



Bushfire Development Report as expert evidence

for the Pakenham East Precinct Structure Plan

Prepared for
the Victorian Planning Authority

May 2018

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Terramatrix project: VPA-2018-01 Pakenham East PSP

Cover image: Looking north at vegetation along Deep Creek, north of the Princes Highway.

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1 Preface

1.1 Expert Witness Details

1.1.1 Name and address

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1.1.2 Qualifications

- Bachelor of Applied Science in Environmental Assessment and Land Use Policy, 1990, Victoria College.
- Graduate Diploma in Bushfire Protection, 2014, University of Western Sydney.
- Level 3 Accredited Bushfire Practitioner - Bushfire Planning and Design, Fire Protection Association Australia (FPAA) Accreditation Number BPAD29090.

1.2 Area of expertise

Bushfire planning and design.

1.3 Skills and experience

I have over 25 years experience in land use planning (environmental, strategic and statutory planning), environmental management and bushfire planning including as a Park Ranger and Environmental Planner for State and local governments.

My role at Terramatrix includes managing the Terramatrix Bushfire Planning and Design (BPAD) team. This includes leading and undertaking bushfire risk assessments for strategic planning projects such as precinct structure plans, producing Bushfire Management Statements and other bushfire development reports for residential and commercial developments, subdivisions and planning scheme amendments.

I am a Victorian bushfire practitioner accredited by the Fire Protection Association Australia (FPAA) in association with the Country Fire authority (CFA) and Department of Environment, Land, Water and Planning (DELWP) to provide Level 3 Bushfire Planning and Design (BPAD) services.

I am a guest lecturer in Bushfire Planning and Design for University of Melbourne - Bushfire Urban Planning and have previously presented on the Victoria University Graduate Certificate in Performance Based Building and Fire Codes. I have also provided sessional training services for a range of clients including the Planning Institute of Australia PLANET course - Preparing and Assessing a Bushfire Management Statement.

I am regularly called upon to provide expert evidence about bushfire safety and compliance for Planning Panels and at VCAT.

1.4 Instructions and scope of this report

I have been engaged by the Victorian Planning Authority, and instructed by Thomas Patereskos, of Harwood Andrews, to provide expert evidence in relation to Amendment C234 to the Cardinia Planning Scheme, which proposes to incorporate the Pakenham East Precinct Structure Plan.

My instructions have been to review the brief of materials provided and prepare an Expert Witness Statement about matters relating to bushfire safety and compliance arising from the Amendment.

I have also been instructed to appear as an expert witness at the Panel hearing if required.

The information in this report has been prepared and is provided in accordance with the 'Guide to Expert Evidence' published by Planning Panels Victoria (PPV, 2015).

A reference list of documents referred to is provided at the end of the report.

1.5 Client relationship

I was engaged in May 2018 by the VPA to provide expert bushfire safety and planning advice. My relationship with the client is a standard commercial one and no private, personal or other matter has influenced the content or findings of this statement.

'I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel '.



Hamish Allan
Manager - Bushfire Planning and Design
Terramatrix Pty. Ltd.
23rd May 2018.



2 Introduction

This Bushfire Development Report (BDR) has been prepared for the Victorian Planning Authority (VPA), to assess how development in the Pakenham East Precinct Structure Plan (PEPSP) can respond to the bushfire risk and comply with the applicable Victorian planning and building controls that relate to bushfire, especially the requirements of the State Planning Policy Framework (SPPF) at Clause 13.05 *Bushfire* in the Victoria Planning Provisions (Cardinia Planning Scheme, 2018a).

The VPA are the planning authority for Amendment C234, which proposes to incorporate the PEPSP into the Cardinia Planning Scheme and rezone the majority of the land to Urban Growth Zone – Schedule 5 (VPA, 2018). The PEPSP area is located to the east of the established residential and township area of Pakenham, approximately 56km southeast of the Melbourne CBD in the Cardinia Shire Council local government area (LGA) (VPA, 2017).

This report assesses the bushfire hazard to the PEPSP area and identifies how future development can respond to the bushfire objectives and strategies that apply in the SPPF at Clause 13.05.

A key purpose of the report is to identify those parts of the precinct where RHF is expected not to exceed 12.5kW/m^2 and where therefore, future dwellings or other buildings could be constructed to a BAL-12.5 construction standard. This is in accordance with one of the key strategies for settlement planning at Clause 13.05, invoked by VC140 that was gazetted 12th December 2017. This amendment made the SPPF more directive and clearer about bushfire risk, including establishing 12.5kW/m^2 as a maximum radiant heat flux (RHF) safety threshold for planning scheme amendments, settlement planning and certain types of development applications in a bushfire prone area, such as vulnerable uses and subdivisions of more than 10 lots.

All of the PEPSP area is currently a designated Bushfire Prone Area (BPA). No part of the PSP is affected by the Bushfire Management Overlay (BMO).

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

- *Bushfire State Planning Policy Amendment VC140*, Planning Advisory Note 68, (DELWP, 2018);
- *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); and as appropriate,
- *Planning Permit Applications – Bushfire Management Overlay*, Technical Guide (DELWP, 2017b).

3 Study area

The precinct comprises the Pakenham East Precinct Structure Plan area, comprising approximately 630ha of land, generally bounded by Deep Creek and Ryan Road to the west, Mount Ararat Road to the east, the Princes Freeway to the south, and a high voltage transmission line easement to the north (VPA, 2017) (see Figure 1 and Figure 2).



Figure 1 - Precinct location (PEPSP in red outline, 5km buffers of the PSP in blue outline (Google Earth imagery 2017)).

The precinct currently comprises agricultural land dominated by pasture, with a small area of low density residential living abutting Ryan Road immediately to the south of the Princes Highway.

Future development in the PSP will comprise an extension to the existing Pakenham township area to the west (VPA, 2017). This will include residential development, a town centre, schools and community facilities, and areas of public open space, including a drainage reserve along Hancocks Gully, which runs through the eastern half of the site; and a drainage reserve along Deep Creek, to the west (see Figure 2).

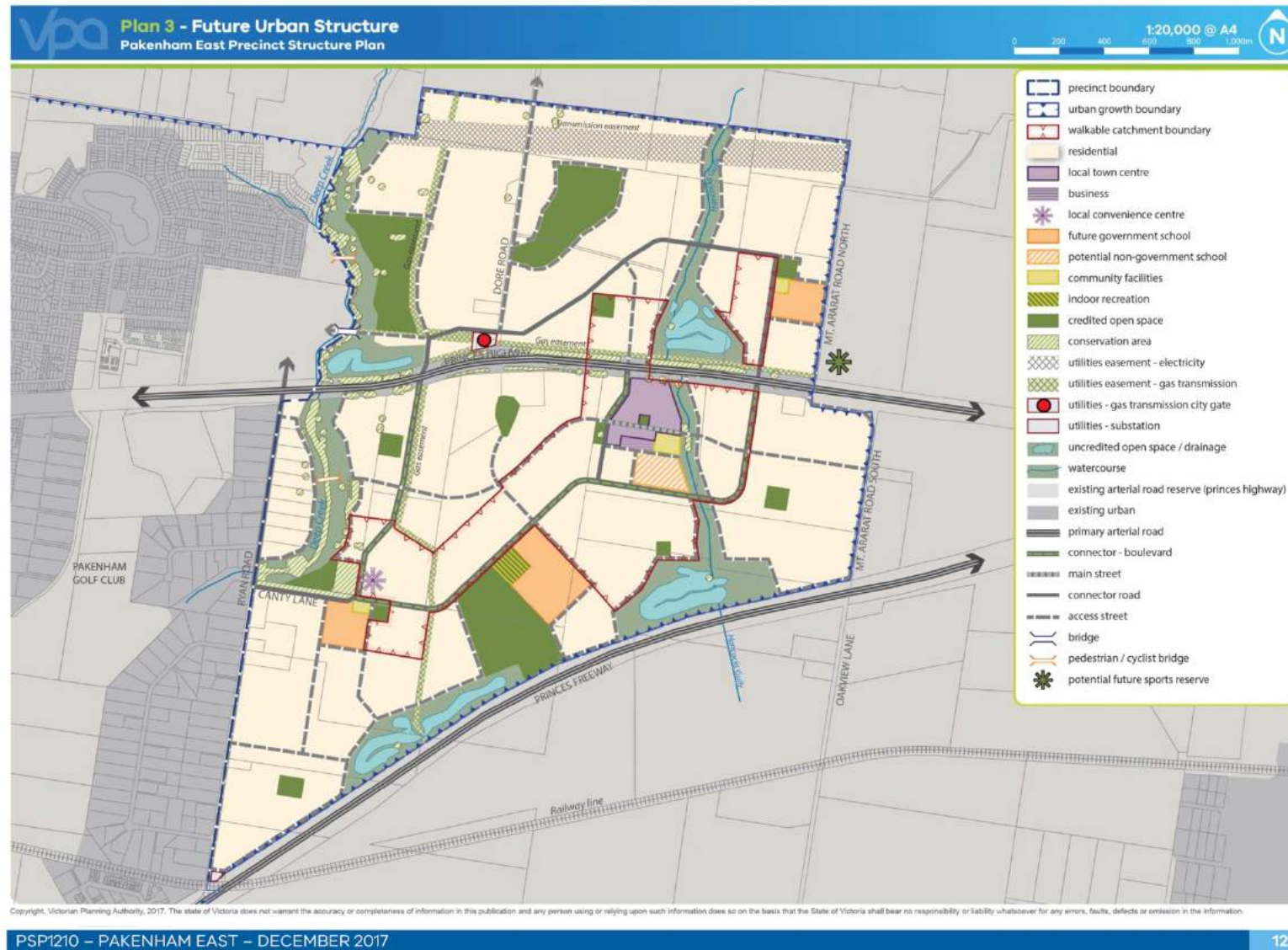


Figure 2 - Future urban structure of PEPSP (VPA, 2017).

4 Bushfire planning and building controls

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

4.1 State Planning Policy Framework (SPPF)

4.1.1 Clause 10.01 Integrated Decision Making

Clause 10.01 states that planning and responsible authorities should integrate policies and balance conflicting objectives in favour of net community benefit. However, in bushfire affected areas, it requires that the protection of human life must be prioritised over all other policy considerations (Cardinia Planning Scheme, 2018b).

4.1.2 Clause 13.05 Bushfire

Clause 13.05 has the objective *'To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life'* (Cardinia Planning Scheme, 2018a). The policy must be applied to all planning and decision making under the Planning and Environment Act 1987, relating to land which is:

- Within a designated 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 13.05 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'* (Cardinia Planning Scheme, 2018a).

Key strategies are stipulated in Clause 13.05, 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
- Any application for development that will result in people congregating in large numbers.

This report assesses the hazard and identifies the bushfire protection measures that will be required for future development in the PEPSP area. It is considered that development can appropriately prioritise the protection of human life and meet the objectives of Clause 13.05, by ensuring future dwellings and other development will not be exposed to RHF above 12.5kW/m², which is commensurate with a BAL-12.5 construction standard.

The maximum 12.5kW/m² 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'* (DELWP, 2018).

A more detailed response to the strategies in Clause 13.05 is provided in Section 6.

4.2 Local Planning Policy Framework (LPPF)

The Municipal Strategic Statement at *Clause 21.01-3* in the Cardinia LPPF, identifies that one of the key issues facing Cardinia is the protection of life and property from flooding and wildfire (Cardinia Planning Scheme, 2017a).

4.3 Bushfire Management Overlay (BMO)

The purposes of the BMO are:

- *'To implement the State Planning Policy Framework and Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.*
- *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'* (Cardinia Planning Scheme, 2017b).

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).

No part of the PEPSP area, or the land within 1km of the PEPSP boundary, is covered by the BMO (see Map 5). This is considered appropriate and reflects recent statewide BMO mapping introduced into the Cardinia Planning Scheme by amendment GC13, which was gazetted on 3rd October 2017.

4.4 Bushfire Prone Area (BPA)

The precinct is currently designated as a BPA. BPAs are those areas subject to or likely to be subject to bushfire, as determined by the Minister for Planning (see Map 5, which shows the extent of BPA (and BMO) coverage around the precinct). Those areas of highest bushfire risk within the BPA are designated as BMO areas.

In a BPA, the Building Act 1993 and associated Building Interim Regulations 2017, through application of the National Construction Code (NCC), require bushfire protection standards for class 1, 2 and 3¹ buildings, 'Specific Use Bushfire Protected Buildings'² and associated class 10A buildings³ 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.

In a BPA, applicable buildings must be constructed to a minimum Bushfire Attack Level (BAL)-12.5, or higher, as determined by a site assessment or planning scheme requirement. A BAL is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. There are six BALs defined in AS 3959-2009, which range from BAL-LOW, which has no bushfire construction requirements to BAL-FZ (Flame Zone) where flame contact with a building is expected.

In a BPA not subject to the BMO, larger developments and certain vulnerable uses (see Section 4.1) are required by Clause 13.05 to:

- *'Consider the risk of bushfire to people, property and community infrastructure.'*

¹ 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.

² Specific Use Bushfire Protected Buildings are defined in the Victorian *Building Interim Regulations 2017*, they generally comprise 'vulnerable' uses and include schools, kindergartens, childcare facilities, aged care facilities and hospitals.

³ Class 10a buildings are defined in the BCA as non-habitable buildings including sheds, carports, and private garages.

- *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’ (Cardinia Planning Scheme, 2018a).*

There should be no obstacle to future development complying with the building regulations as invoked in a BPA. It is likely that as development progresses, much of the land within the PEPSP area 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 is completed.

Reliably low threat urban areas become eligible for excision if they satisfy statewide hazard mapping criteria, including that they would need 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 will be a consideration (DELWP, 2015b).

4.5 Precinct Structure Plan

Objective O21 for future development in the PEPSP is to *‘Ensure that bushfire hazards are identified and that protection measures are considered in the layout and design of the local street network, subdivisions and buildings and works’ (VPA, 2017).*

Additionally, one of the requirements, R14, for subdivision of land in ‘Interface Housing Area 2’, is that it must address ‘bushfire risk management’. ‘Interface Housing Area 2’, is that part of the PSP currently zoned LDRZ and is shown in Map 6.

It is considered that objective O21 and requirement R14 can be met by simply complying with the existing bushfire development and building controls that apply, as identified in this report (see Section 6).

4.6 Other controls

4.6.1 Zoning

To facilitate development in the PEPSP area, most of the land will be rezoned to Urban Growth Zone – Schedule 5 (VPA, 2018).

The zoning does not have any appreciable bushfire safety implications.

It is noted that the exhibited UGZ5 schedule requires that a permit for subdivision, that contains a condition requiring a construction management or site management plan, must ensure that the plan addresses any potential bushfire risks arising during construction and must include a statement from a suitably qualified professional that the proposed bushfire risk management measures are appropriate (Cardinia Planning Scheme, *undated – proposed C234a*).

4.6.2 Overlays

None of the proposed overlay controls are likely to have any appreciable impact on bushfire safety.

It is noted that one of the decision guidelines in the exhibited Schedule 2 to the Incorporated Plan Overlay, states that the responsible authority, before deciding on an application to remove, destroy or lop vegetation, must consider '*The management of vegetation to minimise fire hazard*' (Cardinia Planning Scheme, *undated – proposed C234b*).

5 Bushfire hazard assessment

One of the bushfire hazard identification and assessment strategies in Clause 13.05, is to use the best available science to identify the hazard posed by vegetation, topographic and climatic conditions (Cardinia Planning Scheme, 2018a). The basis for the hazard assessment should be:

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

This section includes a bushfire assessment at:

- The wider landscape scale, for at least 20km around the site (See Figure 12 and Map 5);
- The local landscape scale extending up to 1km from the site (See Map 5); and
- The site scale, up to 400m around the site (see Map 1).

Note that AS 3959-2009 *Construction of buildings in bushfire prone areas*, as invoked in the Victorian *Building Interim Regulations 2017*, requires a site assessment of the vegetation and topography up to 100m around a building, for the purposes of determining the applicable BAL construction standard for that building (Standards Australia, 2011).

A site hazard assessment in BMO areas extends to 150m around a building, development site or subdivision boundary (DELWP, 2017b). For vulnerable uses and larger developments in a BPA, a 150m assessment zone may also be required (DELWP, 2018).

The topography was analysed by site assessment and by creating an elevation model for the site and the land 1km around it, using a GIS TIN (Triangulated Irregular Network) generated from publicly available 10m contour data (see Map 3 and Map 4).

5.1 Vegetation

Vegetation within a 100m assessment zone around the precinct was assessed and classified in accordance with the AS 3959-2009 methodology. Classified vegetation is vegetation that is deemed hazardous from a bushfire perspective.

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 is based on the mature state of the vegetation and the likely fire behaviour that it will generate.

The assessment and classification is based on the likely future state of the vegetation, based on the information provided in the PEPSP (VBA, 2017) and Native Vegetation Precinct Plan (EHP, 2017), predicated upon the assumptions that:

- All grassy vegetation in the 100m assessment zone around the precinct to the north and east of the PSP boundary, which has an overstorey foliage cover of less than approximately 10%, will comprise hazardous grass greater than 100m high and therefore be classifiable as Grassland.
- All vegetation on the residential properties to the west of the PSP boundary, within the 100m assessment zone, will continue to comprise low threat vegetation that can be excluded from classification.
- All land within the PEPSP area, apart from the proposed Deep Creek Drainage Reserve, will either be non-vegetated or comprise low threat vegetation.
- Land at least 30m either side of Deep Creek is likely to be (re)vegetated and will comprise classified Woodland⁴.

5.1.1 Woodland

Areas of remnant vegetation dominated by a Eucalypt overstorey, accord best with the AS 3959-2009 vegetation type of Woodland, which is 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).

A Woodland classification is based on the observed fuel hazard of the vegetation currently present and the likely future state of the vegetation, and DELWP extant Ecological Vegetation Class (EVC) mapping that identifies six EVCs on or within 400m of the PEPSP. Remnant EVCs are confined largely to the Deep Creek corridor and the Princes Highway road reserve (see Map 1). Some small remnant patches also occur along Dore Road but the Native Vegetation Precinct Plan shows these as proposed to be removed.

Map 2 shows the possible extent of future Woodland vegetation that will occur in or within 100m of the PEPSP area based on the extant EVC mapping and the application of a 30m buffer of Deep Creek. These Woodland areas will be almost wholly located within the proposed drainage reserve along Deep Creek (see Figure 7 and Figure 8). They comprise three EVCs in the Gippsland Plains bioregion.

EVC 83 Swampy Riparian Woodland – 20% benchmark tree canopy cover

'Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the

⁴ For the purposes of the study, a 30m buffer (i.e. 60m total width) has been assumed, which is consistent with the typical width for (re)vegetated waterways and, more or less, follows the width of the existing treed vegetation along Deep Creek).

stream levees in combination with large tussock grasses and sedges in the ground layer' (DSE 2004a).

EVC 937 Swamp Woodland – 15% benchmark tree canopy cover

'Open eucalypt woodland to 15 m tall with ground-layer dominated by tussock grasses and/or sedges and often rich in herbs. Occurs on poorly drained, seasonally waterlogged heavy soils, primarily on swamp deposits but extending to suitable substrates within some landscapes of sedimentary origin' (DSE, 2004b).

EVC 53 Swamp scrub – 50% benchmark canopy cover

'Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark Melaleuca ericifolia (or sometimes Woolly Tea-tree Leptospermum lanigerum) which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer' (DSE, 2004a).

It is noted that the ecological investigation report for the PEPSP (EHP, 2018) and the Native Vegetation Precinct Plan (EHP, 2017), identify some areas of Riparian Forest EVC along Deep Creek.

Riparian Forest with a tall, dense understorey is likely to accord best with a Forest classification. In the BMO and AS 3959-2009 methodologies, Forest vegetation has a tree canopy cover of more than 30% and a presumed overall fine fuel load of 35t/ha, whilst Woodland has a tree canopy cover of 10-30% and a lesser presumed overall fine fuel load of 25t/ha (Standards Australia, 2011). The higher fuel load for Forest results in greater setbacks being required, compared to Woodland, for the same BAL construction standard⁵.

Overall, based on the small patch size of the Riparian Forest areas, observed fuel loads in the vegetation, and accounting for the narrow width of the vegetation and its isolated occurrence, it is considered an overall Woodland classification and commensurate BAL setbacks, is more appropriate than a Forest classification.

DELWP mapping shows a small patch of Swamp Scrub occurring north of Canty Lane, which could be classified as Scrub under AS 3959-2009 (see Figure 10 and Map 2). However, due to the small size of this patch, the 6-8m height of the vegetation (significantly higher than the 3m average height applied for Scrub in AS 3959-2009), and its occurrence contiguous with Woodland, it has been classified as Woodland. It is noted that the Native Vegetation Precinct Plan identifies this vegetation as Swampy Woodland (EHP, 2017).

⁵ For BAL-12.5 in response to Forest with a 0° slope, a 48m building setback is required, whereas for Woodland, 33m is required.

5.1.2 Grassland

Areas of grassy vegetation with an overstorey foliage cover of less than 10%, and grass more than 100mm high, 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. The pastures to the north of the PSP boundary and east beyond Mount Ararat Road, are classifiable as Grassland but they have not specifically been identified as such in Map 1 or 2.

It is assumed that all the open grassy areas within the PSP (e.g. the proposed open space parks), with an overall canopy cover not exceeding 10%, will be managed (i.e. mown or slashed) during the fire danger period and therefore will not be classifiable.

5.1.3 Roadsides and waterways

Some roadsides retain patches of remnant vegetation, including along the Princes Highway and Dore Road (see Figure 3 and Figure 4). If, in the future, they remain in a more or less unmodified 'natural' state, they may be classifiable as hazardous vegetation. However, the Native Vegetation Precinct Plan shows no vegetation to be retained along roadsides, other than some patches along Canty Lane and the Princes Highway. It is assumed that other roadsides will be managed as low threat, non-hazardous vegetation.

Roadsides and narrow waterways or drainage lines that retain patches of remnant vegetation or are revegetated, can be excluded from classification as low threat, non-hazardous vegetation if they are no more than 20m wide and are separated from future buildings and any other narrow strips or other areas of classified vegetation, by at least 20m (see Section 5.1.4).

5.1.4 Excluded vegetation and non-vegetated areas

Areas of low threat vegetation and non-vegetated areas within 100m of a building, 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:

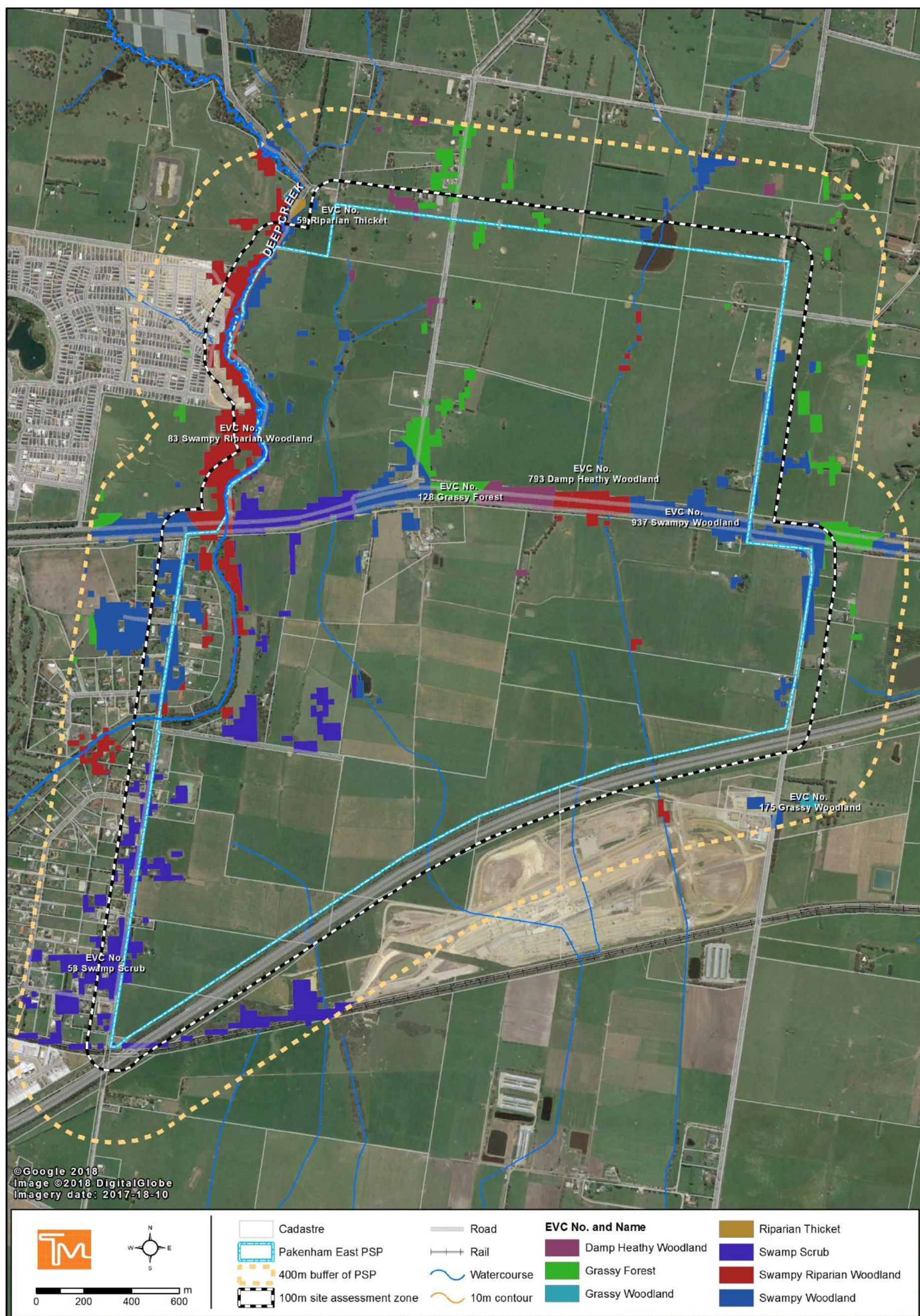
- i. *'Vegetation of any type that is more than 100m from the site.*
- ii. *Single areas of vegetation less than 1 ha in area and not within 100m of other areas of vegetation being classified.*
- iii. *Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other.*

- 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 condition⁶, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks' (Standards Australia, 2011).*

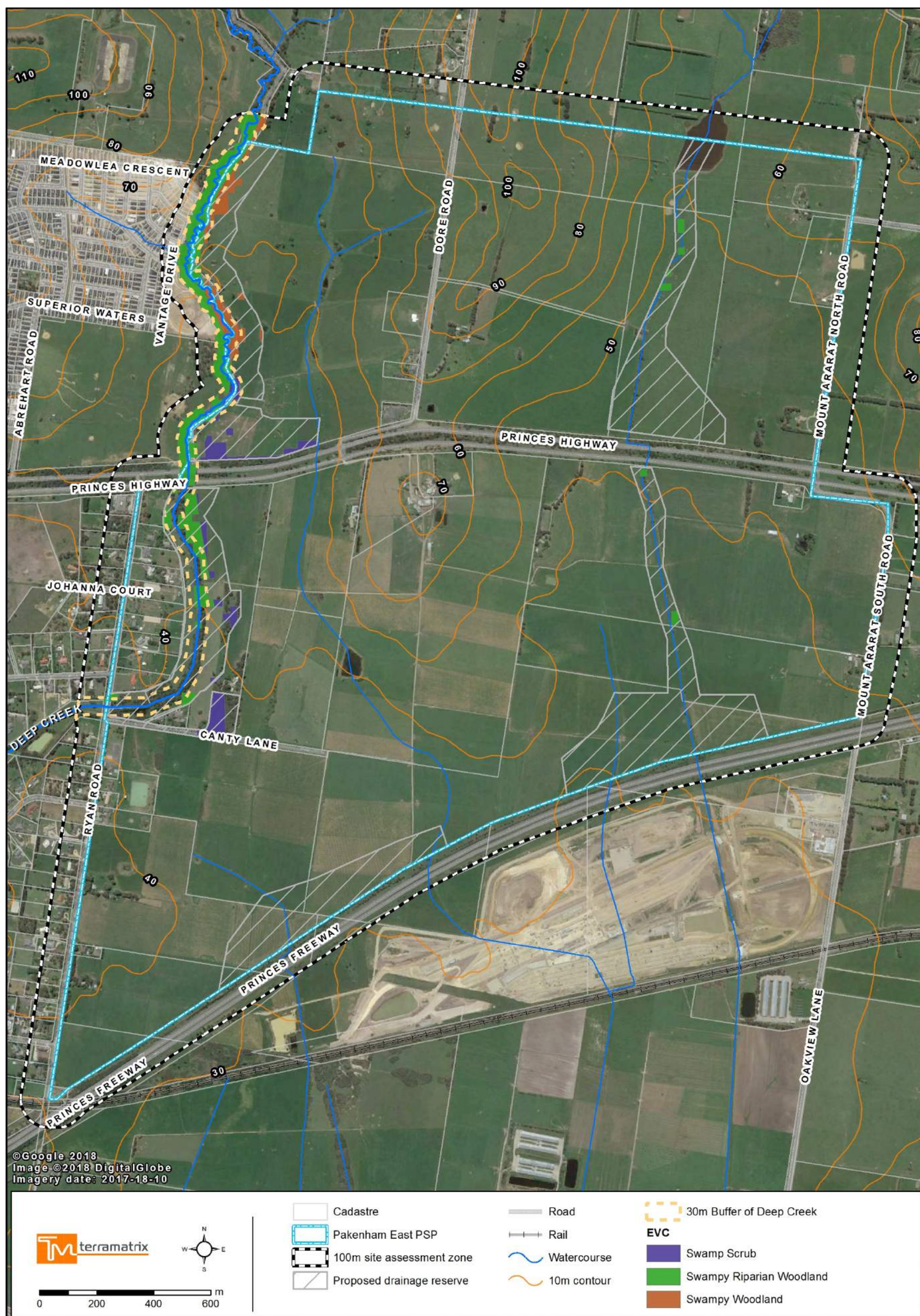
All future urban residential and township areas will likely comprise low threat vegetation as maintained lawns, cultivated gardens or parklands, in the same state as the residential areas to the west (see Figure 9) and the LDRZ area abutting Ryan Road (identified as 'Interface Housing Area 2' in the PSP as shown in Map 6).

Non-vegetated areas will include the roads, driveways and structures.

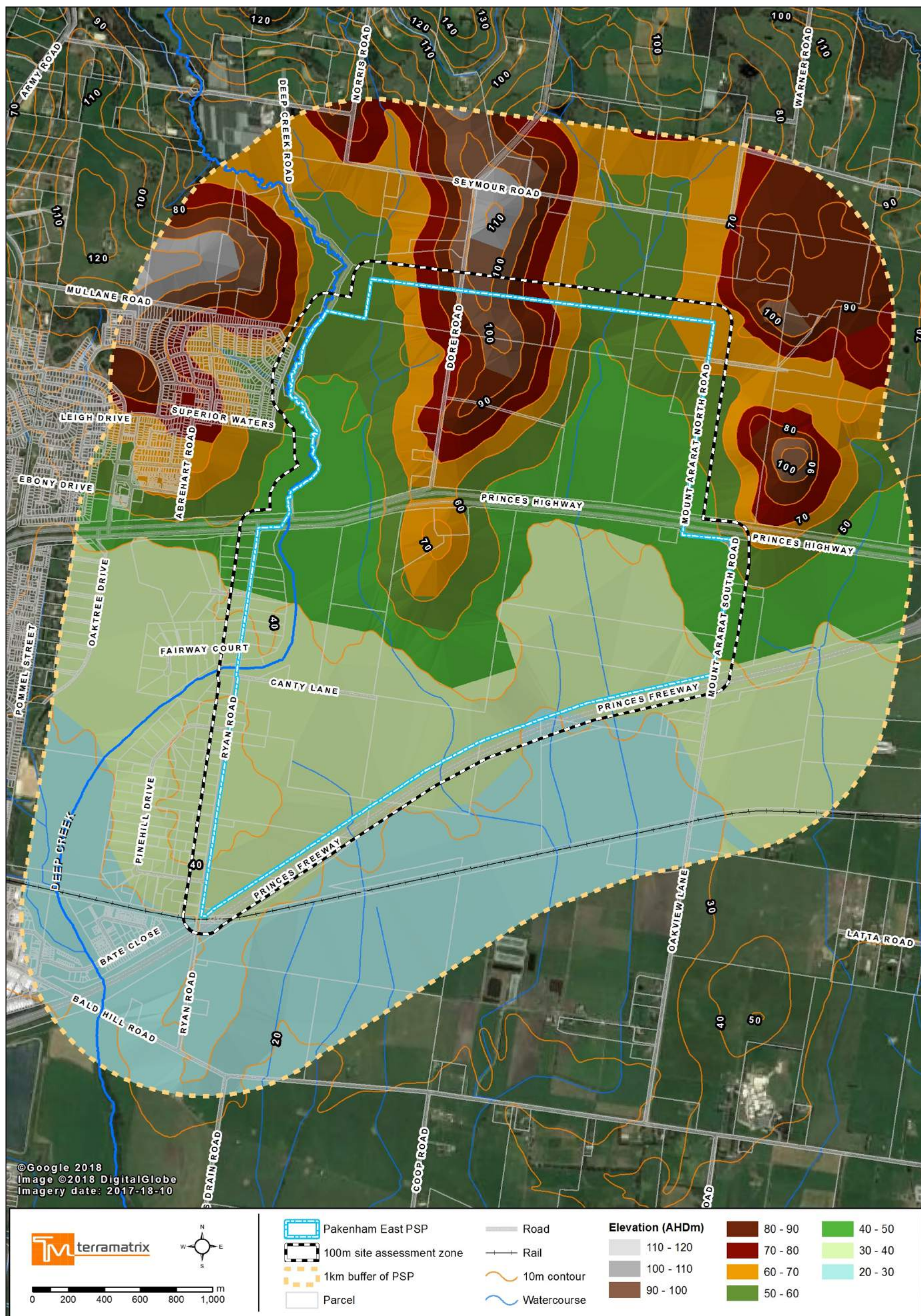
⁶ Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, recognisable as short-cropped grass for example, to a nominal height of 100mm (Standards Australia, 2011).



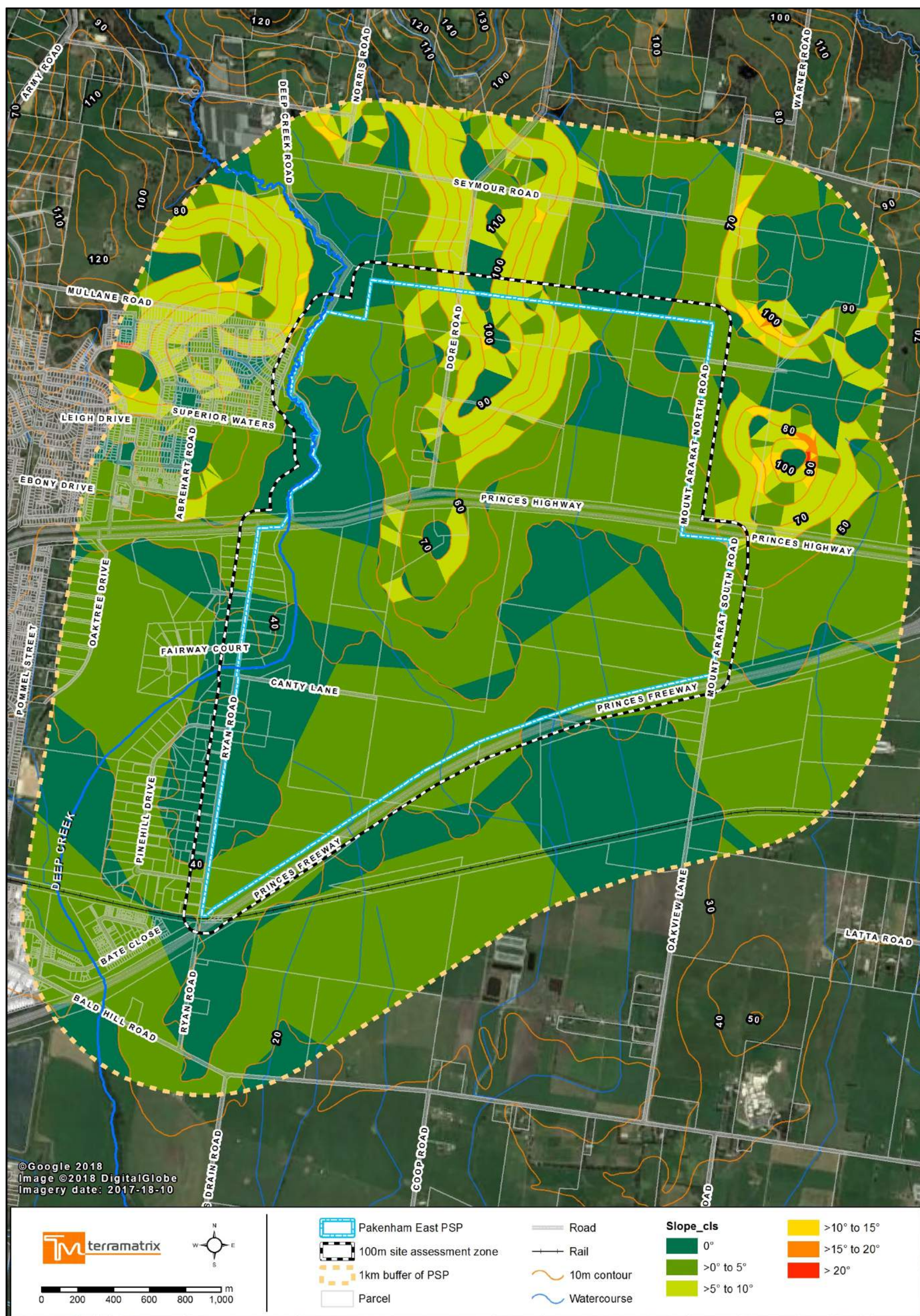
Map 1 - Extant EVCs occurring in, and within 400m around, the precinct.



Map 2 - Possible future extent of classifiable Woodland vegetation within the precinct and 100m assessment zone. Showing EVCs occurring within the proposed drainage reserves and for 30m to the west of Deep Creek. Revegetation and/or regeneration may increase the extent of vegetation.



Map 3 - Elevation map of the precinct and surrounding land for 1km.



Map 4 - Slope map of precinct and surrounding landscape to 1km. Derived from 10m contours. Note that the slope classes shown do not differentiate between upslopes and downslopes.

5.2 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 land under the classified vegetation that will most significantly influence the bushfire attack on a building. Two broad types apply:

- Flat and/or Upslope - land 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°.

Within 1km around the site, the land falls generally from the north to the south. A more or less centrally located spur occurs in the northern half of the PSP area, between Deep Creek and Hancocks Gully. Two hills also occur to the northwest and northeast (see Map 3).

Overall the topography on and around the precinct, within the 100m assessment zone and extending for more than 1km, is relatively benign, with no significant changes in elevation that would exacerbate the bushfire attack.

The majority of the land has a gradient of less than 10° (see Map 4). Slopes under the Woodland and Grassland are all either flat or upslope and therefore, for the purpose of determining BALs and vegetation setbacks, the applicable slope class is 'All upslopes and flat land'.



Figure 3 – Roadside vegetation either side of the Doros Road access, adjacent to the Princes Highway (right of image).



Figure 4 – Existing roadside vegetation along Doros Road, which is likely to be removed.



Figure 5 – Looking west across the precinct from the eastern boundary where a school is proposed.



Figure 6 – Looking south from the Princes Highway along Deep Creek.



Figure 7 – Looking south along Deep Creek Road showing Woodland vegetation.



Figure 8 – Woodland vegetation along Deep Creek



Figure 9 – Looking west across Deep Creek at residential development under construction.



Figure 10 – Looking east at vegetation at the end of Canty Lane.



Figure 11 – Looking southwest across the precinct from the Princes Highway.

5.3 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, (and similarly in BMO areas, as one of the inputs to determine the defensible space distances in the Tables to Clause 52.47-3).

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 range⁷ and the description of conditions for each FDR.

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 | |

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 precinct. It should also be noted that under various climate change

⁷ The GFDI ranges for each FDR in Table 1 may vary in some jurisdictions.

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).

Currently CFA and DELWP have no published policy on FFDI recurrence intervals and therefore there is no compelling reason to apply a different FFDI in the precinct, to the FFDI 100 threshold used throughout non-Alpine areas of Victoria in the planning and building systems⁸.

5.4 Landscape assessment

5.4.1 Location description and context

The precinct is located to the east of the established residential and township area of Pakenham, approximately 56km southeast of the Melbourne CBD in the Cardinia Shire Council local government area (see Figure 12). The PEPSP is the easternmost PSP in the Melbourne area, and the Urban Growth Boundary forms the northern, eastern and southern boundaries of the precinct (see Map 5).

5.4.2 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 the 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 and AS 3959-2009 presumptions (see Table 2).

The surrounding landscape accords best with the lesser risk Landscape Type 1. There is little vegetation beyond 150 metres of the site up to at least 1km, except grasslands and low-threat vegetation (see Map 5). The vegetation associated with Deep Creek is more hazardous, commensurate with a Woodland classification. However, its narrow width and isolated occurrence with very limited connectivity to larger patches of trees or shrubs, means that it is not credible for it to support a large, 100m wide bushfire moving at a quasi-steady-state rate of forward spread as envisaged in the AS 3959-2009 methodology.

A large fire could spread towards the site, potentially under prevailing north or northwesterly winds typically associated with severe fire weather, including from a fire in forest or woodland further to the north. However, this fire scenario would impact the precinct as a grassfire and would have to travel more than 1km through a relatively benign pastoral landscape comprising a mosaic of rural and rural-residential living.

⁸ In Alpine areas of Victoria an FFDI 50 applies for determining BALs using Method 1 of AS 3959-2009.

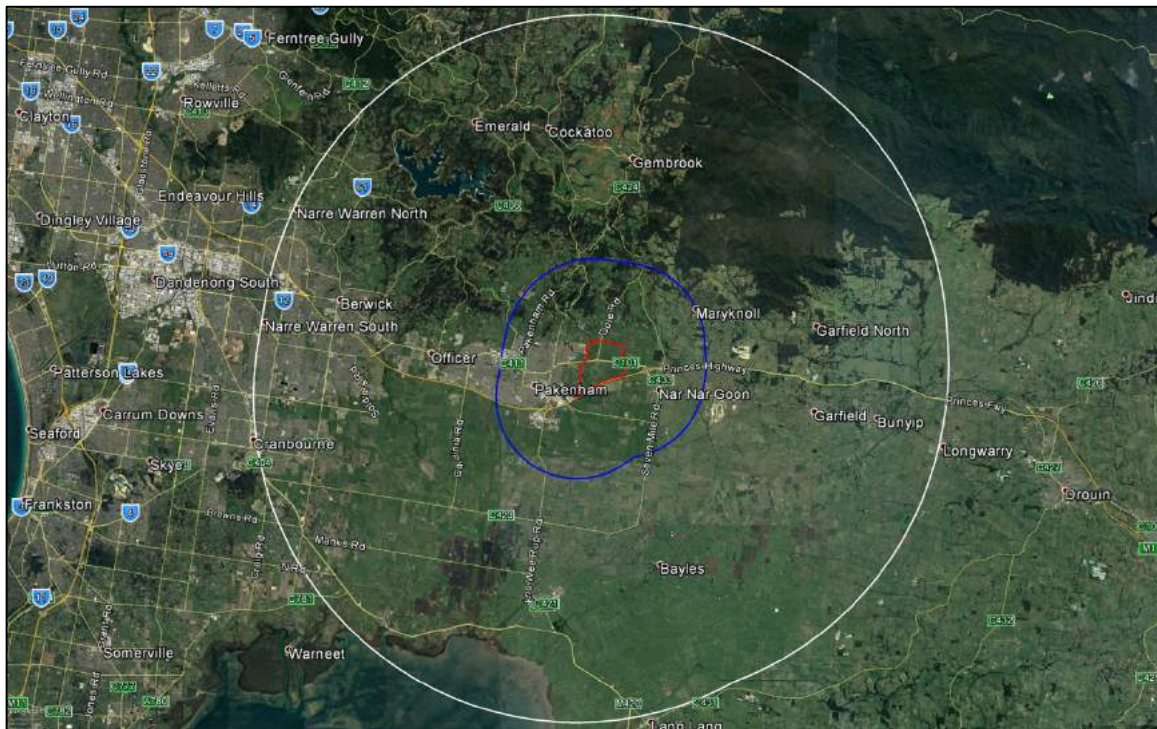

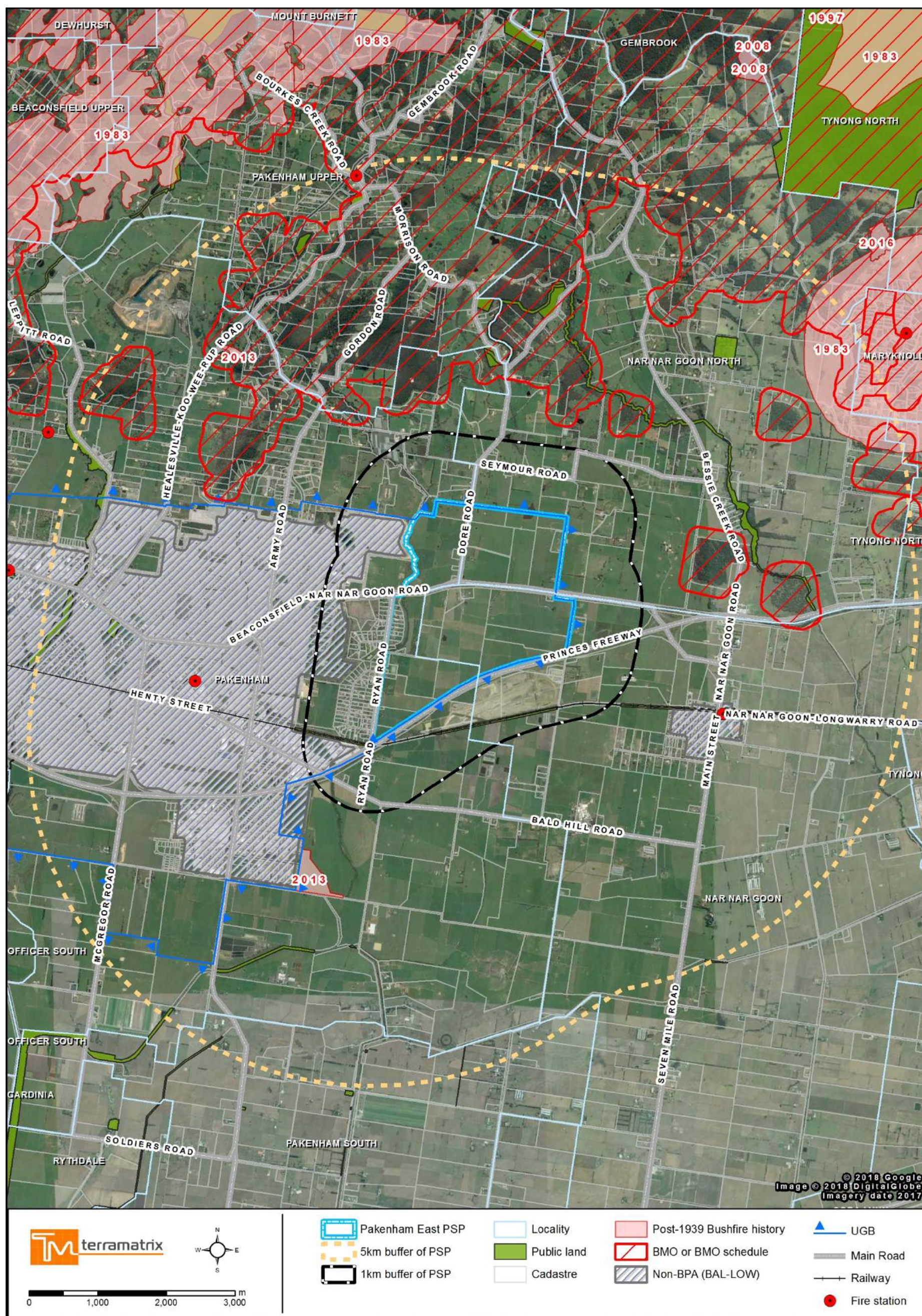


Figure 12 – Location and landscape context of the precinct (shown in red outline). A 5km buffer of the precinct is shown in blue outline, a 20km buffer is shown in white outline.

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

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



Map 5 - Bushfire hazard landscape assessment.

Especially once development has commenced and progresses in the precinct, access will be readily available to places that provide shelter from bushfire. The author agrees with the description of the risk in the explanatory report for the amendment:

'The precinct lies within an identified bushfire prone area. Most of the land within and surrounding the precinct (north, south and east) is currently used for agriculture, grazing and other farming. In the short to medium term this land presents a fire risk, albeit low, generally associated with dry grass. In the medium to long term most of the land within the precinct will be developed for urban purposes that will substantially reduce any identified fire risk' (VPA 2018).

5.4.3 Regional bushfire risk assessments and plans

Strategic Bushfire Management Plan East Central

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. The PEPSP is in the East Central landscape. No matters are identified for the precinct or Pakenham area, although Pakenham Upper, in the forested hills to the north, is mentioned as a high risk locality (DELWP, 2015c).

Regional Bushfire Planning Assessment (RBPA) Melbourne Metropolitan 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 – Melbourne Metropolitan Region* covers the Cardinia Shire Council LGA. It does not identify any bushfire issues for the precinct or wider Pakenham area but shows the precinct as being in a 'Bushfire landscape of consideration' (DPCD, 2012).

6 Planning and building response

This section identifies how future development can respond to the bushfire risk, specifically the building regulations and the requirements of Clause 13.05 for development in a BPA.

6.1 Clause 13.05 Bushfire

The strategies stipulated in Clause 13.05, are detailed in the following sub-sections that provide a summary response about how development can respond to the strategies.

6.1.1 Protection of human life strategies

Clause 13.05 requires that the priority be given to protection of human life.

Prioritising the protection of human life over all other policy considerations

The precinct is in a low risk location. The protection of human life can be prioritised by application of the existing building regulations for construction in a BPA, and ensuring future dwellings and other buildings are located where a BAL-12.5 construction standard can be achieved (i.e. achieving setbacks for future buildings from unmanaged vegetation, such that radiant heat will 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.

As identified in Section 5.4, the site is in a low risk landscape. Therefore, if future buildings are setback sufficiently from any hazardous vegetation to achieve a BAL no higher than BAL-12.5, the risk can be deemed to be acceptable.

The nearest *lowest* risk locations are considered to be the urban-residential and township areas of Pakenham immediately to the west of the precinct that are not in the BPA (see Map 5).

As identified in Section 4.4, once development has occurred, some reliably low threat urban areas within the precinct may become eligible for excision from the BPA if they satisfy the exclusion criteria.

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 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 13.05 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 13.05 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 will be able to appropriately implement the strategies in Clause 13.05 that aim to prioritise protection of human life, and will therefore meet the CFA strategic planning principles for bushfire.

6.1.2 Bushfire hazard identification and assessment strategies

Clause 13.05-1 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* (DEWLP, 2015a) and *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DEWLP, 2018).

The type and extent of (hazardous) vegetation within, and up to 400m around, the precinct was identified, and within 100m of the precinct boundary it was classified into AS 3959-2009 vegetation groups. Classification was based on the anticipated long-term state of the vegetation, DELWP extant 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.

GIS analysis of publicly available 10m contour data for the area was undertaken, including creating a Digital Elevation Model (DEM) of the topography, and determining slopes, extending to 1km around the precinct (see Map 3 and Map 4).

In relation to climatic conditions and fire weather, the applicability of the AS 3959-2009/BMO FFDI 100 benchmark is discussed in Section 5.3.

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 5. This is based on the most recent BPA mapping for the date which was published 15th May 2018.

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

As identified in Section 4.3, no part of the PEPSP area, or the land within 1km of the PEPSP boundary, is covered by the BMO (see Map 5). This is considered appropriate and reflects recent statewide BMO mapping introduced into the Cardinia Planning Scheme by amendment GC13, which was gazetted on 3rd October 2017.

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 scale (see Section 5).

At the local (site) scale, the assessment follows the AS 3959-2009 methodology applied in a BPA, of classifying vegetation and topography within 100m of a building.

At the landscape scale a 20km, 5km and 1km radius of the site has been applied (see Figure 1, Figure 12 and Map 5) in accordance with guidance about assessing risk for planning scheme amendments in the Planning Advisory Note 68 (DEWLP, 2018) 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.

The author understands that the CFA have been consulted during the planning process and their feedback will inform the final plan.

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.

Clause 13.05, and the building regulations invoked by the BPA coverage, including the bushfire hazard landscape assessment, specify the general requirements and standards for assessing the risk. These have been used in this report and bushfire protection measures have been identified commensurate with the risk (see following).

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.

If the objectives and strategies of Clause 13.05 are successfully implemented, as discussed in this report, and the building regulations for construction in a BPA are complied with, then the risk can be deemed to be acceptably mitigated such that development can proceed.

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 PEPSP area.

It is noted that the exhibited UGZ5 schedule requires that a permit for subdivision, that contains a condition requiring a construction management or site management plan, must ensure that the plan addresses any potential bushfire risks arising during construction and must include a statement from a suitably qualified professional that the proposed bushfire risk management measures are appropriate (Cardinia Planning Scheme, *undated – proposed C234a*).

6.1.3 Settlement planning strategies

Clause 13.05 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/m², and BAL 12.5 dwellings could potentially be sited, are provided in Table 3 and shown in Map 6. Taking into the consideration the assessment of landscape risk, implementation of these setbacks and BAL-12.5 construction of new buildings, can be deemed to acceptably mitigate the risk.

Table 3 – Applicable building setback distances for BAL-12.5 construction.

| Vegetation | Slope class | Building setback distance |
|------------|----------------------------|---------------------------|
| Grassland | All upslopes and flat land | 19 |
| Woodland | | 33 |

See also the exclusion criteria and setback distances in Section 5.1.4 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 *lowest* risk locations are considered to be those areas in the surrounding landscape which are not in a designated Bushfire Prone Area (BPA). These comprise the urban-residential and township areas of Pakenham immediately to the west of the precinct (see Map 5).

As identified in Section 4.4, once development has occurred, some reliably low threat urban areas within the precinct may become eligible for excision from the BPA if they satisfy the exclusion criteria.

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:

- Development can achieve vegetation setbacks from hazardous vegetation to enable BAL-12.5 construction, provide an appropriate water supply for fire-fighting via a conventional reticulated hydrant system, and appropriate access/egress for emergency vehicles and residents via a conventional residential road network.

- Ensure any hazardous vegetation retained or re-established, does not create an increase in the hazard exposure for existing residents.

The risk to existing residents will be reduced by the development of additional urban residential areas and associated low threat or non-vegetated land. As identified above, this may eventually create BAL-LOW areas with the potential to be excised from the BPA, if they are sufficiently distant from any hazardous vegetation.

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 vegetation setback distances from any hazardous vegetation, as identified in Table 3, are implemented then construction can achieve a BAL not exceeding BAL-12.5. Future development and excision from the BPA of some parts of the precinct, may enable BAL-LOW.

6.1.4 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

The Native Vegetation Precinct Plan aims to provide for the identification and protection of areas of high biodiversity conservation value (EHP, 2017; EHP, 2018). There are no apparent additional biodiversity impacts associated with the findings of this bushfire assessment.

6.1.5 Use and development control in a Bushfire Prone Area

Clause 13.05 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'* (Cardinia Planning Scheme, 2018a).

It 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'* (Cardinia Planning Scheme, 2018a).

Future development applications should be able to achieve acceptable safety if:

- Appropriate setbacks for future development from classified vegetation are achieved to enable BAL-12.5 construction (see Map 6);
- Adequate access and egress for emergency management vehicles is provided by a residential road network with a perimeter road where possible 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.

6.2 Specific issues

6.2.1 Transmission line easement

To ensure that long grass or other hazardous vegetation does not establish in the transmission line easement, future property owners with land in the easement could be required to enter into a S173 agreement, or other similar mechanism, to require that land be maintained in a non-vegetated or low threat state. Alternatively, the process of checking properties and issuing Municipal Fire Prevention Notices in relation to any hazardous vegetation could be relied upon.

6.2.2 Drainage Reserves

Buildings adjacent to drainage reserves (or other large open space areas) that could comprise unmanaged grass (i.e. grass >100mm high that cannot therefore be considered low threat), will need to have a 19m setback from the grass for BAL-12.5 construction. It is reasonable to assume all active open space reserves will be low threat, however, the state of the drainage reserves is less certain. It would be desirable to provide the 19m setback as a road where possible (see below).

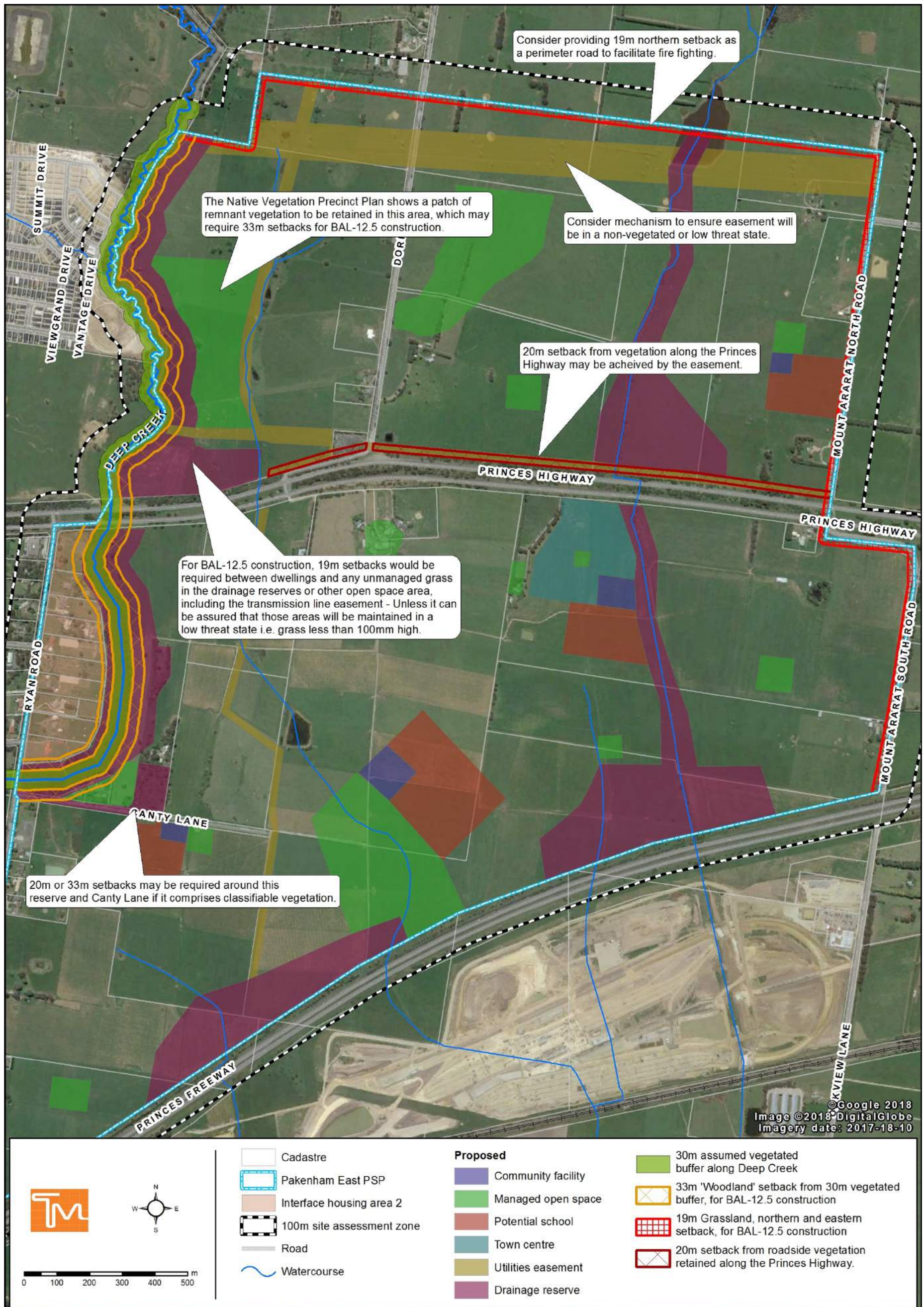
6.2.3 Perimeter Roads

Perimeter roads are a useful design feature to separate future development from hazardous vegetation and facility property protection and fire fighting. A perimeter road would be especially useful between development and the Deep Creek Reserve, and along the northern PSP boundary where the highest risk of bushfire approaching and impacting exists. A road along the eastern boundary would be similarly useful.

6.2.4 Roadside vegetation

Roadsides (and narrow waterways or drainage lines) that retain narrow patches of remnant vegetation or are revegetated, can be excluded from classification as low threat, non-hazardous vegetation if the vegetation strips are no more than 20m wide and are separated from future buildings and any other narrow strips or other areas of classified vegetation, by at least 20m.

The assessment map provided as Map 6 illustrates some of the issues.



Map 6 - Assessment map.

7 Conclusion

This report has assessed the bushfire hazard in and around the precinct, in accordance with Clause 13.05 in the Cardinia Planning Scheme, the AS 3959-2009 methodology as invoked by the Victorian building regulations, and additional guidance, as appropriate, provided in *Planning Practice Note 64 Local planning for bushfire protection* (DEWLP, 2015a) and *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DEWLP, 2018).

The assessment also fulfills the requirements of *Ministerial Direction 11 Strategic Assessment of Amendments*, which requires that an amendment addresses any relevant bushfire risk (Direction No. 11, 2013).

All of the precinct is currently in a designated BPA. No part of the precinct, or the land within 1km of the PEPSP boundary, is covered by the BMO.

The landscape is one of low bushfire risk. Bushfire behaviour will be within AS 3959-2009 presumptions and design parameters. Accordingly, it is considered that the risk can be mitigated to an acceptable level and that development in the PEPSP is appropriate, if dwellings are separated from hazardous vegetation to allow BAL-12.5 construction, in accordance with the building regulations and Clause 13.05.

The type and extent of (hazardous) vegetation within, and up to 400m around, the precinct has been identified, and within 100m of the precinct it has been classified into AS 3959-2009 vegetation groups, based on the Native Vegetation Precinct Plan, DELWP extant EVC mapping, aerial imagery and site assessment.

Areas of remnant treed vegetation, where the overall foliage cover is greater than 10%, accord best with the AS 3959-2009 vegetation type of Woodland. Other parts of the precinct, along the northern and eastern precinct boundaries, may be exposed to Grassland from the pastures in these directions. The assessment and classification is based on the current and likely future state of the vegetation.

Overall the topography on and around the precinct, within the 150m assessment zone and extending for more than 1km, is benign, with no significant changes in elevation or slopes that would significantly exacerbate the bushfire attack. For the purposes of determining BALs and defendable space setbacks, the applicable slope class is 'All slopes and flat land' under the Woodland and Grassland.

It is considered that development can appropriately prioritise the protection of human life and meet the objectives of Clause 13.05, largely by ensuring future dwellings will not be exposed to RHF above 12.5kW/m^2 , which is commensurate with a BAL-12.5 construction standard. This would require a minimum 33m setback of buildings from areas of classified Woodland and a

minimum 19m defensible space setback from classified Grassland. 20m setbacks are recommended from narrow (less than 20m wide) patches of vegetation e.g. along the Princes Highway.

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, supported by a perimeter road where possible to assist property defence and fire-fighting i.e. between hazardous vegetation and future dwellings (e.g. along the northern precinct boundary and the proposed Deep Creek drainage reserve).

A reliable water supply for fire-fighting can be provided via a conventional reticulated hydrant system.

The risk to existing residents will be reduced by the development of additional urban residential areas and associated low threat or non-vegetated land. This will eventually create BAL-LOW areas with the potential to be excised from the BPA if they are sufficiently distant from hazardous vegetation.

8 References

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