESS site is implemented) to surface water resources in terms of:

- water quantity, in particular with regard to peak flow management;
- water quality; and
- impacts to watercourses, water bodies and the downstream receiving environment.

Whilst not specifically considered in this SWA, the proposed minor works in 21 Thornells Road associated with the overhead transmission line connection into the Tyabb substation would have no material additional impact on surface water resources during both construction and operation.

5.2 Water quantity

5.2.1 Construction

During construction there is the potential for a temporary increase in site runoff as a result of clearing, earthworks, compaction of soils and installation of impervious surfaces, leading to additional runoff leaving the site and impacting downstream properties and receptors. Construction activities may also lead to partial blockage or redirection of site runoff as a result of poorly considered construction activities, fencing or storage/stockpile areas, leading to inundation of construction areas or downstream properties, damage to plant and equipment, and potential risk to life.

Potential construction phase impacts to site runoff volumes and rates are considered minor and manageable with implementation of temporary water and soil management measures that would form part of the ESCP and CEMP (refer Section 4.3.2).

Flood conditions and risks as advised by MPSC should also be considered in the development of these measures at detailed design stage.

5.2.2 Operation

Site runoff potential for the catchment contributing to Watercourse A is also likely to increase permanently during the operational phase as the project will involve the replacement of a proportion of the currently pervious grassed areas with:

- hardstand areas that are effectively impervious (eg battery infrastructure, and substation area); and
- other areas with higher imperviousness than existing grass cover (eg gravel access roads and areas surrounding battery infrastructure).

Site runoff potential for the catchment contributing to Watercourse A will also be increased by a small increase in total catchment area (from 5.0 to 6.1 ha), through introduction of a more efficient site drainage system, and loss of existing depression storages formed by trapped low points that currently lie within the site.

However, a range of measures to mitigate potential increases in peak flow rates leaving the site are presented in Section 4.3.1. These have the objective of ensuring that peak flow rates are not increased for events up to and including the 100 year ARI design event.

On this basis, potential operational phase impacts to peak flow rates discharging from the site are not anticipated.

As described for WM_7 in Table 4.1, if necessary an OSD basin could be provided in the north-east corner of site to assist in achieving the required level of stormwater attenuation. This area is not required for other site infrastructure and is understood to otherwise be relatively unconstrained. The preferred stormwater infrastructure configuration, and need for an OSD basin, will be determined as part of detailed design.

5.3 Water quality

5.3.1 Construction

The primary risk to water quality during construction will occur as a result of ground disturbance during earthworks and other site activities, including material handling, installation of battery infrastructure and surrounding areas, new buildings, new substation, trenching for services and grading for new access roads. There is potential that these works will lead to exposure of soils and increase potential risk of erosion and mobilisation of sediment into receiving watercourses.

Contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities could also adversely impact water quality.

Potential residual risks and impacts are considered minor and manageable with implementation of temporary water and soil management measures that would form part of the ESCP and CEMP (refer Section 4.3.2).

5.3.2 Operation

Section 5.2.2 describes the potential for increases in site runoff for the catchment contributing to Watercourse A during the operational phase of the project. Similarly, there is potential for an increase in stormwater pollutant loads in this location as a result of:

- an increase in pollutant generation rates associated with the proposed site land use; and
- construction of a more efficient site drainage system.

Pollutants of concern for the site infrastructure would include typical stormwater pollutants such as gross pollutants (litter and small vegetation/debris), sediment (in the form of increased TSS loads/concentrations) and nutrients (in the form of increased TN and TP loads/concentrations). For the substation area, pollutants and contaminants of concern would also likely include hydrocarbons and oil/grease.

A range of measures to mitigate potential increases in pollutant loads are described in Section 4.3.1. These have the objective of ensuring that relevant pollutant load reduction targets are met, and that specific water quality risks associated with the substation area are addressed. These targets are described under WM_8 and WM_9 in Table 4.1.

On this basis, potential adverse residual impacts to water quality discharging from the site are not anticipated.

As described for WM_8 in Table 4.1, if necessary, a stormwater basin incorporating bioretention could be provided in the north-east corner of site to assist in achieving the required level of stormwater pollutant removal. This basin could potentially be configured as a dual-purpose basin (ie combined with OSD functionality to meet peak flow and offsite discharge management objectives per WM_7), if required. This area is not required for other site infrastructure and is understood to otherwise be relatively unconstrained. The preferred stormwater infrastructure configuration, and need for a stormwater treatment basin, will be determined as part of detailed design.

5.4 Watercourses, water bodies and downstream receiving environment

Potential adverse impacts to watercourses are not anticipated on the basis that proposed water management measures for the construction and operational phases of the project, as detailed in Table 4.1, are designed to address and mitigate potential impacts to downstream environments and receiving water bodies. These water management measures will be implemented, as far as practicable, to ensure:

- increases to peak flow rates leaving the site will be avoided;
- adverse impacts to water quality discharging from the site will be avoided; and
- the proposed point of discharge into Watercourse A will be appropriately designed and stabilised with scour protection measures to limit erosion potential.

By extension, potential adverse impacts to watercourses and water bodies further downstream of the site, including Western Port and the associated Ramsar wetland, are also not anticipated. With respect to the Significant Impact Guidelines, there is no direct impact to the Ramsar wetland and no measurable change to hydrology or water quality owing to the very small contribution of the site to the overall wetland catchment area. Referral of the project to DAWE for consideration of MNES with respect to the Ramsar wetland is therefore not warranted.

The existing dams on the site will be retained, and their present form and function preserved. EMM 2020a makes recommendations to remove existing green and hard waste from around the dams to minimise shelter for pests. Proactive removal of this waste, including the disused aerator in Dam 1, would also serve to minimise risk of degradation in water quality over time and is therefore recommended.

Recommended ongoing dam maintenance activities that should be undertaken during construction and operation of the project include weed management, water quality monitoring and inspection of dam embankments, spillways and connecting pipework. Corrective maintenance should be undertaken as required to maintain the integrity and function of the dam infrastructure.

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Abbreviations

AHD	Australian Height Datum
ARI	average recurrence interval
ASC	Australian Soil Classification
ASS	acid sulfate soils
BESS	battery energy storage system
BGL	below ground level
CEMP	construction environmental management plan
DELWP	Department of Environment, Land, Water and Planning
DO	dissolved oxygen
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESCP	erosion and sediment control plan
ha	hectares
km	kilometres
LGA	local government area
m	metres
MNES	matters of national environmental significance
MPSC	Mornington Peninsula Shire Council
MPPS	Mornington Peninsula Planning Scheme
OSD	on-site detention
P&E Act	*Planning and Environment Act 1987*
SMU	soil mapping unit
SWA	surface water assessment
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
USBPEMG	*Urban Stormwater – Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee 1999)
VPP	Victoria Planning Provisions
WQO	water quality objective

Appendix A

Survey plan

Legend		
3	Title Peg	
4	Temporary Bench Mark (TBM)	
102	Top of Bank	
103	Toe of Bank	
104	Existing Surface	
110	Change of Grade	
201	Tree	
203	Group Trees/Shrubs	
205	Edge of Dense Vegetation	
301	Drain - Con/Earth	
302	Dam	
317	Obvert- Culvert/Pipe	OBV
321	Invert Pipe or Pit	INV
412	Track (Vehicular)	
419	Edge of Concrete	
503	Sign	SIGN
602	Shed	
603	Building	
612	Stockpile	
634	Ridge Line	
635	Spouting	
641	Aerial Photo linework	
712	Electricity Pole	
713	Electricity Pole with Light	
716	Electricity Pit	ELEC
721	Telecom Pit	
723	Telecom Marker Post	
729	Telecom Pit	
751	Stop Valve	SV
753	Fire Hydrant	FH
757	Water Marker Post	POST
762	Unclassified Pit	UP
902	Boundary Fence Intersection	
903	Fence	
904	Gate	
905	Fence Unclassified	
910	Top of Fence	
950	Title	
990	Easement	
998	DCMB	

Notations

Date of Survey: September 2020

Land Subject to Easement
E-1: Water Supply Easement

This Plan is to be read in conjunction with the attached Surveyors Report.

The location of buildings beyond site boundaries are indicative only.

Information relating to abutting properties has only been shown where visible or accessible.

Aerial photograph linework (Layer 641) is approximate only (derived from an aerial photograph).

The Digital Cadastral Map Base linework (Layer 998) is indicative only and should not be used for design purposes.

Where boundary dimensions differ from Title dimensions, Land Registry approval must be sought for the survey based dimensions prior to development.
(S) - Survey
(T) - Title

Refer to Plan Ref: 302685CA for site photographs.
Direction of photographs shown thus (1)

All dimensions and survey marks shown on this Plan should be verified/confirmed by all contractors and consultants prior to any future construction & site works.

Levels shown thus 21·65 are to Australian Height Datum vide PM110 with a stated value of RL9.206m.

3D information on parts of this plan have been obtained by a process of Photogrammetry from a UAV.
Horizontal Spatial Accuracy: +/- 0.05m
Vertical Spatial Accuracy: +/- 0.1m

Refer to frozen layers with a suffix of -L for levels.
Refer to frozen layers with a suffix of -C for crosses.
Refer to frozen layer "TRIANGLE" for 3D Triangles.
Layers with a prefix of UAV were obtained by UAV.
Contour interval: Minor 0.2m. Major 1m.

Scale	1:500 (0 5 10 15 20)
Certified	Lachlan McCleary, Licensed Surveyor
Drawn	XA
Date	21/09/20
Survey Data	30268519.see
CAD drawing number	302685-BB
Original sheet size	A1
Client	Maoneng C/- Elle Donnelley
Project	Boundary Re-establishment, Feature and Level Survey
Details	15 Thornells Road, Tyabb Crown Allotment 60A Parish of Tyabb Vol.10194 Fol.708
Sheet	1 of 1
Job Number	302685

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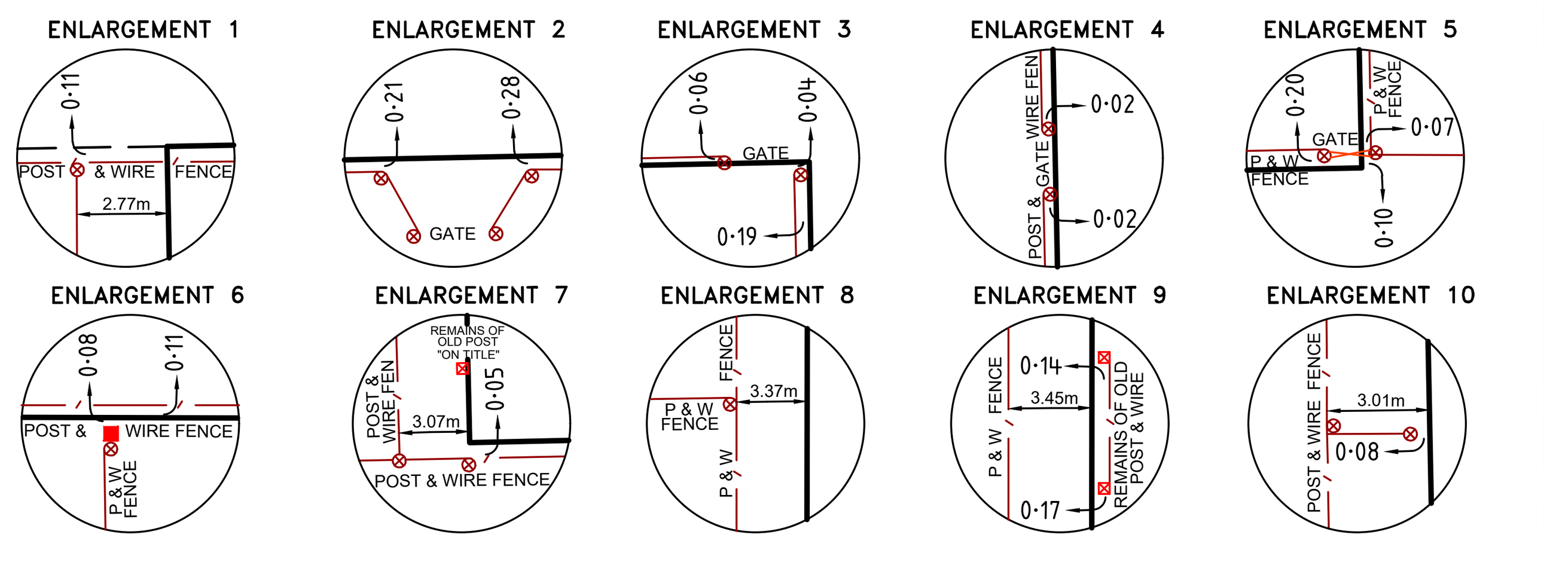
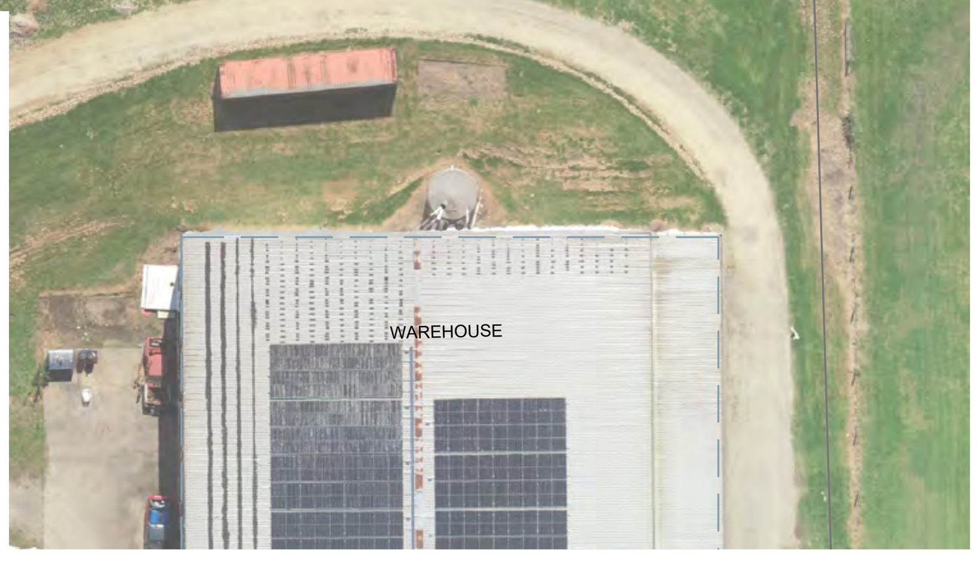
Services

Services that were not visible at the time of survey may not be shown on this Plan. Reference should be made to Service Authority plans prior to commencement of works.

In all instances, it is essential that the position of underground services (whether or not shown on this Plan) be verified on site and abutting sites prior to any critical design or commencement of works. This should be done in consultation with all relevant Service Authorities.

UTO - Unable To Open (Pits)





ADVERTISED PLAN

Appendix B

Site photographs

Photograph B.1 View north across northern portion of site, with existing shed in middleground

Photograph B.2 View north across southern portion of site, dams to the right of picture

Photograph B.3 View south across Dam 3, adjacent property to the south in the background

Photograph B.4 View south across Dam 2

Photograph B.5 View east across Dam 1

Photograph B.6 View north along Watercourse A from access road crossing

Photograph B.7 View north along Watercourse A at point of discharge from site

Photograph B.8 View south at depression along western boundary

Photograph B.9 Ponding in trapped low point on access track at northern end of site