



Bushfire Assessment and Development Report

for the Waurn Ponds
Train Maintenance and Stabling Facility
at 255 Reservoir Rd, Waurn Ponds

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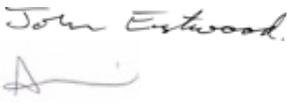
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1 Introduction

This Bushfire Development Report (BDR) has been prepared for AECOM on behalf of Rail Projects Victoria (RPV) to demonstrate how the proposed development of land for the 'Waurin Ponds Train Maintenance and Stabling Facility' (the Project) at 255 Reservoir Road, Waurin Ponds, can respond to the Victorian planning and building controls that relate to bushfire, specifically the requirements for development in a Bushfire Prone Area (BPA) including *Clause 13.02 Bushfire*.

The entire Project area is in a designated Bushfire Prone Area (BPA). This report addresses the requirements for building in a BPA in accordance with AS 3959-2018 *Construction of buildings in bushfire-prone areas*. The assessment has also been undertaken to meet the objectives and strategies for development at *Clause 13.02 Bushfire* in the Planning Policy Framework (Greater Geelong Planning Scheme, 2018). The site is not covered by the Bushfire Management Overlay (BMO).

Meeting the objectives and strategies for development at *Clause 13.02 Bushfire* will also satisfy the requirements of *Ministerial Direction 11 Strategic Assessment of Amendments*, which states that an amendment must address any relevant bushfire risk (Direction No. 11, 2013).

The assessment has been undertaken consistent with guidance provided in *Planning Practice Note 46 Strategic Assessment Guidelines for preparing and evaluating planning scheme amendments* (DELWP, 2017a) and *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DELWP, 2018).

It is noted that the CFA, as the relevant fire authority, have provided feedback on the development proposal in a letter dated 27 October 2017. The opinion of the CFA was that the proposed development does not create a risk to neighbouring farmland. The CFA recommended that:

- A ring road be constructed on the inside perimeter of the fencing;
- The CFA State Infrastructure and Dangerous Goods Team be consulted during the design phase; and
- RPV provide the responding brigades with a site tour and induction once development is complete.

An internal road has been provided on the plan (see Map 3) which meets the intent of the CFA advice. This report recommends that the CFA State Infrastructure and Dangerous Goods Team be consulted during the design phase and RPV provide the responding brigades with a site tour and induction once development is complete in accordance with the recommendations from the CFA.

1.1 Project description

The Project will insert an incorporated document into the Planning Scheme to facilitate the use and development of the facility. The project land comprises all areas of land required within the site for the purposes of the Project, at 255 Reservoir Road extending 350 metres south of the rail reserve between Pettavel Road and Bogans Lane (see Figures 1 and 2).

The wider project land includes all land that the Project requires for delivery of ancillary infrastructure and associated construction activity:

- At 255 Reservoir Road:
 - Approximately 50 metres north of the rail corridor between Pettavel Road and Reservoir Road/Bogans Lane. It is anticipated that only a small portion of this wider project land will be required, subject to the determination of the ultimate location of the occupational crossing as part of Stage 2 of the project.
- Surrounding 255 Reservoir Road:
 - Within the existing rail corridor for approximately 3040 metres west and for 3550 metres east of Bogans Lane inclusive;
 - Within the Bogans Lane road reservation, 500 metres south of Reservoir Road;
 - Within the Pettavel Road road reservation, 170 metres north of the rail corridor and 480 metres south of the rail corridor;
 - Within the Reservoir Road road reservation, 800 metres east of, and including its intersection with Bogans Lane.

1.1.1 Staged Delivery

It is proposed to deliver the Project in two stages with stage 1 expected to be delivered by 2021. Delivery of the balance of the Facility (Stage 2) is subject to further Government decision making in relation to the funding and procurement of new trains to service the Geelong Line and broader regional rail network and associated stabling and maintenance requirements. The timing for delivery of Stage 2 is unknown at this time. Stage 2 may be delivered in one or more stages depending on the outcome of this decision making.

1.1.1.1 Stage 1 Infrastructure

Stage 1 is anticipated to deliver a train stabling facility with the capacity to stable 6 trains. It is anticipated that the facility will primarily cater for VLocity/DMU trains, however, it is proposed to have capacity to cater for 3 locomotive trains in the short-term while locomotives continue to be phased out of the V/Line fleet. The facility would be located south of the existing railway corridor, directly east of the existing farm laneway at the centre of the Site, and west of Bogans Lane. The Stage 1 facility would occupy an area of approximately 11 hectares, and would be in the order of 1030 metres long, 150 metres wide at its widest section and 100 metres wide at its most narrow point.

Stage 1 is anticipated to comprise:

Initial site development

- Land acquisition for the entire footprint of Stage 1 and Stage 2;
- On-site mobilisation;

- Connections to key services (electricity, water, sewerage, drainage, communications, etc.);
- Security fencing and entrance/exit gates around the perimeter of the stabling roads and Stage 1 facilities;
- Earthworks to support initial facilities and trackwork;
- Landscaping;
- Road access from Bogans Lane;
- Power and dam infrastructure works resulting from the acquisition of farmland for the facility site;
- Modified stock crossing and vehicular access to the adjacent leasehold farm property (i.e. the Boral owned land to the east);
- It is expected that the existing level crossing that serves the central farm laneway will remain in operation at its current location, potentially with some modifications as required by V/Line.

Track layout

- Six stabling roads, comprising four single ended and two double ended stabling roads;
- One single entry/exit train access point from existing rail corridor towards the eastern end of the site, just west of Bogans Lane.

Servicing facilities

- Fuelling facilities on four stabling roads;
- Power, toilet extraction and water replenishment equipment, footpaths and yard lighting provided on all of the stabling roads.

Ancillary facilities

- Upgrades to the existing signalling system within the rail corridor;
- Waste compound for rubbish and hard waste;
- Bunded fuelling area;
- Water storage and supply for stabling sidings;
- Drainage systems, including water sensitive urban design (WSUD) and the modification or relocation of farm dams;
- Telecommunications;
- Asphalt footpaths;
- CCTV to cover stabling sidings area;
- Driver and cleaner's amenities;
- Formed and sealed access roadways, with capacity to allow for B-double truck access and turnaround;
- Car parking for drivers, visitors and cleaners.

1.1.1.2 Stage 2

As stated above, Stage 2 is subject to further Government decision making. However, it is anticipated that Stage 2 will increase the stabling capacity of the Facility to 26 trains and will introduce a train maintenance facility. Based on an indicative concept design, the Stage 2 facility is anticipated to occupy an area of approximately 46 hectares, and be in the order of 1720 metres long, 320 metres wide at its widest section and 160 metres wide at its narrowest.

Stage 2 is anticipated to comprise:

Site development

- Security fencing and entrance/exit gates around the perimeter of the Stage 2 facility;
- Earthworks to support expansion of facilities and trackwork;
- Landscaping;
- A rerouting of the farm laneway to cross the rail corridor in proximity to the Pettavel Road boundary of the Site.

Rail facilities

- Two access points from existing rail corridor, one towards the eastern end of the site and one towards the western end of the site;
- Stabling roads for up to 26 trains;
- Bio-wash facilities;
- Train wash facilities;
- A maintenance facility with 5 maintenance roads.

Servicing facilities

- Expansion of fuel and water facilities;
- A substation;
- Expansion of staff facilities;
- One gatehouse along the entry road.

Ancillary facilities may include the following:

- Drainage systems, including WSUD and the modification or relocation of farm dams;
- Telecommunications;
- Internal/external access arrangements;
- Utility protection and installation;
- Signalling infrastructure;
- Emergency access via Pettavel Road.

1.2 Construction Phase

1.2.1.1 Construction Activities

Key construction activities anticipated for the Project include:

Table 1 Construction Activities

Stage	Construction Activities
Stage 1	
Site Development	<ul style="list-style-type: none"> • On-site mobilisation; • Connections to key services (electricity, water, sewerage, drainage, communications); • Security fencing and entrance/exit gates; • Earthworks to support initial facilities and trackwork; • Road access from Bogans Lane; • Initially required internal roads; and • Security and safety facilities.
Works	<ul style="list-style-type: none"> • Construction of internal roads, footpaths, car parking and associated sealing; • Construction of new rail tracks and associated signalling systems; • Construction of fuelling facilities; • Reinstatement and landscaping; • Installation of utility infrastructure; • Bulk earthworks; and • Construction of ancillary buildings and services.
Stage 2	
Works	<ul style="list-style-type: none"> • Construction of train maintenance building and internal fit out; • Construction of additional tracks and connections; • Modifications to the fuelling facility; • Automated train wash plant and bio-wash; • Extension of stabling sidings; • Expansion of staff amenities and training facilities; • Provision of train cleaners store and amenities building; • Expansion of staff car parking; • Provision of train crew administration facilities.

Being grazed farmland, the site is already substantially cleared of vegetation. The exception is two areas of linear shelterbelt vegetation. Vegetation removal will be minimised to the extent practical and occur progressively throughout all activities.

1.2.1.2 Construction Operation

The construction duration is expected to be approximately 12 to 18 months for each stage of the Project, and subject to the Project requirements at the time. During each phase, the construction operating hours will be undertaken in accordance with the relevant protocols.

During the site preparation and construction phases, access to the site is anticipated to be provided via Bogans Lane for Stages 1 and 2. Alternative access may be possible from Pettavel Road for Stage 2.

Vehicle movements would be coordinated as required and advised by standard traffic management measures.

The preferred site access route during construction of the site is via the Geelong Ring Road. Alternatively, access to the site can be provided via Princes Highway.

1.2.1.3 Staff Numbers

During the construction phase it is expected that up to 100 personnel could be on-site at any one time.

1.3 Operational Phase

This section describes the expected operational activities.

Operational activities are subject to completion of the detailed design phase for each stage of the Project and confirmation of the operator's timetabling requirements.

1.3.1.1 Operation of Train Stabling and Maintenance Facilities

The Facilities are anticipated to operate 24 hours a day, seven days a week.

It is expected that trains will enter and exit the facility from turnouts constructed off the mainline.

The layout of the track work would enable flexibility for the train operator and maintainers to minimise any potential conflicting train movements, and reduce the overall amount of shunting time onsite for the trains.

It is anticipated that trains will enter and exit the site during the day and night as required to serve the railway timetable. Trains may arrive/depart at 10 minute intervals during peak periods. The total number of train arrivals and departures per day is not yet known and will be subject to the operator's timetabling requirements.

It is assumed that up to 3 trains may be idling at any one point in time during Stage 1 operations. The total number of trains idling as part of Stage 2 is subject to future detailed design and operational requirements. These assumptions will be reviewed subject to the operator's timetabling requirements.

The overall operational concept for the Facility is to provide an efficient series progression for stabling, servicing and maintenance (if required) of trains from initial train arrival until its next scheduled departure into revenue service. Typical train movements would be entry through the northern most fuelling roads, continuing through to the western most shunting neck. From here the train would head east into the stabling roads where it would reside prior to departure. If maintenance was required, trains would leave the stabling siding and enter the maintenance facility.

1.3.1.2 Staff numbers

It is anticipated that the Facility may accommodate 10 staff during Stage 1 of the Project and 40 staff during Stage 2, with the expectation that all staff will not be on site at any one time, and staff will work in shifts. An expected breakdown of shift allocation is as follows:

Table 2 Staff Numbers

Shift Time	Staff Percentage	Number of Staff for Stage 1	Number of Staff for Stage 2
Morning	40%	4	16
Afternoon	40%	4	16
Overnight	20%	2	8

1.3.1.3 Vehicle and Staff access

The primary access point to the Facility would be located to the east from Bogans Lane. The preferred access route to the site from the Geelong Ring Road would be via Anglesea Road and Reservoir Road. Vehicles will be expected to exit the site the same way.

The primary access gate is to be utilised by staff and delivery vehicles to both enter and exit the facility. Visitors and administration office personnel would be directed to the relevant area and directed to the car park after checking-in, identification and registration at the primary access gate. For Stage 2, emergency vehicle access could be provided at the western end of the site from Pettavel Road, where required. Appropriate internal access would also be provided for emergency vehicles to the maintenance workshop, stabling tracks and main parts of the Facility.

The internal road layout would be designed to limit the need to cross tracks within the site. Adequate car parking spaces will be provided for both maintenance and operations staff and visitors. It is expected that car parking areas will be located to minimise walking distances to site facilities. Pedestrian movement networks would be designed to provide adequate access, minimise walking distances to site facilities and provide for personal safety.

1.4 Site summary

Address:	255 Reservoir Road, Waurnd Ponds, VIC 3216
Municipality:	City of Greater Geelong
Zone/s	Farming Zone and Schedule (FZ)
Overlay/s	None
Directory reference:	VicRoads 93 F5
Assessment date:	6 th March 2017
Assessor:	John Eastwood - Analyst

1.5 Location description

The site is located approximately 13km southwest of the Geelong CBD and is immediately adjacent to the Geelong-Warrnambool rail line (see Figures 1, 2, 3 and Map 1). The surrounding landscape is gently undulating, rising gradually from the southeast to the northwest and is dominated by grassed pastoral land for at least 10km. The Bellarine Peninsula to the east and the Victorian volcanic plain to the west and northwest largely comprise the same gently undulating areas of pasture extending beyond 10km from the site. There is an area of extractive industry (Boral Quarries) immediately to the northeast, and beyond that the suburb of Waurnd Ponds, which is contiguous to the Geelong urban area.

The region is bisected by the Princes Highway and the Geelong-Warrnambool rail line, with an extensive local road network. Further afield, the forested areas of the Great Otway National Park and the Alcoa lease area near Anglesea are located approximately 13km to the southwest, with minor patches of treed vegetation scattered across the landscape generally following property lines and waterways.

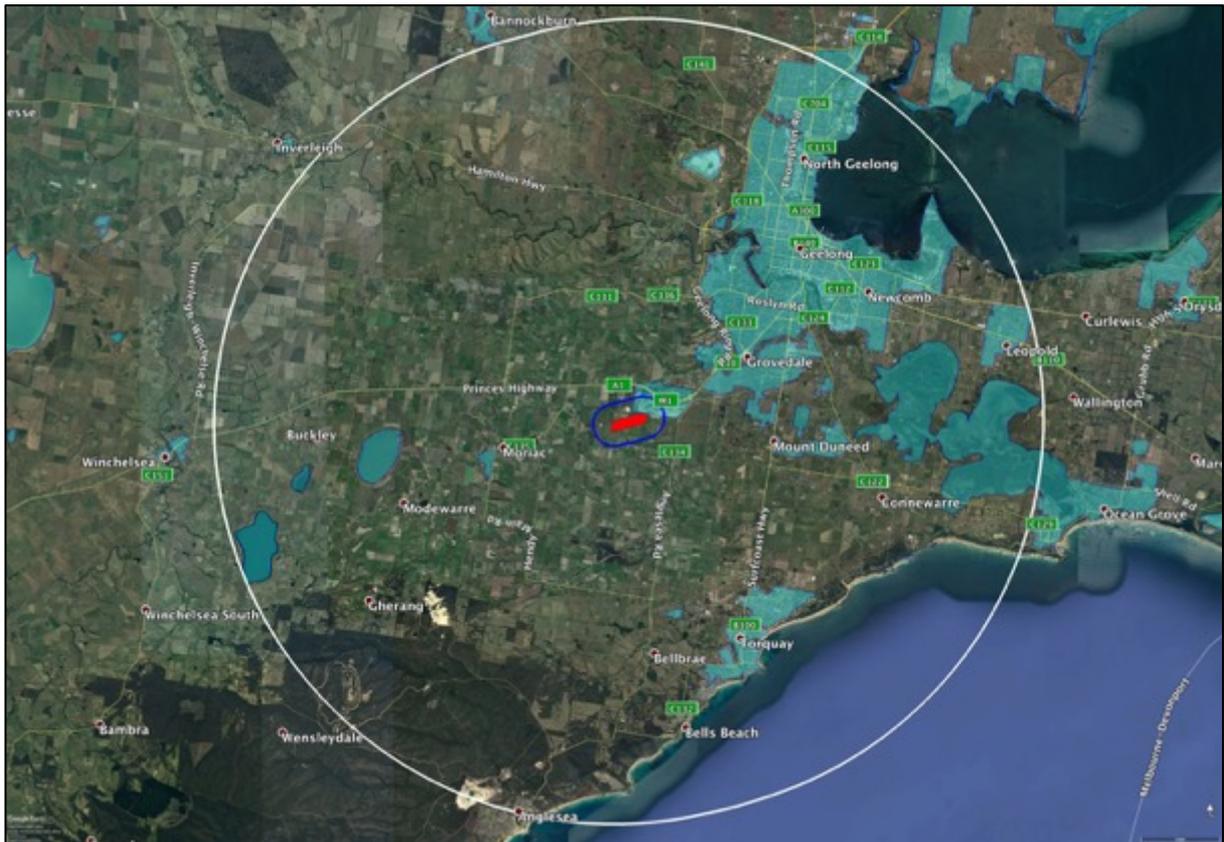


Figure 1 – Project area (red fill) with 1km and 20km radii (blue and white outlines respectively) as per Clause 13.02 landscape assessment methodology. Note that non-BPA land is shown in semi-transparent light blue. (Image © 2018 CNES/Airbus, Data SIO, NOAA, US Navy, NGA, GEBCO, © 2018 Google, Image © 2018 DigitalGlobe; Imagery date 2017/03/19).



Figure 2 – Regional context (Rail Projects Victoria, 2019).

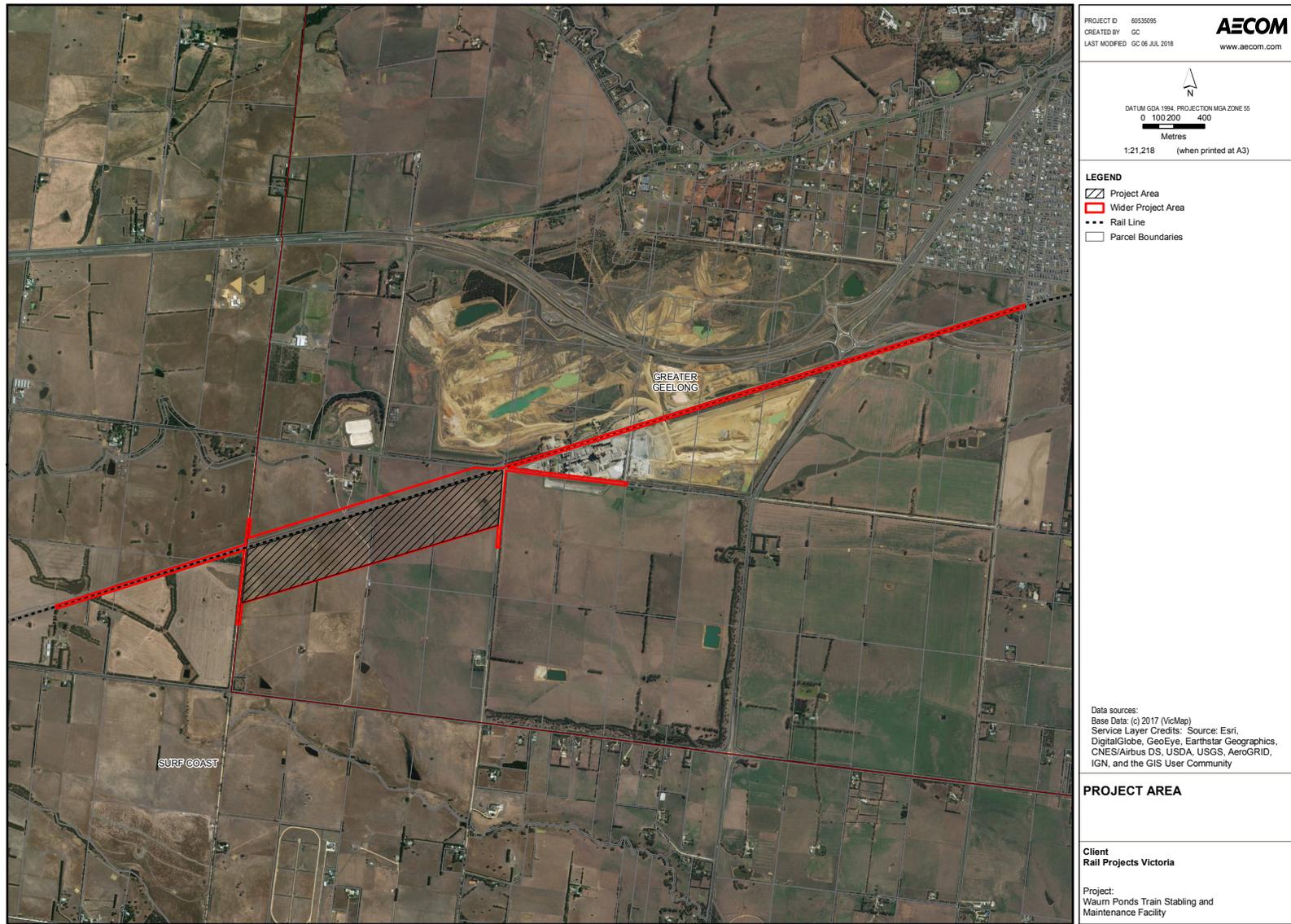


Figure 3 - Project Area (Rail Projects Victoria, 2019).

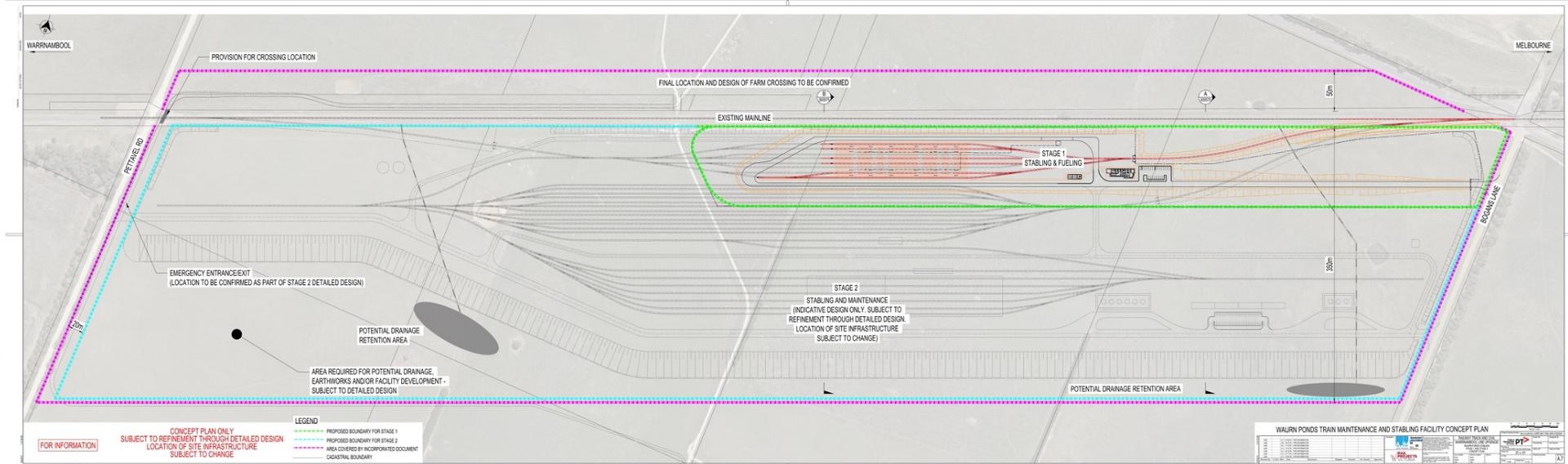


Figure 4 - Concept Plan (Rail Projects Victoria, 2019) (see also Maps 2 and 3).

2 Planning and Building Controls

This section identifies applicable bushfire planning and building controls.

2.1 Ministerial Direction No. 11

Ministerial Direction No. 11 Strategic Assessment of Amendments requires a comprehensive strategic evaluation of most planning scheme amendments and the outcomes they produce, including an evaluation and explanation of how an amendment addresses any relevant bushfire risk (Direction No. 11, 2013).

It is considered that this report meets the requirements of Ministerial Direction No. 11 as appropriate.

2.2 Planning Policy Framework (PPF)

Clause 13.02 *Bushfire* has the objective '*To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life*' (Greater Geelong Planning Scheme, 2018a). The policy must be applied to all planning and decision making under the Planning and Environment Act 1987 relating to land which is:

- Within a designated BPA;
- Subject to a BMO; or
- Proposed to be used or developed in a way that may create a bushfire hazard.

Clause 13.02 requires priority to be given to the protection of human life by:

- *'Prioritising the protection of human life over all other policy considerations.*
- *Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.*
- *Reducing the vulnerability of communities to bushfire through consideration of bushfire risk in decision-making at all stages of the planning process'* (ibid.).

Other strategies are also provided in relation to:

- Bushfire hazard identification and assessment;
- Settlement planning;
- Areas of high biodiversity conservation value; and
- Use and development control in a BPA.

The way in which the Project gives effect to each of the strategies is discussed in Section 6.

Clause 21.05-1 in the Greater Geelong Planning Scheme identifies bushfire as a key issue and influence: '*A number of areas in the municipality are susceptible to wildfire hazard, including some*

grasslands around Lara, the foothills of the Brisbane Ranges, and parts of the Anakie township (Greater Geelong Planning Scheme, 2010a).

Clause 21.05-8 *Wildfire* has the stated objective *'To minimise the impacts of wildfire'* and the strategies to achieve the objective are to *'Identify areas at risk of wildfire'* and *'Ensure that development in identified areas considers the impacts of wildfire'* (Greater Geelong Planning Scheme, 2010b).

This report appropriately responds to these objectives and strategies.

2.3 Bushfire Prone Area (BPA)

The Project is in a designated Bushfire Prone Area (BPA, see Figures 1 and 5). BPAs are those areas subject to or likely to be subject to bushfires, as determined by the Minister for Planning.

In Victoria, the Building Act 1993 and associated Building Regulations 2018, through application of the National Construction Code (NCC)¹, require bushfire protection standards in designated BPAs, for class 1, 2 and 3 buildings, 'Specific Use Bushfire Protected Buildings' and associated class 10a buildings or decks. The applicable performance requirement in the NCC is:

'A building that is constructed in a designated bushfire prone area must, to the degree necessary, be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the—

- a) potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire; and*
- b) intensity of the bushfire attack on the building'* (ABCB, 2019).

In a BPA, applicable buildings must be constructed to a minimum Bushfire Attack Level (BAL)-12.5, or higher, as determined by a site assessment or planning scheme requirement. A BAL is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. There are six BALs defined in AS 3959-2018, which range from BAL-Low, which has no bushfire construction requirements, to BAL-FZ (Flame Zone) where flame contact with a building is expected (refer Appendix 1).

Compliance with *AS 3959-2018 Construction of Buildings in Bushfire Prone Areas* (Standards Australia, 2009) is 'deemed-to-satisfy' the NCC performance requirement. None of the proposed building types appear to be those which would be required to meet the performance requirement. This should be confirmed by the building surveyor having jurisdiction. Notwithstanding, it is recommended that habitable buildings are constructed to the minimum BAL-12.5 standard (see Section 6.1.1).

¹ The NCC is published in three volumes. The Building Code of Australia (BCA) comprises Volume One and Volume Two of the NCC and the Plumbing Code of Australia (PCA) comprises Volume Three. Volume One deals primarily with Class 2 to Class 9 buildings (multi-residential, commercial, industrial and public buildings and structures), and Volume Two deals primarily with Class 1 and 10 buildings (residential and non-habitable buildings and structures).

2.4 Other development controls

2.4.1 Zoning

The land is currently in the Farming Zone (FZ), and a Schedule applies. The land is bisected by an existing rail line zoned Public Use Zone to which Schedule 4 applies (PUZ4), with an area adjacent to which Schedule 1 applies (PUZ1). This zoning has no bushfire safety implications for the site.

2.4.2 Overlays

There are no overlays that apply to the site.

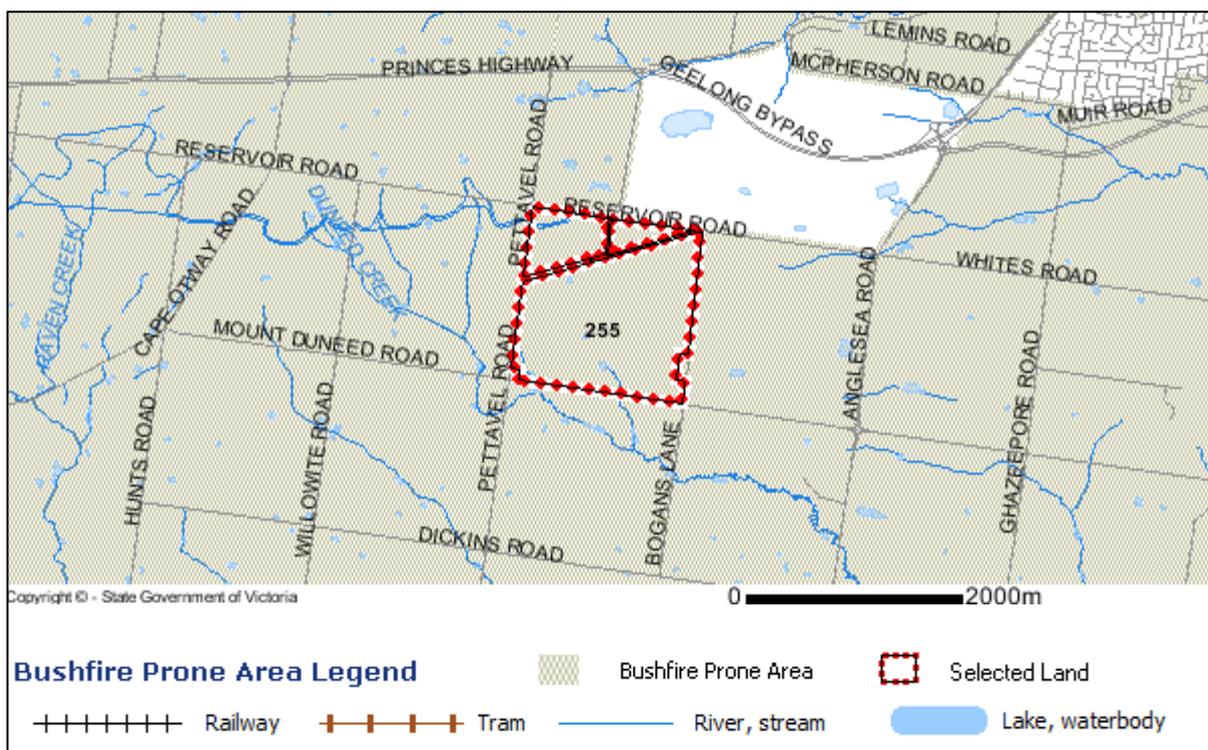


Figure 5 – 255 Reservoir Rd (red dotted outline) and BPA coverage (in beige shading) (Source: DELWP, 2019).

3 Methodology overview and assumptions

The assessment of bushfire risk and development of a recommended treatment plan is based on an assessment of the bushfire risk at a landscape scale (see Section 4.1); a local and neighbourhood scale (see Section 4.2), and a site scale assessment following the Method 1 approach of AS 3959-2018 Construction of Buildings in Bushfire Prone Areas (Standards Australia, 2018) (see Section 5).

The outcome of the assessments are used to identify appropriate protection measures in accordance with the building regulations and the objectives and strategies of Clause 13.02 (see Section 6).

3.1 AS 3959-2018

The method 1 approach in AS 3959-2018 (Standards Australia, 2018) is used to determine the Bushfire Attack Level (BAL). The outcome of the assessment is the identification of an applicable BAL construction standard (a standard set of construction requirements to provide some protection for the building from bushfire attack including burning embers, radiant heat and flame contact).

The BAL is based on the level of radiant heat flux (RHF) (expressed in kilowatts per square metre) to which the building would be exposed (see Appendix 1) and is determined using bushfire behaviour and impact modelling under a predetermined scenario.

Method 1 uses a simplified five step procedure to determine the BAL. These steps are:

- Determine the relevant FDI (GFDI 130, see below for explanation).
- Determine the classified vegetation (see Section 5.1).
- Determine the distance of the site from the classified vegetation (see Section 5.1).
- Determine the effective slope (see Section 5.2).
- Determine the BAL from the appropriate table (see Section 5.3).

The Grassland Fire Danger Index (GFDI) is used to represent the level of bushfire threat based on weather (and fuel) conditions. A GFDI 130 is applied in non-alpine grassland areas of Victoria by the building system, to establish building setback distances from classified vegetation in accordance with AS 3959-2018. The benchmark represents a 'one size fits all' threshold for fire weather conditions but does not necessarily reflect the worst-case conditions for a site, and which, has been exceeded at a range of locations in Victoria during some significant fire events.

4 Bushfire Hazard Landscape Assessment

One of the bushfire hazard identification and assessment strategies in Clause 13.02, is to use the best available science to identify the hazard posed by vegetation, topographic and climatic conditions (Greater Geelong Planning Scheme, 2018). The basis for the hazard assessment should be:

- *'Landscape conditions - meaning the conditions in the landscape within 20 kilometres and potentially up to 75 kilometres from a site;*
- *Local conditions - meaning conditions in the area within approximately 1 kilometre from a site;*
- *Neighbourhood conditions - meaning conditions in the area within 400 metres of a site; and,*
- *The site for the development'* (Greater Geelong Planning Scheme, 2018).

This section includes a bushfire assessment to describe the landscape conditions, local conditions and neighbourhood conditions. The assessment of the site is presented in Section 5 in accordance with the site assessment methodology of *AS 3959-2018 Construction of buildings in bushfire-prone areas*.

It should be noted that AS 3959-2018 requires a site assessment of the vegetation and topography up to 100m around a building, for the purposes of determining the applicable BAL construction standard for that building (Standards Australia, 2018). A hazard assessment in BMO areas, however, extends to 150m around a building, development site or subdivision boundary (DELWP, 2017b). For vulnerable uses and larger developments in a BPA, a 150m assessment zone may also be required (DELWP, 2018). The use of a 100m assessment zone in this study to assess the bushfire hazard as per the requirements of the BPA is considered appropriate to the landscape risk and the applicable methodology.

Map 1 comprises a bushfire hazard landscape assessment plan, and Map 2 comprises a bushfire hazard site assessment plan.

4.1 Landscape conditions

To assist in defining risk, four 'broader landscape types', representing different risk levels, are described in DELWP technical guide *Planning Applications Bushfire Management Overlay* (DELWP, 2017b). Whilst the site is not in the BMO, the landscape typologies are useful descriptors of landscape risk, and are intended to streamline decision making and support more consistent decisions based on the landscape risk.

It is considered that the development site and surrounding landscape for more than 20km has affinities with Broader Landscape Type 1, as there is little vegetation beyond the site except grassland, and Landscape Type 3, as neighbourhood scale destruction from a bushfire is credible, bushfire can approach from more than one aspect and the access to an appropriate place that provides shelter is not certain (see Table 3).

The most credible bushfire scenarios for a large landscape fire, are an approach from those directions typically associated with the direction of the wind on severe or higher fire danger days i.e. a bushfire approach from the north, northwest, west or southwest.

Table 3 - Landscape risk typologies (from DELWP, 2017b).

Broader Landscape Type 1	Broader Landscape Type 2	Broader Landscape Type 3	Broader Landscape Type 4
<ul style="list-style-type: none"> • There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation). • Extreme bushfire behaviour is not possible. • The type and extent of vegetation is unlikely to result in neighbourhood-scale destruction of property. • Immediate access is available to a place that provides shelter from bushfire. 	<ul style="list-style-type: none"> • The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site. • Bushfire can only approach from one aspect and the site is located in a suburban, township or urban area managed in a minimum fuel condition. • Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area. 	<ul style="list-style-type: none"> • The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site. • Bushfire can approach from more than one aspect. • The site is located in an area that is not managed in a minimum fuel condition. • Access to an appropriate place that provides shelter from bushfire is not certain. 	<ul style="list-style-type: none"> • The broader landscape presents an extreme risk. • Fires have hours or days to grow and develop before impacting • Evacuation options are limited or not available.
I N C R E A S I N G R I S K 			

4.2 Local and neighbourhood conditions

The local and neighbourhood conditions (at 1km and 400m from the site) are largely consistent with the landscape conditions described in the section above.

The Project is located approximately 3km southwest of the urban area of Waurin Ponds. The site is bounded to the north by the railway line, to the east by Bogans Lane, and to the west by Pettavel Road. To the south is pasture on private property, with Mt Duneed Road approximately 500m to the south of the site boundary.

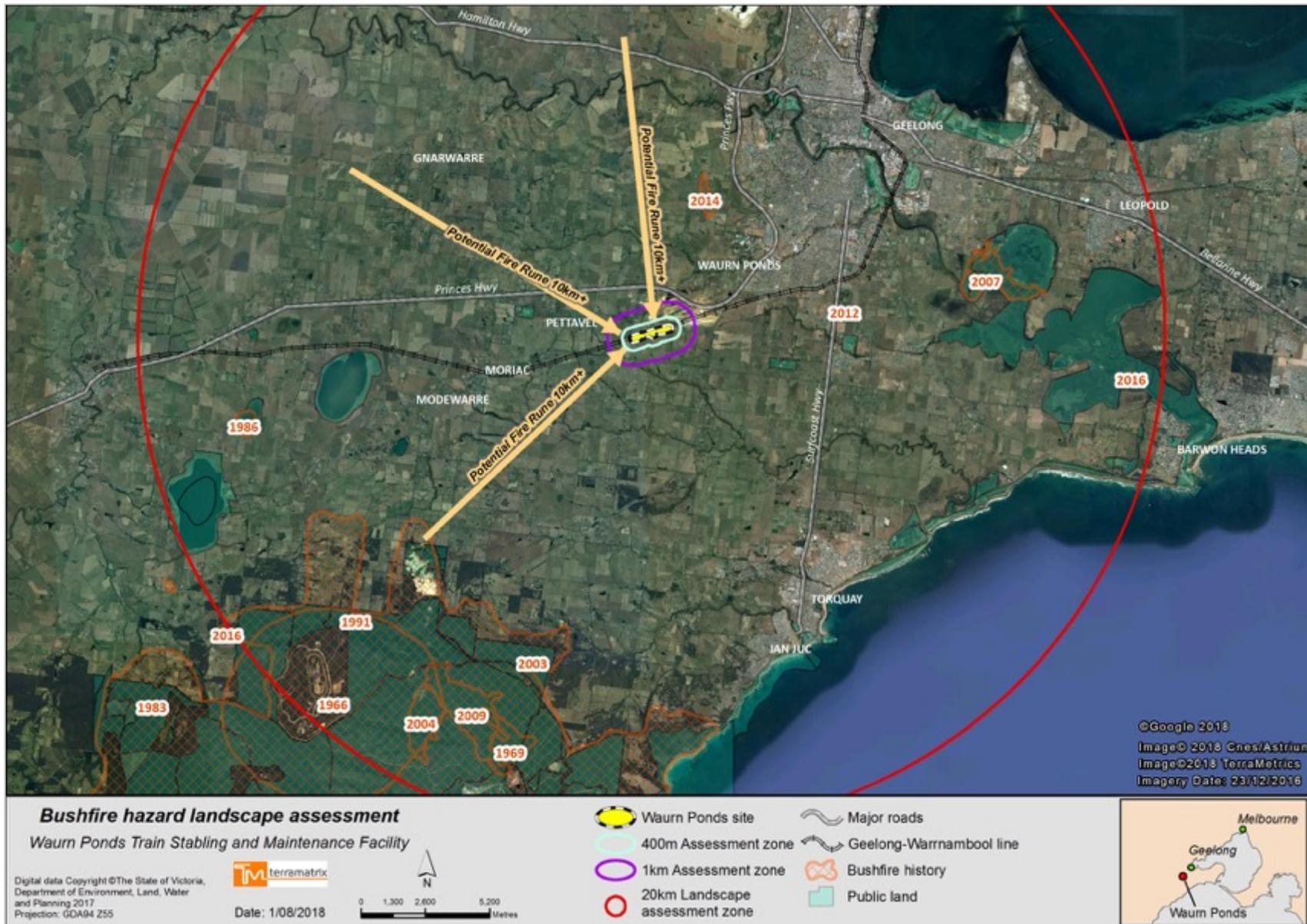
The surrounding area is predominately pasture or other agricultural land. The only exception is to the northeast, where there is a large quarry and industrial area associated with the Boral Cement Works.

Under the Code Red fire weather conditions assumed in AS 3959-2018, it is credible for a large grassfire to develop in the surrounding landscape and potentially threaten the site. The fire would be a large, fast moving grassfire that, depending on the fuel condition, could be of significant size and intensity.

Under this fire scenario, if the entire Project site is maintained as low threat, the fire behaviour onsite will be greatly reduced, potentially to a level where the internal roads and other non-combustible surfaces may provide a fuel break of sufficient size to halt fire spread.

There is also some potential for a fire to be ignited on the site and spread into the wider landscape. Under elevated fire weather conditions, an ignition could rapidly develop, burning off the site and impacting neighbouring properties. Under a worst-case scenario, if a fire was not quickly brought under control, it would have the potential to become a large out of control landscape scale fire.

Again, the vegetation management of the site, and the position of potential fire breaks (such as the roads and tracks) will significantly increase the ability of fire crews to suppress a fire and prevent fire escape.



Map 1 - Bushfire hazard landscape assessment plan.

5 Bushfire Hazard Site Assessment

5.1 Vegetation

The AS 3959-2018 site assessment process requires the identification of classified vegetation within 100m of the development. Classified vegetation is vegetation that constitutes a bushfire hazard. The classification system is not directly analogous to Ecological Vegetation Classes (EVCs) but uses a generalised description of vegetation based on the AUSLIG (Australian Natural Resources Atlas: No. 7 - Native Vegetation) classification system. Vegetation is classified according to its bushfire behaviour characteristics.

It is recommended that once the site is developed, grass within the site boundary be maintained as low threat (i.e. cut to less than 100mm in height at all times). As the grass within the site boundary will be maintained in a low threat condition, no Grassland has been identified within the property perimeter in Map 2.

One type of vegetation was identified in the 100m site assessment zone which accords with the AS 3959-2018 classification of Grassland.

5.1.1 Grassland

Areas of pasture surrounding and within the site match the AS 3959-2018 classification of Grassland, which is defined as all forms of vegetation including areas with shrubs and trees if overstorey foliage cover is less than 10%.

Note that Grassland that is mown or slashed to less than 100mm high, is considered 'low threat' and is not classified as hazardous.

To the west of the site, a small patch of trees and a planted windbreak along Pettavel Road are just within the 100m assessment zone. Whilst they cannot be excluded as they are contiguous to classified grassland, they are sufficiently separated from the structures and stabling yards on the site to not be an influence on the bushfire attack on any buildings.

5.1.2 Excluded vegetation and non-vegetated areas

Areas of low threat vegetation and non-vegetated areas within 100m of the site can be excluded from classification in accordance with Section 2.2.3.2 of AS 3959-2018, if they meet one or more of the following criteria:

- i. *'Vegetation of any type that is more than 100m² from the site.*
- ii. *Single areas of vegetation less than 1 ha in area and not within 100m of other areas of vegetation being classified vegetation.*

² This distance extends to 150m in BMO areas.

- iii. *Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other, or of other areas of vegetation being classified vegetation.*
- iv. *Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.*
- v. *Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.*
- vi. *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition³, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks¹ (Standards Australia, 2018).*

As all grass areas appeared to be at least 100mm high at the time of the site assessment, no areas of low threat vegetation beyond the site have been identified. Non-vegetated areas include the roads, rail lines, minor waterbodies and rock piles within the site.

5.2 Topography

To determine a BAL construction standard, the 'effective slope' must be identified. This is the slope of land under the classified vegetation that will most significantly influence the bushfire attack on a building. Two broad types apply:

- Flat and/or Upslope - land under the classified vegetation that is flat or on which a bushfire will be burning downhill in relation to the development. Fires burning downhill (i.e. on an upslope) will generally be moving more slowly with a reduced intensity.
- Downslope - land under the classified vegetation on which a bushfire will be burning uphill in relation to the development. As the rate of spread of a bushfire burning on a downslope (i.e. burning uphill towards a development) is significantly influenced by increases in slope, downslopes are grouped into five classes in 5° increments from 0° up to 20°.

The slope around the site rises gradually from the southeast to the northwest at approximately 2°-3°. Therefore, to the southeast the applicable slope class is 'Downslope >0° - 5°'; to the northwest, the east and west, the 'All upslopes and flat land' slope class applies (see Map 2). The slight downslope from the south would not cause any significant increase in the level of fire attack.

5.3 BAL determination

The BAL of the proposed development has been determined using Method 1 of AS 3959-2018 using Table 2.4.2.

³ Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, recognisable as short-cropped grass for example, to a nominal height of 100mm (Standards Australia, 2018).

Table 4 – Applied BAL construction standard and defensible space distance.

Vegetation	Slope Class	BAL construction standard	Defensible Space Distance (m)
Grassland	>0 to 5°	BAL-12.5	22



Map 2 - Bushfire hazard site assessment plan.



Figure 6 - Looking east from Bogans Lane across the site with Geelong-Warrnambool rail line on the right in the image.



Figure 7 – Looking southwest along the existing rail line from Bogans Lane.



Figure 8 - Looking southwest from Reservoir Road showing Grassland in the Downslopes >0°-5° class.



Figure 9 - Looking east across site from Pettavel Road with Geelong-Warrnambool rail line on left in image.

6 Planning and development response

Note that the findings and recommendations of this section relate to both Stage 1 and Stage 2 of the project.

6.1 Development response

6.1.1 Building compliance

The project involves the construction of several buildings and facilities for the maintenance and servicing of trains (see Map 3), including:

- Maintenance facility (shed) (50m x 250m x 10m);
- Operations administration and train crew facilities;
- Furling facility (160m x 25m x 5.5m);
- Train wash (50m x 10m x 12m);
- Train biowash (50m x 10m x 12m);
- Fuel tanks (6.5m diameter x 3.5m), waste oil storage and other fuel storage;
- Sanding tank;
- Water tanks;
- Substation; and
- Car parks

Upon completion, approximately 40 staff will be onsite during operating hours and during construction up to approximately 100 site occupants.

In Bushfire Prone Areas (BPAs), the Building Act 1993 and associated Building Regulations 2018, through application of the National Construction Code (NCC), require bushfire protection standards for class 1, 2 and 3 buildings, 'Specific Use Bushfire Protected Buildings' and associated class 10a buildings or decks. Applicable buildings must be constructed to a minimum Bushfire Attack Level (BAL)-12.5, or higher, as determined by a site assessment or planning scheme requirement.

Each BAL construction standard represents a safety threshold for Radiant Heat Flux exposure (RHF, expressed as kw/m^2). The distance to achieve a desired RHF threshold is calculated from inputs including the presumed weather conditions, vegetation type and slope i.e. a BAL-12.5 building is designed to be exposed to not more than $12.5\text{kw}/\text{m}^2$ RHF, for which, in response to flat or upslope Grassland, a 19m building setback is required.

There will be no accommodation component to any building on the site, and therefore none of the proposed buildings would be class 1, 2 or 3 buildings, associated class 10a buildings or decks or 'Specific Use Bushfire Protected Buildings'. Accordingly, a BAL construction standard for the buildings is likely not required for building compliance. However, the classification of the buildings and hence BPA compliance, will need to be confirmed by the building surveyor having authority.

Although a BAL construction standard is not technically required by the building regulations, due to the building type and proposed use, it would be prudent, as a precautionary safety measure that shows protection of human life is being prioritised, to consider constructing key buildings to the minimum BAL-12.5 standard that applies in the BPA. This approach might be considered only for those buildings that would be occupied periodically by staff and contractors i.e. habitable buildings (see Map 3) or buildings of value, where their loss in a bushfire may severely impact the operation of the site.

6.1.2 Other structures and infrastructure

The vulnerability of other structures and infrastructure on the site to bushfire attack (including radiant heat flux, smoke, strong winds, embers and possible flame contact) should be considered, as without adequate vegetation management, or non-vegetated land around them, they may be exposed to damaged or destroyed in the event of a grassfire impacting the site.

No information has been provided to Terramatrix on the vulnerability of rolling stock to fire. Trains may have exposed and vulnerable features such as hydraulic lines and electrical fittings. Similarly, the substation and outdoor fuel storage areas are potentially vulnerable elements of the facility.

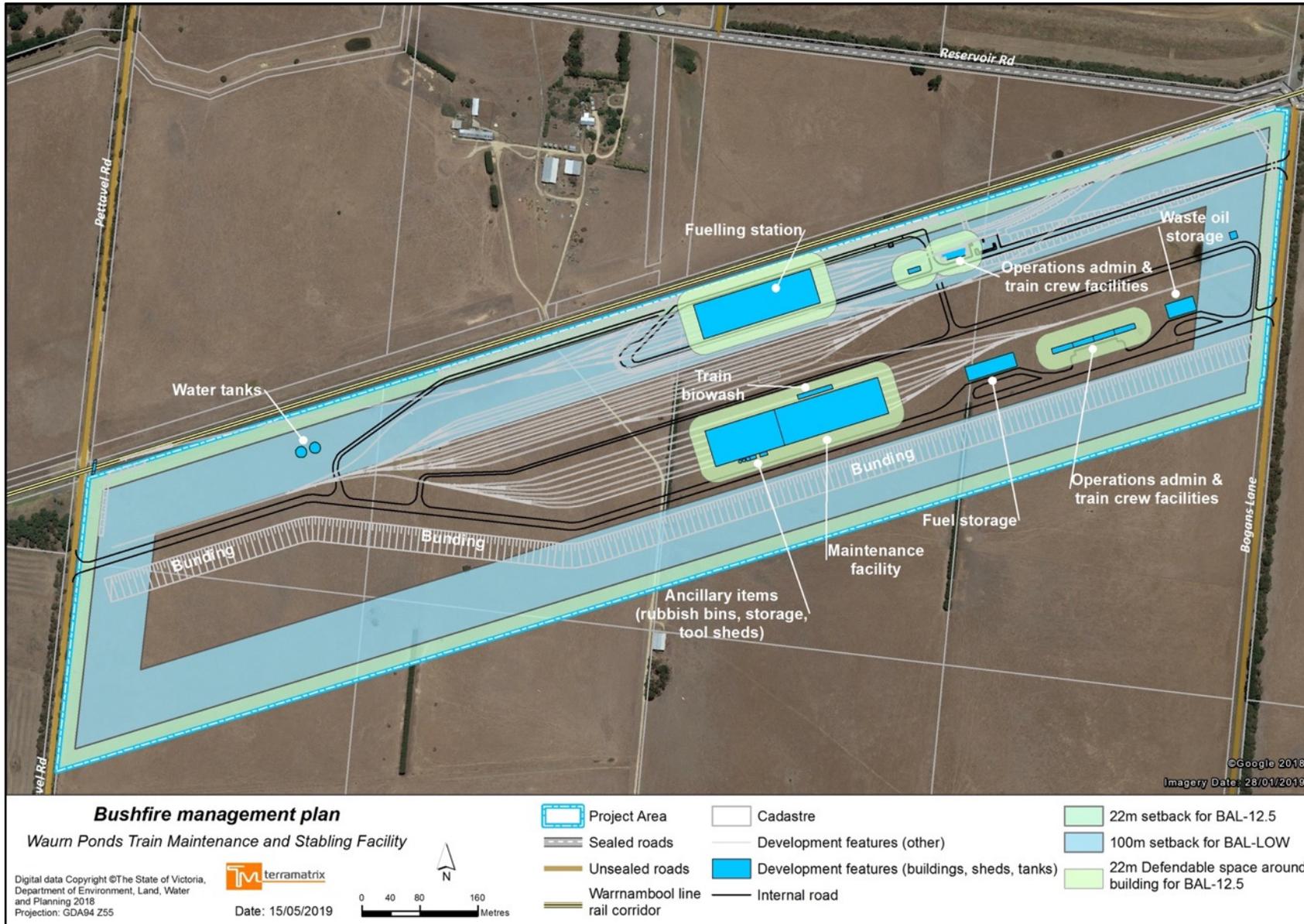
It is recommended that RPV assess the value of assets and consider the need to protect them from bushfire attack. Where appropriate, tailored bushfire mitigation measures can be put in place to minimise their loss. The CFA requested that their State Infrastructure and Dangerous Goods Team be engaged during the building design phase to advise on structural fire safety (Luke, 2017). The type of treatment would be based on their vulnerability to bushfire attack (flame, radiant heat, ember attack or smoke) and may include options such as vegetation management, shielding, ember proofing or simple housekeeping measures. Table 5 presents a list of RHF thresholds to people and building elements.

Table 5 – RHF thresholds (Source: Standards Australia, 2011)

Phenomenon	kW/m ²
Pain to humans after 10 s to 20 s	4
Pain to humans after 3 s	10
Ignition of cotton fabric after a long time (piloted ⁴)	13
Ignition of timber after a long time (piloted)	13
Ignition of cotton fabric after a long time (non-piloted ⁵)	25
Ignition of timber after a long time (non-piloted)	25
Ignition of timber in 20 s (non-piloted)	45

⁴ Introduction of a small flame to initiate ignition

⁵ Flame not introduced to initiate ignition



Map 3 – Bushfire management plan showing potential vegetation management zone.

6.1.3 Vegetation management

If a BAL-12.5 (or other RHF threshold) is to apply to any building or other asset, a minimum area of non-vegetated land or 'low threat' vegetation (e.g. grass mown to less than 100mm high) will be required to be maintained around that asset during fire season.

For BAL-12.5 buildings exposed to Grassland on flat land, the required setbacks are a minimum 19m separation. For Grassland in the 'Downslopes >0°-5°' class, the applicable BAL-12.5 distance is 22m.

For illustrative purposes only, Map 3 shows the extent of a 22m defendable space around each building. Although it is recommended that the entire site will be managed in a low threat state, this defendable space represents the minimum area required around buildings built to BAL-12.5. Any landscaping within the defendable space area should aim to meet the standards for defendable space detailed in Appendix 2.

Analysis of the Landscape and Visual Impact Assessment and discussions with AECOM, indicate this will be achievable, but a more detailed landscape plan is required to confirm propose plantings can be considered 'low threat'.

6.1.4 Access and Water

As per the CFA letter of advice (Luke, 2017), the site provides an internal road with access points on both Pettavel Rd and Bogans Rd. Minor roads come off the main access route and run between the existing mainline and the new lines, and between the stage one and stage two stabling roads (see Map 3) to encircle the major infrastructure on the site.

Providing at least two ways in and out of a site is a long-standing principle for bushfire safety, to ensure there are options for evacuation for both site occupants and emergency services. All roads will be at least 3.5m in width and constructed of non-flammable materials. Given the size of the site, it is also recommended that passing areas and turning circles as per CFA specifications for BMO compliance (detailed at Appendix 3) are provided.

A static water supply for fire-fighting is not a requirement under the planning or building provisions however, as a precautionary approach, it is recommended a static supply be provided that (as a minimum) complies with the BMO requirements for static water, as detailed in Appendix 4. This should be a static water supply of at least 40,000L capacity provided and maintained solely for firefighting purposes and provided with CFA fittings and access. Map 3 shows the location of a proposed static water supply (capacity unknown).

6.1.5 Preventing ignition and fire spread onsite

Activity on the site may result in an ignition which, under elevated fire weather conditions, may spread beyond the property boundaries. The likelihood of an ignition can be reduced by applying some (or all) of the following actions:

- Managing grass on the site in a low threat state (i.e. <100mm in height).
- Providing a designated smoking area and prohibiting smoking outside this area.
- Developing a hot works policy that articulates restrictions on hot works (in line with, or additional to, the total fire ban day restrictions) and fire suppression equipment requirements (such as having an extinguisher on hand).
- Ensuring all staff and contractors are aware of the ignition controls and abide by all relevant policies and procedures.

6.1.6 Site Management Plan

A Site Management Plan (SMP) that addresses bushfire risk during construction should be developed prior to commencing construction. At a minimum, the plan should specify:

- The staging of development and the likely bushfire risks at each stage;
- An area of land between the development edge and hazardous vegetation consistent with the separation distances specified in AS3959-2009, managed as low threat;
- The measures to be undertaken during construction to reduce the likelihood of an ignition or spread of fire due to work associated with the development; and
- How access and egress will be provided for construction workers and emergency vehicles.

The site management plan should be developed to the satisfaction of the CFA.

6.1.7 Bushfire emergency management planning

It is recommended that RPV develop a Bushfire Emergency Management Plan (BEMP) for the Facility as a component of an overall site health, safety and environmental management plan.

A BEMP should include amongst other things:

- An assessment of the likelihood of ignitions due to onsite activities and appropriate mitigation actions such as designated smoking areas, hot works policy and the provision of suppression resources such as fire extinguishers;
- An assessment of the level of bushfire risk to people, infrastructure and operations (based on an analysis of the exposure, vulnerability and consequence to all assets);
- A treatment plan to mitigate the assessed risk including triggers for closure/evacuation of the Facility e.g. on days declared 'Code Red' Fire Danger;
- A schedule for training and stakeholder engagement, including familiarisation sessions for local CFA brigades; and
- A monitoring and review schedule.

A BEMP would have the purpose of ensuring that management and staff actions prior to and during a bushfire event are appropriate and effective and have the effect of minimizing risk to life and assets.

The BEMP would provide guidance to staff and emergency services regarding appropriate actions and the bushfire safety features onsite. This may be achieved through ensuring that the site is provided with a place of enhanced bushfire protection for a shelter-in-place response and/or an

evacuation plan, and that all staff know the risks of bushfire and are aware of the site-appropriate response.

The BEMP should be developed in consultation with and to the satisfaction of the CFA.

6.1.8 Bushfire mitigation measures

All bushfire mitigation measures discussed in this report, including the provision of BAL construction standards, access and water and the management of the grass within the site and the areas of defensible space, can be properly implemented within the boundaries of the Project Land and will not impact or restrict the use of the surrounding property.

6.2 Clause 13.02 Bushfire

Clause 13.02 Bushfire has the objective *'To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life'* (Greater Geelong Planning Scheme, 2018a).

Strategies are provided in relation to:

- Protection of human life;
- Bushfire hazard identification and assessment;
- Settlement planning;
- Areas of high biodiversity conservation value; and
- Use and development control in a Bushfire Prone Area.

The way in which the proposed amendment gives effect to each of the strategies is detailed in the table below.

Strategy	Response
Protection of human life	
Prioritising the protection of human life over all other policy considerations	<p>It is considered that the Project can prioritise the protection of human life.</p> <p>Any proposed structure will be located such that a BAL-12.5 construction standard (and corresponding setback from hazardous vegetation) can be achieved. Large parts of the site achieve a BAL-Low under AS 3959-2018 (>100m from the hazardous vegetation) with appropriate vegetation management.</p> <p>It is recommended that a bushfire emergency management plan be developed to ensure an appropriate</p>

	<p>response by staff to an onsite ignition or bushfire in the vicinity of the site (see Section 6.1.7).</p> <p>The main egress route provides access from the site to the low threat urban areas of Waurin Ponds, approximately 5km north east of the site.</p>
<p>Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.</p>	<p>The proposed development site has characteristics that reduces the inherent level of bushfire risk:</p> <ul style="list-style-type: none"> • The bushfire hazard adjacent to the site is restricted to Grassland, on relatively flat land (refer Section 4.1); • The vegetation management within the site can enable AS 3959-2018 compliant development, with low BALs (refer Section 6.1.1); • The site is relatively close to the more urbanised Waurin Ponds area; and • There are multiple egress routes from the site to the north and east towards Waurin Ponds. <p>The site is of sufficient size to provide areas that would be rated as BAL-12.5 or BAL-Low (i.e. more than 100m from classified vegetation beyond the site boundary) with appropriate vegetation management and, if considered necessary, to include a communal shelter-in-place location to ensure staff/contractors/visitors are able to shelter safely if evacuation of the area was not feasible.</p>
<p>Reducing the vulnerability of communities to bushfire through consideration of bushfire risk in decision-making at all stages of the planning process</p>	<p>The vulnerability of this development has been considered and a number of bushfire mitigation measures recommended. In particular, the construction of habitable buildings to BAL-12.5 (and the provision of commensurate vegetation management). A construction standard is not required by the types of buildings under the NCC/Building Regulations, however this measure is considered desirable to address the potential bushfire impact to the site. In addition, the development of a BEMP specifying actions for staff and contractors to take before, during and after a bushfire, would reduce their vulnerability.</p> <p>The potential threat of a fire being ignited on the site and spreading beyond the property boundaries was also considered, and the development of ignition reduction policies and procedures recommended.</p>

	<p>This report demonstrates that bushfire risk is being appropriately considered by the planning scheme amendment.</p>
Bushfire hazard identification and assessment	
<p>Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.</p>	<p>Bushfire Hazard Level mapping of the wider area has been conducted by DELWP.</p> <p>This report assesses bushfire risk in accordance with Clause 13.02 of the Greater Geelong Planning Scheme.</p> <p>This report identifies the hazard in accordance with the commonly accepted methodologies of AS 3959-2018 and, as appropriate, additional guidance provided in <i>Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140</i> (DEWLP, 2018b).</p> <p>The type and extent of (hazardous) vegetation within and around the site has been identified and classified into AS 3959-2018 vegetation groups. Classification was based on the anticipated long-term state of the vegetation, aerial imagery, site assessment, published guidance on vegetation assessment for bushfire purposes and experience with the fuel hazard posed by the vegetation type.</p> <p>GIS analysis of publicly available 10m contour data for the area was undertaken (see Map 2).</p> <p>In relation to climatic conditions and fire weather, the AS 3959-2018 default GFDI 130 benchmark used in the Victorian planning and building system, has been applied as discussed in Section 3.</p>
<p>Considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the Building Act 1993 or regulations made under that Act.</p>	<p>The entire site is within the BPA, as determined by Bushfire Hazard Level mapping conducted by DELWP.</p>
<p>Applying the Bushfire Management Overlay in planning schemes to areas where the</p>	<p>The site is not covered by the BMO, as determined by Bushfire Hazard Level mapping conducted by DELWP, which was gazetted on 3rd October 2017.</p>

extent of vegetation can create an extreme bushfire hazard.	
Considering and assessing the bushfire hazard on the basis of: <ul style="list-style-type: none"> • Landscape conditions - meaning the conditions in the landscape within 20 kilometres and potentially up to 75 kilometres from a site; • Local conditions – meaning conditions in the area within approximately 1 kilometre from a site; • Neighbourhood conditions – meaning conditions in the area within 400 metres of a site; and • The site for development. 	<p>The hazard has been assessed and described at the regional, municipal and local (site and neighbourhood) scale .</p> <p>At the local scale, the assessment follows the AS 3959-2018 methodology, of classifying vegetation and topography within a 100m assessment zone (see Section 5)</p> <p>At the landscape scale the bushfire risk has been considered at 20km, 5km and 1km of the site in accordance with guidance about assessing risk for planning scheme amendments provided in Planning Advisory Note 68 (DEWLP, 2018) (see Section 4).</p>
Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.	<p>CFA, as the relevant fire authority, have provided feedback on the development proposal in a letter dated 27 October 2017. The opinion of the CFA was that the proposed development does not create a risk to neighbouring farmland. The CFA recommended that:</p> <ul style="list-style-type: none"> • A ring road be constructed on the inside perimeter of the fencing; • The CFA State Infrastructure and Dangerous Goods Team be consulted during the design phase; and • RPV provide the responding brigades with a site tour and induction once development is complete. <p>An internal road has been provided on the plan (see Map 3) which meets the intent of the CFA advice. This report recommends that the CFA State Infrastructure and Dangerous Goods Team be consulted during the design phase and RPV provide the responding brigades with a site tour and induction once development is complete in accordance with the recommendations from the CFA.</p>
Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development	<p>DELWP advisory and practice notes, Clause 13.02 and the building regulations invoked by the BPA coverage, including the bushfire hazard landscape assessment, specify the general requirements and standards for</p>

<p>plan approvals properly assess bushfire risk and include appropriate bushfire protection measures.</p>	<p>assessing the risk. These have been used in this report as appropriate and bushfire protection measures have been identified commensurate with the risk.</p>
<p>Not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied or bushfire protection measures can be adequately implemented.</p>	<p>The risk can be deemed to be acceptably mitigated such that development can proceed if the objectives and strategies of Clause 13.02 are successfully implemented, as discussed in this report; and for development in the BPA, the building regulations for construction are complied with.</p>
<p>Settlement planning</p>	
<p>Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959-2018 Construction of buildings in bushfire-prone areas (Standards Australia, 2009).</p>	<p>The site is in a low bushfire risk location, with the bushfire hazard restricted to Grassland, on predominantly flat land. The site can provide large areas that would have a BAL-12.5 rating or lower under AS 3959-2018. It is proposed that at a minimum, all habitable buildings are built to a BAL-12.5 construction standard.</p>
<p>Ensuring the availability of, and safe access to, areas assessed as a BAL-Low rating under AS 3959-2009 Construction of buildings in bushfire-prone areas (Standards Australia, 2009) where human life can be protected from the effects of bushfire.</p>	<p>If required, the site can provide a 'low threat' BAL-Low communal area, that is setback at least 100m from classified vegetation, and which contains buildings that could provide a viable shelter-in-place location. The site is approximately 5km to the Waurin Ponds urban area.</p>
<p>Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.</p>	<p>The Project will not increase the bushfire risk to existing and future residents, property and community infrastructure.</p> <p>The site is located within a landscape that has the potential to support a landscape scale grassfire. The Project will see the majority of the site become less hazardous, due to the construction of non-combustible infrastructure and surfaces, as well as the ability to manage any remaining vegetation in a low threat state.</p> <p>The potential for a fire to start on site will be managed through internal policies and procedures in line with</p>

	<p>Victorian regulations. The potential for spread off site will be largely mitigated by the condition of the vegetation on site and the provision of a perimeter road within the fence.</p>
<p>Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reduce bushfire risk overall.</p>	<p>The Project will not increase the risk to existing and future residents, property and community infrastructure, and may in fact reduce the overall bushfire risk due to the change in site from grassland to infrastructure and surfaces that are non-combustible, or vegetation managed as low threat. In addition, the provision of a perimeter road may impede fire spread and/or facilitate firefighter activity.</p>
<p>Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.</p>	<p>No alternative areas have been assessed as part of this bushfire assessment.</p>
<p>Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2009.</p>	<p>The project does not result in an intensification of residential development. All buildings onsite have the potential to achieve a BAL-12.5 rating or lower under AS 3959-2018.</p>
<p>Areas of high biodiversity conservation value</p>	
<p>Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are of high biodiversity conservation value.</p>	<p>AECOM undertook an ecological assessment of the site and provided guidance on further steps required to minimise ecological impact and meet legislative requirements for the development (AECOM <i>Waurin Ponds Stabling and Maintenance Facility Ecological Assessment</i> (2019)). Most of the site is exotic pasture, with small areas of scattered trees. All proposed bushfire mitigation measures can likely be implemented without impacting the biodiversity values on site.</p>
<p>Use and development control in a Bushfire Prone Area</p>	
<p>'In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when</p>	<p>Depending on how many people congregate on the site, this strategy may not be applicable, However the risk has been considered and acceptable safety can be achieved.</p>

<p>assessing planning applications for the following uses and development:</p> <ul style="list-style-type: none"> • Subdivisions of more than 10 lots. • Accommodation. • Child care centre. • Education centre. • Emergency services facility. • Hospital. • Indoor recreation facility. • Major sports and recreation facility. • Place of assembly. • Any application for development that will result in people congregating in large numbers. <p>When assessing a planning permit application for the above use and development:</p> <ul style="list-style-type: none"> • Consider the risk of bushfire to people, property and community infrastructure. • Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk. <p>Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts.'</p>	
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7 Conclusion

The bushfire risk to the proposed Waurin Ponds Train Maintenance and Stabling Facility at 255 Reservoir Road, was assessed against the objectives and strategies of Clause 13.02 *Bushfire* of the Greater Geelong Planning Scheme and *AS3959-2018 Construction of Buildings in Bushfire Prone Areas* (Standards Australia, 2018).

The site is within an agricultural landscape with predominately grassland vegetation in all directions. The topography is relatively benign from a bushfire perspective and will not significantly influence the level of bushfire attack. The site is within the Bushfire Prone Area, however, overall the landscape risk is considered to be relatively low.

A number of measures to mitigate the bushfire risk and meet the objectives of Clause 13.02 are recommended. These are:

- Protection of the site overall, by managing vegetation within the property boundaries in a low threat state (all grass to be maintained in a low threat state, nominally at a height of less than 100mm); providing a water supply in accordance with CFA requirements; and access in accordance with CFA requirements;
- All key buildings (such as offices) should be built to a minimum BAL-12.5 and provided with a minimum 22m of defendable space in all directions (it is recommended that the whole site is managed in a low threat state - all grass to be maintained in a low threat state, nominally at a height of less than 100mm);
- The vulnerability to bushfire attack and criticality of all other built assets should be assessed, and appropriately addressed through treatments such as shielding, non-combustible construction materials and vegetation management;
- The development of a Site Management Plan, that addresses how bushfire risk will be mitigated during the construction phase of the development;
- That the CFA State Infrastructure and Dangerous Goods Team be consulted during the design phase and RPV provide the responding brigades with a site tour and induction once development is complete in accordance with the recommendations from the CFA;
- The development of policies and procedures to minimise the likelihood of an ignition and subsequent spread off-site, of a bushfire from site activities; and
- The development of a Bushfire Emergency Management Plan (BEMP) to manage the risk of ignitions and potential impact of a bushfire to people onsite.

The level of bushfire risk can be acceptably mitigated if adequate bushfire protection measures are incorporated into the development. The report presents a number of bushfire development recommendations including vegetation management, BAL construction standards for the buildings, water, access and the development of a site bushfire emergency plan. All bushfire mitigation measures discussed in this report, including the provision of BAL construction standards, access and water and the management of the grass within the site and the areas of defendable space, can be properly implemented within the boundaries of the Project Land and will not impact or restrict the use of the surrounding property.

Appendix 1: BAL construction standards

Bushfire Attack Level (BAL)	Risk Level	Construction elements are expected to be exposed to...	Comment
BAL-Low	VERY LOW: There is insufficient risk to warrant any specific construction requirements but there is still some risk.	No specification.	At 4kW/m ² pain to humans after 10 to 20 seconds exposure. Critical conditions at 10kW/m ² and pain to humans after 3 seconds. Considered to be life threatening within 1 minute exposure in protective equipment.
BAL-12.5	LOW: There is risk of ember attack.	A radiant heat flux not greater than 12.5 kW/m ²	At 12.5kW/m ² standard float glass could fail and some timbers can ignite with prolonged exposure and piloted ignition.
BAL-19	MODERATE: There is a risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to radiant heat.	A radiant heat flux not greater than 19 kW/m ²	At 19kW/m ² screened float glass could fail.
BAL-29	HIGH: There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat.	A radiant heat flux not greater than 29 kW/m ²	At 29kW/m ² ignition of most timbers without piloted ignition after 3 minutes exposure. Toughened glass could fail.
BAL-40	VERY HIGH: There is a much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front.	A radiant heat flux not greater than 40 kW/m ²	At 42kW/m ² ignition of cotton fabric after 5 seconds exposure (without piloted ignition).
BAL- FZ (i.e. Flame Zone)	EXTREME: There is an extremely high risk of ember attack and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front.	A radiant heat flux greater than 40 kW/m ²	At 45kW/m ² ignition of timber in 20 seconds (without piloted ignition).

Source: AS 3959-2018 (Standards, Australia, 2018).

Appendix 2: BMO vegetation management requirements

As per Table 6 to Clause 53.02-5:

'Defendable space is provided and is managed in accordance with the following requirements:

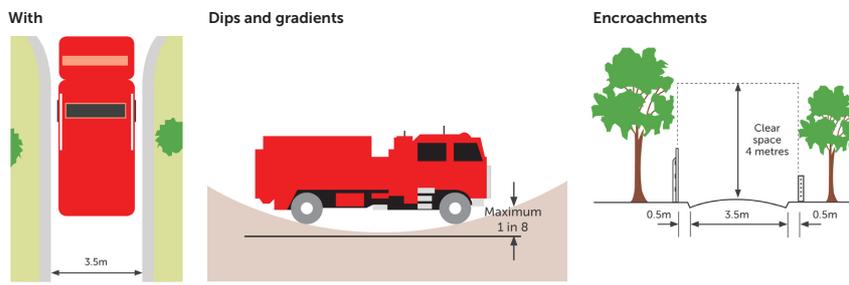
- *Grass must be short cropped and maintained during the declared fire danger period.*
- *All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period.*
- *Within 10 metres of a building, flammable objects must not be located close to the vulnerable parts of the building.*
- *Plants greater than 10 centimetres in height must not be placed within 3m of a window or glass feature of the building.*
- *Shrubs must not be located under the canopy of trees.*
- *Individual and clumps of shrubs must not exceed 5 sq. metres in area and must be separated by at least 5 metres.*
- *Trees must not overhang or touch any elements of the building.*
- *The canopy of trees must be separated by at least 5 metres.*
- *There must be a clearance of at least 2 metres between the lowest tree branches and ground level*

Unless specified in a schedule or otherwise agreed in writing to the satisfaction of the relevant fire authority' (Greater Geelong Planning Scheme, 2018b).

Appendix 3: BMO access requirements

Where the length of access is greater than 30 metres the following design and construction requirements apply:

- Curves must have a minimum inner radius of 10 metres.
- The average grade must be no more than 1 in 7 (14.4%) (8.1°) with a maximum of no more than 1 in 5 (20%) (11.3°) for no more than 50 metres.
- Dips must have no more than a 1 in 8 (12.5%) (7.1°) entry and exit angle.
- A load limit of at least 15 tonnes and be of all-weather construction.
- Provide a minimum trafficable width of 3.5 metres.
- Be clear of encroachments for at least 0.5 metres on each side and at least 4 metres vertically.
- A cleared area of 0.5 metres is required to allow for the opening of vehicle doors along driveways.

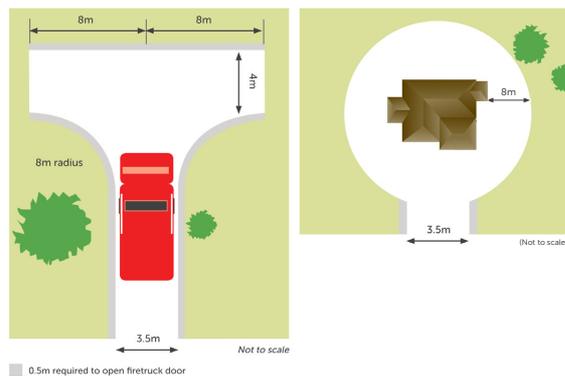


Access between 100 metres to 200 metres in length

In addition to the above:

A turning area for fire fighting vehicles must be provided close to the building by one of the following:

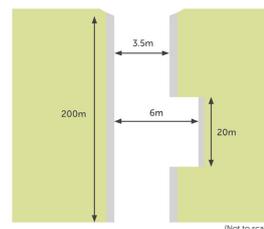
- a turning circle with a minimum radius of 8 metres
- a driveway encircling the dwelling
- other vehicle turning heads such as a T or Y head which meet the specification of Austroad Design for an 8.8 metre service vehicle.



Access greater than 200 metres in length

In addition to the above, passing bays are required at least every 200 metres that are:

- a minimum of 20 metres long
- with a minimum trafficable width of 6 metres.

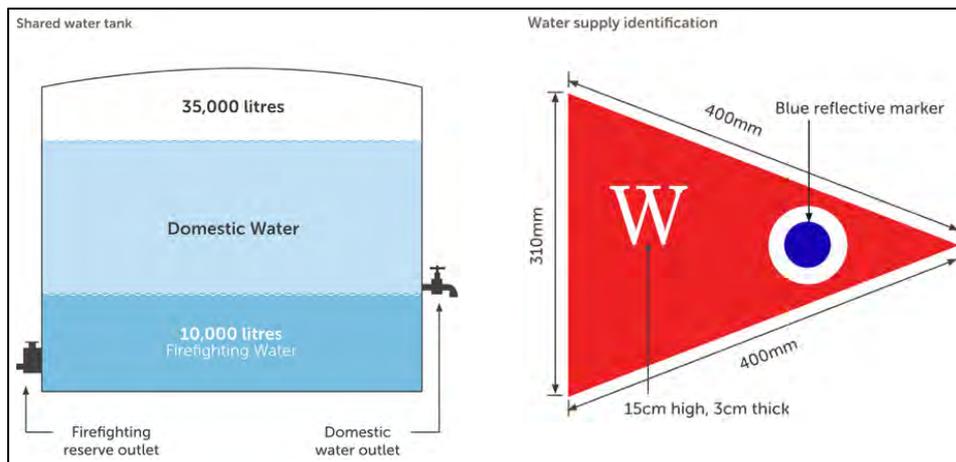


(DELWP, 2017c)

Appendix 4: BMO static water supply requirements

Water tank requirements (Greater Geelong Planning Scheme, 2017b)

'The water supply should be stored in an above ground water tank constructed of concrete, steel or corrugated iron. The water supply should be identified. The water supply may be provided in the same water tank as other water supplies provided they are separated with different outlets.'

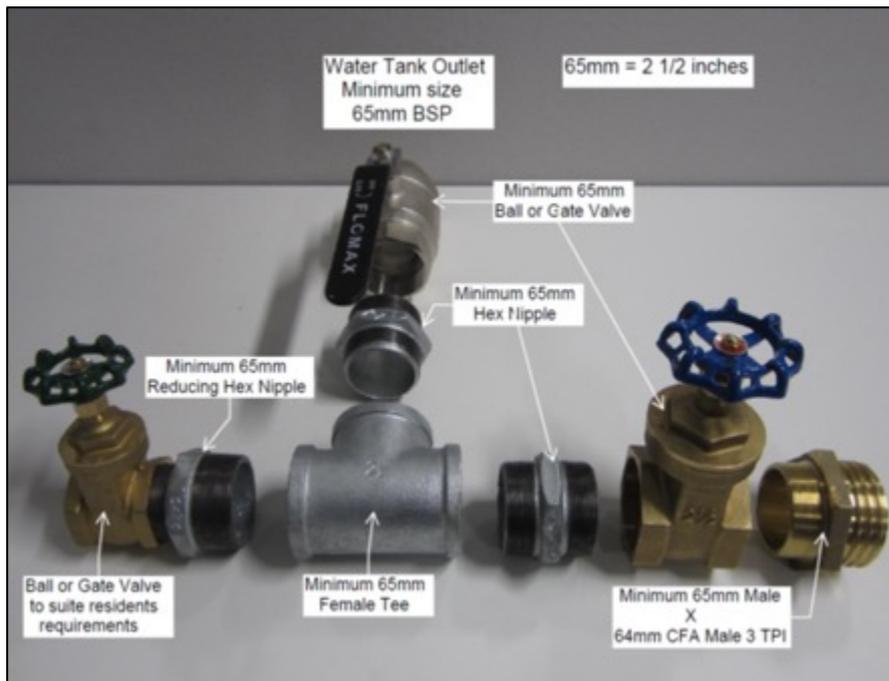


CFA Fittings (CFA, 2014b)

'If specified within Table 4 to Clause 52.47-3 (if fire brigade access to your water supply is required), CFA's standard BMO permit conditions require the pipe work, fittings and tank outlet to be a minimum size of 64 mm.'

65 mm BSP (British Standard Pipe) is the most common size available. A 65 mm fitting is equivalent to the old 2 1/2 inch. A 65 mm BSP (2 1/2 inch) fitting exceeds CFA's requirements and will therefore comply with CFA's standard permit conditions for the BMO.

The diagram below shows some common tank fittings available at most plumbing suppliers which meet the connection requirements. It includes a 65 mm tank outlet, two 65 mm ball or gate valves with a 65 mm male to 64 mm CFA 3 threads per inch male coupling. This is a special fitting which allows the CFA fire truck to connect to the water supply. An additional ball or gate valve will provide access to the water supply for the resident of the dwelling.'



CFA Standard permit conditions for water supply (CFA, 2014a)

Conditions required for all applications

'Show [xx litres] of effective water supply for fire fighting purposes which meets the following requirements:

- *Is stored in an above ground water tank constructed of concrete or metal.*
- *All fixed above-ground water pipes and fittings required for fire fighting purposes must be made of corrosive resistant metal.'*

Additional conditions to apply if CFA fittings and access is required

'The water supply must also –

- *Incorporate a ball or gate valve (British Standard Pipe (BSP) 65mm) and coupling (64 mm CFA 3 thread per inch male fitting).*
- *The outlet/s of the water tank must be within 4m of the accessway and be unobstructed.*
- *Be readily identifiable from the building or appropriate identification signage to the satisfaction of CFA must be provided.*
- *Any pipework and fittings must be a minimum of 65 mm (excluding the CFA coupling).'*

8 References

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AECOM (2019) *Waurin Ponds Stabling and Maintenance Facility Ecological Assessment*. AECOM, Collins Square, Melbourne.

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Greater Geelong Planning Scheme (2018a) *Clause 13.02 Bushfire*, Viewed at <<http://planningschemes.dpcd.vic.gov.au/schemes/greatergeelong>>.

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