Bushfire Development Report

for the Croskell Precinct Structure Plan

Prepared for
the Victorian Planning Authority

v4.0 July 2024

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Cover image: Looking north across the site and surrounding landscape.

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MAPS

Glossary

AS 3959-2018	*AS 3959-2018 Construction of buildings in Bushfire Prone Areas.* Australian standard invoked by the National Construction Code and Victorian building regulations for the assessment of BALs and the design and construction of defined building classes in a BPA.
BAL	*Bushfire Attack Level* - A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire e.g. a building constructed to a BAL-12.5 standard is designed to be exposed to radiant heat not exceeding 12.5 kW/m^2.
BMO	*Bushfire Management Overlay* - A planning scheme provision used to guide the development of land in areas of high bushfire hazard. The BMO applies to areas where there is potential for extreme bushfire behaviour, such as a crown fire and extreme ember attack and radiant heat
BPA	*Bushfire Prone Area* - An area that is subject to, or likely to be subject to, bushfire attack as determined by the Minister for Planning.
Bushfire	An unplanned fire burning in vegetation; sometimes referred to as wildfire. A generic term which includes grass fires, forest fires and scrub fires.
Bushfire attack	Attack by wind, burning embers, radiant heat or flame generated by a bushfire.
Bushfire hazard	A specific source of potential damage or harm, typically consisting of three key elements; vegetation, weather and topography.
Bushfire risk	The chance or probability of damage or harm if exposed to a bushfire hazard and the severity of the impact i.e. consideration of the likelihood and consequences of impacts from bushfire.
Classified vegetation	Vegetation deemed to be a bushfire hazard in accordance with the Bushfire Management Overlay (BMO) and/or AS 3959-2018 *Construction of buildings in bushfire prone areas*.
CFA	*Country Fire Authority*
DELWP	The former *Department of Environment, Land Water and Planning.* The responsibilities of this Dept. are now split across the Department of Energy, Environment and Climate Action (DEECA) and the Department of Transport and Planning (DTP).
Effective slope	The slope of the land (gradient, measured in degrees) under the classified vegetation which most influences the bushfire attack. The slope is determined on the basis of the fire moving towards the building and the rate

	of spread of the fire and not solely on the basis of the relative elevation of the vegetation.
Ember attack	Attack by smouldering or flaming windborne debris that is capable of entering or accumulating around a building, and that may ignite the building or other combustible materials and debris.
EVC	*Ecological Vegetation Class* - The standard unit for classifying vegetation types in Victoria. EVCs are described through a combination of floristics, lifeforms and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (i.e. lower level in the classification) that occur across a biogeographic range and, although differing in species, have similar habitat and ecological processes operating.
FBI	*Fire Behaviour Index* – A numerical scale of potential fire behaviour and fire danger risk designed to inform operational decision making. Determines daily Fire Danger Ratings for a fire district.
FFDI	*Forest Fire Danger Index* – A numerical index representing the chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects.
FRV	*Fire Rescue Victoria*
PSP	*Precinct Structure Plan* – Strategic masterplans for local areas that usually cater for between 5,000 to 30,000 people, 2,000 to 10,000 jobs or a combination of both. They are the 'blueprint' for localised development and investment that will occur over many years and will incorporate any relevant directions already outlined in a higher level Framework Plan.
RHF	*Radiant heat flux* - The heat transfer rate per unit area from thermal (electromagnetic) radiation, expressed as kilowatts per metre squared. Calculated or measured for a specific surface to determine the radiant heat received by that surface from flames associated with a bushfire.
VPA	*Victorian Planning Authority*

Executive summary

- The Croskell Precinct Structure Plan (Croskell PSP) area is in a relatively low bushfire risk landscape.
- No part of the study area or the land for over 2.6 km around it is affected by the BMO or a Schedule to the BMO.
- Alternative locations for development in the Casey LGA, that are likewise outside BMO areas, have a higher bushfire risk and would not result in a significantly lesser risk than future growth in the Croskell PSP.
- Bushfire behaviour with the potential for neighbourhood-scale destruction is not credible.
- The surrounding landscape is dominated by land that is flat or rising away from the site and will not exacerbate fire behaviour.
- In all directions much of the land around the precinct is currently, and will increasingly become, designated as non-BPA land.
- Once developed with reliably low threat and non-vegetated areas, some of the precinct will meet the criteria for future excision from the BPA, creating a large area safe from bushfire attack for existing and future residents.
- The only appreciable existing bushfire hazard within at least 2.6 km is Grassland, with minor areas of treed vegetation within the site that are unlikely to be retained in their current form.
- Areas of higher hazard vegetation likely to be retained or created in the drainage reserves will be relatively small, isolated and narrow. They will, therefore, not pose a significant threat if new and existing development is sufficiently setback from them the distances identified in this report.
- The development areas can be sufficiently setback from retained areas of Grassland in the power transmission easement and Grassland, Scrub and Forest in the proposed drainage reserves to provide enough separation distance and ensure development is not exposed to RHF above 12.5kW/m^2. This assumes that appropriate setbacks, including a minimum 19 m perimeter road is provided between the vegetation in the drainage reserves and power transmission easement and the development, to ensure separation from any hazard and supplement the setback distances from any higher hazard retained vegetation.
- Interface areas where development setbacks will be required include from:
  - Unmanaged vegetation in the drainage reserves and power transmission easement.
  - Unmanaged vegetation on adjacent land where the vegetation poses an interim or possibly permanent bushfire hazard (generally to the west and small areas to the south); and
  - Potentially hazardous Scrub in the Cultural Heritage Investigation Area.
- Layout and subdivision design that implements the setbacks will ensure that no BAL construction standard will result that is higher than the maximum BAL-12.5 outcome stipulated in the settlement planning strategies of Clause 13.02-1S.
- The only land use areas anticipated to contain buildings of a class that would require a BAL, are those designated residential.
- Some Class 9 buildings in the BPA will need to respond to Specification 43 of the NCC 2022.

- Scaled, illustrative design cross sections for areas that interface a permanent hazard, should be prepared as part of the PSP, to show the interface layout with development setbacks, including any proposed roads and landscaping.
- The subdivision application requirement typically required in a Schedule to the UGZ (e.g. as applied in the neighbouring Thompsons Road PSP), identifying how management of the bushfire hazard during the development and construction phases will be achieved, should be adopted.
- There are no apparent biodiversity impacts associated with the findings of this bushfire assessment.
- Development of the precinct can satisfy the objective and all strategies of Clause 13.02-1S, which aim to prioritise protection of human life.
- Accordingly, acceptable bushfire safety will be achieved and the state planning policy objective for bushfire in the Casey Planning Scheme will be met, if the measures identified in this report are implemented. There are no apparent barriers to this being achievable.

1 Introduction

This Bushfire Development Report has been prepared for the Victorian Planning Authority (VPA). It assesses the bushfire risk to the Croskell Precinct Structure Plan (PSP) area and identifies how the PSP and future development within the precinct, can respond to the risk and comply with the applicable planning and building controls that relate to bushfire, specifically the objective and strategies of the Planning Policy Framework (PPF) at Clause 13.02-1S *Bushfire Planning*.

The VPA, in conjunction with stakeholders, are currently preparing the Croskell PSP to guide future industrial and commercial development, and residential growth in the precinct. The northern part of the study area - north of the power easement and Victorian Desalination Project (VDP) cable that bisect the site on an east-west axis - will form an employment district, with the southern part comprising residential areas, drainage reserves and a Cultural Heritage Investigation Area (see Figure 2).

The purpose of this report is to assess the bushfire hazard (both existing to be retained and arising from proposed landscaping) to the precinct and its suitability for development and, if appropriate, identify mechanisms to mitigate the resultant bushfire risk to an acceptable level.

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, 2015).
- *Design Guidelines, Settlement Planning at the Bushfire Interface* (DELWP, 2020a).
- *Bushfire State Planning Policy Amendment VC140,* Planning Advisory Note 68, (DELWP, 2018); and in relation to assessing landscape risk,
- *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017).

2 Overview of precinct

The Croskell PSP is in the City of Casey, in Melbourne's south east growth corridor, approximately 52 km (50 mins travel) by road from the Melbourne CBD (Google Earth online, 2023) (see Figure 1). The precinct comprises 317 ha of land in Cranbourne East and Clyde North, bounded generally by Thompsons Road to the north, Narre-Warren-Cranbourne Road to the west, Berwick-Cranbourne Road to the east and Linsell Boulevard and existing residential development to the south.

The Draft Place Based Plan showing the arrangement of proposed land uses is provided as Figure 2. The precinct is anticipated to provide 8,900 jobs as most of the precinct will be a Regionally Significant Commercial Area. This means most of the land will be used for future commercial and industrial purposes, however there will also be a mix of housing types, community facilities, drainage infrastructure, roads, pedestrian/bike paths and open space (VPA, 2023a).

Whilst the precinct is designated as a Bushfire Prone Area (BPA), much of the land around it in all directions is currently, and will increasingly become, designated as non-BPA land. No part of the precinct, or any land for over 2.6 km around it, is covered by the Bushfire Management Overlay (BMO) (see Map 1). The site is within the Fire Rescue Victoria (FRV) legislated boundary.

Figure 1 - Croskell PSP location (shown in purple fill) with non-Bushfire Prone Areas shown in blue shading and the Urban Growth Boundary (UGB) shown in red outline (Google Earth imagery 22-03-2024).

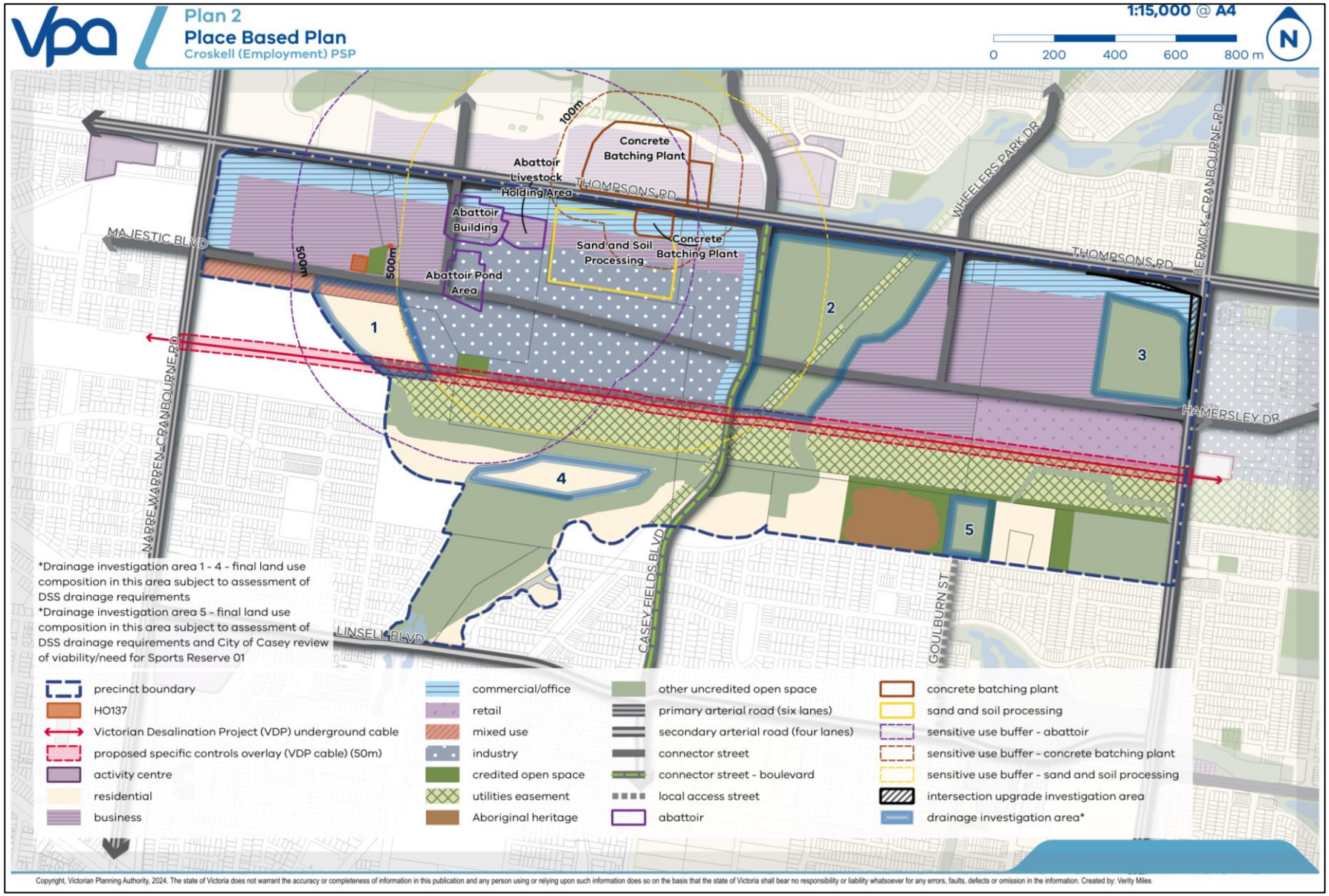


Figure 2 - Place Based Plan for the Croskell PSP (VPA, 2024).

3 Bushfire planning and building controls

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

3.1 Planning provisions

Clause 13 *Environmental Risks and Amenity* in the Planning Policy Framework (PPF) has several minor provisions that consider bushfire, two key provisions pertinent to bushfire.

3.1.1 Clause 12.02-1S River and riparian corridors, waterways, lakes, wetlands and billabongs

As the Croskell PSP will retain considerable areas of wetlands in drainage reserves adjacent to and intermixed with residential areas, this Clause may have implications for the site. Strategies of the Clause relevant to bushfire are:

- *'Retaining, enhancing and re-establishing indigenous riparian vegetation along waterway systems, ensuring it responds to the bushfire risk of a location.*
- *Retaining and re-establishing vegetation, including grasslands and canopy trees, surrounding waterway systems to enhance and connect to the landscape setting, ensuring it responds to the bushfire risk of a location'* (Casey Planning Scheme).

Once developed, the Croskell PSP will largely comprise low threat vegetation and non-vegetated areas, with most of the site eligible for exclusion from the BPA. However, the drainage reserves may not be eligible for exclusion and some areas of the site – including adjacent residential and commercial areas - may remain in the BPA. It is noted, however, that the drainage reserves that extend to the north of Thompsons Road have been excised from the BPA despite the presence of unmanaged vegetation (see Section 4.3).

3.1.2 Clause 13.01-1S Natural hazards and climate change

The objective of this Clause is to minimise the impacts of natural hazards and adapt to the impacts of climate change through risk-based planning. Strategies to achieve the objective are:

- *'Respond to the risks associated with climate change in planning and management decision making processes.*
- *Identify at risk areas using the best available data and climate change science.*
- *Integrate strategic land use planning with emergency management decision making.*
- *Direct population growth and development to low risk locations.*
- *Develop adaptation response strategies for existing settlements in risk areas to accommodate change over time.*
- *Ensure planning controls allow for risk mitigation and climate change adaptation strategies to be implemented.*

- *Site and design development to minimise risk to life, health, property, the natural environment and community infrastructure from natural hazards'* (Casey Planning Scheme).

Especially in southern and eastern Australia, since the 1950's there has been an increase in the length of the fire weather season and a greater number of higher risk days associated with climate change (CSIRO/BOM, 2022). The Australasian Fire and Emergency Service Authorities Council (AFAC) identify that a failure of building codes and land use planning to adequately adapt to climate change is a significant risk (AFAC, 2018).

This clause in the PPF supports the adoption of a precautionary and conservative approach to assessing and responding to bushfire risk. Fire weather is discussed further in Section 4.4.

3.1.3 Clause 13.02-1S Bushfire Planning

Clause 13.02-1S has the objective '*To strengthen the resilience of settlements and communities to bushfire through risk based planning that prioritises the protection of human life*' (Casey Planning Scheme). The policy must be applied to all planning and decision making under the Planning and Environment Act 1987, relating to land which is:

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

Clause 13.02-1S 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'* (Casey Planning Scheme).

Key strategies are stipulated in Clause 13.02-1S, 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 bushfire hazard in accordance with hazard identification and assessment strategies of Clause 13.02-1S and identifies the bushfire protection measures that will be required for future development in accordance with the settlement planning strategies. It is considered that development in the Croskell PSP can appropriately prioritise the protection of human life and meet the objective of Clause 13.02-1S. Key features to achieve this are appropriate subdivision design, including lot layout, perimeter roads and separation from hazardous vegetation during and after development. Minimum separation distances should ensure 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 3959-2018*' (Casey Planning Scheme).

A detailed response to the strategies in Clause 13.02-1S and recommendations for development are provided in Section 5.2.

3.1.4 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 (Casey Planning Scheme).

3.2 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 precinct is currently designated as a BPA, however, as development occurs, most, or all the precinct, will be excised from the BPA.

Note that land not within the BPA is defined as an area of low bushfire hazard, where the extent, configuration and/or management of vegetation results in low potential for bushfire spread (DELWP, 2019).

Figure 1, Map 2 and Map 1 show the extent of BPA coverage in and around the precinct and the surrounding broader landscape as the inverted or corresponding areas of non-BPA land; Figure 3

shows the actual coverage. Note that no part of the precinct, or land for over 2.6 km around it, is affected by the Bushfire Management Overlay (BMO).

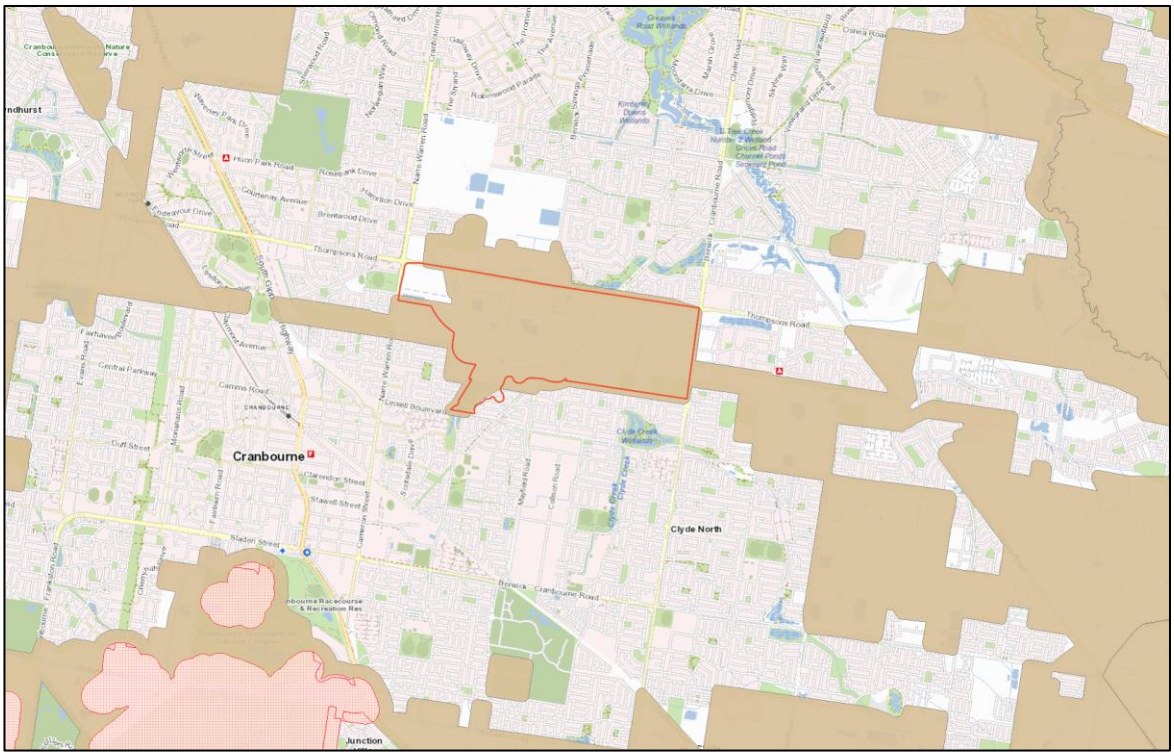


Figure 3 – BPA coverage (brown shading) and BMO to the south-west (pink shading) around the Croskell PSP (shown with red boundary) (Vicplan, 2024).

In a BPA, the Building Act 1993 and associated Building Regulations 2018, through application of the National Construction Code 2022 (NCC), require specific design and construction standards for Class 1, 2 and 3[1] buildings, certain Class 9 and 4 buildings[2] (see Section 3.2.1), and Class 10A buildings[3] or decks adjacent to, or connected with, these classes of buildings.

For Class 1 buildings (dwellings) and associated Class 10A buildings or decks, the applicable performance requirement in the NCC is:

'A Class 1 building or a Class 10a building or deck associated with a Class 1 building that is constructed in a designated bushfire prone area must be designed and constructed to—

(a) reduce the risk of ignition from a design bushfire with an annual exceedance probability not more than 1:50 years; and

[1] Class 1, 2 and 3 buildings are defined in the NCC 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] Applicable Class 9 buildings are Class 9a health-care buildings, Class 9b early childhood centres, primary and secondary schools, Class 9c residential care buildings, and any Class 4 parts of a building associated with these Class 9 buildings.

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

(b) take account of the assessed duration and intensity of the fire actions of the design bushfire; and
(c) be designed to prevent internal ignition of the building and its contents; and
(d) maintain the structural integrity of the building for the duration of the design bushfire. (ABCB, 2022).

The performance requirement for Class 1, 2 and 3 buildings and associated Class 10a buildings and decks, is deemed to be satisfied by design and construction in accordance with AS 3959-2018 *Construction of buildings in bushfire prone areas* and, for Class 1 buildings and associated decks, the NASH Standard – *Steel Framed Construction in Bushfire Areas* (NASH, 2021).

In a BPA larger developments and certain vulnerable uses, including applications for subdivision of more than 10 lots, are required by Clause 13.02-1S 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'* (Casey Planning Scheme).

There are no obstacles to future development in the Croskell PSP complying with the applicable strategies at Clause 13.02-1S and the building regulations invoked in a BPA. BAL-LOW land, where the BPA has been removed within the precinct, will be created as reliably low threat and non-vegetated areas are created as development progresses. The only land use areas anticipated to contain buildings of a class that would require a BAL, are those designated residential.

3.2.1 Vulnerable uses

In the BPA, applicable Class 9 buildings are Class 9a health-care buildings, Class 9b early childhood centres, primary and secondary schools, Class 9c residential care buildings, and any Class 4 parts of a building associated with these Class 9 buildings are considered to be a 'vulnerable use'.

These buildings must satisfy the applicable bushfire performance requirements of the National Construction Code (NCC) 2022. These include:

VIC G5P1

1) Reduce the risk of ignition from a design bushfire with an annual exceedance probability not more than 1:100 years, or 1:200 years for a Class 9 building.
2) Take account of the assessed duration and intensity of the fire actions of the design bushfire.
3) Be designed to prevent internal ignition of the building and its contents.
4) Maintain the structural integrity of the building for the duration of the design bushfire.

VIC G5P2

1) Reduce the risk of an untenable indoor environment for occupants during a bushfire event.
2) Be provided with vehicular access to the site to enable firefighting and emergency personnel to defend or evacuate the building.
3) Have access to a sufficient supply of water for firefighting purposes on the site.
4) Provide safe access within the site to the building (including carparking areas), as well as safe egress after the bushfire event.

Specification 43 applies as a deemed-to-satisfy compliance pathway. The measures include a minimum building setback from hazardous vegetation; Bushfire Attack Level (BAL) construction standard; setback from other buildings, property boundaries and car parks; water supply and emergency service access. Smaller greenfield sites may find it impracticable to comply with this Specification, in which case a performance solution would be required for building approval.

3.2.2 Excision

DTP 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 statewide hazard mapping criteria, including that the land needs to be:

- At least 300 m from areas of classified vegetation (except grassland) larger than 4ha in size; and
- At least 150 m from areas of classified vegetation (except grassland) 2 to 4ha in size; and
- At least 60 m from areas of unmanaged grassland more than 2ha in size (DELWP, 2019).

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, 2019).

3.3 Other controls

3.3.1 Zoning

The central area of the Croskell PSP site is Farming Zone - Schedule 2 (FZ2), with a corridor of Urban Floodway (UFZ) bisecting the site along the drainage line running on a north-east to south alignment. The north-east and south-east parts of the site are Urban Growth Zone (UGZ), separated by an east-west alignment of FZ along the 500 kV Hazelwood-Rowville transmission line easement. The western end of the site is in the General Residential Zone - Schedule 1 (GRZ1).

Of the existing zones, only land in the UFZ may have appreciable bushfire safety implications (when considered in relation to the drainage reserves proposed within the site) as it is likely to result in the retention of potentially hazardous vegetation adjacent to residential land, as is the

case where it abuts land in existing residential areas. Proposed drainage reserves will necessitate a response similar to that applied along Tangmere Way and Staunton Walk and will possibly see the retention of BPA coverage of land within 60m of retained vegetation.

Similarly, the FZ2 associated with the east-west power easement may see the retention of hazardous vegetation (noting that the same easement in other zones to the east and west of the site has seen the retention of the BPA over adjacent land). Other zones within the site have no implications for bushfire safety.

Land within the Croskell PSP boundary will be rezoned, with the existing Farm Zone and GRZ rezoned to UGZ, a SUZ zone will be applied to the easement and the schedule of the UGZ will be modified to incorporate applied zones for the residential/employment areas of the precinct. The new zoning and schedule alteration are unlikely to have appreciable bushfire safety implications.

It is noted that in many growth areas, schedules to the UGZ include a requirement that an application for subdivision includes a Site Management Plan that addresses bushfire risk during and, where necessary, after construction, including:

- *The staging of development and the likely bushfire risks at each stage.*
- *An area of land between the development edge and non-urban areas consistent with the separation distances specified in AS 3959-2018, where bushfire risk is managed.*
- *The land management measures to be undertaken by the developer to reduce the risk from fire within any surrounding rural or undeveloped landscape to protect residents and property from the threat of grassfire and bushfire; and*
- *How adequate opportunities for access and egress will be provided for early residents, construction workers and emergency vehicles.*

Similar controls feature in the Thompsons Road PSP to the east of the site, described as a 'Construction Management Plan' as documented at Section 3.3.3 below. This requirement helps to ensure that bushfire risk is managed during the construction period and given the potential for grassfire risk within the Croskell PSP, particularly prior to development and potentially during the construction period, it would be prudent to require this measure (or similar) as a condition of subdivision permits.

3.3.2 Overlays

Various parts of the Croskell PSP are covered by a range of Overlays and Schedules, including:

- Development Plan Overlay (DPO1)
- Development Contributions Plan Overlay (DCPO4)
- Environmental Audit Overlay (EAO)
- Heritage Overlay (HO137)
- Land Subject to Inundation Overlay (LSIO)
- Public Acquisition Overlay (PAO1, PAO2, PAO3)

- Specific Controls Overlay (SCO6)

Similar to the UFZ above, only the LSIO and associated proposed drainage reserves may have implications for bushfire within the site as it is likely to result in the retention of potentially hazardous vegetation adjacent to residential land. None of the other existing overlay controls are considered to have appreciable implications for bushfire safety.

3.3.3 Neighbouring PSPs

The site is bounded by or adjacent to five other PSPs:

- Cranbourne North (Stage 1) PSP
- Cranbourne North (Stage 2) PSP
- Clyde North PSP
- Thompsons Road PSP
- Cranbourne East PSP

Of these, only the Thompsons Road PSP addresses bushfire at O17:
'Objective 17 - Ensure that bushfire protection measures are considered in the layout and development of the local street network.

And at R30 and R31:
Requirement 30 - For the purpose of Clause 56.06-7, the requirements of the relevant fire authority are, unless otherwise approved by the CFA:
Constructed roads must be a minimum of 7.3m trafficable width where cars park on both sides, or:

  - *A minimum of 5.4 m in trafficable width where cars may park on one side only.*
  - *A minimum of 3.5 m width no parking and 0.5 m clearance to structures on either side, and if this width applies, there must be passing bays of at least 20 m long, 6 m wide and located not more than 200 m apart.*
- *Roads must be constructed so that they are capable of accommodating a vehicle of 15 tonnes for the trafficable road width.*
- *The average grade of a road must be no more than 1 in 7 (14.4% or 8.1˚).*
- *The steepest grade on a road must be no more than 1 in 5 (20% or 11.3˚) with this grade continuing for no more than 50 metres at any one point.*
- *Dips on the road must have no more than 1 in 8 grade (12.5% or 7.1˚) entry and exit angle.*
- *Constructed dead end roads more than 60 metres in length from the nearest intersection must have a turning circle with a minimum radius of 8 m (including roll over curbs if they are provided).*

Requirement 31 - Before the commencement of works for a stage of subdivision, a Construction Management Plan that addresses Bushfire Risk Management must be submitted to and approved

by the responsible authority and the CFA. The Construction Management Plan must specify, amongst other things:

- *Measures to reduce the risk from fire within the surrounding rural landscape and protect residents from the threat of fire.*
- *A separation buffer, consistent with the separation distances specified in AS3959-2009, between the edge of the development and non-urban areas.*
- *How adequate opportunities for access and egress will be provided for early residents, construction workers and emergency vehicles'* (VPA, 2014).

The bushfire controls of the Thompsons Road PSP address access in relation to the requirements of the relevant fire authority at Clause 56.06-7 where the requirements of Table C1 (at Clause 56.06-8) cannot be met. Although the site is within the FRV legislated boundary, CFA access requirements will apply in the residential areas of the site and can be found in the CFA publication *Design Requirements, Vehicle Access and Water Supply Requirements in Residential Developments,* Version 1, August (CFA, 2022).

4 Bushfire hazard assessment

One of the bushfire hazard identification and assessment strategies in Clause 13.02-1S, is to use the best available science to identify the hazard posed by vegetation, topographic and climatic conditions (Casey Planning Scheme). 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'* (Casey Planning Scheme).

This section includes an assessment of the hazard at the:

- Broader landscape scale, considering conditions beyond 1 km and up to 20 km around the site.
- The local and neighbourhood scale up to 1 km around the site; and
- The site scale up to 150 m around the precinct boundaries, including classifying vegetation and topography to determine future BAL construction standards that could be achieved within the precinct.

Note that the BPA coverage invokes AS 3959-2018 *Construction of buildings in bushfire prone areas* to determine an applicable BAL(s), which requires assessment of the vegetation and topography up to 100 m around a building or site (Standards Australia, 2020). For vulnerable uses and larger developments in a BPA, a 150 m assessment zone may be required (DELWP, 2018a). Whilst the bushfire risk to the precinct is relatively low, as a precaution for strategic planning purposes, a 150 m assessment area has been applied at the site scale.

Map 1 shows a 20 km landscape assessment area around the precinct, Map 3 shows the 1 km local and 400 m neighbourhood assessment areas, and Map 4 shows the 150 m site assessment area around the precinct. Map 6 shows a 100 m BAL assessment area around development areas that are likely to contain buildings that require a BAL.

4.1 Broader landscape scale conditions

4.1.1 Location description and context

The Croskell PSP is located toward the centre of the City of Casey, in Melbourne's southeast growth corridor. It is approximately 52 km (50 mins travel) by road from the Melbourne CBD (Google Earth online, 2023) (see Figure 1 and Map 1), in a largely urban area in Melbourne's southeast growth corridor with land being transformed from predominantly pasture to residential, commercial and industrial land uses.

The broader landscape is characterised by:

- To the north of the site, the urban area extends over 10 km to Lysterfield Park.
- To the east of the site, the urban area extends approximately 4 km and is expanding further as the growth area is developed.
- To the west, the urban area extends several kilometres to the predominantly flat grasslands between Cranbourne and the Skye/Carrum Downs area, and then the urban area to Port Phillip Bay.
- To the south of the site, the landscape is predominantly urban in nature for approximately 4 km, giving way to a mosaic of pastoral land, horticulture and rural living properties up to the shores of Westernport Bay approximately 16 km away.

The designated BPA covers most of the 20 km landscape assessment zone to the north, south and east, except for the denser urban areas of Officer/Pakenham. The BMO covers all large areas of treed vegetation, such as to the north-west in the Dandenong Range, and including the Royal Botanic Gardens - Cranbourne and the Woodland north of the racecourse.

There is an extensive fire history within 20 km, generally at a distance such that they are not of direct relevance to the site and predominantly in the larger forested areas to the north-east (Upper Beaconsfield, Cockatoo and surrounds were burnt in the 1983 Ash Wednesday bushfires with significant loss of life and property) and on French Island to the south. Smaller fires have occurred frequently in the bushland around Frankston.

The bushfire threat from all directions is very low. There is no credible scenario in which the site could be approached by a bushfire of the scale and intensity envisioned by AS 3959-2018. The only scenario is a locally ignited grassfire that could burn within the site and affect developing stages and neighbouring land.

A comprehensive local road network provides ready access to lower threat areas in all directions around the site.

4.1.2 Broader landscape risk type

Whilst there is no BMO coverage in, or near to the site, to assist in assessing landscape risk, four 'broader landscape types', representing different landscape risk levels, are described in the technical guide *Planning Applications Bushfire Management Overlay*. These are useful descriptors to apply, which are intended to streamline decision-making and support more consistent decisions based on the landscape risk (DELWP, 2017).

The four types range from low risk landscapes, where there is little hazardous vegetation beyond 150 m 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 3959-2018 presumptions (see Table 1).

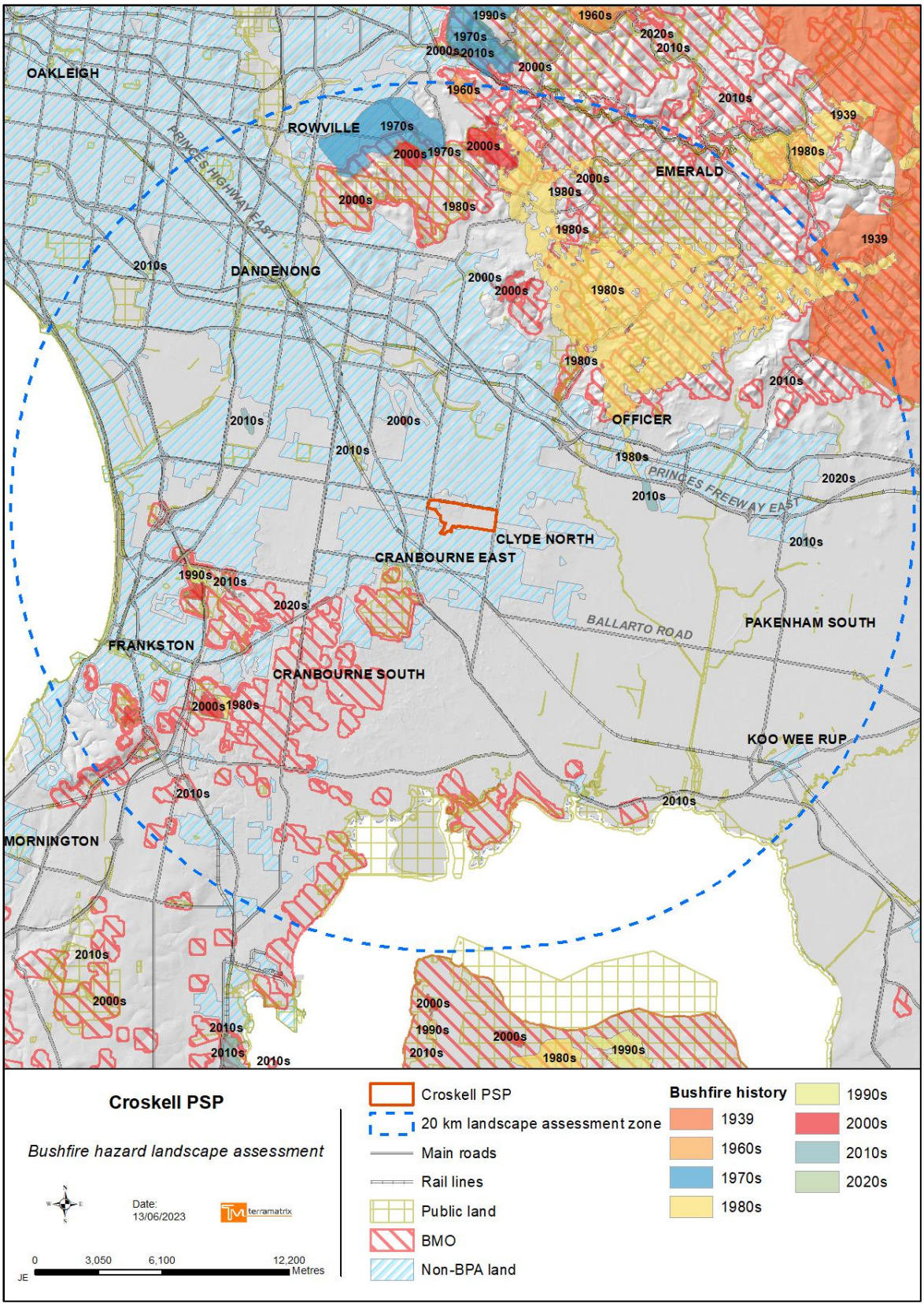
Table 1 - Landscape risk typologies (from DELWP, 2017).

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.* • *Evacuation options are limited or not available.* • *Fires have hours or days to grow and develop before impacting.*
I N C R E A S I N G R I S K →			

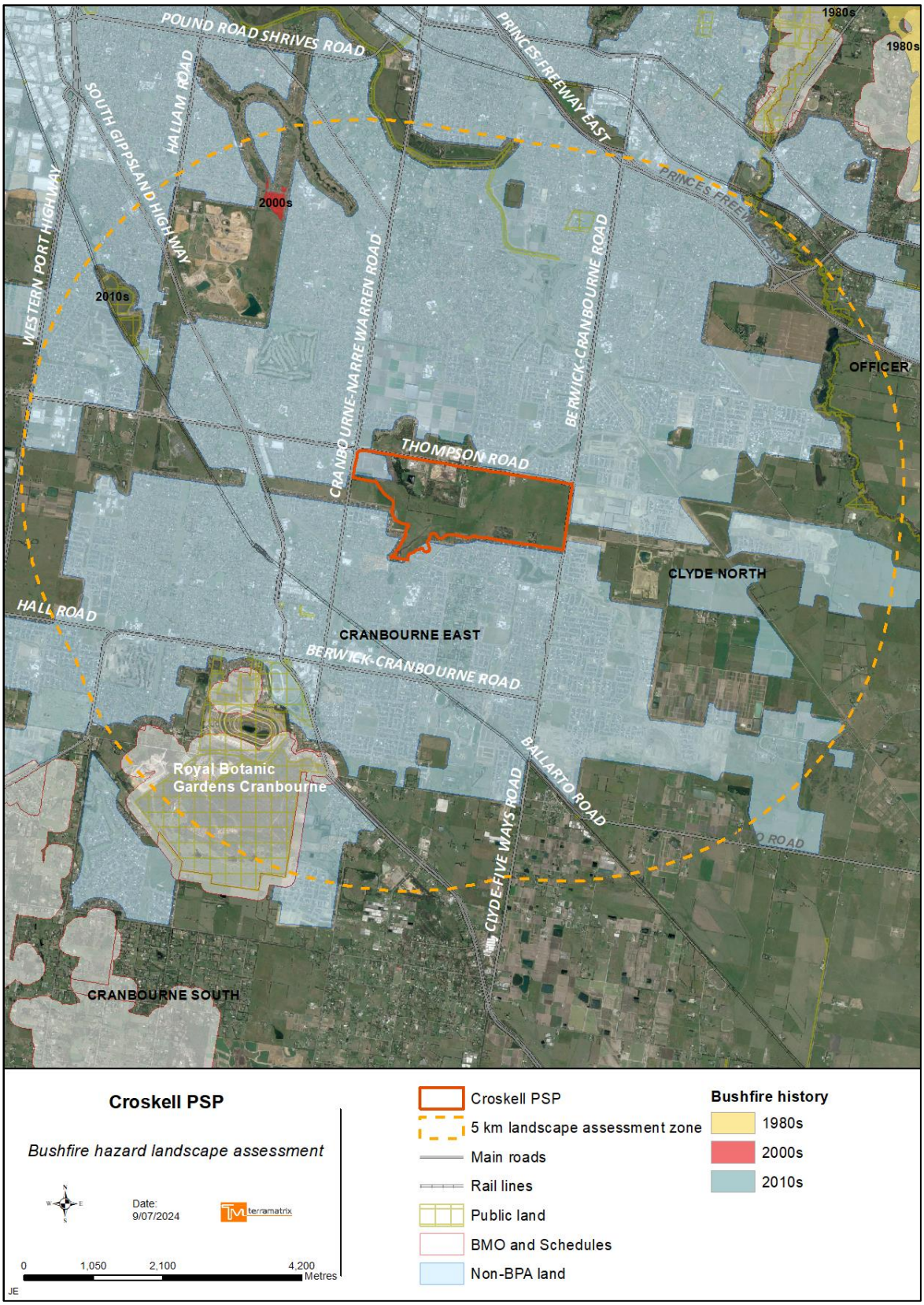
The characteristics of the Croskell PSP best accord with those of the lesser risk Landscape Type 1. Within 4 km of the precinct, there is little hazardous vegetation except for remnant Grassland in easements and undeveloped properties. The areas of trees and shrubs that occur are small and confined to relatively narrow strips along the creeks, drainage lines and roadsides. They do not pose a significant hazard that could generate large-scale fire behaviour. Bushfire behaviour with the potential for neighbourhood-scale destruction is not credible, with the site itself forming the only large area of potentially hazardous vegetation for many kilometres.

Much of the land for several kilometres around the precinct in all directions is not designated as a BPA. The nearest areas of higher hazard vegetation with bushfire risk potential are the patches of Forest and Woodland that occur approximately 2.6 km to the south-west in the Royal Botanic Gardens - Cranbourne and the Woodland north of the racecourse. The higher risk associated with these areas is denoted by the BMO coverage (see Map 1).

Although the Clause 13.02-1S methodology specifies assessment at 20 km (see Map 1), 1 km and 400 m (see Map 3), a 5 km assessment has been added to provide a more detailed assessment of the immediately surrounding landscape (see Map 2).



Map 1 - Bushfire hazard broader landscape map.



Map 2 – 5 km landscape assessment zone.

4.1.3 Regional bushfire assessments and strategies

Metropolitan Bushfire Management Strategy 2020

Strategic bushfire management planning in Victoria is jointly delivered by Forest Fire Management Victoria (FFMVic), Country Fire Authority (CFA), Emergency Management Victoria (EMV) and local governments. A key output is a Bushfire Management Strategy for each of the six planning regions. Each strategy informs more detailed operational-level planning, including municipal fire prevention planning, the CFA and FFMVic joint fuel management program, and readiness and response planning.

The Croskell PSP is in the region covered by the Metropolitan Bushfire Management Strategy. No specific issues in the strategy are identified pertaining to the precinct. House loss modelling shows the precinct is in a least risk part of the region (DELWP, 2020b).

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 Casey City Council LGA. It does not identify any bushfire issues for the precinct or wider area (DPCD, 2012).

Casey City Council Municipal Fire Management Plan (MFMP) and Municipal Emergency Management Plan (MEMP)

There is no specific information in the Casey City Council MFMP pertinent to the precinct or this assessment. However the Casey City Council MFMP identifies the 500kV transmission lines as a potential bushfire hazard, with a rating of 'Very High', based on a 'Moderate' consequence rating and an 'Almost Certain' likelihood rating (Casey City Council, 2018). Treatments are in the '400 series' of treatments, which relate to 'preparedness' and focus on management plans and assets such as water supply.

4.2 Local and neighbourhood conditions

4.2.1 Risk factors

There are no significant risk factors in the landscape within the 1 km local or 400 m neighbourhood areas defined in the hazard assessment strategies of Clause 13.02-1S. The hazard comprises Grassland in and around (such as in the power easements to the east and west) the precinct, and small, typically small or narrow patches of Scrub that are mainly associated with the Thompsons Road/The Avenue wetlands, and the area of Woodland to the north-west between 150m and 500m from the site (see Map 3).

The topography outside of the site is largely flat or upslope (rising slightly to the north-west) and will not exacerbate fire behaviour.

4.2.2 Bushfire scenarios

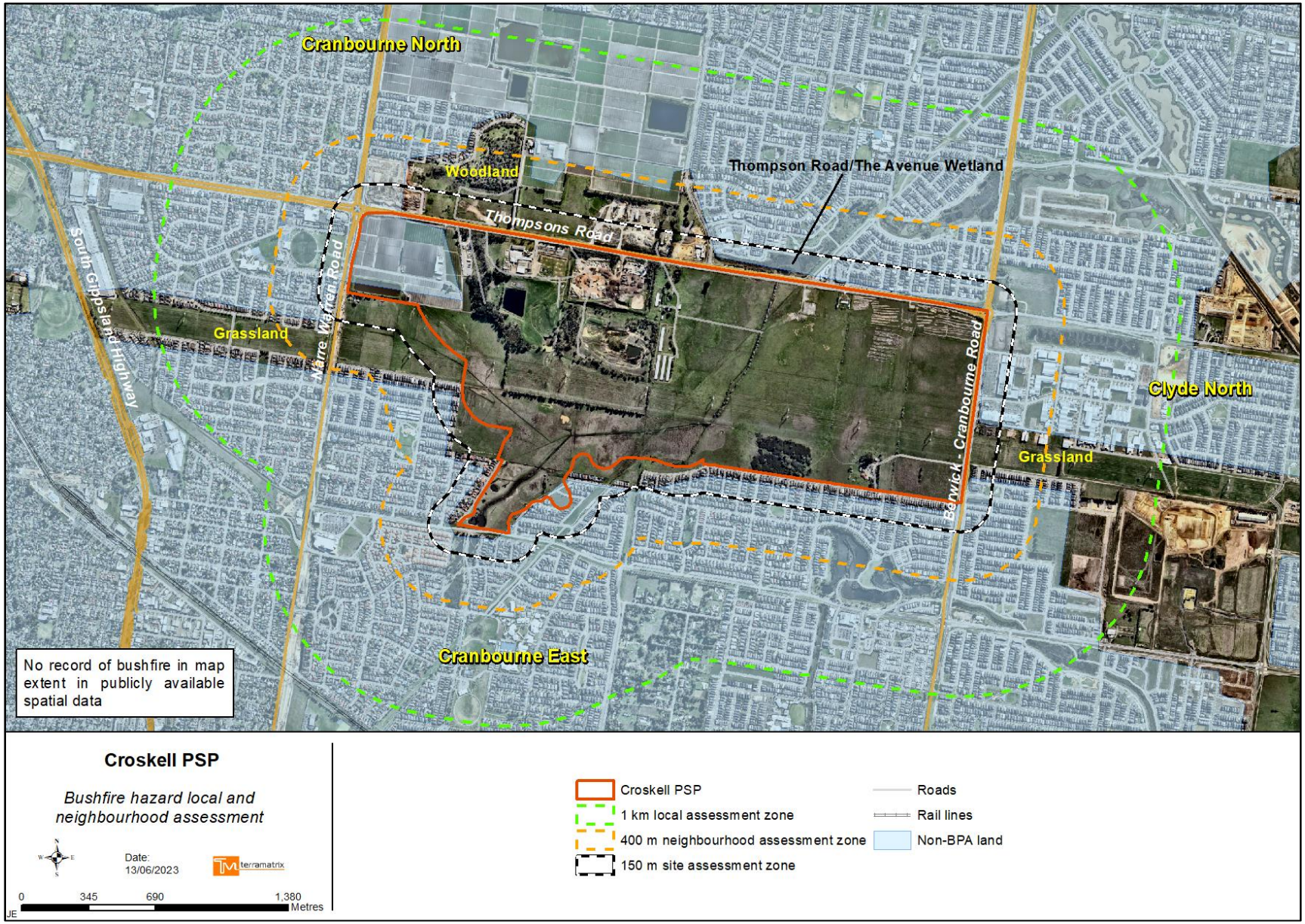
There is no credible scenario in which the site could be approached by a bushfire of the scale and intensity envisioned by AS 3959-2018. However, a locally ignited fire could burn within the site and affect developing stages and neighbouring land.

Fires from the north, west or southwest are the directions of highest threat, as they are typically associated with the predominant wind direction during elevated fire danger weather in Victoria (Long, 2006). The pattern and scale of existing and future residential and commercial development in these (and other) directions has removed or significantly lessened the risk, and the impacts associated with an Ash Wednesday-type scenario in the landscape to the north in the Lysterfield Park or Dandenong Ranges would be confined to smoke.

The risk can be acceptably mitigated by providing appropriate measures during development, setbacks from the unmanaged vegetation, including perimeter roads to assist in fire fighting where a permanent bushfire hazard interface occurs, a reticulated hydrant system as subdivision occurs, and BAL construction standards for buildings if required by the building regulations (see Section 3.2).

Note that whilst grassfires can be fast, unpredictable and life threatening, they do not typically generate significant ember attack or intensities that would contribute to penetration and destruction of an established residential area.

Note also that as identified in Section 5, non-BPA land will be created across much of the precinct once reliably low threat and non-vegetated areas are established as development commences. Access for people in the precinct will be readily available to these reliably low threat or non-vegetated areas that can function as places of relative safety from bushfire.



Map 3 - Bushfire hazard local and neighbourhood assessment map.

4.3 Site scale conditions

The AS 3959-2018 site assessment methodology is invoked by Clause 13.02-1S to assess the bushfire risk at the site scale, and by the building regulations to determine BAL construction standards for defined classes of buildings in a BPA. It requires classification of the vegetation and topography within 100 m of a site or building.

Whilst the bushfire risk to the precinct is low, as a precaution for strategic planning purposes, a 150 m assessment area around the precinct boundary has been applied for the site scale assessment (see Map 4 and Map 7).

A 100 m BAL assessment area is also shown on Map 6, to identify the potential for classified vegetation to occur within 100 m of buildings that are likely to require a BAL, i.e. those areas proposed for residential use in the Place Based Plan.

4.3.1 Vegetation

Classified vegetation is vegetation that is deemed hazardous from a bushfire perspective and is classified in accordance with the AS 3959-2018 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.

The extent and types of vegetation that may be retained or created in the Croskell PSP is not able to be determined definitively, however, proposed revegetation of drainage areas based on Ecological Vegetation Classes (EVCs) has been used to derive AS 3959 vegetation groups and the descriptions of potential classified vegetation (see Map 7). Based on existing vegetation and the potential for future regeneration or revegetation, assumptions have been made to illustrate potential (indicative) development setbacks. These setbacks – or a variation of them – would apply to any area of retained or created vegetation that is not eligible for exclusion from classification (see Section 4.3.2.) These assumptions are:

- The potential retention of areas or groups of trees in the existing quarry area and neighbouring properties.
- The likely retention of the area of Scrub in the Cultural Heritage Investigation Area in the south-east of the site.
- The revegetation of drainage areas based on EVCs as Grassland, Scrub or Forest.
- The likely retention of Grassland within the utilities easement and areas of drainage reserves not otherwise defined.

- The likely presence of Grassland vegetation on adjacent and nearby land within 150m of the site.

The vegetation included in these assumptions is shown at Map 4 for the whole site, with Map 7 showing the classified vegetation within the 100m assessment zone around residential areas only where the need for setbacks and a BAL construction standard is most likely.

Forest

Areas of proposed and remnant treed vegetation with a well-developed shrubby understorey and overall tree canopy cover greater than 30%, accord best with the AS 3959-2018 Forest group. The Forest comprises the Open Forest or Low Open Forest vegetation types, which typically have a canopy of trees to 30 m high, with 30-70% overall foliage cover including an understorey of sclerophyllous low trees and tall scrubs (Standards Australia, 2020).

Some areas of the drainage reserves and nearby land within the site will be revegetated as *EVC 83 - Swampy Riparian Woodland* and has been allocated to the Forest group. Swampy Riparian Woodland has a 20% benchmark tree canopy cover and the descriptions of this vegetation class is: *'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 stream levees in combination with large tussock grasses and sedges in the ground layer'* (DSE, 2004a). These areas are shown as Forest on Map 4.

Whilst Forest typically has a canopy of Eucalypts, it includes pine plantations and in places mature pine trees dominate the tree canopy on the western boundary of 1500 Thompsons Road (see Figure 4) with native vegetation on the eastern boundary of 1520 Thompsons Road (see Figure 5). On the western side of the quarry at 1520 Thompsons Road, on the boundary with No. 1500, a larger area of treed vegetation has been assessed as Forest. Other fragments of denser treed vegetation occur on the northern boundary of 1520, 1568 and 1580A and Thompsons Road (see Map 4 and Map 5).

Figure 4 – Looking east-south-east at the south-western part of 1500 Thompsons Road that is dominated by pine trees.

Figure 5 – Looking south-west at native vegetation on the eastern boundary of 1520 Thompsons Road.

Woodland

Where overall foliage cover in the canopy is less than 30%, and shrubs in the understorey are sparse, vegetation may comprise Woodland, which has the following typical characteristics: '*Trees up to 30 m high; 10%–30% foliage cover dominated by eucalypts and/or callitris with a prominent grassy understorey. May contain isolated shrubs*' (Standards Australia, 2020).

Woodland occurs around the quarry site at 1520 Thompsons Road (see Figure 6), blending into denser Forest in places. The southern fringe of the quarry incudes a lower density line of trees (<10% canopy cover) that meets the descriptor of 'Open Woodland', which is in the Grassland vegetation classification of AS 3959-2018 (see Figure 9, Map 4 and Map 5).

Figure 6 – Woodland on the south-eastern boundary of 1520 Thompsons Road.

Scrub

The vegetation in the Cultural Heritage Investigation Area in the south-eastern part of the site best accords with the AS 3959-2018 classification of Scrub (see Figure 7), comprising the Closed Scrub vegetation type, which is defined as:
'*Found in wet areas and/or areas affected by poor soil fertility or shallow soils; >30% foliage cover. Dry heaths occur in rocky areas. Shrubs >2 m high. Typical of coastal areas and tall heaths up to 6 metres in height. May be dominated by Banksia, Melaleuca or Leptospermum with heights of up to 6 metres'*.

The Scrub group also includes the Open Scrub vegetation type, which is defined as '*Shrubs greater than 2 m high; 10–30% foliage cover with a mixed species composition'* (Standards Australia, 2020) (Map 4 and Map 5).

This classification matches the description for *EVC No. 53 Swamp Scrub,* which is *'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, 2004b). This EVC is planned for areas of the drainage reserves and has been classified as Scrub as shown on Map 5.

Figure 7 - Scrub within the Cultural Heritage Investigation Area, abutting Donahue Street in the south-east of the Croskell PSP.

Grassland

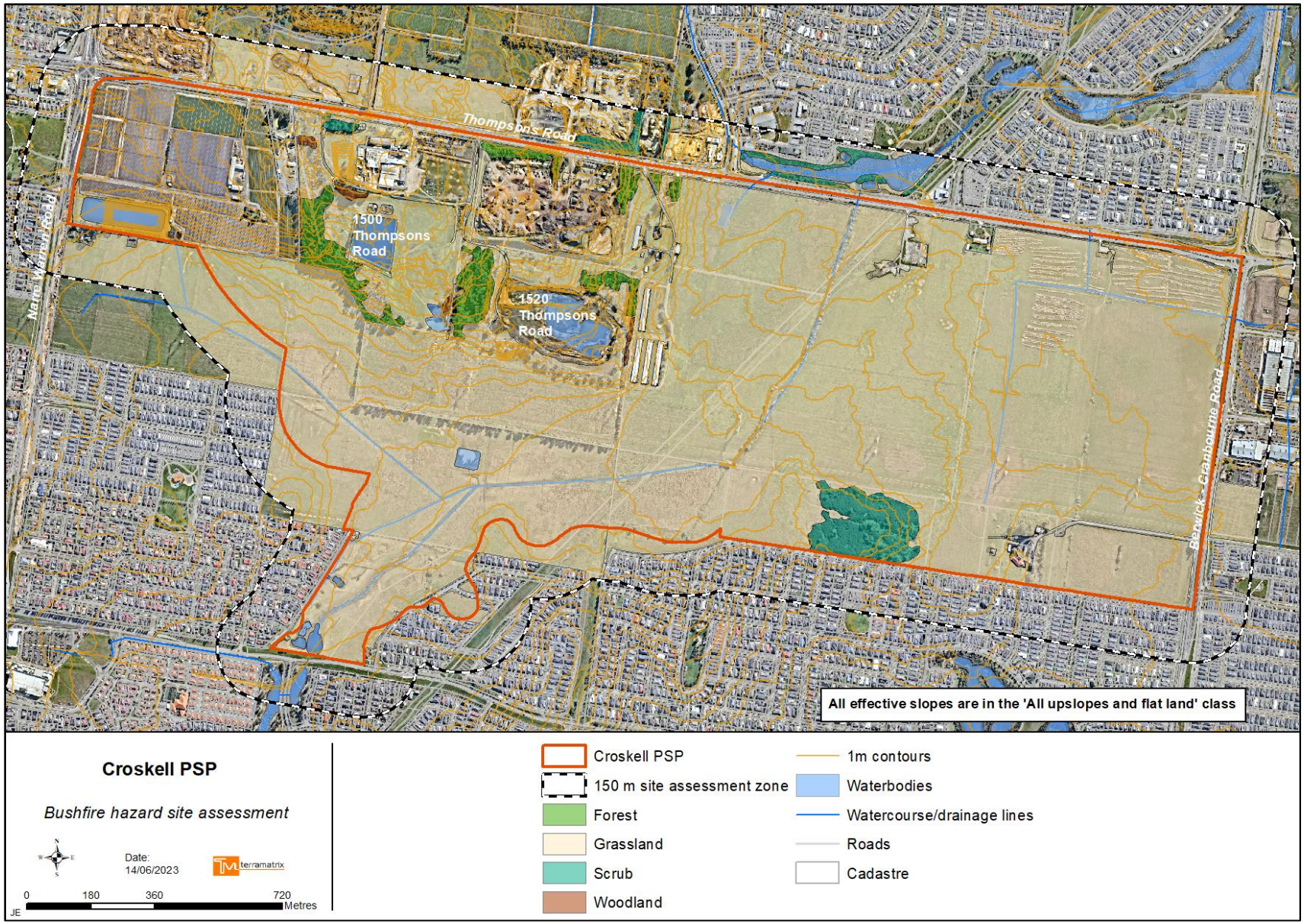
Areas of grassy vegetation with an overstorey foliage cover of less than 10%, are classifiable in the Grassland group of AS 3959-2018, which is defined as '*All forms* (of vegetation except tussock moorlands) *including areas with shrubs and trees, if the overstorey foliage cover is less than 10%'* (Standards Australia, 2020). Grassland includes open woodland, pasture and cropland except for non-curing crops.

Grassland vegetation is considered hazardous, and therefore classifiable, when it is unmanaged i.e. >100 mm tall. A conservative and precautionary approach should be adopted, of assuming grassland areas will be unmanaged and classifiable unless they are reasonably assured to be managed in perpetuity, in a low threat state, no more than 100 mm high. However, if any grassland areas are mown or slashed and maintained in a low threat state during the fire danger period, they may meet one or more of the exclusion criteria and not be classifiable (see Section 4.3.2).

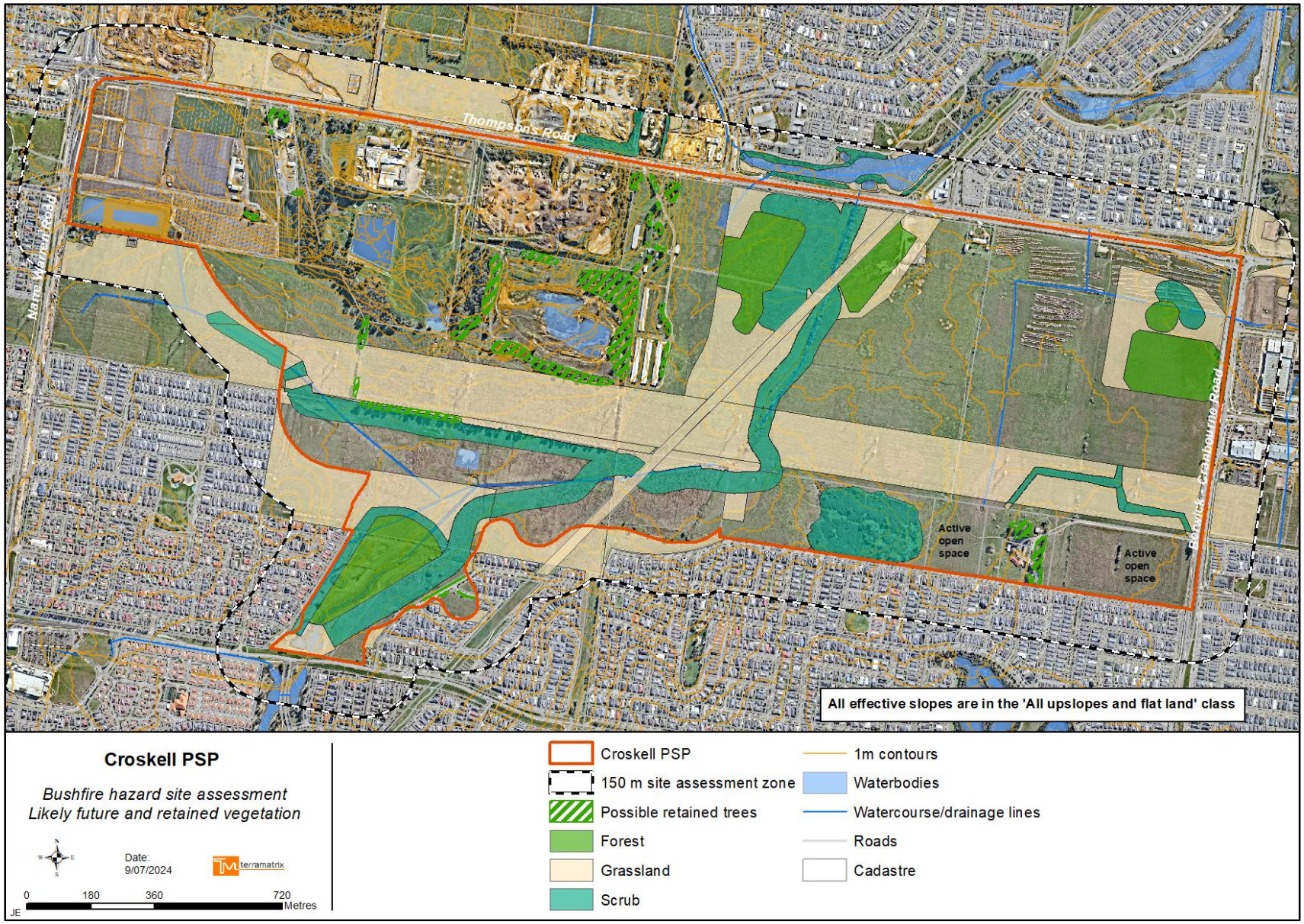
The majority of the site, and some patches on adjoining land, comprise Grassland (see Map 4, Map 5, Figure 8 and Figure 9). As noted above, it is assumed that the utilities easements and drainage reserves will comprise Grassland; where this assumption is incorrect, the need for setbacks as discussed at Section 5 will be altered.

Figure 8 – Grassland to the south of 1500 Thompsons Road, extending through the utilities easement and future drainage reserves to Bales Road and Linsell Boulevard.

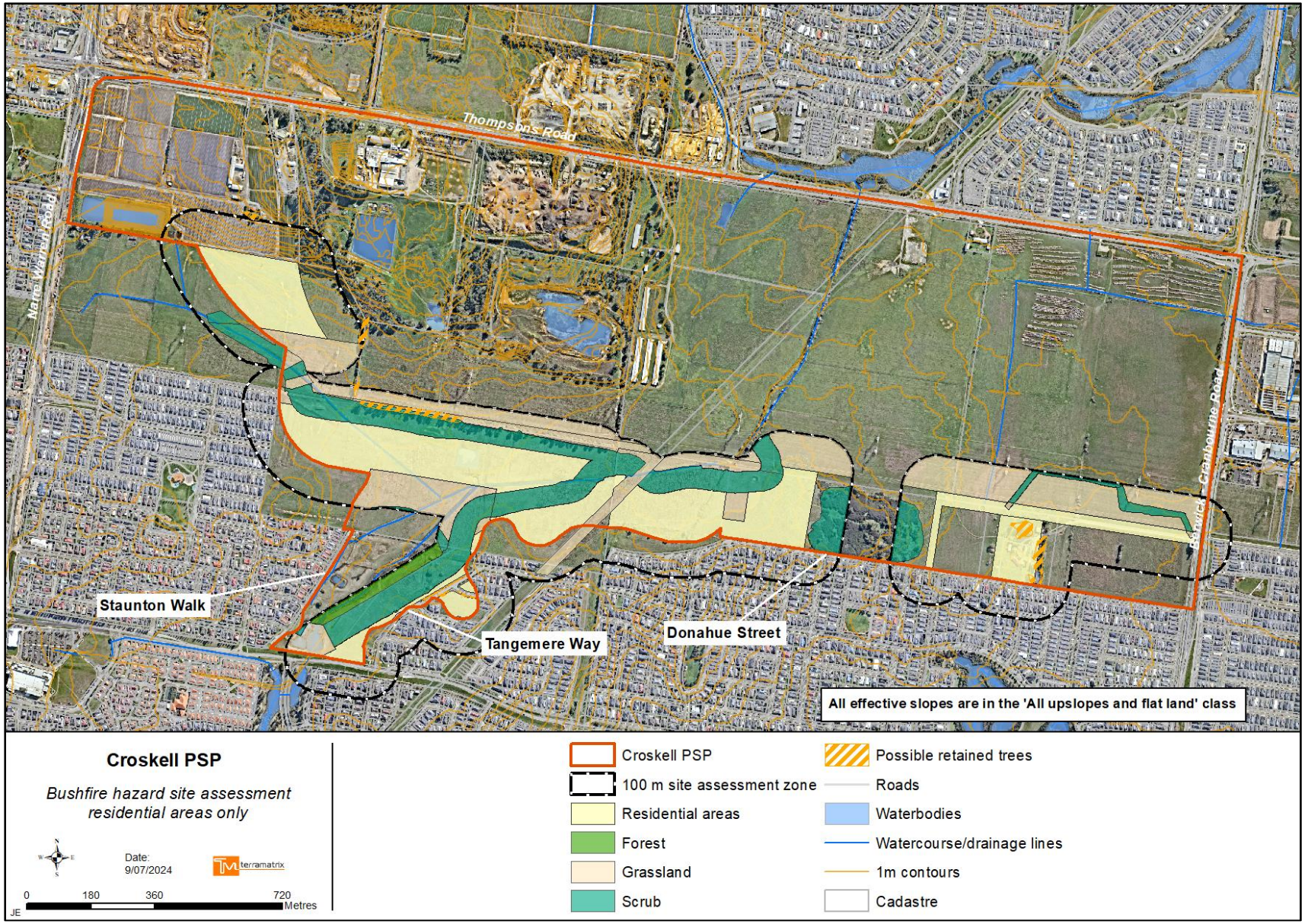
Figure 9 – Open Woodland classified as Grassland in the southern part of 1520 Thompsons Road.



Map 4 – Bushfire hazard site assessment map showing 150 m site assessment area around entire site with existing vegetation.



Map 5 - Bushfire hazard site assessment – 2, showing 150 m site assessment area with likely future vegetation.



Map 6 - Showing 100 m BAL assessment area around residential areas of the Croskell PSP that will likely contain buildings requiring a BAL (see Section 3.2).

4.3.2 Excluded vegetation and non-vegetated areas

Areas of low threat vegetation and non-vegetated areas can be excluded from classification and be deemed non-hazardous for determining BALs, in accordance with Section 2.2.3.2 of AS 3959-2018, if they meet one or more of the following criteria:

(a) 'Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

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

2 *A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees'* (Standards Australia, 2020).

It is reasonable to assume that land in the residential, industrial and commercial parts of the precinct will be either non-vegetated or comprise low threat vegetation such as maintained lawns, cultivated gardens, streetscapes and other landscaped areas. It is also assumed that any future local parks will be managed in a low threat state.

The proposed drainage reserves – other than those designated for revegetation as shown on Map 4 - may not be low threat and it has been assumed will comprise Grassland. The structure, size and setback from development of any vegetation within these areas, and how the vegetation is managed during the fire danger period, will determine whether they are non-hazardous vegetation. Note that the land between Staunton Walk and Tangmere Way in the southern part of the site currently contains areas of managed and unmanaged vegetation (see Figure 11). As the management of the grass may vary, this area (some of which will become residential land and part drainage reserve) is not considered eligible for exclusion from classification.

Areas of treed vegetation or bushland that have been excluded include narrow strips of roadside vegetation and single rows of trees that comprise windbreaks.

Figure 10 – Land used for horticulture in 1500 Thompsons Road in the west of the site is non-hazardous and excluded from classification.

Figure 11 – Land between Staunton Walk and Tangmere Way forming a drainage area (and potential future residential area) classified as Grassland.

4.3.3 Topography

AS 3959-2018 requires that the 'effective slope' be identified to determine the BAL and applicable development setback distances from classified vegetation. 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 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˚[4].

The Croskell PSP is largely flat, with the north-western quarter rising away from the centre to Thompsons Road. The area generally comprising 1500 and 1520 Thompsons Road slopes up to the north-west, with some more topographically complicated areas on a small scale associated with the quarry and current land use. These minor changes in elevation are not considered relevant to bushfire risk.

[4] For downslope gradients over 20˚ and up to 30˚, the detailed 'Method 2' procedure of AS 3959-2018 is used to determine the BAL.

For the purposes of this bushfire assessment, land in the precinct and surrounding landscape is effectively flat, without any significant changes in elevation that would appreciably influence bushfire behaviour.

Therefore, for the purposes of determining BALs and building-vegetation setback distances for future development for the site, the applicable slope class for all vegetation types is likely to be 'All upslopes and flat land'.

4.4 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 a BAL based on building setback distances from classified vegetation in accordance with AS 3959-2018.

The indices were 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. However, since September 2022 the FFDI/GFDI have been replaced by the Fire Behaviour Index (FBI) as a new Australian Fire Danger Rating System (AFDRS) for determining FDRs in all jurisdictions. Table 2 displays the new FDRs, their FBI range, the anticipated fire behaviour and recommended actions for each FDR.

Note that the new AFDRS and FBIs do not correlate directly with the FFDI/GFFDI indices applied in the planning and building system. However, the benchmark FFDI 100 used to represent a 'one size fits all' model of extreme fire weather conditions (and the threshold for the previous ‘Code Red’ FDR), can be considered analogous to the new FBI 100 ‘Catastrophic’ FDR. Note that these extreme conditions have been exceeded during significant fire events, including at some locations in Victoria on ‘Black Saturday’ 2009. Therefore, it is important to note that this FDR threshold is not necessarily the *worst-case* conditions for any particular location, including the Croskell PSP area.

Additionally, as identified in Section 3.1.2, in southern and eastern Australia since the 1950’s there has been an increase in the length of the fire weather season and an increase in extreme fire weather (CSIRO/BOM, 2022). The trend of a longer fire season and increased number of dangerous fire weather days is projected to continue. Climate change is contributing to these changes in fire weather including by affecting temperature, relative humidity and associated changes to the fuel moisture content (CSIRO/BOM, 2023).

The Melbourne Metropolitan Bushfire Management Strategy also states that in Victoria climate change is forecast to extend the length of the fire danger period, make bushfires larger, more severe and frequent, and increase the frequency of days of elevated fire danger (DELWP, 2020b).

Climate change trends associated with the risk of bushfire, support the adoption of a precautionary and conservative approach in identifying and responding to the risk. However, as CFA and DELWP have no published policy on FFDI recurrence intervals there is 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[5].

Table 2 - Fire Danger Ratings (Victoria State Government, 2022).

Forest Behaviour Index	Fire Danger Rating (FDR)	Fire Behaviour	Action
>=100	Catastrophic	If a fire starts and takes hold, lives are likely to be lost.	○ These are the most dangerous conditions for a fire. ○ Your life may depend on the decisions on you make, even before there is a fire. ○ For your survival, do not be in bushfire risk areas. ○ Stay safe by going to a safer location early in the morning or the night before. ○ If a fire starts and takes hold, lives and properties are likely to be lost. ○ Homes cannot withstand fires in these conditions. You may not be able to leave and help may not be available.
50-99	Extreme	Fires will spread quickly and be extremely dangerous.	○ These are dangerous fire conditions. ○ Check your bushfire plan and that your property is fire ready. ○ If a fire starts, take immediate action. If you and your property are not prepared to the highest level, go to a safer location well before the fire impacts. ○ Reconsider travel through bushfire risk areas. ○ Expect hot, dry and windy conditions. ○ Leaving bushfire risk areas early in the day is your safest option.
24-49	High	Fires can be dangerous.	○ There is a heightened risk. Be alert for fires in your area. ○ Decide what you will do if a fire starts. ○ If a fire starts, your life and property may be at risk. The safest option is to avoid bushfire risk areas.
12-23	Moderate	Most fires can be controlled.	○ Stay up to date and be ready to act if there is a fire.

[5] In Alpine areas of Victoria an FFDI 50 applies for determining BALs using Method 1 of AS 3959-2018.

5 Planning and design response

This section identifies how future development in the precinct can respond to the bushfire risk. It includes an assessment against the objective and strategies of Clause 13.02-1S, published guidance on settlement planning and the building regulations applicable to construction in a BPA.

5.1 Settlement Planning Guidelines

This section provides a summary assessment of how the proposal can incorporate the *Design Guidelines for Settlement Planning at the Bushfire Interface* (DELWP, 2020a) as appropriate. The section structure and headings follow that of the guidelines.

5.1.1 Settlement form and structure

Considering the bushfire hazard in directing growth

This report has assessed the bushfire hazard in relation to broader landscape considerations, neighbourhood and local conditions, and conditions at the site scale. The surrounding landscape contains little classified vegetation and is low risk.

The location enables quick access to large urban areas of relative bushfire safety and a fast and well-resourced emergency service response can be expected.

Large areas of non-BPA (BAL-LOW) land occur around the Croskell PSP and will likely be extended over most of the precinct once reliably low threat and non-vegetated areas are created by future development. The existing and future BAL-LOW areas are immediately accessible and provide places of relative safety from bushfire.

The distribution of land uses in the settlement

The proposed land uses in the precinct are primarily industrial and commercial, with smaller residential areas south of the east-west transmission easement. The areas proposed for conventional urban-residential development are sited close to a potential permanent Grassland interface within the drainage reserves and transmission easement. Whilst they abut areas of Grassland (and potentially one small area of Scrub, if retained), this vegetation is unlikely to pose a significant hazard and appropriate setbacks from the retained classified vegetation can acceptably mitigate any risk.

Lot sizes in settlement layout

The settlement planning guidelines consider that in bushfire interface areas lot sizes between 800 m^2 and 1,200 m^2 provide a good balance between the risk of larger lots retaining more vegetation within a residential area, and smaller lots providing an increased risk of house-to-

house ignitions or increased house losses from ember attack due to the higher housing density (DELWP, 2020a).

However, given the low risk location of the Croskell PSP, there is no justification for requiring larger lot sizes in any parts of the precinct to meet the suggested optimal lot size. All the precinct is suitable for higher density conventional urban residential development or industrial/commercial uses on a range of lot sizes.

Vegetated areas within a settlement

As identified in Section 4.3.2, some but not all of the land in the precinct can be expected to be either non-vegetated or comprise low threat vegetation such as maintained lawns, cultivated gardens, streetscapes and other landscaped areas. It is also reasonable to assume that any proposed local parks will be managed in a low threat state.

The proposed drainage reserves may, however, not be low threat. The structure, size and setback from development of any vegetation within them, and how the vegetation is managed during the fire danger period, will determine whether they are deemed to be non-hazardous vegetation. Irrespective, it is recommended that minimum 19 m development setbacks be provided from them, which is the minimum setback distance required for BAL-12.5 construction from Grassland and Shrubland. Other, larger, setbacks will be required as shown on Map 7 in response to areas of Scrub or Forest; these setbacks will apply as shown inf the vegetation distribution created as upon completion of the revegetation of the drainage reserves matches that shown. Where the eventual revegetation works vary from those proposed, the distribution of setbacks will also vary. Th 19 m setbacks should be provided in the form of a perimeter road (see Section 5.1.2). Note that this approach has been applied within the existing urban areas along the southern boundary of the site where they interface with bushfire hazard, such as along the previously mentioned Bales Road, Staunton Walk, Tangemere Way and Donahue Street.

Retarding basins to mitigate the flood threat or other water sensitive urban design (WSUD) features with managed grass, reliably open water or wet areas and little or no vegetation, may be deemed low threat. Large, seasonally inundated wetlands or WSUD features that may be dry and be vegetated during the fire danger period could, however, comprise classifiable vegetation. Accordingly, it is recommended that minimum 19 m development setbacks also be provided from them, in the form of a perimeter road.

5.1.2 The settlement interface

Applying the required development setbacks

To satisfy key settlement planning strategies of Clause 13.02-1S development, especially future dwellings and other buildings requiring a BAL (see Section 3.2), must be sufficiently setback from classified vegetation to ensure no more than a BAL-12.5 construction standard applies (see Figure 12 and Appendix A).

The strategies aim to strengthen the resilience of settlements and communities and prioritise protection of human life, including by:

- *'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[6] under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).*
- *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 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009)'* (Casey Planning Scheme).

The indicative setbacks are shown in Map 7 to illustrate the distances future development would need to be from the utilities easement, Cultural Heritage Investigation Area, the drainage reserves and any areas of retained vegetation. A table of possible vegetation types and commensurate setback distances is provided for other areas of existing or potential future vegetation (see Table 3).

The BAL-12.5 building setback[7] distances required in response to potential or planned classified vegetation in the applicable 'All upslopes and flat land' slope class (see Section 4.3.3) are provided in Table 3 below and indicative locations for these setbacks are shown in Map 7.

Vegetation unlikely to be retained, or otherwise excludable from classification, is shown on Map 7 but setbacks not applied. The setbacks shown are indicative only and any variation to the management or retention of the vegetation will correspondingly alter the setbacks.

[6] Note that the first strategy is to ensure RHF is less than 12.5kW/m^2 (author's emphasis). The second strategy stipulates a maximum BAL-12.5 construction standard (which allows for RHF up to and including 12.5kW/m^2). It is assumed the intent of both strategies to ensure that BAL-12.5 is a maximum construction standard for settlement planning, which is consistent with the wording of the latter strategy and the criteria and setback distances for BAL-12.5 in AS 3959-2018.

[7] 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 (Standards Australia, 2020).

Table 3 – Minimum building/vegetation setback distances to achieve a radiant heat flux of less than 12.5 k/w m².

Slope class	Vegetation	Setback distance
All upslopes and flat land	Grassland	19 m
	Scrub	27 m
	Woodland	33 m
	Forest	48 m

Lots that back onto an area of permanent hazard should be avoided. Setbacks can be achieved by one or more of the following measures:

- Roads between classified vegetation and development (lots).
- Defined building envelopes to provide some, or all, of a setback within lots; and
- Non-vegetated land and/or managed vegetation within any reserve, to achieve the setback within the perimeter of the reserve, rather than external to the reserve.

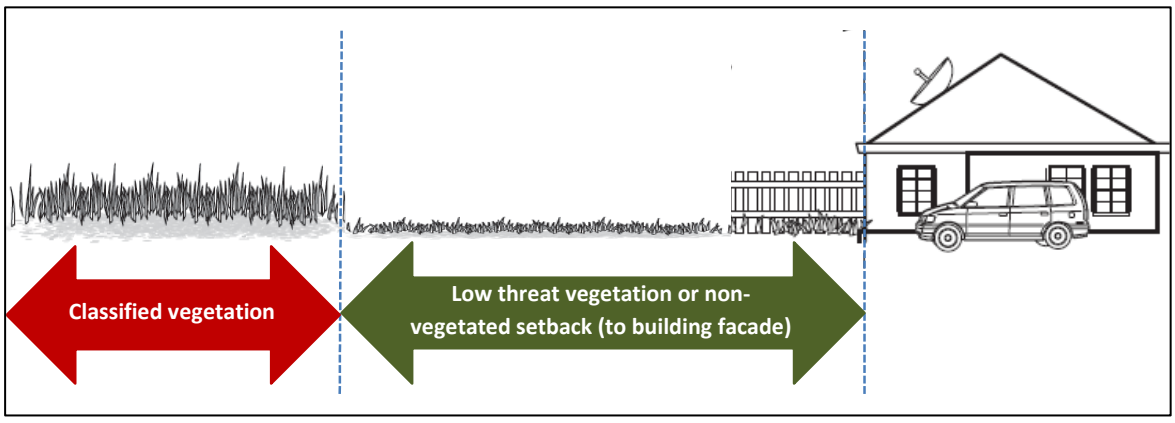


Figure 12 - Illustration of a building-classified vegetation setback (adapted from CFA, 2013).

Note that the setbacks shown on Map 7 are indicative only and will vary according to the eventual distribution of unmanaged vegetation retained within or adjacent to the development areas. Where vegetation is removed or assuredly managed in a low threat state, setbacks will not apply.

The following setbacks (from Table 3) are shown on Map 7:

- The vegetation shown as 'Possible retained trees' (based on the Croskell PSP – Tree Retention Value map (VPA, 2023b) reflects possible areas of Forest to be retained within the site, with a commensurate 48m setback applied.
- Scrub in the Cultural Heritage Investigation Area is shown with 27m setbacks; note that the surrounding Grassland imposes setbacks that largely incorporate these.
- Forest, Grassland and Scrub that form part of the planned revegetation process for the drainage areas (see Section 4.3).

- Grassland in areas of the drainage reserves that are not part of the planned revegetation.
- Grassland outside of the site that may be retained in the long term.

All areas of Grassland are shown with 19m setbacks.

Note that this requirement for setbacks to achieve a radiant heat flux of less than 12.5kW/m^2 is not that same as the need for a BAL construction standard. All development areas will need to achieve the limited radiant heat flux requirement, where only those structures that require a BAL (see Section 3.2) will need to be built to BAL-12.5 in accordance with Clause 13.02-1S and the Building Regulations.

Designing the settlement interface

The interface areas where development setbacks in accordance with Table 3 will be required include:

- The area between any unmanaged vegetation in the drainage reserves and transmission easement and the development adjacent to them;
- Any areas of retained treed vegetation or bushland that do not meet the exclusion criteria of AS 3959-2018 (see Section 4.3.2);
- Any areas of retained Grassland on land adjacent to the site that do not meet the exclusion criteria of AS 3959-2018 (see Section 4.3.2);
- Development abutting any retained Scrub in the Cultural Heritage Investigation Area.

Scaled, illustrative design cross section(s) for areas that interface a permanent hazard, should be provided in the PSP to show the interface layout with development setbacks, including any proposed roads and landscaping. Figure 13 shows Staunton Walk, an existing perimeter road separating residential areas and the bushfire hazard within the Croskell PSP site.

Figure 13 – Perimeter road between the site and existing residential areas at Staunton Walk to the south of the site.

Designing access and egress

Subdivision design should provide good access/egress for emergency vehicles. A conventional urban-residential road layout in accordance with the standards at Clause 56-06 will provide appropriate access. Additional guidance is provided in the CFA document '*Design Requirements, Vehicle Access and Water Supply Requirements in Residential Developments*' (CFA, 2022). These access requirements are consistent with those applied in the Thompsons Road PSP as documented at Section 3.3.3.

Perimeter roads are a highly desirable access feature to achieve or contribute to BAL setbacks, separate future development from hazardous vegetation with a 'hard' non-vegetated edge and facilitate property protection and fire fighting (see Figure 14). This is seen in response to the bushfire hazard created by the site where existing residential development occurs close to the southern boundary.

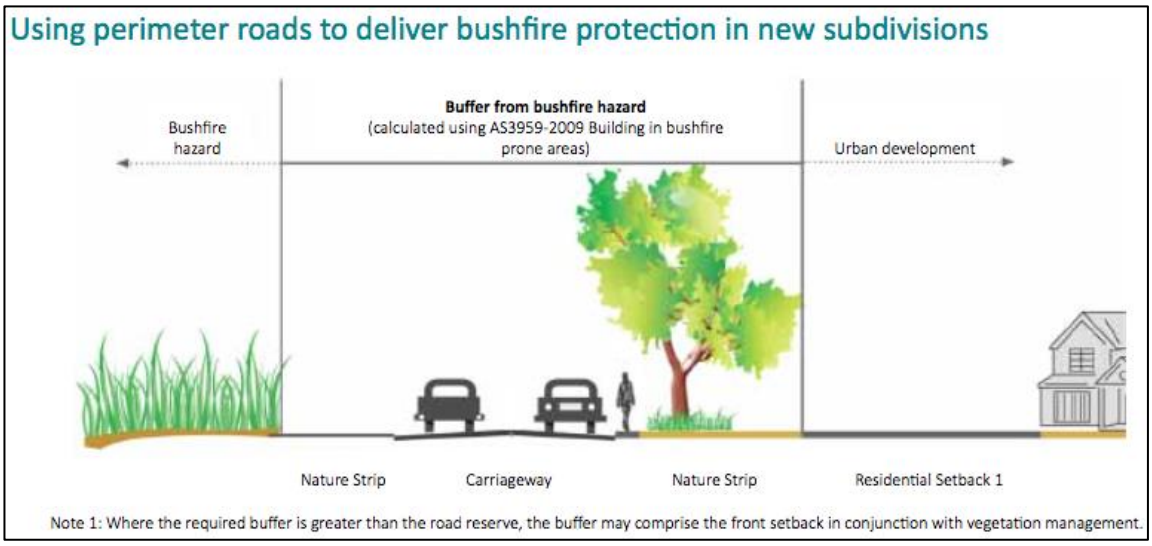


Figure 14 - Illustration of a perimeter road to provide required development setbacks (DELWP, 2015a).

5.1.3 Bushfire protection measures across a settlement

Vegetation management

As an urban growth precinct in a low risk location, with limited hazardous vegetation likely to be retained within or adjacent to the precinct, it can be assumed that the majority of vegetation will be low threat and no specific overlay controls or other planning mechanisms for vegetation control are considered necessary. The one key exception is the need to manage the temporary Grassland hazard within the precinct during the construction period.

In many growth areas, schedules to the zone require that an application for subdivision includes a Site Management Plan that addresses bushfire risk during and, where necessary, after construction, including:

- The staging of development and the likely bushfire risks at each stage.
- An area of land between the development edge and non-urban areas consistent with the separation distances specified in AS 3959-2018, where bushfire risk is managed.
- The land management measures to be undertaken by the developer to reduce the risk from fire within any surrounding rural or undeveloped landscape to protect residents and property from the threat of grassfire and bushfire; and
- How adequate opportunities for access and egress will be provided for early residents, construction workers and emergency vehicles.

This requirement was adopted in the Thompsons Road PSP (applied in the Thompsons Road PSP as documented at Section 3.3.3.) and a similar requirement should be incorporated into the Croskell PSP.

Inspection of properties during the fire danger period via the Municipal fire hazard inspection program and, if required, the issuing of fire prevention notices for non-compliance, will provide an additional protective measure to prevent long grass creating a hazard on lots.

Building construction standards

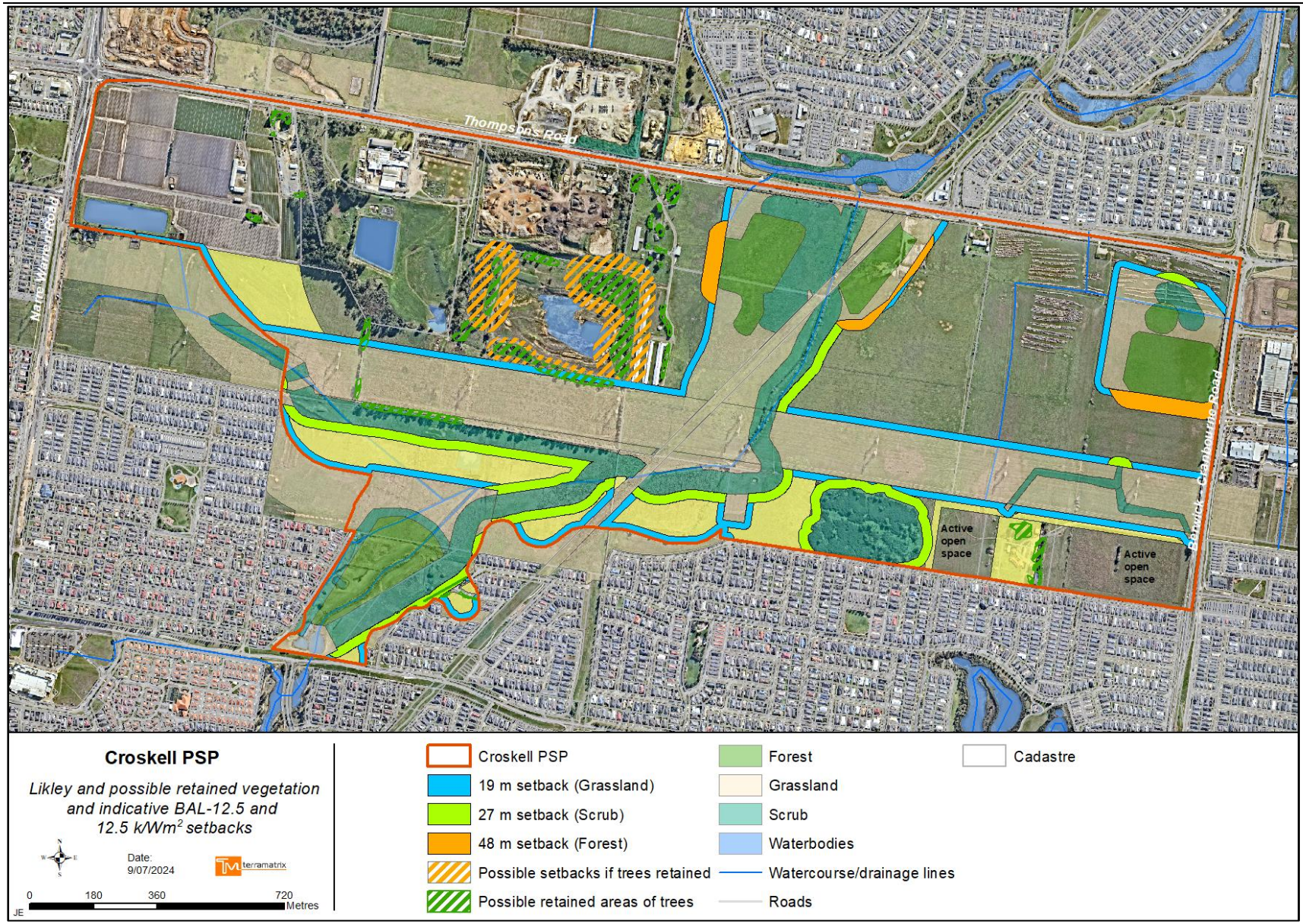
Layout and subdivision design must ensure that no BAL construction standard will result that is higher than the minimum BAL-12.5 that applies in a BPA, and which is invoked as a safety threshold for settlement planning by Clause 13.02-1S. The setbacks for BAL-12.5 construction are provided in Table 3 and indicatively shown in the mapping.

BAL-LOW land within the precinct, where the BPA designation has been removed, will be created once reliably low threat and non-vegetated areas are established that are sufficiently distant from hazardous vegetation. No BAL will be required for any buildings outside the BPA.

The only land use areas anticipated to contain buildings of a class that would require a BAL are those designated residential (see Figure 2).

Fences and other localised fuel sources

As an urban growth precinct in a low risk location, with little hazardous vegetation within or adjacent to the precinct, no specific fence or other fuel controls or mechanisms are considered necessary, beyond those that exist already in the planning controls and building regulations. Non-combustible fences (e.g. steel/colorbond), however, could be encouraged on the permanent interfaces where perimeter roads have not been applied as they can provide useful protection against grassfire impacts.



Map 7 – Possible areas of retained vegetation and indicative setbacks.

5.2 Clause 13.02-1S Bushfire Planning

The following sub-sections provide a summary response about how development in the precinct can respond to the objectives and strategies for bushfire safety in the PPF at Clause 13.02-1S.

5.2.1 Protection of human life strategies

Clause 13.02-1S 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 the hazard assessment in Section 4, the Croskell PSP is in a low bushfire risk location at the site, local and wider landscape scales. The protection of human life can be prioritised by design and layout of development as identified in this report, and the application of the existing building regulations for construction in a BPA. Measures to achieve this are recommended in this report as appropriate, for inclusion in the structure plan.

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.

The hazard assessment identified that the Croskell PSP is in a low bushfire risk location. All future development should, and can, be setback sufficiently from any hazardous vegetation such that it will not be exposed to RHF above 12.5kW/m^2 and, therefore, the risk will be mitigated to an acceptably low level.

The nearest locations where human life can be better protected from the effects of bushfire are the existing urban areas immediately adjacent to the precinct, including many that are not in the BPA.

Once developed with reliably low threat and non-vegetated areas, most of the precinct will meet the criteria for future excision from the BPA, creating a large area of safety from bushfire attack for existing and future residents in the area.

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.

5.2.2 Bushfire hazard identification and assessment strategies

Clause 13.02-1S-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 potential hazards in accordance with the commonly accepted methodologies of AS 3959-2018 and, as appropriate, additional guidance provided in *Planning Practice Note 64 Local planning for bushfire protection* (DELWP, 2015), *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DELWP, 2018) and in relation to landscape risk, *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017).

The type and extent of potentially hazardous vegetation within and around the precinct has been identified. Classification is based on the anticipated long-term state of the vegetation, aerial imagery and site assessment.

Publicly available 1 m contour data for the area was accessed, which along with the site assessment, determined that the land is essentially flat and therefore the topography is benign from a bushfire perspective.

In relation to climatic conditions and fire weather, the AS 3959-2018 default FFDI 100/GFDI 130 benchmark used in the Victorian planning and building system, has been applied as discussed in Section 4.4.

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 3.2) and is shown in Figure 1, Figure 3, Map 1 and Map 3. This is based on the most recent BPA mapping for the state.

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

BMO coverage reflects current mapping in the Casey Planning Scheme. No part of the study area or the land for over 2.6 km around it is affected by the BMO or a Schedule to the BMO (see Figure 3, and Map 1).

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 broader landscape, local, neighbourhood and site scales (see Section 4).

The characteristics in the landscape between 1 km and out to at least 20 km around the site have been considered in accordance with guidance about assessing risk for planning scheme amendments provided in the Planning Advisory Note 68 (DELWP, 2018) and Planning Practice Note 64 (DELWP, 2015) (see Map 1). Additionally, a 5 km assessment zone has been added to provide a more detailed assessment of the local landscape between 1 km and 5 km (see Map 2).

Local and neighbourhood conditions have been assessed at distances of 1 km and 400 m around the precinct respectively (see Map 3).

At the site scale, a 150 m assessment area has been applied around the precinct boundary, and a 100 m BAL assessment area around areas likely to contain buildings that require a BAL. The site assessment follows the AS 3959-2018 methodology for classifying vegetation and topography (see Map 4).

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

This report is anticipated to be provided to the CFA/FRV for comment and their views will be incorporated into the final report. This report forms part of the consultation process that will occur prior to development.

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.

DTP advisory and practice notes, Clause 13.02-1S 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 and strategies have been identified, reviewed and incorporated into this assessment.

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 13.02-1S are successfully implemented as identified in this report.

5.2.3 Settlement planning strategies

Clause 13.02-1S 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 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).

The precinct is a low risk location with the characteristics of Broader Landscape Type 1 as described in the technical guide *Planning Applications Bushfire Management Overlay*. Applicable distances for dwellings or other buildings to be setback from classifiable vegetation, such that RHF is calculated to not exceed 12.5kW/m^2 and where, therefore, BAL 12.5 buildings could potentially be sited, have been identified.

Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.

The nearest locations where human life can be better protected from the effects of bushfire are the existing developed areas immediately adjacent to the precinct, including large areas that are not in the BPA (see Map 3). There is ready access to these areas from the Croskell PSP.

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 or future residents, their property or community infrastructure, if development is setback from hazardous vegetation to enable BAL-12.5 construction. A reticulated hydrant system for fire fighting will be provided in conjunction with access/egress for emergency vehicles and residents via a

typical urban road network, with perimeter roads where lots abut a permanent Grassland hazard.
The risk to existing residents will be reduced by the development of additional low threat or non-vegetated land that would accompany development of the precinct.

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.

As identified previously, this report appropriately assesses and addresses the risk at a range of scales. There is no potential for neighbourhood-scale destruction.

Areas of higher hazard vegetation are unlikely to be retained at a scale or in locations where they will pose a bushfire hazard. They will, therefore, not pose a significant threat if new and existing development is sufficiently distant from them as identified in this report.

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

Assessment of multiple alternative locations is beyond the scope of this report and the precinct in a designated growth corridor suitable for urban/industrial/commercial development. As concluded in this report the bushfire risk to this precinct is low and able to be mitigated by the standard bushfire controls that currently exist in the planning and building system.

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 3959-2018'

If the setback distances from any hazardous vegetation, as identified in this report, are implemented, then development can achieve a BAL not exceeding BAL-12.5.

5.2.4 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 *Croskell Precinct Structure Plan Biodiversity Assessment* (WSP, 2022) documents the biodiversity assessment of the site, and identified the remnant vegetation as being of low quality, and no Growling Grass Frogs were observed. There are no evident biodiversity impacts associated with the findings of this bushfire assessment.

5.2.5 Use and development control in a Bushfire Prone Area

Clause 13.02-1S 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'* (Casey Planning Scheme).

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'* (Casey Planning Scheme).

Future development could achieve acceptable bushfire safety if the measures identified in this report are implemented. There are no apparent barriers to this being achievable.

6 Conclusion

This study has assessed the bushfire hazard in and around the Croskell PSP, in accordance with Clause 13.02-1S in the Casey Planning Scheme, the AS 3959-2018 methodology invoked by the Victorian planning and building system, and additional guidance provided in DTP planning and advisory notes, including:

- *Local planning for bushfire protection,* Planning Practice Note 64 (DELWP, 2015).
- *Design Guidelines, Settlement Planning at the Bushfire Interface* (DELWP, 2020a).
- *Bushfire State Planning Policy Amendment VC140,* Planning Advisory Note 68, (DELWP, 2018); and in relation to assessing landscape risk,
- *Planning Permit Applications – Bushfire Management Overlay,* Technical Guide (DELWP, 2017).

The Croskell PSP is in a low bushfire risk landscape. Bushfire behaviour with the potential for neighbourhood-scale destruction is not credible. The surrounding landscape is dominated by residential and commercial non-vegetated urban areas, with areas of remnant vegetation on flat, or almost flat, land that will not exacerbate fire behaviour. No part of the study area or the land for over 2.6 km around it is affected by the BMO or a Schedule to the BMO.

In all directions much of the land around the precinct is currently, and will increasingly become, designated as non-BPA land. Once developed with reliably low threat and non-vegetated areas, much of the precinct will meet the criteria for future excision from the BPA, creating a large area of safety from bushfire attack for existing and future residents in the area.

The only appreciable bushfire hazard within at least 2.6 km are areas of Grassland with the site itself. Areas of higher hazard vegetation likely to be retained or created within the site will be relatively small, isolated and narrow. They will, therefore, not pose a significant threat if new and existing development is sufficiently setback from them the distances identified in this report.

The development areas can be sufficiently setback from retained areas of Grassland in the power transmission easement and proposed drainage reserves to provide enough separation distance such that development is not exposed to RHF above 12.5kW/m^2. This assumes that a minimum 19 m perimeter road is provided between the drainage reserves and power transmission easement and the development, to ensure separation from any Grassland hazard and supplement the setback distances from any higher hazard retained vegetation.

Interface areas where development setbacks will likely be required include:

- Between unmanaged vegetation in the drainage reserves and power transmission easement and the development adjacent to them.
- The unmanaged vegetation on adjacent land where development will interface with an interim or possibly permanent bushfire hazard (generally to the west and small areas to the south); and

- Development abutting potentially hazardous Scrub in the Cultural Heritage Investigation Area.

Layout and subdivision design that implements the setbacks will ensure that no BAL construction standard will result that is higher than the maximum BAL-12.5 outcome stipulated in the settlement planning strategies of Clause 13.02-1S. Note that the only land use areas anticipated to contain buildings of a class that would require a BAL, are those designated residential, although some Class 9 buildings in the BPA in other areas of the site will have to respond to the NCC 2022.

Scaled, illustrative design cross sections for areas that interface a permanent hazard, should be prepared as part of the PSP, to show the interface layout with development setbacks, including any proposed roads and landscaping.

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

Development of the precinct can satisfy the objective and all strategies of Clause 13.02-1S, which aim to prioritise protection of human life. Accordingly, acceptable bushfire safety will be achieved and the state planning policy objective for bushfire in the Casey Planning Scheme will be met, if the measures identified in this report are implemented. There are no apparent barriers to this being achievable.

7 Appendices

7.1 Appendix A: 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, 2020.

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