Bushfire Development Report

for the East of Aberline Precinct Structure Plan
Warrnambool

Prepared for
Warrnambool City Council

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Terramatrix project: WarrnamboolCC-2018-01 Aberline to Horne Growth Corridor
Cover image: Looking west from Horne Road, along Russells Creek towards Francis Tozer Reserve.

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1 Summary

Warrnambool City Council and the Victorian Planning Authority are currently developing the East of Aberline Precinct Structure Plan (EOA PSP) in Warrnambool, to guide the future urban development of the land immediately to the north-east of the existing township.

The EOA PSP area is wholly within a Bushfire Prone Area (BPA) and partially covered by the Bushfire Management Overlay (BMO). The PSP constitutes settlement planning and, as such, Clause 13.02 *Bushfire* of the Warrnambool Planning Scheme requires that bushfire risk be considered (Warrnambool Planning Scheme, 2018b).

The EOA PSP area is exposed to classified Grassland (pasture) to the north, east and south beyond the precinct boundary, and to Woodland in the Francis Tozer Reserve that extends from Wangoom Road south into the EOA PSP area. It is likely that a reserve will be established along Russells Creek, which will be revegetated and likely to also comprise classified vegetation that requires a bushfire planning response.

Key points:

- The entire EOA PSP area is within a designated BPA, and a small area around Francis Tozer Reserve is covered by the BMO.
- The site is adjacent to the established urban area of Warrnambool, that includes areas that would be rated as BAL-Low using the AS 3959-2009 site assessment methodology.
- Grassland and Woodland adjacent to and within the EOA PSP area comprises a bushfire hazard that must be considered in the development and use of the precinct.
- A future reserve along Russells Creek is likely to comprise a bushfire hazard that must be considered in the development of adjacent land.
- The terrain within and around the EOA PSP area is benign from a bushfire perspective in the 'Flat land and all upslopes' or 'Downslopes >0-5°' slope classes.
- To achieve the BAL-12.5 rating required for settlement growth by Clause 13.02 *Bushfire*, buildings will need to be setback 19m or 22m from classified Grassland and 33m or 41m from classified Woodland, depending upon the effective slope. These areas have been identified and mapped.
- Large areas of the EOA PSP area are available for BAL-12.5 development.
- Part of the area covered by the BMO may be suitable for application of Schedule 1 to the BMO in the Warrnambool Planning Scheme, provided appropriate setbacks from Francis Tozer Reserve are provided in subdivision design.
- Much of the EOA PSP area is likely to be rendered low threat by the planned urban development and may become eligible for excision from the BPA as development proceeds.

2 Introduction

This Bushfire Development Report has been prepared for Warrnambool City Council and the Victorian Planning Authority (VPA) to assess how development in the East of Aberline Precinct Structure Plan area (EOA PSP) can respond to the bushfire risk and comply with the applicable planning and building controls that relate to bushfire, especially the objectives and strategies of the Planning Policy Framework (PPF) at Clause 13.02 *Bushfire* and, where applicable, Clause 44.06 *Bushfire Management Overlay (BMO)* and associated Clause 53.02 *Bushfire Planning* in the Warrnambool Planning Scheme.

Warrnambool City Council and the VPA are currently developing the EOA PSP to guide the future urban development of the land. The precinct will be developed in stages over a long time period and is currently estimated to provide 48 years supply of residential land. It is anticipated that the EOA PSP area could eventually accommodate more than 7,000 people in 4,000 new homes.

The EOA PSP area is currently predominantly used for grazing and is zoned Farm Zone (FZ). The two exceptions are:

- Francis Tozer Reserve, a privately-owned bushland reserve that is used by local schools as an educational resource (zoned FZ); and
- The Wannon Water storage ponds in the southeast corner of the EOA PSP area (zoned PUZ).

It is understood that both these features will remain, and that the remaining FZ land within the EOA PSP area will be made available for urban development and probably re-zoned to General Residential Zone (GRZ).

The entire EOA PSP area is a designated Bushfire Prone Area (BPA). Approximately 53ha of land, comprising Francis Tozer Reserve and land within 150m of it, is also covered by the Bushfire Management Overlay (BMO). This constitutes approximately 7.7% of the EOA PSP area proposed for residential development.

This report has been prepared in accordance with guidance for the assessment of, and response to, bushfire risk, provided in:

- *Local planning for bushfire protection,* Planning Practice Note 64 (DELWP, 2015a);
- *Strategic Assessment Guidelines for preparing and evaluating planning scheme amendments,* Planning Practice Note 46 (DELWP, 2017a);
- *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017b); and
- *Bushfire State Planning Policy Amendment VC140,* Planning Advisory Note 68, (DELWP, 2018a).

3 Overview of study area

The EOA PSP area is located adjacent to the north-eastern boundary of the current Warrnambool township (see Figure 1), in the Warrnambool City local government area (LGA). The EOA PSP area comprises approximately 360ha of land, generally bounded by:

- Wangoom Road to the north;
- Aberline Road to the west;
- Boiling Down Road and Gateway Road to the southwest;
- Dales Road (unsealed) to the south;
- Wangoom Road to the north;
- Horne Road in the southeast; and then
- The rear boundary of properties east of Horne Road, from the industrial precinct north to Dixons Lane.

Figure 1 - EOA PSP location (EOA PSP area in red outline, 5km buffer in blue outline (Google Earth imagery 27-10-2017)).

The proposed future urban structure of the EOA PSP has not been finalised, but when fully developed, the precinct is expected to contain approximately 4,000 dwellings and supporting infrastructure. It is not yet known whether the precinct will also contain a local shopping precinct, a school or other community facilities. A possible future urban form is shown in Map 1.

This layout shows a linear reserve to be established along Russells Creek, including revegetation and a shared path. The linear reserve will run past, and link to, the southern end of Francis Tozer Reserve. There may also be drainage basins and wetlands established along Russells Creek, but this detailed planning is not yet finalised.

Map 1 – Potential future urban structure (for the purpose of bushfire assessment only).

4 Bushfire planning and building controls

This section summarises the applicable planning and building controls that relate to bushfire.

4.1 Planning Policy Framework (PPF)

4.1.1 Clause 71.02-3 Integrated Decision Making

Clause 71.02-3 states that planning and responsible authorities should endeavour to integrate policies and balance conflicting objectives in favour of net community benefit. However, in bushfire affected areas, it states that the protection of human life must be prioritised over all other policy considerations (Warrnambool Planning Scheme, 2018a).

4.1.2 Clause 13.02 Bushfire

Clause 13.02 has the objective '*To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life*' (Warrnambool Planning Scheme, 2018b). 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 Bushfire Prone Area;
- Subject to a Bushfire Management Overlay; 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'* (Warrnambool Planning Scheme, 2018b).

Key strategies are stipulated in Clause 13.02, which require regional growth plans, precinct structure plans and planning scheme amendments to assess the bushfire hazard and respond with appropriate bushfire protection measures. This also applies to planning permit applications for:

- 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; and
- Any application for development that will result in people congregating in large numbers.

This study assesses the hazard and identifies the bushfire protection measures that will be required for future development in the EOA PSP. It is considered that development can appropriately prioritise the protection of human life, and meet the objectives of Clause 13.02, by ensuring future dwellings and other development will not be exposed to RHF above 12.5kW/m^2, which is commensurate with a BAL-12.5 construction standard.

The maximum 12.5kW/m^2 safety threshold is required in settlement planning as the upper limit for acceptable risk. Responsible authorities must '*Not approve 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*' (Warrnambool Planning Scheme, 2018b).

A detailed response to the strategies in Clause 13.02 is provided in Section 6.4.

4.2 Local Planning Policy Framework (LPPF) [1]

4.2.1 Clause 21.01 Municipal Profile, Council Vision and Strategic Directions

380ha[2] of land east of Aberline Road is identified as an urban growth corridor suitable for residential expansion and industrial use (Warrnambool Planning Scheme, 2016a).

The potential impact of further urban development on environmental values in the municipality is identified as a key issue; and the threat of climate change to coastal settlement is recognised, with a focus on the potential impact of sea level rise and storm surge (Warrnambool Planning Scheme, 2016a).

4.2.2 Clause 21.02 Settlement

Clause 21.02-2 *Urban Growth* identifies preparation of a Structure Plan for the EOA PSP area as future strategic work.

[1] It is noted that the LPPF will be translated into the PPF as the Municipal Planning Strategy, as proposed by VC148 (DELWP, 2018b). However, at the time of preparing this report the LPPF and MSS are components of the Warrnambool Planning Scheme.
[2] EOA PSP area comprises approximately 360ha.

Clause 21.02-3 *Open Space* contains strategies to ensure that development does not compromise the ecological integrity of the Russells Creek corridor and to incorporate sites with environmental value into the open space network (Warrnambool Planning Scheme, 2016b).

4.2.3 Clause 21.03 Environment and Landscape Values

Clauses 21.03-1 *Biodiversity* and 21.03-2 *Native vegetation management* provide objectives and strategies relevant to the EOA PSP area. These include to:

- Recognise, protect and enhance sites of significance for their specific biodiversity values;
- Require development to be directed away from wetlands and rehabilitate urban waterways to protect and enhance sensitive ecosystems;
- Improve natural habitats on public land and encourage revegetation on private land and in aquatic systems within the city;
- Facilitate the creation of wildlife corridors through the provision of a network of open space;
- Protect remnant vegetation, especially in habitat corridors, associated with drainage lines, stream frontages and on roadsides and protect, in particular, those EVCs rated as having either high or very high conservation significance, and habitat corridors or areas identified as habitat for rare and threatened flora and fauna species; and
- Require revegetation along waterways and floodplains using original EVC species, with inclusion of understorey species (Warrnambool Planning Scheme, 2016c).

The Francis Tozer Reserve is specifically recognised as “an important example of remnant native grassland and should be preserved as a community education resource”.

The strategies of Clause 21.03 support the retention and enhancement of vegetation within the Francis Tozer Reserve and the proposed revegetation of Russells Creek.

4.2.4 Clause 21.04 Environmental Risks

Clause 21.04-5 *Bushfire* identifies the grassland interface of Warrnambool as being at significant risk from bushfire. It recognises that under severe fire weather there is a risk of grassfire penetrating into the residential areas.

The following objectives and strategies are established (Warrnambool Planning Scheme, 2016d):

Objective 1 To ensure that land use and development is directed to locations and carried out in ways that minimise its vulnerability to the threat of fire.

Strategy 1.1 Minimise the vulnerability of people and property to bushfire.
Strategy 1.2 Improve fire prevention and hazard management by:

- Ensuring that adequate separation is maintained between vegetation and powerlines;
- Reducing the vulnerability of residences by appropriate preventative measures.
- Encouraging good standards of design and operating practices to minimise the occurrence and impact of uncontrolled fire.

Strategy 1.3 Ensure that the Bushfire Management Overlay covers land identified as being in an area of high fire hazard.

Strategy 1.4 Ensure that new development in small settlements and at the urban/rural interface is adequately designed and serviced to take into account the risk of uncontrolled fire.

Objective 2 To strengthen community resilience to bushfire by:

- Prioritising the protection of human life over other policy considerations when planning to create or expand a settlement at risk from bushfire.
- Applying a precautionary approach to planning and decision-making when assessing the risk to life, property and community infrastructure from bushfire.
- Taking advantage of existing settlement patterns where new development will not expose the community to increased risk from bushfire.
- restrict and control development on land prone to wildfire.

Strategy 2.1 Settlement planning decisions should prioritise protection of human life and respond to the following principles with regard to bushfire risk management:

- Direct development to locations of lower bushfire risk.
- Carefully consider development in locations where there is significant bushfire risk that cannot be avoided.
- Avoid development in locations of high bushfire risk.
- Avoid development in areas where planned bushfire protection measures may be incompatible with other environmental objectives.

It is considered that application of the existing planning and building controls that relate to bushfire will facilitate an appropriate design response that will adequately mitigate the bushfire risk to the EOA PSP.

4.2.5 Clause 21.05 Natural Resource Management

Clause 21.05-2 *Water* describes Russells Creek as '*an intermittent creek that is located entirely within the City of Warrnambool. The creek has recently been the subject of flood mitigation works. The upper reaches are in rural land and the creek has been degraded as a result of stock grazing and access to the creek. Housing estates border the creek corridor in most of the lower reaches. The environmental values of Russells Creek could be enhanced both in terms of the*

riparian vegetation, in stream rehabilitation and improved stormwater quality'. (Warrnambool Planning Scheme, 2016e).

Strategies relevant to the future urban form of the EOA PSP are to require buffers and reserves between waterways and new development; and to support the restoration of degraded land, particularly stream frontages, floodplains and riparian areas (Warrnambool Planning Scheme, 2016e).

These strategies support the creation of a riparian reserve and the proposed revegetation of Russells Creek.

4.3 Bushfire Management Overlay

The purposes of Clause 44.06 *Bushfire Management Overlay (BMO)* are:

- *'To implement the Municipal Planning Strategy and the Planning Policy Framework.*
- *To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire.*
- *To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented.*
- *To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level'* (Warrnambool Planning Scheme, 2018c).

The BMO largely applies to patches of treed vegetation greater than 4ha in size, where head fire intensity has been modelled to be 30,000kW/m or more. It also extends over land 150m around those areas, based on research into house loss from bushfires which has found that 92% of house loss occurs within 150m of the bushfire hazard (DTPLI, 2013).

The BMO requires a planning permit for all subdivision of land, and buildings and works associated with the following uses (some exemptions apply):

- Accommodation (including a dependent person's unit);
- Child care or Education centre;
- Hospital;
- Industry;
- Leisure and Recreation;
- Office;
- Place of assembly;
- Retail premises;
- Service station;
- Timber production; and
- Warehouse.

A BMO application must be accompanied by:

- A *Bushfire hazard site assessment*, including a plan that describes the bushfire hazard within 150m of the site in accordance with the site assessment methodology of *AS 3959-2009 Construction of buildings in bushfire-prone areas* and Clause 44.06;
- A *Bushfire hazard landscape assessment,* including a plan that describes the bushfire hazard of the general locality more than 150m from the site; and
- A *Bushfire management statement*, detailing how the development responds to the bushfire risk and the requirements and objectives of Clauses 44.06 and 53.02.

Section 5 of this report includes a bushfire hazard site and landscape assessment in accordance with the BMO application requirements.

Clause 53.02 *Bushfire Planning* applies to BMO applications and contains:

- **Objectives:** An objective describes the outcome that must be achieved in a completed development.
- **Approved measures:** An approved measure meets the objective.
- **Alternative measures:** An alternative measure may be considered where the responsible authority is satisfied that the objective can be met. The responsible authority may consider other unspecified alternative measures.
- **Decision guidelines:** The decision guidelines set out the matters that the responsible authority must consider before deciding on an application, including whether any proposed alternative measure is appropriate.

The extent of BMO coverage of the precinct and surrounding land is shown in Map 2 and Map 9. This reflects BMO mapping introduced into the Warrnambool Planning Scheme by amendment GC13, which was gazetted on 3rd October 2017. The BMO covers most of the Francis Tozer Reserve and land within 150m of it. Land within the 150m buffer constitutes approximately 7.7% of the total area proposed for residential development.

A schedule to the BMO may specify substitute approved measures, additional alternative measures and additional or substitute decision guidelines (Warrnambool Planning Scheme, 2018d).

Part of the future residential area in the EOA PSP, which is currently within the BMO, may be suitable for application of the BMO1 (see Map 9 and Section 6.3).

4.4 Bushfire Prone Area (BPA)

BPAs are those areas subject to or likely to be subject to bushfire, as determined by the Minister for Planning. The entire EOA PSP area is currently designated as a BPA (see Map 2), which shows the extent of BPA (and BMO) coverage around the precinct and in the surrounding landscape.

In a BPA, 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[3] buildings, 'Specific Use Bushfire Protected Buildings'[4] and associated class 10A buildings[5] 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, 2016).

Compliance with *AS 3959-2009 Construction of buildings in bushfire prone areas* (Standards Australia, 2011) is 'deemed-to-satisfy' the performance requirement.

Applicable classes of buildings in a BPA must be constructed to a minimum Bushfire Attack Level (BAL)-12.5, or higher, as determined by a site assessment, planning permit, 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 3959-2009, which range from BAL-LOW, which has no bushfire construction requirements, to BAL-FZ (Flame Zone) where flame contact with a building is expected (see Appendix D for an explanation of BALs).

In a BPA not subject to the BMO, larger developments and certain vulnerable uses, including applications for subdivision of more than 10 lots, are required by Clause 13.02 to:

- *'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.*
- *Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts'* (Warrnambool Planning Scheme, 2018b).

There are no significant obstacles to future development in the EOA PSP area complying with the applicable strategies at Clause 13.02 and the building regulations invoked in a BPA.

Reliably low threat or non-vegetated areas will be created as urban development of the precinct progresses.

[3] Class 1, 2 and 3 buildings are defined in the Building Code of Australia (BCA), and are generally those used for residential accommodation, including houses and other dwellings, apartments, hotels and other buildings with a similar function or use.

[4] Specific Use Bushfire Protected Buildings are defined in the Victorian *Building Regulations 2018,* they generally comprise 'vulnerable' uses and include schools, kindergartens, childcare facilities, aged care facilities and hospitals.

[5] Class 10a buildings are defined in the BCA as non-habitable buildings including sheds, carports, and private garages.

DELWP review and excise areas from the BPA approximately every 6 months, particularly in growth areas where the hazard is removed as urban development occurs. Land becomes eligible for excision if it satisfies state-wide hazard mapping criteria, including that the land needs to be:

- At least 300m from areas of classified vegetation (except grassland) larger than 4ha in size; and
- At least 150m from areas of classified vegetation (except grassland) 2 to 4ha in size; and
- At least 60m from areas of unmanaged grassland more than 2ha in size (DELWP, 2015b).

For isolated areas of vegetation greater than 1ha but less than 2ha, the shape of the area and connectivity to any other hazardous vegetation is a further consideration (DELWP, 2015b).

4.5 Other controls

4.5.1 Zoning

A change in zoning from Farm Zone to General Residential Zone will not have any significant bushfire safety implications. Whilst it will facilitate more intensive development, the EOA PSP is to be designed such that future development will not be exposed to RHF above 12.5kW/m^2, which is commensurate with a BAL-12.5 construction standard.

4.5.2 Overlays

Apart from the BMO, none of the existing or likely future overlay controls are anticipated to have any direct implications for bushfire safety.

Map 2 - BPA and BMO coverage of the EOA PSP and surrounds.

5 Bushfire hazard 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 (Warrnambool Planning Scheme, 2018b). 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 within approximately 1 kilometre from a site;*
- *Neighbourhood conditions - meaning conditions within 400 metres of a site; and,*
- *The site for the development'* (Warrnambool Planning Scheme, 2018b).

This section includes a bushfire assessment at:

- The wider landscape scale, for up to 20km around the site (see Map 7);
- The local landscape scale extending up to 5km from the site (see Figure 1 and Map 7); and
- The neighbourhood and site scale up to 400m around the EOA PSP boundary (see Map 1, Map 3, Map 4, Map 5 and Map 6).

The BPA invokes AS 3959-2009 *Construction of buildings in bushfire prone areas,* which requires a site assessment of the vegetation and topography up to 100m around a building (Standards Australia, 2011). In BMO areas the assessment zone extends up to 150m; and for vulnerable uses and larger developments in a BPA a 150m assessment zone may also be required (DELWP, 2018a).

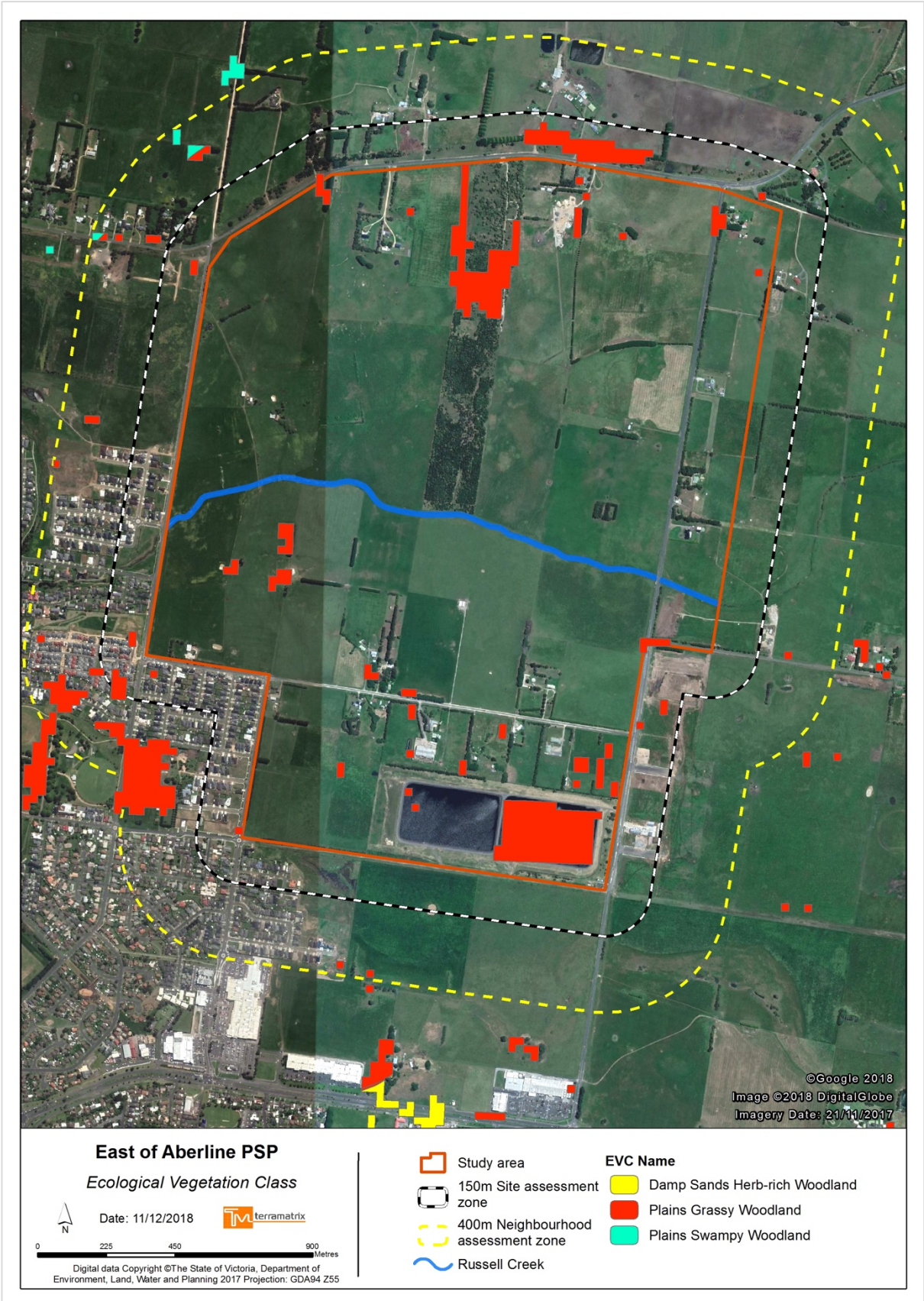
Map 3, Map 4, Map 5 and Map 6 show a 150m assessment zone around the boundary of the EOA PSP, for all areas regardless of BMO coverage.

5.1 Vegetation

Classified vegetation is vegetation that is deemed hazardous from a bushfire perspective and is classified in accordance with the AS 3959-2009 methodology.

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. The classification should be based on the likely fire behaviour that it will generate, and for settlement planning purposes, the long-term structure of the vegetation in its mature state[6].

[6] Under the BMO the long term mature state of the vegetation is considered, however for determining a BAL using AS 3959-2009 the assessment is at a 'point in time', which does not necessarily take into account future changes in the vegetation.



Map 3 – EVCs in and around the EOA PSP (from NatureKit Victoria).

5.1.1 Grassland

Grassland is the predominant vegetation type within the EOA PSP area, and in the 100m site assessment zone adjacent to the northern, eastern and southern boundaries of the precinct (see Map 4, Figure 2 and Figure 3).

Areas of grassy vegetation greater than 100mm high with an overstorey foliage cover of less than 10%, are classifiable in the Grassland group of AS 3959-2009, which is defined as '*All forms* (of vegetation) *including areas with shrubs and trees, if overstorey foliage cover is less than 10%'* (Standards Australia, 2011).

Grassland vegetation is considered hazardous, and therefore classifiable, when it is unmanaged i.e. >100mm tall. Settlement planning should apply a conservative and precautionary approach, and assume Grassland areas will be unmanaged and classifiable, unless there is reasonable assurance they will be managed in a low threat state, no more than 100mm high, in perpetuity.

Figure 2 – Looking south-west from the corner of Horne Road and Dales Road showing classified Grassland beyond the southern boundary of the EOA PSP.

Figure 3 – Looking north from the corner of Horne Road and Wangoom Road, at Grassland beyond the northern boundary of the EOA PSP.

5.1.2 Woodland

Vegetation in the Francis Tozer Reserve (see Figure 4 and Figure 5) accords best with the BMO/AS 3959-2009 Woodland group, comprising the Woodland or Open Woodland vegetation types, which are defined as '*Trees 10–30 m high; 10–30% foliage cover dominated by eucalypts; understorey or low trees to tall shrubs typically dominated by Acacia, Callitris or Casuarina*' (Standards Australia, 2011).

DELWP mapping of EVCs[7] identifies this vegetation as EVC 55 Plains Grassy Woodland and the 2018 flora and fauna assessment (EHP, 2018) specifies EVC 55_63 Higher Rainfall Plains Grassy Woodland (see Map 3). A summary of the DELWP EVC/Bioregion Benchmark for Vegetation Quality Assessment in the Victorian Volcanic Plain bioregion for EVC 55_63 Higher Rainfall Plains Grassy Woodland is provided below.

The southern portion of Francis Tozer Reserve, that has been actively re-planted, currently has a tree canopy cover greater than the EVC benchmark, but it is considered that Woodland is the appropriate classification.

[7] It is noted that the extant DELWP EVC mapping has been undertaken at state-wide scale and is based on a modelled extent of native vegetation. It may not therefore, accurately represent actual EVCs present in the study area. The site visit and hazard assessment confirmed, however, that any more accurate, site specific mapping of native vegetation will not change the bushfire hazard assessment.

EVC 55_63 Higher Rainfall Plains Grassy Woodland – 20% benchmark canopy cover

'*An open, eucalypt woodland to 15m tall or acacia/sheoak woodland to 10m tall. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer. This variant occupies areas receiving greater than 700mm annual rainfall.*' (DSE, 2004).

Areas of 'potentially classifiable' Woodland are shown in Map 4. It should be noted that this mapping has been undertaken to inform the EOA PSP development. It is for strategic planning purposes only and should not be used for determining BALs for BPA compliance or statutory planning purposes such as BMO applications.

The only significantly large area of Woodland is in the Francis Tozer Reserve. Other patches are small enough to be excluded from consideration in their own right and are instead incorporated in the surrounding Grassland.

Figure 4 – Woodland in the northern section of the Francis Tozer Reserve.

Figure 5 – Woodland created by revegetation in the southern section of the Francis Tozer Reserve.

5.1.3 Excluded vegetation and non-vegetated areas

Areas of low threat vegetation and non-vegetated areas can be excluded from classification in accordance with Section 2.2.3.2 of AS 3959-2009, if they meet one or more of the following criteria:

i. *'Vegetation of any type that is more than 100m[8] 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.*
iii. *Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other.*
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.*
v. *Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.*
vi. *Low threat vegetation, including grassland managed in a minimal fuel condition[9], maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks'* (Standards Australia, 2011).

[8] 150m in BMO areas.

[9] 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, 2011).

It is reasonable to assume that all of the proposed residential areas will be either non-vegetated or comprise low threat vegetation such as maintained lawns, roadsides or cultivated gardens. It is also reasonable to assume that the proposed local parks (see Map 1) will be managed in a low threat state.

Figure 6 – Looking south from Rodgers Road into the industrial estate under development, east of Horne Road.

Figure 7 – Looking south-west from Aberline Road into the 'Northern Edge' residential estate, currently under construction and adjacent to the north-west corner of the EOA PSP.

5.2 Future vegetated form

It is assumed that most classified vegetation outside of the EOA PSP area, to the north and north-east will remain, at least in the short term.

The 'Northern Edge' estate adjacent to the north-western boundary of the EOA PSP (see Figure 7), the estate immediately south of Boiling Down Road adjacent to the southern boundary of the precinct, and the industrial precinct adjacent to the south-eastern boundary of the precinct (see Figure 6) are all currently under development and will likely comprise low threat vegetation and non-vegetated areas prior to development taking place within the EOA PSP area.

Urban development of the EOA PSP will result in the removal of most classified Grassland from within the precinct boundary. Woodland in Francis Tozer Reserve is to be retained and a number of reserves are likely to be created along Russells Creek, which may involve re-vegetation at some locations. Areas that could potentially comprise classified vegetation, and which may not be low threat are described below.

Francis Tozer Reserve

The entirety of Francis Tozer Reserve comprises classified Woodland. This classification is appropriate to its current condition (noting that though the re-planted southern area currently has an artificial density of trees, this may self-thin over time, and that fuel hazard is comparable

to BMO assumptions for Woodland) and, if managed to the EVC benchmark, will remain Woodland.

It is proposed that the reserve be fronted by an interface road or low threat public parkland (Spiire, 2017). This layout is supported as it will substantially provide the requisite low threat setbacks for BAL-12.5 construction in the adjacent residential area (see Section 6.1).

Future dwellings within 150m of the Francis Tozer Reserve will be covered by the BMO, which will require appropriate bushfire protection measures to be implemented.

Russells Creek

Russells Creek is currently degraded within the EOA PSP area (see Figure 8 and Figure 9) and will be protected within a linear reserve and re-vegetated. For the purpose of this bushfire assessment, it is assumed that the reserve will extend for 30m each side of the watercourse (60m total width) and may be complemented by public open space and drainage reserves as envisaged in the landscape strategy (Spiire, 2018) (see Map 1). The waterway reserves will be managed by City of Warrnambool and the intent is to re-vegetate them, at least in part.

The Russells Creek reserve will run across the southern end of Francis Tozer Reserve, and link to Grassland beyond the eastern boundary of the precinct.

For the purpose of this bushfire assessment, it is assumed that vegetation in the Russells Creek reserve will be classified Woodland or Grassland that future buildings will need to be setback from (see Section 6.1). The associated wetlands could feasibly also contain Scrub. Setback distances are provided for all these vegetation types, with the applicable distance to be determined by the re-vegetation that takes place.

The landscape strategy proposes that the Russells Creek reserve and associated public open space be bordered by an interface road (Spiire, 2018), but no profiles are currently available.

Figure 8 – Looking west along Russells Creek from Horne Road, with the Francis Tozer Reserve in the background.

Figure 9 – Looking west along Russells Creek from the southern edge of the Francis Tozer Reserve.

Figure 10 – Looking south-west from Aberline Road into the adjoining residential area, showing Russells Creek in an urban park setting.

Road reserves

Wangoom Road (see Figure 11) and Wiggs Lane (see Figure 12), immediately to the north of the EOA PSP area, are sites of regional significance due to their remanent grassland (EHP, 2018). It is assumed that these road reserves will retain their existing vegetation and, as they are contiguous to Grassland in the adjoining paddocks, will remain classified vegetation.

Figure 11 – Looking east along the northern road reserve of Wangoom Road, a site of regional biological significance.

Figure 12 – Looking north along Wiggs Lane.

Map 4 - Vegetation classification as per AS 3959-009 – current vegetation in EOA PSP area and within 150m.

5.3 Topography

AS 3959-2009 requires that the 'effective slope' be identified to determine the BAL and applicable vegetation setback distances. This is the slope of the land under classified vegetation that will most significantly influence the bushfire attack on a building. Two broad types apply:

- Flat and/or Upslope - land 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˚.

Land in the EOA PSP area and surrounding landscape is flat, or gently sloping (see Map 5 and Map 6), without significant changes in elevation that would appreciably influence bushfire behaviour.

For the purposes of determining BALs and defendable space/vegetation setback distances for future development, the applicable slope class for vegetation outside the precinct boundary is 'All upslopes and flat land' or ‘Downslope >0-5º’ as shown on Map 8, and ‘Downslope >0-5º’ in regard to Russells Creek.

Map 5 - Elevation in and around the EOA PSP area.

Map 6 - Slopes within the EOA PSP and 150m buffer zone.

5.4 Fire weather

The Forest Fire Danger Index (FFDI) and the Grassland Fire Danger Index (GFDI) represent the level of bushfire threat based on weather (and fuel) conditions. An FFDI 100/GFDI 130 is applied in non-alpine areas of Victoria by the building system, to establish building setback distances from classified vegetation in accordance with AS 3959-2009.

The indices are also used for predicting fire behaviour including the difficulty of suppression, forecasting Fire Danger Ratings (FDRs) and determining an appropriate level of preparedness for emergency services. Table 1 displays the FDRs, their FFDI range[10] and the description of conditions for each FDR.

Note that the benchmark of an FFDI 100 represents a 'one size fits all' model of extreme fire weather conditions for the state, but which has been exceeded during some significant fire events, including at some locations in Victoria on 'Black Saturday' 2009. Therefore, it is important to note that this is not necessarily the *worst-case* conditions for any particular location, including the EOA PSP area.

It should also be noted that under various climate change scenarios, the frequency and severity of elevated fire danger days across south-east Australia is expected to increase (Lucas *et al.*, 2007; Hughes and Steffen, 2013). The DELWP *South Western Strategic Bushfire Management Plan* notes that long-term records show an increase in bushfire danger and the length of the bushfire season for Victoria in recent decades. Projections for Victoria's future climate indicate that the frequency and intensity of bushfires in south-east Australia will continue to increase, with:

- Reduced average rainfall and stream flows;
- Fewer and heavier rainfall days and more consecutive dry days;
- An increase in the extent and frequency of droughts;
- More days over 35° and a higher annual mean temperature; and
- An increase in the number of extreme re danger days (with FFDI greater than 75), by between 15% and 70% by 2050 (DELWP, 2015c).

Currently CFA and DELWP have no published policy on FFDI recurrence intervals. There is, therefore, no compelling reason to apply a different FFDI/GFDI from the FFDI 100/GFDI 130 threshold used throughout non-Alpine areas of Victoria in the planning and building system[11].

[10] The GFDI ranges for each FDR in Table 1 may vary in some jurisdictions.

[11] In Alpine areas of Victoria an FFDI 50 applies for determining BALs using Method 1 of AS 3959-2009.

Table 1 - Fire Danger Ratings (Source: AFAC, 2017; CFA, 2017).

Forest Fire Danger Index	Grassland Fire Danger Index	Fire Danger Rating (FDR)	Description of conditions
100+	150+	Code Red	The worst conditions for a bush or grass fire. Homes are not designed or constructed to withstand fires in these conditions. The safest place to be is away from high risk bushfire areas.
75-99	100-149	Extreme	Expect extremely hot, dry and windy conditions. Fires will be uncontrollable, unpredictable and fast moving. Spot fires will start, move quickly and will come from many directions. Homes that are situated and constructed or modified to withstand a bushfire, that are well prepared and actively defended, may provide safety. You must be physically and mentally prepared to defend in these conditions.
50-74	50-99	Severe	Expect hot, dry and possibly windy conditions. If a fire starts and takes hold, it may be uncontrollable. Well prepared homes that are actively defended can provide safety. You must be physically and mentally prepared to defend in these conditions.
25-49		Very High	If a fire starts, it can most likely be controlled in these conditions and homes can provide safety. Be aware of how fires can start and minimise the risk. Controlled burning off may occur in these conditions if it is safe – check to see if permits apply.
12-24		High	
0-11		Low – Moderate	

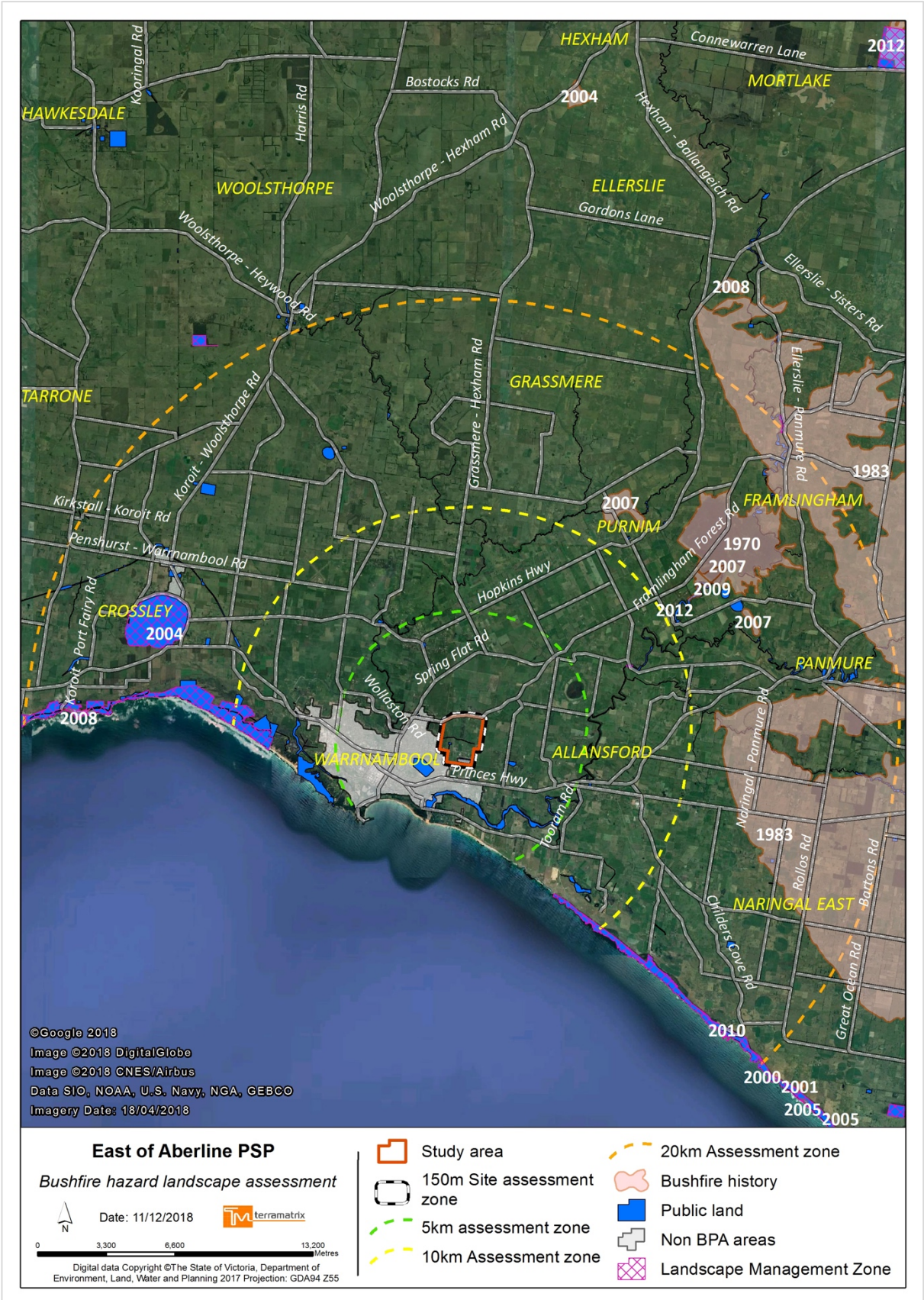
5.5 Landscape assessment

5.5.1 Location description and context

The EOA PSP area is located adjacent to the north-eastern boundary of the current Warrnambool township (see Map 1, Map 7 and Figure 1), which comprises a low threat urban-residential landscape.

Land to the north, east and south of the precinct is primarily pastoral and a relatively low bushfire threat. Treed vegetation is limited to small patches of remnant Woodland, in particular along Wangoom Road to the east of the EOA PSP area.

The only substantial area of Scrub is to the southwest of Warrnambool in the Belfast Coastal Reserve (see Figure 1 and Map 7). Whilst south-westerly winds, associated with the passage of a cold front, can be an important component of extreme bushfire weather, the EOA PSP is shielded from a fire approach from this direction by the existing urban area of Warrnambool.



Map 7 - Bushfire hazard landscape assessment.

5.5.2 Landscape risk

To assist in assessing landscape risk, four 'broader landscape types', representing different landscape risk levels, are described in the DELWP technical guide *Planning Applications Bushfire Management Overlay*. These are intended to streamline decision-making and support more consistent decisions based on the landscape risk (DELWP, 2017b).

The four types range from low risk landscapes where there is little hazardous vegetation beyond 150m of a site and extreme bushfire behaviour is not credible, to extreme risk landscapes with limited or no evacuation options, and where fire behaviour could exceed BMO/AS 3959-2009 presumptions (see Table 2).

Table 2 - Landscape risk typologies (from DELWP, 2017b).

Broader Landscape Type 1	Broader Landscape Type 2	Broader Landscape Type 3	Broader Landscape Type 4
• *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.*	• *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.*	• *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.*	• *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 →			

The landscape setting of the EOA PSP accords best with the low risk Landscape Type 1. Apart from small patches of Woodland scattered through the landscape, there is little hazardous vegetation beyond 150 metres of the precinct except Grassland.

Within the EOA PSP area, the Francis Tozer Reserve is small and, once the proposed urban development has occurred, it is highly unlikely to support a large, 100m wide bushfire moving at

a quasi-steady-state rate of forward spread directly at buildings, as envisaged in the AS 3959-2009 methodology.

Access for people in the EOA PSP would be readily available to reliably low threat or non-vegetated areas, either within the precinct after development or in the existing township, that can provide shelter from bushfire.

5.5.3 Regional bushfire risk assessments and plans

Barwon South West Regional Strategic Fire Management Plan 2011

Regional Fire Management Planning Committees have prepared ten-year Regional Strategic Fire Management Plans (RSFMP), which were developed around the concept of resilience and have a strategic focus on preventing and minimising the impact of bushfire. The plans identify broad fire management risks across the eight regions covering Victoria and identify strategies for addressing the issues.

The Warrnambool LGA is included in the Barwon South West RSFMP. No specific issues are identified pertaining to the study area, and Warrnambool is not listed as a 'human settlement' asset in the Victorian Fire Risk Register (Barwon South West Regional Strategic Fire Management Planning Committee, 2011).

Regional Bushfire Planning Assessment (RBPA) Barwon South West Region

As part of the response to the 2009 Victorian Bushfires Royal Commission, Regional Bushfire Planning Assessments (RBPAs) were undertaken across six regions that covered the whole of Victoria. The RBPAs provide information about 'identified areas' where a range of land use planning matters intersect with a bushfire hazard to influence the level of risk to life and property from bushfire. The RBPAs state that '*This information should be addressed as part of strategic land use and settlement planning at the regional, municipal and local levels*' (DPCD, 2012).

The *Regional Bushfire Planning Assessment – Barwon South West Region* covers the City of Warrnambool LGA. It does not identify any bushfire issues for the EOA PSP or surrounding area. The only bushfire issues identified for City of Warrnambool LGA are the interface between the urban area of Warrnambool and coastal vegetation, and low density residential lots adjacent to bushfire hazard areas at Woodford in the north of the municipality (DPCD, 2012).

Warrnambool City Council Integrated Municipal Fire Management Plan (IMFMP)

The Warrnambool City Council IMFMP 2012-2015 aligns closely with the Barwon South West RSFMP objectives and vision for fire management. The plan recognises the potential for residential growth in the EOA PSP, assesses bushfire risk in 'Warrnambool North East' as Medium (Likely impact with Minor consequences) and lists planning and building regulations as a bushfire risk control across the (WCCMFMPC, 2012).

DELWP Strategic Bushfire Management Plan South Western

For strategic bushfire management planning, DELWP and Parks Victoria have divided Victoria into seven bushfire risk landscapes, based on anticipated bushfire behaviour including weather, fuel hazard and landscape considerations.

Warrnambool is identified in a bushfire catchment with the potential for '*Very large, fast moving grass fires can impact on numerous communities in a single day (as the Framlingham fire did on Ash Wednesday 1983). Impacts can include houses destroyed, farmland burnt, roads closed, choking smoke or the need to leave the area*.' (DELWP, 2015c).

It is noted that there is very little public land in this area, and Warrnambool is not identified as a priority community for bushfire protection (DELWP, 2015c).

DELWP Fire Operations Plan

The *Fire Operations Plan 2017/18 0 2019/20 Barwon South West Region* sets out where and when fuel management activities are planned to occur in the region.

Fire Management Zones (FMZs) are areas of public land where fire is used for specific asset, fuel and overall forest and park management objectives (FFMV, 2018). Four different FMZs are defined for Victoria, with each FMZ differing in its intended fuel treatment aims and associated performance measures. Although the name of the zone indicates the primary purpose for that zone, multiple goals may be achieved when undertaking activities in a given zone. For example, a burn undertaken primarily for land management purposes may also have asset protection results (FFMV, 2018).

- **Asset Protection Zone** - Aim to reduce fuel through planned burning or other methods approximately every 5 to 7 years.
- **Bushfire Moderation Zone** - Aim to reduce fuel through planned burning or other methods approximately every 8 to 15 years. Length of time between planned burns in some areas can vary due to ecological considerations.
- **Landscape Management Zone** - Planned burning will focus on maintaining and improving ecosystem resilience, and fuel management will also be undertaken for risk reduction.
- **Prescribed Burning Exclusion Zone** - No planned burning, mainly to protect particular areas that can't tolerate fire (FFMV, 2018).

Due to the absence of public land, there are no FMZs in the vicinity of Warrnambool and the associated map of works for Far South West District (Eastern) indicates that no mechanical fuel management is scheduled (FFMV, 2017).

6 Planning and design response

This section identifies how future development can respond to the bushfire risk, including the requirements of Clause 13.02, Clause 44.06 and associated Clause 53.02 in BMO areas, published CFA guidance and the building regulations applicable to construction in a BPA.

6.1 Building setbacks

6.1.1 BAL-12.5 setback distances

Future dwellings, and other buildings requiring a BAL, will need to be sufficiently setback[12] from classified vegetation to enable a BAL-12.5 construction standard. The setbacks required for Grassland, Scrub[13] and Woodland, based on the hazard assessment in Section 5 and determined using the simple Method 1 procedure of AS 3959-2009, are shown in Table 3 below and on Map 8.

Table 3 - Building setbacks for BAL-12.5.

Slope class	Vegetation	BAL-12.5 setback distance (defendable space)
All upslopes and flat land	Grassland	19m
	Woodland	33m
	Scrub	27m
Downslope >0-5°	Grassland	22m
	Woodland	41m
	Scrub	31m

Note that no setbacks will be needed from areas of unmanaged vegetation that meet one or more of the exclusion criteria for low threat vegetation (see Section 5.1.3), including:

- Single areas of vegetation less than 1ha in area and at least 100m from other areas of classified vegetation;

[12] The setback distance is measured from the edge of the classified vegetation to the external wall of the building, or for parts of the building that do not have external walls (including carports, verandas, decks, landings, steps and ramps), to the supporting posts or columns. The following parts of a building are excluded:

a) Eaves and roof overhangs.
b) Rainwater and domestic fuel tanks.
c) Chimneys, pipes, cooling or heating appliances or other services.
d) Unroofed pergolas.
e) Sun blinds.
f) Landings, terraces, steps and ramps not more than 1m high (Standards Australia, 2011).

[13] Scrub vegetation is not currently found in the study area, but is a possible outcome of re-vegetation of the Russells Creek and associated wetlands.

- Multiple areas less than 0.25ha (2,500m^2) in area that are at least 20m from a building or each other; and
- Strips of vegetation less than 20m wide that are at least 20m from a building, other strips or any other area of classified vegetation.

In parts of the EOA PSP area, around Francis Tozer Reserve covered by the BMO, the setbacks comprise defendable space[14] that would need to be managed to the standards stipulated in Table 6 to Clause 53.02-5, as detailed in Appendix A of this report. In the BPA, the setbacks would need to comprise low threat vegetation or non-vegetated areas.

6.1.2 Vegetation beyond the EOA PSP boundary

Development close to the perimeter of the EOA PSP will need to respond to classified vegetation beyond the precinct boundary, including providing the requisite setbacks to achieve BAL-12.5 (see Section 6.1.1).

The EOA PSP is exposed to classified Grassland (pasture) to the north, east and south beyond the precinct boundary.

The 'Northern Edge' estate adjacent to the north-western boundary of the EOA PSP, the new area of residential development adjacent to the southern boundary of the precinct, and the industrial precinct adjacent to the south-eastern boundary of the EOA PSP are all currently under development and will likely comprise low threat vegetation and non-vegetated areas prior to development taking place within the EOA PSP.

6.1.3 Francis Tozer Reserve

As identified in Section 5.2, Francis Tozer Reserve comprises classified Woodland and will be retained. The effective slope applicable to future dwellings will vary depending on their location in relation to the reserve but are anticipated to be in the 'All upslopes and flat land' or 'Downslope >0-5°' slope classes. Map 8 shows the more conservative 'worst case' setback of 41m.

It is proposed that the reserve be fronted by an interface road or low threat public parkland (Spiire, 2017). This layout is supported as it will provide a substantial portion of the requisite low threat setbacks for BAL-12.5 construction in the adjacent residential area, but may need to be supplemented, with a mandated setback of the buildings within the residential lots, to achieve the requisite 33m or 41m.

[14] Defendable space is defined at Clause 73.01 of the Warrnambool Planning Scheme as '*An area of land around a building where vegetation is modified and managed to reduce the effects of flame contact and radiant heat associated with bushfire*' (Warrnambool Planning Scheme, 2018e).

Future development within 150m of the Francis Tozer Reserve will be covered by the BMO, which will require appropriate bushfire protection measures to be implemented addressing subdivision, landscape, siting and design, defendable space, construction, water supply and access as prescribed by Clause 53.02 of the Warrnambool Planning Scheme.

6.1.4 Russells Creek reserve and associated drainage reserves

As identified in Section 5.2, the Russells Creek reserve and associated wetlands and drainage areas, may not be low threat and could potentially comprise classified vegetation if they do not meet one or more of the exclusion criteria of AS 3959-2009. Their size and setback from buildings and other patches of classified vegetation, and how the naturally occurring and/or planted vegetation within them is managed during the fire danger period, will determine whether they are excludable as non-hazardous vegetation.

Ponds with reliably open water or wet areas and little or no vegetation may be deemed low threat. However, seasonally inundated wetlands that may be dry and vegetated during the fire danger period could comprise classifiable Grassland, Scrub or Woodland on a 'Downslope >0-5°', from which 22m, 31m or 41m setbacks respectively would be required for BAL-12.5 buildings.

The potential Russells Creek reserve could be 60m in width and is assumed to contain classified Woodland. A 41m setback will be required for adjacent dwellings (see Map 8), this could be partially met by the proposed interface road, but would need to be supplemented, with a mandated setback of the buildings within the residential lot, to achieve the requisite setback. Alternatively, a strip of the vegetated buffer could be managed as low threat vegetation (e.g. to the BMO defendable space standard at Table 6 of Clause 53.02 of the Warrnambool Planning Scheme) to provide the additional setback required.

The Russells Creek reserve passes through the BMO coverage generated by Francis Tozer Reserve. It is possible that, following re-vegetation, it may cause the BMO coverage to be extended. It is also feasible that the BMO coverage may extend northwards in the future to include all of the Francis Tozer Reserve as the Woodland regenerates (currently the northern section is not covered by the BMO). It is recommended that consultation occur with DELWP in regard to these possibilities and the impact they may have on development within the EOA PSP.

6.1.5 Perimeter roads

The EOA PSP will be bounded by classified Grassland to the northwest, north, east and south beyond the growth area boundary. Within the precinct, the Francis Tozer Reserve will, and Russells Creek reserve is likely to, comprise classified vegetation that will also require a bushfire planning response.

Much of the interface of the EOA PSP with external Grassland is formed by existing perimeter roads, e.g. Wangoom Road and Dixons Lane to the north, Dales Road to the south and Horne

Road to the east, which should be incorporated into the low threat setbacks required for future dwellings. The existing road formations and, in some cases managed nature strips, could provide most or all of the BAL-12.5 19m or 22m setback required from Grassland.

Within the EOA PSP area, perimeter roads around significant areas of retained vegetation should be incorporated into subdivision design where possible, to achieve BAL-12.5 separation distances for future development from any potentially hazardous vegetation, and to facilitate property protection and firefighting (see Figure 13). The landscape strategy indicates interface roads around Francis Tozer Reserve and the Russells Creek reserve (Spiire, 2018). We support this approach.

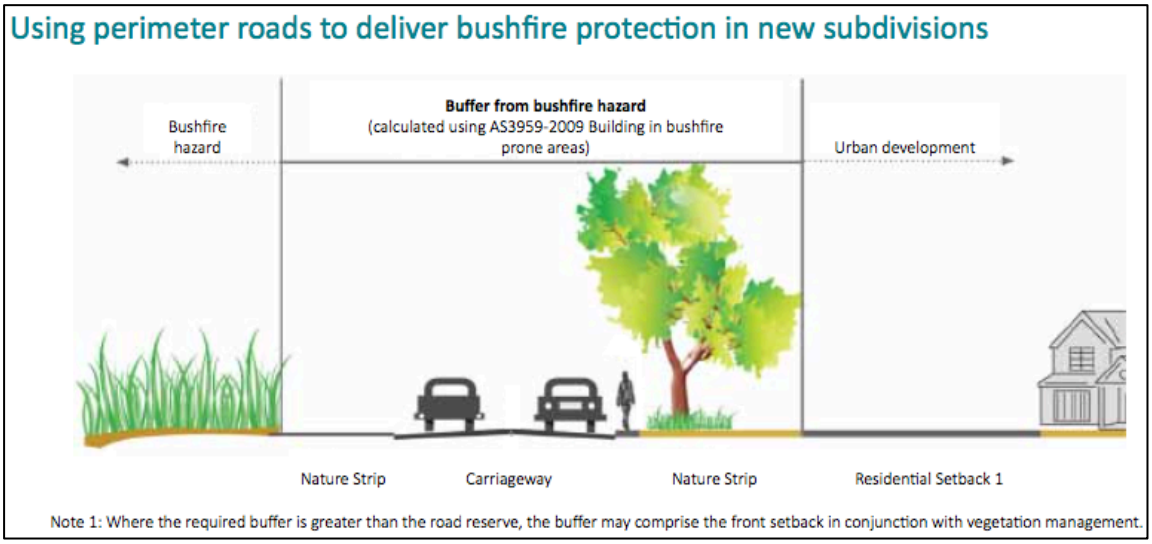
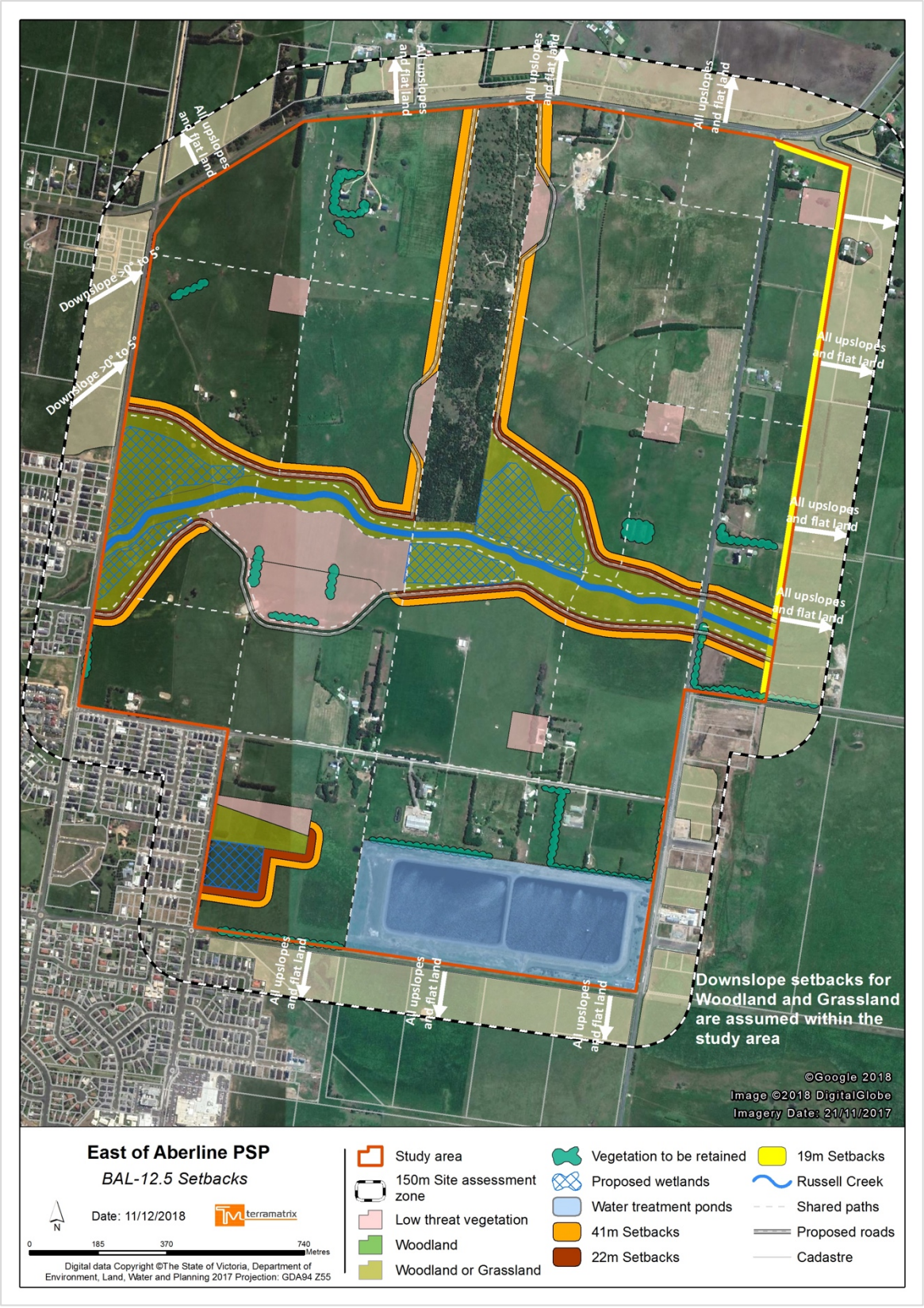


Figure 13 - Illustration of a perimeter road to provide required development setbacks (DELWP, 2015a).



Map 8 - BAL-12.5 setbacks from classified vegetation (n.b. an effective slope of 'Downslope >0-5°' has been applied to vegetation along Russells Creek and in the Francis Tozer Reserve).

6.2 Excision of areas from the BPA

It is likely that as development progresses, much of the land within the EOA PSP will become eligible to be excised from the BPA. DELWP review and excise areas from the BPA approximately every 6 months, particularly in growth areas where the hazard is removed as urban development occurs.

Areas of the EOA PSP that may be eligible for excision as urban development progresses are:

- Land more than 60m from classified Grassland, i.e. from the pasture outside precinct; and
- Land more than 300m from classified Woodland, i.e. in Francis Tozer Reserve and in the Russells Creek reserve if re-vegetated in this way.

It is recommended that more detailed analysis occur once the future urban form, and the nature of re-vegetation in the reserves, has been confirmed.

Excision from the BPA would enable BAL-LOW construction in these areas.

6.3 BMO schedule

The BMO affects a small area of the precinct, within approximately 150m of the Woodland of the Francis Tozer Reserve that extends southwards into the EOA PSP from Wangoom Road (see Map 2 and Map 9).

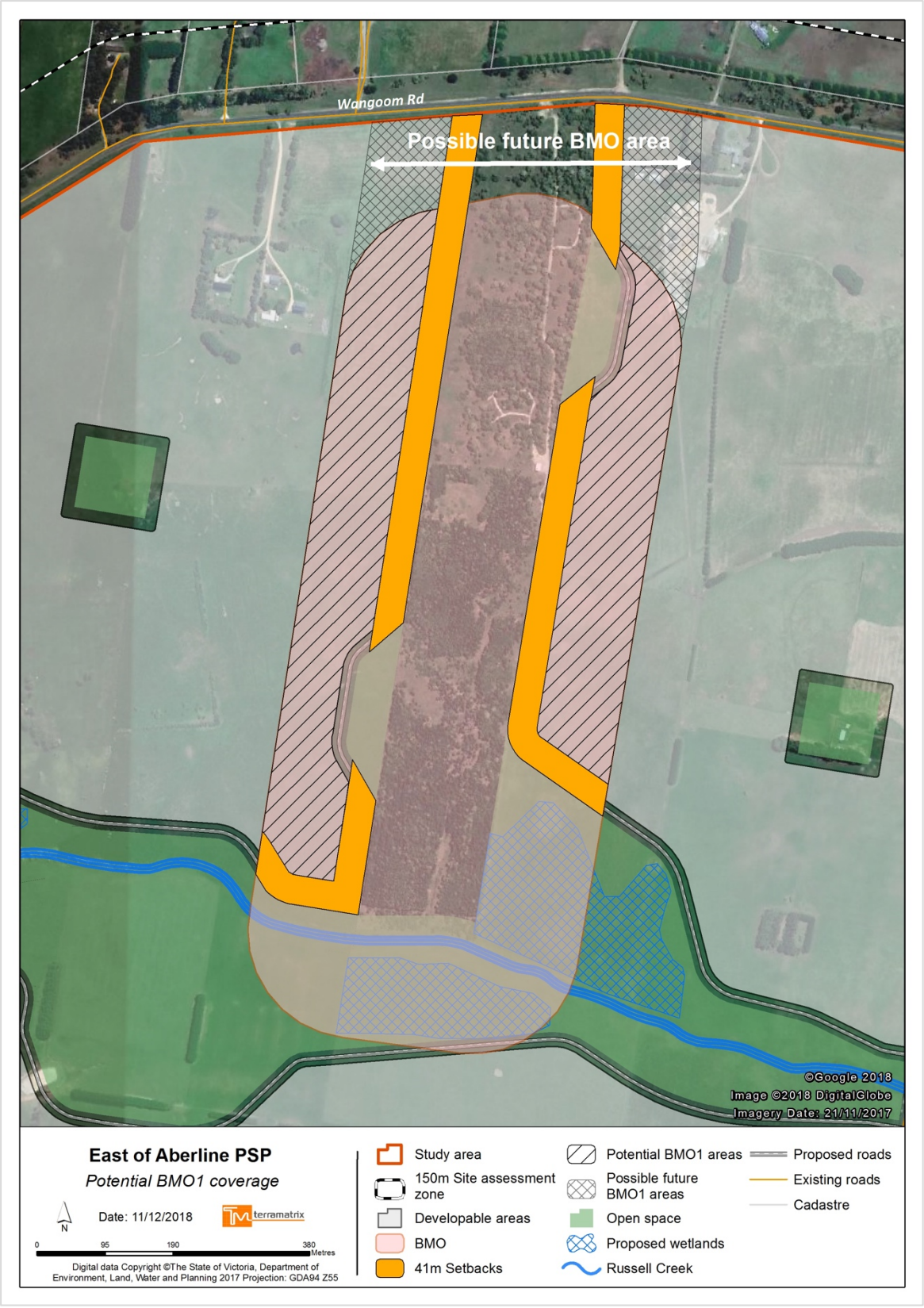
As future dwellings and other buildings are to be located where a BAL-12.5 construction standard (or BAL-LOW) can be achieved (i.e. providing setbacks for future buildings from unmanaged vegetation, such that radiant heat impacting upon the buildings can be expected to be below 12.5kW/m^2), it is considered that the small area of future residential development that would be affected by the BMO will be suitable for application of the existing BMO1 schedule in the Warrnambool Planning Scheme.

This potential BMO1 area in the EOA PSP is shown in Map 9. It is considered appropriate for BMO1 coverage as:

- The bushfire hazard in the Francis Tozer Reserve will remain, and require a planning response, following development of the precinct;
- The simplified application requirements of the BMO1 apply to applications to construct or extend one dwelling on a lot, which is therefore applicable to the proposed residential area in the precinct; and
- Future dwellings and other buildings are to be located where a BAL-12.5 construction standard applies, hence the BMO1 requirements, which include a BAL-12.5 construction standard, are appropriate.

Map 9 also shows the area that would be affected by the BMO and a potential Schedule 1, if BMO coverage were to be increased to cover all of the Francis Tozer Reserve, which is considered likely as re-vegetation occurs within the reserve.

As discussed in Section 6.1.4, depending on the nature of re-vegetation within the proposed Russells Creek reserve this area could also qualify for BMO coverage in the future. The BMO 1 Schedule would be applicable to any of the new BMO area beyond the BAL-12.5 setback line, however this is not shown on Map 9 as this extension to the BMO is less certain.



Map 9 - BMO coverage and potential BMO1 area.

6.4 Clause 13.02 Bushfire

The following sub-sections provide a summary response about how development in the EOA PSP area can respond to the objectives and strategies for bushfire safety in the PPF at Clause 13.02.

6.4.1 Protection of human life strategies

Clause 13.02 requires that the priority be given to protection of human life.

Prioritising the protection of human life over all other policy considerations

As identified in Section 5.5, the EOA PSP is in a low-moderate bushfire risk location. The protection of human life can be prioritised by:

- Applying the existing building regulations for construction in a BPA;
- Complying with the requirements of Clause 53.02 for any development in the BMO; and by
- Ensuring future dwellings and other buildings are located where a BAL-12.5 construction standard (or BAL-LOW) can be achieved (i.e. providing setbacks for future buildings from unmanaged vegetation, such that radiant heat impacting upon the buildings can be expected to be below 12.5kW/m^2).

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.

If future buildings are setback sufficiently from any hazardous vegetation such that they achieve a BAL-12.5, or lower, the risk can be deemed to be acceptably mitigated.

The nearest *lowest* risk location is the urban-residential and township area of Warrnambool immediately adjacent to the EOA PSP that are not in the BPA (see Map 2).

It is noted that only approximately 7.7% of the potential residential area within the precinct is covered by the BMO (see Map 2 and Map 9).

Reducing the vulnerability of communities to bushfire through consideration of bushfire risk in decision-making at all stages of the planning process

This report provides the basis for incorporating bushfire risk into decision making associated with planning for development in the precinct.

The CFA consider that community resilience to bushfire will be strengthened (and hence, presumably, vulnerability to bushfire will be reduced) when a strategic planning proposal demonstrates that Clause 13.02 strategies have been applied, and where a proposal takes advantage of existing settlement patterns so that new development will not expose the community to increased risk from bushfire.

The CFA provide principles to respond to Clause 13.02 including that settlement planning decisions should:

- *'Direct development to locations of lower bushfire risk.*
- *Carefully consider development in locations where there is significant bushfire risk that cannot be avoided.*
- *Avoid development in locations of extreme bushfire risk.*
- *Avoid development in areas where planned bushfire protection measures may be incompatible with other environmental objectives'* (CFA, 2015).

It is considered that development of the EOA PSP can appropriately implement the strategies in Clause 13.02 that aim to prioritise protection of human life and will, therefore, meet the CFA strategic planning principles for bushfire.

6.4.2 Bushfire hazard identification and assessment strategies

Clause 13.02-1 requires that the bushfire hazard be identified, and appropriate risk assessment be undertaken.

Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.

This report identifies the hazard in accordance with the commonly accepted methodologies of AS 3959-2009 and, as appropriate, additional guidance provided in *Planning Practice Note 64 Local planning for bushfire protection* (DELWP, 2015a), *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DELWP, 2018a) and *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017b).

The type and extent of (hazardous) vegetation within and around the EOA PSP has been identified. Classification is based on the anticipated long-term state of the vegetation, EVC mapping, aerial imagery, site assessment, published guidance on vegetation assessment for bushfire purposes and experience with the fuel hazard posed by the vegetation types that occur within the region.

Publicly available 10m contour data for the area was accessed which, along with the site assessment, determined that the land is benign from a bushfire perspective.

In relation to climatic conditions and fire weather, the AS 3959-2009 default FFDI 100/GFDI 130 benchmark used in the Victorian planning and building system, has been applied as discussed in Section 5.4.

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.

The extent of BPA coverage has been considered (see Section 4.4) and is shown in Map 2. This is based on the most recent BPA mapping for the state, which was gazetted 16th October 2018.

Applying the Bushfire Management Overlay in planning schemes to areas where the extent of vegetation can create an extreme bushfire hazard.

BMO coverage reflects relatively recent BMO mapping introduced into the Warrnambool Planning Scheme by amendment GC13, which was gazetted on 3rd October 2017 (see Map 2 and Map 9).

As discussed in Section 6.3, the small future residential area of the EOA PSP affected by the BMO may be suitable for application of Schedule 1 to the BMO.

Considering and assessing the bushfire hazard on the basis of:

- ***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.***

The hazard has been assessed and described at the regional, municipal and local (site and neighbourhood) scale (see Section 5).

At the local scale, the assessment follows the BMO methodology for classifying vegetation and topography within a 150m assessment zone, and for this study extending out to 400m around the site where appropriate.

At the landscape scale a 20km, 5km and 1km radius of the site has been applied (see Figure 1 and Map 7) in accordance with guidance about assessing risk for planning scheme amendments provided in the Planning Advisory Note 68 (DELWP, 2018a) and Planning Practice Note 64 (DELWP, 2015a).

Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.

CFA have not been consulted on the development of this report. It is recommended that they be provided with v1.0 of this report and their recommendations can be incorporated into an updated report as appropriate.

Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess bushfire risk and include appropriate bushfire protection measures.

DELWP advisory and practice notes, Clause 13.02, Clause 44.06, Clause 53.02 and the building regulations invoked by the BPA coverage, specify the general requirements and standards for assessing the risk. These have been used in this report as appropriate and bushfire protection measures have been identified commensurate with the risk. Relevant regional bushfire plans have been identified, reviewed and incorporated into this assessment as appropriate.

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.

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 identified in this report, including BMO compliance where applicable and, in the BPA, the building regulations.

The CFA specify that areas where development should not proceed could include:

- *'Isolated settlements where the size and/or configuration of the settlements will be insufficient to modify fire behaviour and provide protection from a bushfire.*
- *Where bushfire protection measures will not reduce the risk to an acceptable level.*
- *Where evacuation (access) is severely restricted.*
- *Where the extent and potential impact of required bushfire protection measures may be incompatible with other environmental objectives or issues, e.g. vegetation protection, land subject to erosion or landslip'* (CFA, 2015).

None of these criteria or characteristics are applicable to the EOA PSP.

6.4.3 Settlement planning strategies

Clause 13.02 requires that settlement planning must strengthen the resilience of settlements and communities and prioritise protection of human life.

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 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).

The applicable distances for dwellings or other buildings to be setback from classifiable vegetation, such that RHF is calculated to be below 12.5kW/m^2 and BAL 12.5 dwellings could potentially be sited, have been identified. Taking into consideration the assessment of landscape risk, implementation of these can be deemed to acceptably mitigate the risk.

See also the exclusion criteria and setback distances in Section 5.1.3 that are necessary for small patches or strips of vegetation to be deemed low threat.

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 better protected from the effects of bushfire.

The nearest existing *lowest* risk locations, where BAL-LOW can be achieved, are the urban areas of Warrnambool immediately adjacent to the EOA PSP that are not a designated BPA (see Map 2). It is likely that upon completion of the proposed development of the EOA PSP, areas within the precinct would also be assessed as BAL-Low.

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.

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.

There will be no increase in risk to existing residents or community infrastructure if:

- Future buildings are setback from hazardous vegetation to enable BAL-12.5 construction, an appropriate water supply for fire-fighting is provided via a conventional reticulated hydrant system, and appropriate access/egress for emergency vehicles and residents is provided via a conventional residential road network;
- Development in the BMO complies with the applicable requirements of Clause 53.02 of the Warrnambool Planning Scheme; and
- It is ensured that any hazardous vegetation retained or re-established, does not create an increase in the hazard exposure for existing residents.

The risk to existing residents, either within the EOA PSP or on the current northern and eastern edge of Warrnambool, is, in fact, likely to be reduced by the development of additional low threat or non-vegetated land associated with the proposed future urban land use.

Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction.

This report appropriately assesses and addresses the risk at a range of scales.

Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.

No alternative low risk development locations have been identified or assessed as part of this study.

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

If the setback distances from any hazardous vegetation, as identified in this report (see Map 8), are implemented, then construction can achieve a BAL not exceeding BAL-12.5.

If, in the future, parts of the EOA PSP area are excised from the BPA, then buildings in non-BPA parts of the precinct could be constructed to BAL-LOW.

6.4.4 Areas of high biodiversity conservation value

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

EHP (2018) found that biodiversity values in the EOA PSP area are largely limited to the Francis Tozer Reserve and Russells Creek corridor. These areas are to be incorporated in reserves and protected from development. The design of the adjacent urban area can provide the requisite BAL-12.5 setbacks that do not encroach onto the high quality vegetation.

There are no apparent biodiversity impacts associated with the findings of this bushfire assessment.

6.4.5 Use and development control in a Bushfire Prone Area

Clause 13.02 requires that '*In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when assessing planning applications for the following uses and development:*

- *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'* (Warrnambool Planning Scheme, 2018b).

Clause 13.02 further states that:
'When assessing a planning permit application for the above uses and development:

- *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.*
- *Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts'* (Warrnambool Planning Scheme, 2018b).

Future development applications in the BPA, can achieve acceptable bushfire safety if:

- Setbacks for future development from classified vegetation are provided to enable BAL-12.5 construction;
- Adequate access and egress for emergency management vehicles is provided by a residential road network, including where possible, a perimeter road between the urban area and unmanaged vegetation to assist property defence and fire-fighting; and
- A reliable water supply for fire-fighting is provided via a conventional reticulated hydrant system, in accordance with the hydrant objective for residential subdivision at Clause 56.09-3.

Note that access standards for driveways and static water supply apply in BMO areas (see details in Appendix B and C).

7 Conclusion

This study has assessed the bushfire hazard in and around the EOA PSP, in accordance with Clause 13.02 in the Warnambool Planning Scheme, the BMO/AS 3959-2009 methodology invoked by the Victorian planning and building system, and additional guidance provided in DELWP planning and advisory notes, including:

- *Local planning for bushfire protection,* Planning Practice Note 64 (DELWP, 2015a);
- *Strategic Assessment Guidelines for preparing and evaluating planning scheme amendments,* Planning Practice Note 46 (DELWP, 2017a);
- *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017b); and
- *Bushfire State Planning Policy Amendment VC140,* Planning Advisory Note 68, (DELWP, 2018a).

The assessment also fulfills the requirement of *Ministerial Direction 11 Strategic Assessment of Amendments,* that a planning scheme amendment addresses any relevant bushfire risk (Direction No. 11, 2013).

The entire EOA PSP area is currently a designated BPA. Land within approximately 150m of the Woodland in Francis Tozer Reserve that extends southwards from Wangoom Road into the precinct, comprising approximately 7.7% of the proposed residential area within the precinct, is also covered by the BMO.

The EOA PSP is in a low bushfire risk landscape. In the directions from which a bushfire threat typically arises (north, northwest, west or southwest) the landscape is generally pastoral or comprises the urban area of the existing township.

If future buildings are setback sufficiently from any hazardous vegetation such that they achieve a construction standard of BAL-12.5 or lower, then the bushfire risk can be deemed to be acceptably mitigated.

There are low risk urban-residential and township areas immediately adjacent to the EOA PSP that are not in the BPA and which offer a place of shelter from any bushfire that may occur.

Overall the topography on and around the precinct area is benign, with no significant changes in elevation or slopes that would significantly exacerbate the bushfire attack. For the purpose of determining BALs and commensurate setbacks from classified vegetation, the applicable slope class is 'All slopes and flat land' or ‘Downslope >0-5º’.

The type and extent of (hazardous) vegetation within and around the precinct has been identified and classified into AS 3959-2009 vegetation groups, based on EVC mapping, aerial imagery and site assessment. The classification is based on the current and likely future state of the

vegetation. Vegetation in Francis Tozer Reserve is classifiable as Woodland, whilst areas of open pasture >100mm high, with less than 10% overstorey foliage cover, comprise Grassland.

The potential Russells Creek reserve and associated drainage areas could comprise classified Woodland, Scrub or Grassland depending on how they are-revegetated. Urban development adjacent to these areas will be required to provide setbacks commensurate to enable a BAL-12.5 construction standard for future buildings.

Applicable setbacks for BAL-12.5 construction in BPA and BMO parts of the precinct are shown in the following table.

Slope class	Vegetation	BAL-12.5 setback distance (defendable space)
All upslopes and flat land	Grassland	19m
	Woodland	33m
	Scrub	27m
Downslope >0-5°	Grassland	22m
	Woodland	41m
	Scrub	31m

If parts of the EOA PSP area become eligible for excision from the BPA as urban development permanently removes the bushfire hazard, BAL-LOW would apply, i.e. no specific construction requirements for bushfire protection.

Schedule 1 to the BMO (BMO1) could be appropriate to part of the small area of the precinct affected by the BMO. The BMO1 bushfire protection measures include a BAL-12.5 construction standard for a dwelling, with defendable space for 30m or to the property boundary, whichever is the lesser distance. Design of future subdivisions in this area should ensure building envelopes are sufficiently setback from the classified vegetation to enable BAL-12.5 construction. The interface roads shown in the landscape plan are supported and should be incorporated where possible, to contribute to the BAL-12.5 separation distances for future development from any potentially hazardous vegetation, and to facilitate property protection and firefighting

Good access and egress for emergency management vehicles and residents, in the event of a bushfire, can be achieved via a conventional residential road network. Most of the perimeter of the EOA PSP area is bounded by existing roads.

Access standards for driveways apply in BMO areas (see details in Appendix C).

A reliable water supply for fire-fighting can be provided via a conventional reticulated hydrant system in accordance with the hydrant objective for residential subdivision at Clause 56.09-3. In

BMO parts of the precinct an additional static water supply will be required (see details in Appendix B).

The risk to existing residents will be reduced by the development of additional low threat or non-vegetated land.

Neither the existing or future zones or overlays (apart from the BMO) have any significant bushfire safety implications, and the existing bushfire controls in the planning and building system can be deemed adequate to address bushfire risk.

8 Appendices

8.1 Appendix A: Defendable space vegetation management standards

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 square 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' (Warrnambool Planning Scheme, 2018d).

8.2 Appendix B: BMO Water supply requirements

Table 4 from Clause 53.02-5 - Capacity, fittings and access (Warrnambool Planning Scheme, 2018d)

Capacity, fittings and access

Lot sizes (square meters)	Hydrant available	Capacity (litres)	Fire authority fittings and access required
Less than 500	Not applicable	2,500	No
500-1,000	Yes	5,000	No
500-1,000	No	10,000	Yes
1,001 and above	Not applicable	10,000	Yes

Note 1: A hydrant is available if it is located within 120 metres of the rear of the building

Fire Authority Requirements

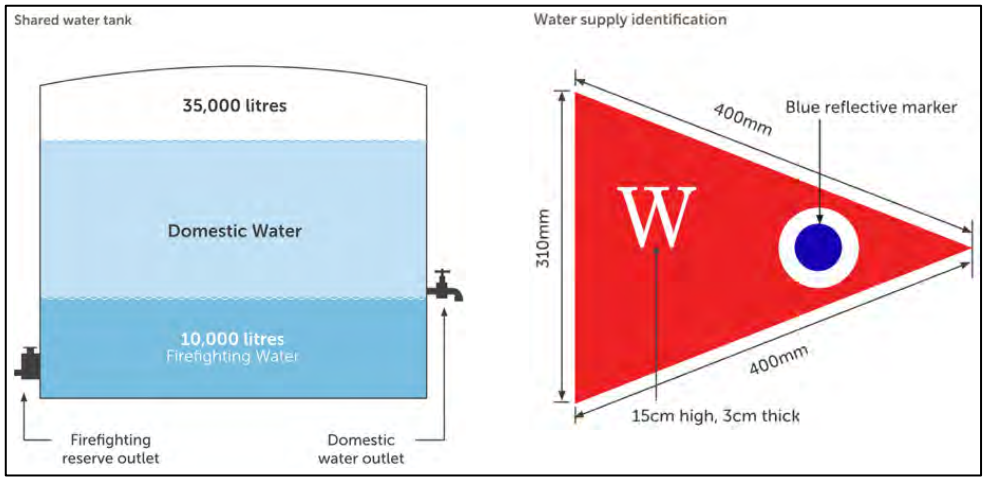
'Unless otherwise agreed in writing by the relevant fire authority, the water supply must:

- *Be stored in an above ground water tank constructed of concrete or metal.*
- *Have all fixed above ground water pipes and fittings required for firefighting purposes made of corrosive resistant metal.*
- *Include a separate outlet for occupant use.*

Where a 10,000 litre water supply is required, fire authority fittings and access must be provided as follows:

- *Be readily identifiable from the building or appropriate identification signage to the satisfaction of the relevant fire authority.*
- *Be located within 60 metres of the outer edge of the approved building.*
- *The outlet/s of the water tank must be within 4 metres of the accessway and unobstructed.*
- *Incorporate a separate ball or gate valve (British Standard Pipe (BSP 65 millimetre) and coupling (64 millimetre CFA 3 thread per inch male fitting).*
- *Any pipework and fittings must be a minimum of 65 millimetres (excluding the CFA coupling)'* (Warrnambool Planning Scheme, 2018d).

The water supply may be provided in the same water tank as other water supplies provided they are separated with different outlets. See figure below illustrating signage and an example of outlets where fire fighting water will be in the same tank as water for other use.



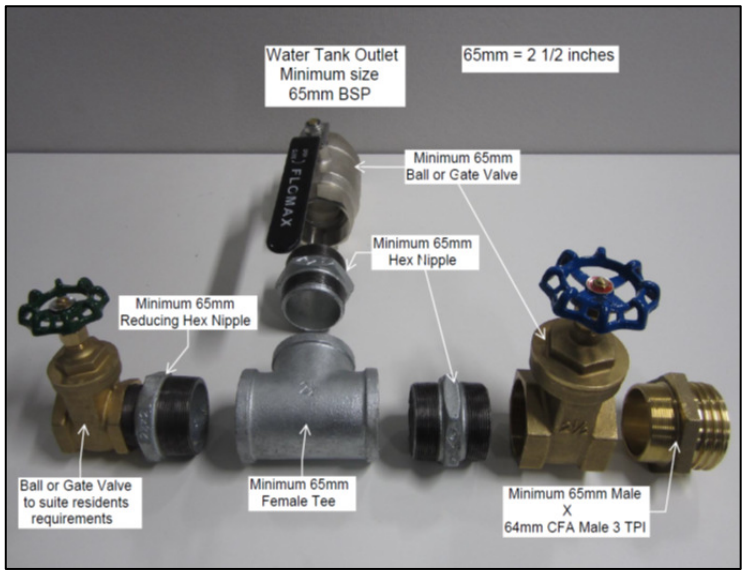
(DELWP, 2017b)

CFA Fittings (CFA, 2014)

'If specified within Table 4 to Clause 53.02-5 (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 21/2 inch. A 65 mm BSP (21/2 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'.



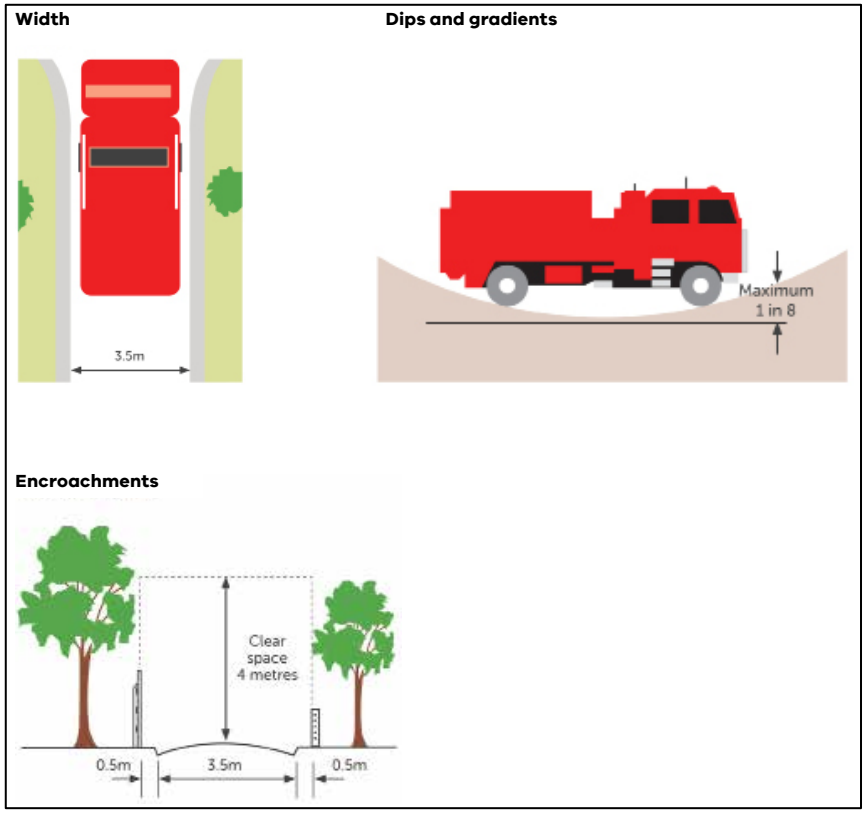
8.3 Appendix C: BMO Access requirements

Driveways less than 30m long have no specific requirements unless access to the water supply outlet is required, in which case the following apply as appropriate.

Access between 30m and 100m in length

Where the length of access is greater than 30 metres the following design and construction requirements apply (*the length of access should be measured from a public road to either the building or the water supply outlet, whichever is longer* (Warrnambool Planning Scheme, 2018e)):

- 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.
- Dips must have no more than a 1 in 8 (12.5 per cent) (7.1 degrees) entry and exit angle.

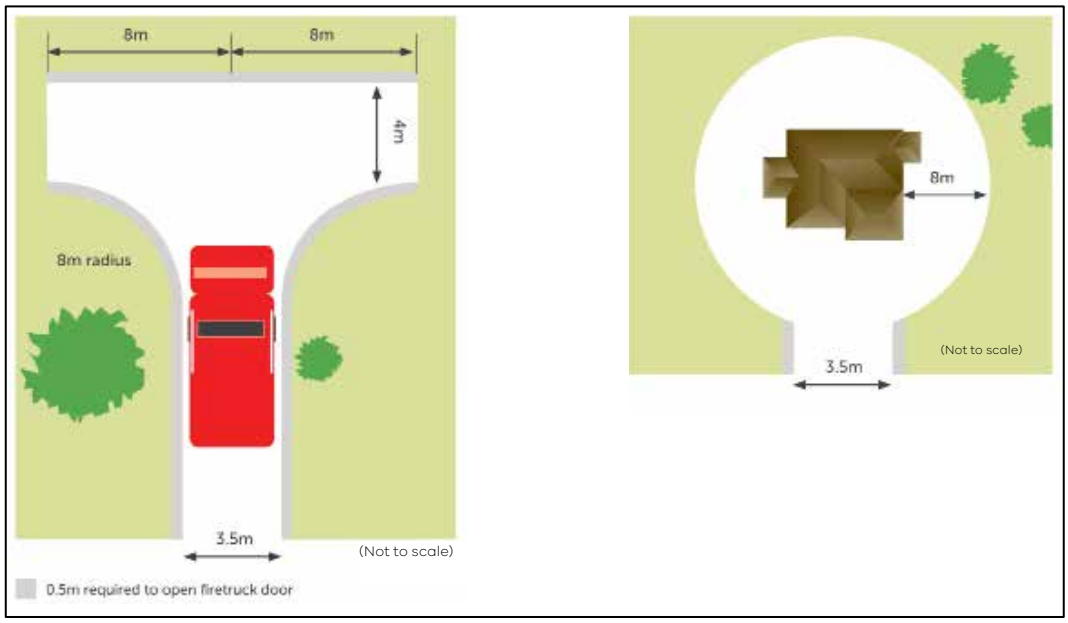


(DELWP, 2017b)

Access between 100m and 200m in length

In addition to the 30m-100m requirements 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.

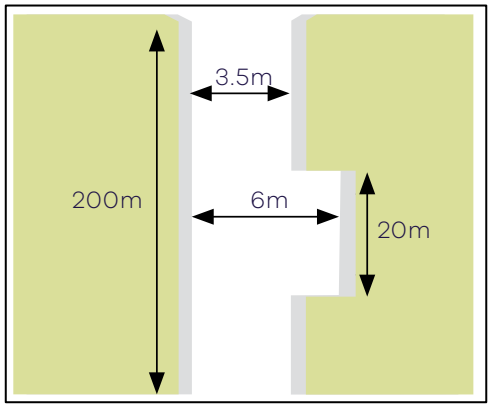


(DELWP, 2017b)

Access greater than 200m in length

In addition to the requirements 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, 2017b)

8.4 Appendix D: 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 (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).

Adapted from Standards Australia (2011).

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