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BUSHFIRE PLANNING

Bushfire assessment to inform the Castlemaine Framework Plan and Urban Character Design Guidelines

Final Report

PREPARED FOR MOUNT ALEXANDER SHIRE COUNCIL
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About

Kevin Hazell Bushfire Planning is a town planning service that works with public and private sector clients to understand and apply planning scheme bushfire policies and requirements. It is led by Kevin Hazell who is a qualified town planner with extensive experience working on bushfire planning at State and local levels in Victoria.

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Version Control

Version	Date	Comment	Name
v0.1	11 May 2021	Draft for Council review	Kevin Hazell Town Planner
v0.2	1 July 2021	Report for engagement with the Country Fire Authority	Kevin Hazell Town Planner
v1.0	23 August 2022	Final Report	Kevin Hazell Town Planner

1. Introduction

Kevin Hazell Bushfire Planning has been engaged by Mount Alexander Shire Council (the 'Council') to prepare a bushfire assessment to inform the review and update of strategic plans and directions for Castlemaine, Campbells Creek and Chewton. This includes informing the Castlemaine Framework Plan and Urban Character Design Guidelines.

1.1 Study area for this bushfire assessment

The study area is generally in accordance with the existing urban boundary of Castlemaine and the town boundary of Chewton that was established through the Chewton Urban Design Framework (which is not currently in the planning scheme).

Areas outside of these boundaries and commercial and industrial land are not within scope of the Council's current work and is outside of the study area for this bushfire assessment.

See Figure 1A: Locality map with study area

See Figure 1B: Locality aerial photo with study area

See Figure 1C: Zone map

See Figure 1D: Bushfire Management Overlay and Bushfire Prone Areas

1.2 Scope of work

The Council has advised that its strategic planning work for the study area includes:

- Investigation as to whether the existing urban boundary needs to be expanded or contracted.
- Identification of any planning strategies which are currently outdated and could be replaced through this project.
- Consideration of the application of the residential zones or other planning controls to provide greater certainty and to encourage a greater diversity of housing in appropriate locations.
- Preparation of an urban character study for residential areas.
- Preparation of a planning scheme amendment to implement the Castlemaine Framework Plan and Urban Character Design Guidelines.

This bushfire assessment is intended to be informative to the above program of work.

1.3 Methodology

c13.02 Bushfire Planning includes strategies that inform how bushfire hazards are to be assessed and for considering where and how growth and new development should occur. Having regard to these strategies, this report responds to the scope of work as follows:

- Section 2 provides an overview of bushfire content in the planning scheme, especially the strategies in *c13.02-1S Bushfire Planning*.
- Section 3 describes the bushfire context using a range of information sources, mostly arising from the work of public authorities such as fire authorities and the Council.
- Section 4 describes landscape bushfire hazards that may influence the study area, similar to the approach for a bushfire hazard landscape assessment described in *Planning Permit Applications Bushfire Management Overlay Technical Guide* (DELWP,2017). This includes the identification of landscape types that help understand the relative risk between different places within the study area.
- Section 5 describes the bushfire hazard at the neighbourhood and local scale to inform consideration of whether there is land capable of being exposed to no more than 12.5kw/sq.m of radiant heat. This is informed by the methodology for a bushfire hazard site assessment as described in *Planning Permit Applications Bushfire Management Overlay Technical Guide* (DELWP,2017) and *AS3959-2018 Building in a Bushfire Prone area* (Standards Australia).
- Section 6 includes a discussion and recommendations on a strategic approach to manage bushfire in conjunction with planning decision making and the identification of locations that could be suitable for directing growth and development. The objectives and strategies in *c13.02-1S Bushfire Planning* are used to inform the recommendations.

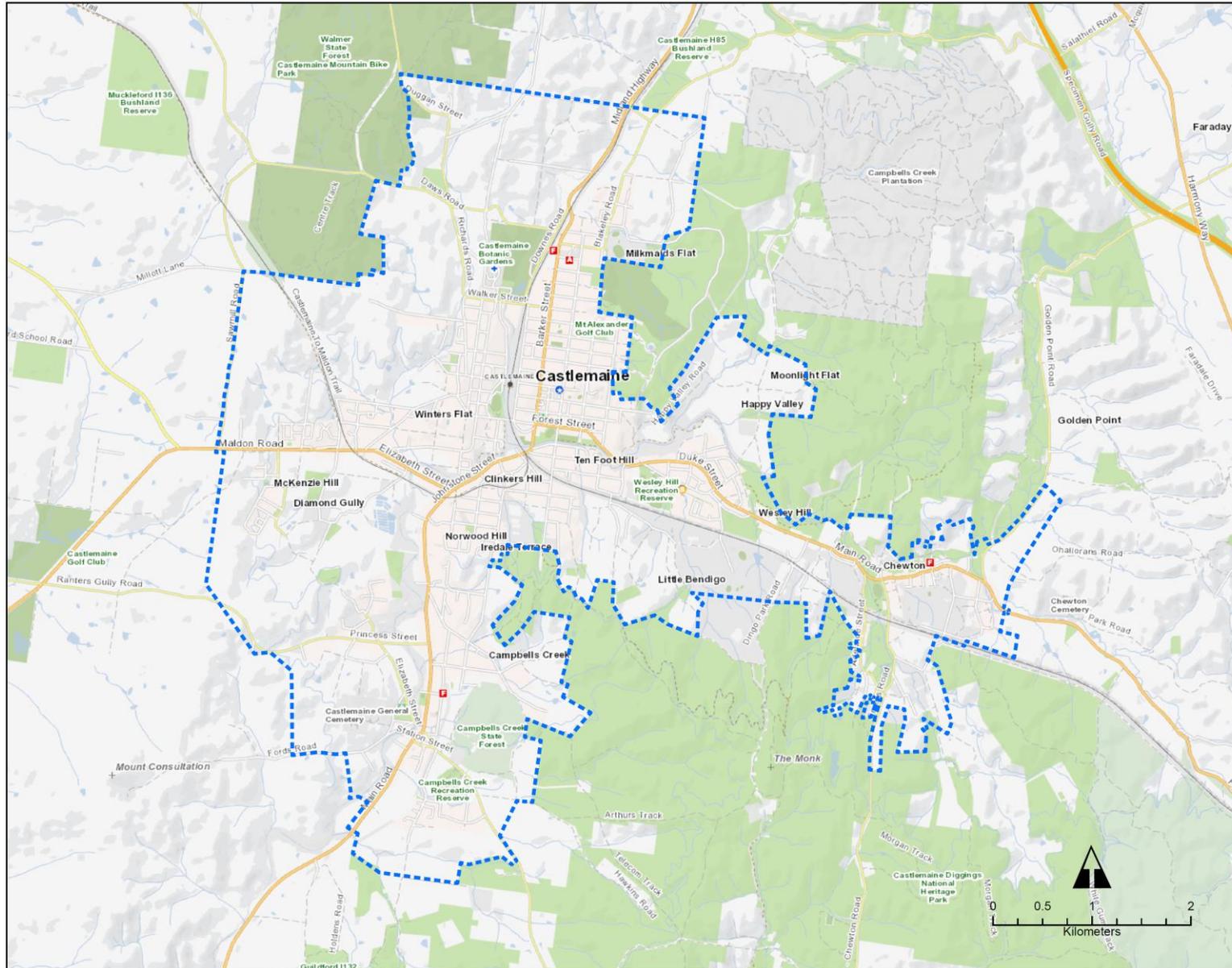
1.4 A note about the bushfire assessments

This bushfire assessment has been prepared to inform decision making associated with reviews of strategies and strategic planning. The analysis is directed to this purpose with a focus on the strategic application of *c13.02-1S Bushfire Planning*.

In future, any request for a planning scheme amendment from a landowner would need to be accompanied by a bushfire hazard landscape assessment and bushfire hazard site assessment tailored to the specific site and proposal. This provides the opportunity for local and site-specific data and information to be accurately captured into any request.

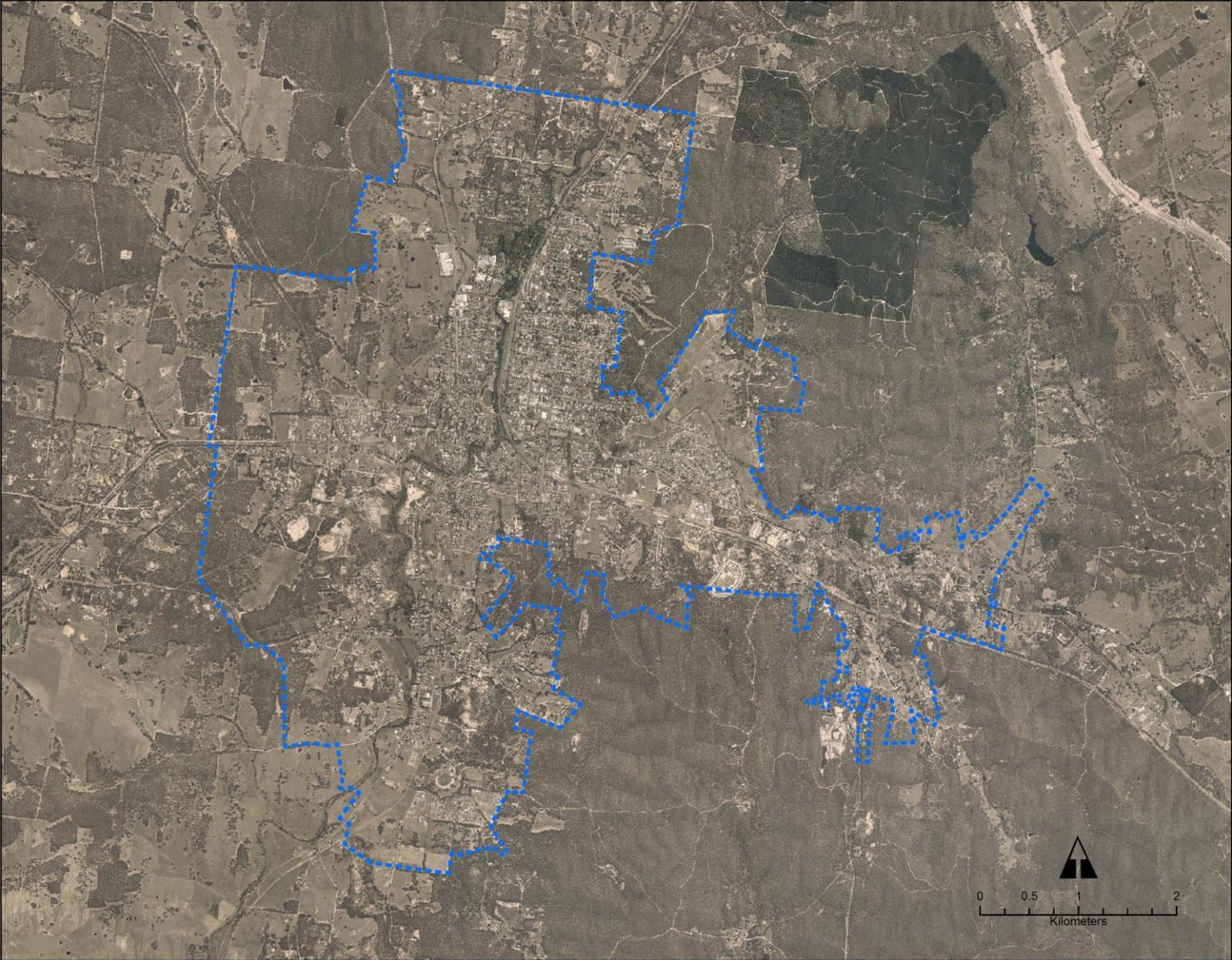
It is also noted that this bushfire assessment does not consider bushfire for the purpose of planning applications, including under *c44.06 Bushfire Management Overlay*.

FIGURE 1A: LOCALITY MAP WITH STUDY AREA



 Study area

FIGURE 1B: LOCALITY AERIAL PHOTO WITH STUDY AREA



 Study area

FIGURE 1C: ZONES

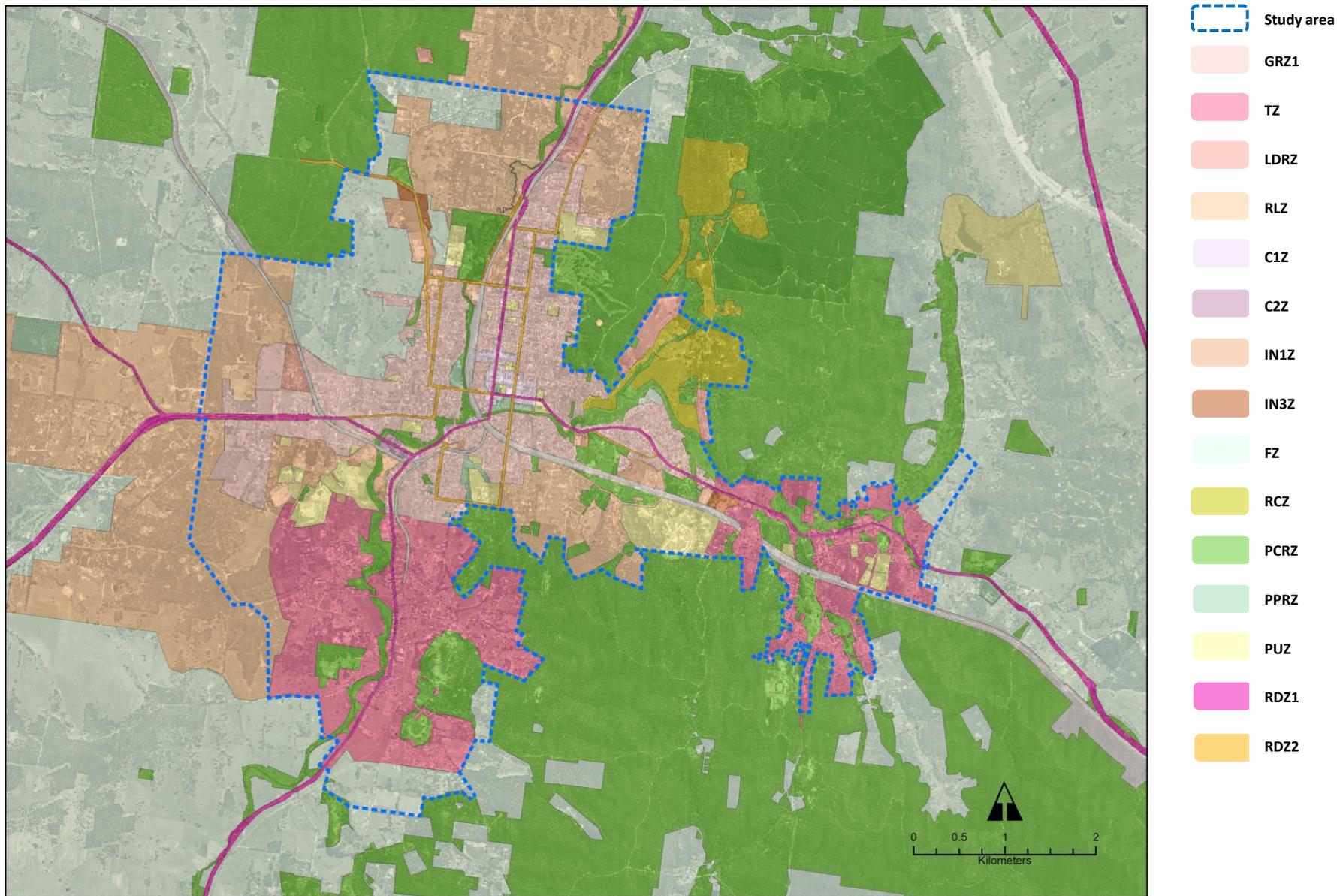
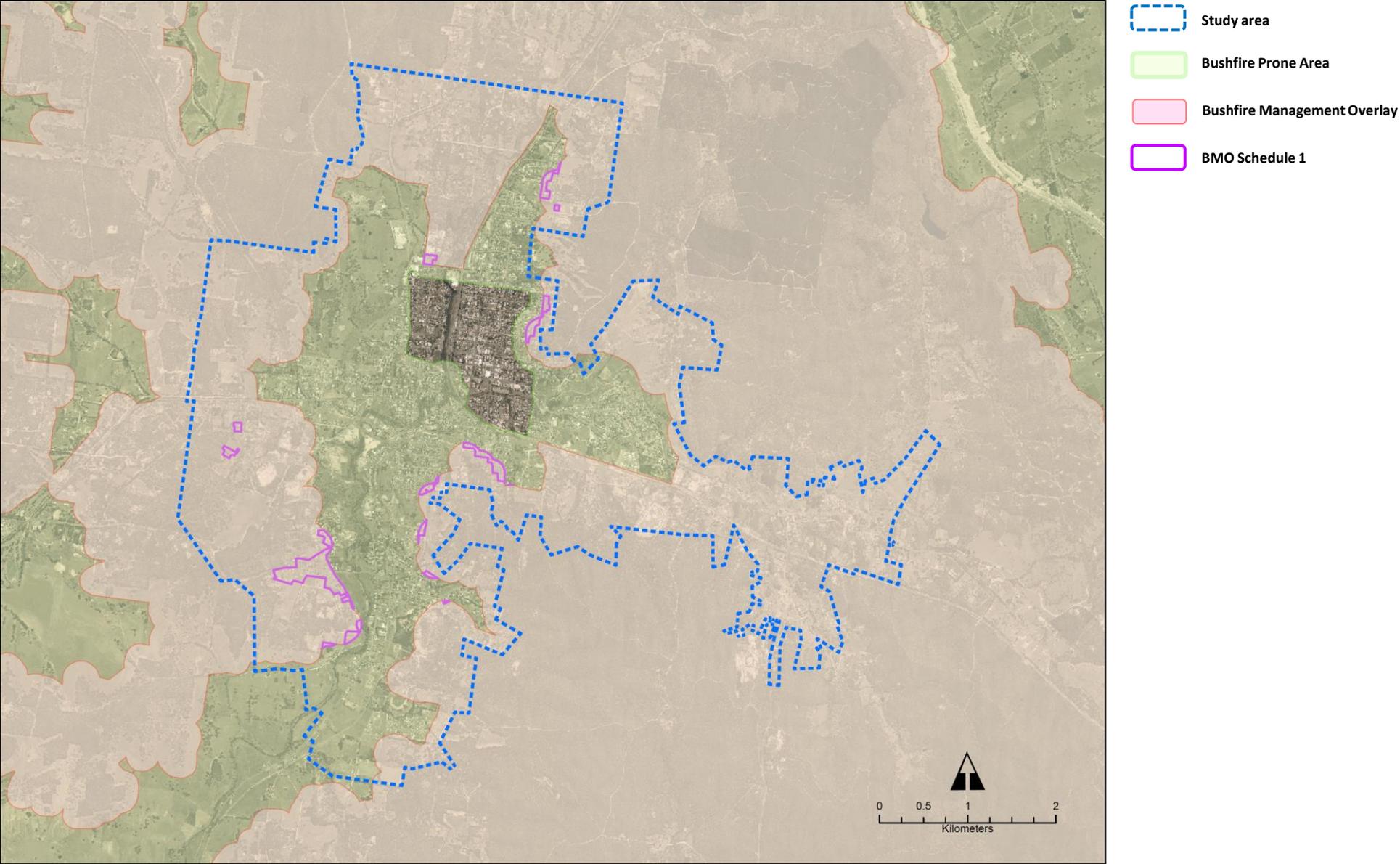


FIGURE 1D: BUSHFIRE MANAGEMENT OVERLAY AND BUSHFIRE PRONE AREA



2. Planning scheme bushfire context

The planning scheme contains provisions that inform permit requirements, application requirements and policies & decision guidelines where the bushfire hazard could be an influence on future land use and development. This section provides an overview of these provisions. Figure 2 summarises the considerations.

2.1 Integrated decision making (c71.02-3)

c71.02-3 requires planning authorities, in bushfire areas:

[T]o prioritise the protection of human life over all other policy considerations.

Bushfire considerations are not to be balanced in favour of net-community benefit, as occurs for all other planning scheme matters. The bushfire emphasis in c71.02-3 was introduced through Amendment VC140 in December 2017. Such policy settings were recommended in 2011 by the *2009 Victorian Bushfires Royal Commission*.

2.2 Natural hazards and climate change (c13.01-1S)

The objective of the State natural hazards and climate change policy is:

To minimise the impacts of natural hazards and adapt to the impacts of climate change through risk-based planning.

c13.01-1S *Bushfire Planning* contains a series of strategies to meet the above objective:

- *Consider 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 or risk adaptation strategies to be implemented.*
- *Site and design development to minimise risk to life, property, the natural environment and community infrastructure from natural hazards.*

2.3 State planning policy for bushfire (c13.02-1S)

The objective of the State planning policy for bushfire is:

To strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.

The key strategy that directs bushfire decision making is:

Give priority 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 the consideration of bushfire risk in decision making at all stages of the planning process.*

c13.02-1S *Bushfire Planning* applies to all planning and decision making relating to land:

- *Within a designated bushfire prone area;*
- *Subject to a Bushfire Management Overlay; or*
- *Proposed to be used or developed in a way that may create a bushfire hazard.*

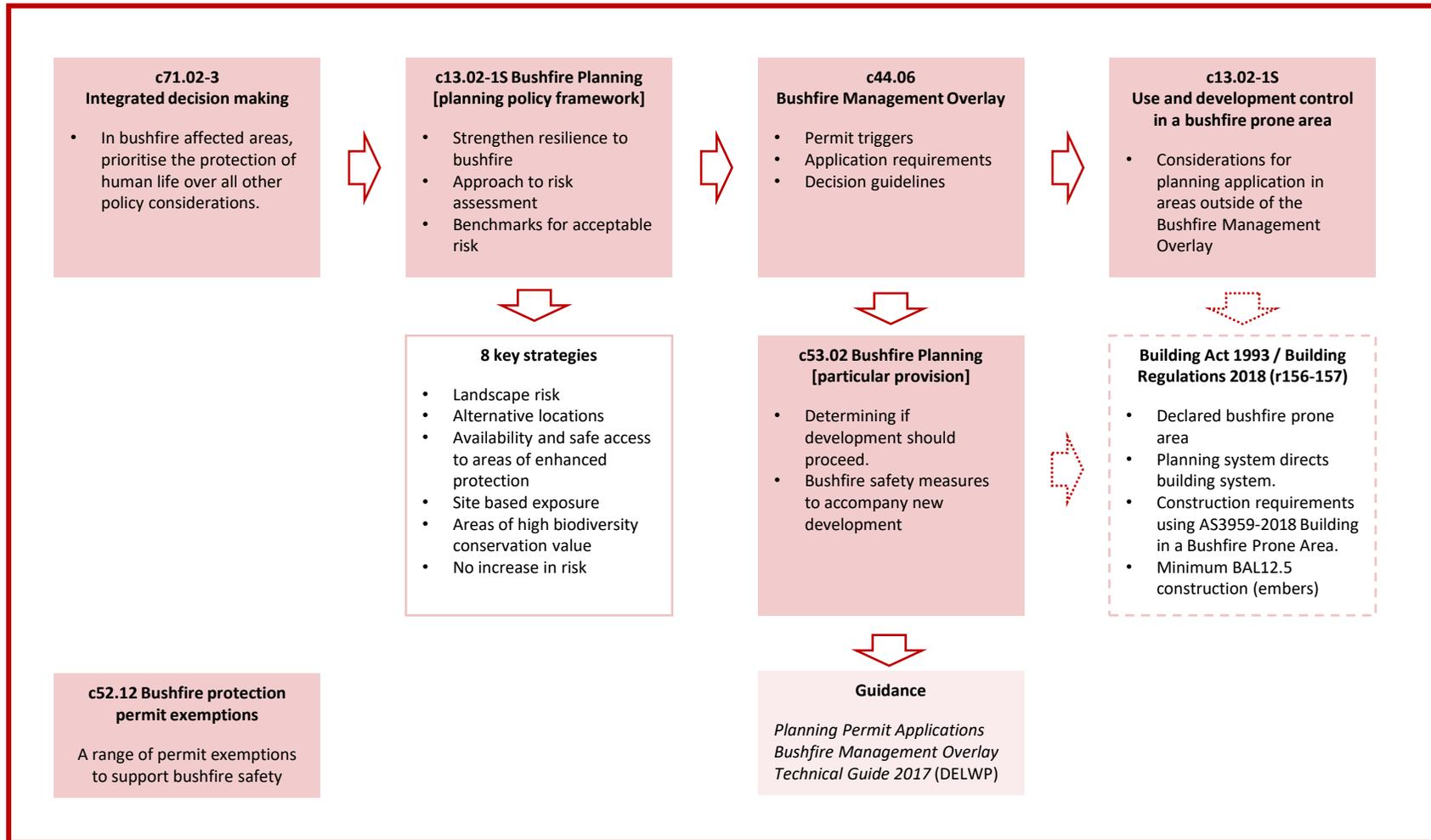
c13.02-1S *Bushfire Planning* contains a series of strategies and these are summarised below.

Landscape bushfire considerations

c13.02-1S *Bushfire Planning* requires a tiered approach to assessing the hazard:

- *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;*
- *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.*

FIGURE 2: PLANNING SCHEME BUSHFIRE PROVISIONS AND SUPPORTING MATERIAL



Alternative locations for development

c13.02-1S *Bushfire Planning* includes two strategies that seek to direct new development:

- *Give priority to the protection of human life by [...] directing population growth and development to low risk locations [.]*
- *Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.*

Availability and safe access to areas of enhanced protection

c13.02-1S *Bushfire Planning* requires a location in easy reach that provides better protection for life from the harmful effects of bushfire:

- *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.*
- *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 views of the relevant fire authority

c13.02-1S *Bushfire Planning* identifies that a key element of a risk assessment is to:

- *Consult [...] with [...] the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.*

Site based exposure

c13.02-1S *Bushfire Planning* provides policy directions for planning authorities about the level of acceptable exposure for new development enabled by a planning scheme amendment:

- *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).*
- *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.*

Areas of high biodiversity conservation value

c13.02-1S *Bushfire Planning* provides directions on situations where a bushfire risk and biodiversity values are both present:

- *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.*

No increase in risk

c13.02-1S *Bushfire Planning* provides an overall view of acceptable risk:

- *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.*

2.4 Bushfire Management Overlay (c44.06)

The purpose of the Bushfire Management Overlay is:

- *To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire.*
- *To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented.*
- *To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.*

The Bushfire Management Overlay is generally applied to patches of vegetation (except grasslands) that are larger than 4 hectares in size. Where such a patch of vegetation exists, a 150 metre ember protection buffer is added and this land is also included in the Bushfire Management Overlay. Areas of extreme hazard are also included in the Bushfire Management Overlay.

Planning Advisory Note 46: Bushfire Management Overlay Methodology and Criteria (2013, DPTLI) provides more information on where the Bushfire Management Overlay is applied.

2.5 Bushfire Planning (c53.02)

c52.03 *Bushfire Planning* specifies the requirements that apply to a planning application under c44.06 Bushfire Management Overlay. The purpose of this provision is:

- *To implement the Municipal Planning Strategy and the Planning Policy Framework.*
- *To ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire.*
- *To ensure that the location, design and construction of development appropriately responds to the bushfire hazard.*
- *To ensure development is only permitted where the risk to life, property and community infrastructure from bushfire can be reduced to an acceptable level.*
- *To specify location, design and construction measures for a single dwelling that reduces the bushfire risk to life and property to an acceptable level.*

2.6 Bushfire prone area (c13.02-1S, Building Act 1993 & Building Regulations 2018)

Bushfire Prone Areas are areas that are subject to or likely to be subject to bushfire. The Minister for Planning makes a formal determination to designate Bushfire Prone Areas under section 192A of the Building Act 1993.

Designated Bushfire Prone Areas include all areas subject to the Bushfire Management Overlay. Bushfire Prone Areas also include grassland areas and, occasionally, smaller patches of non-grassland vegetation.

The Building Regulations 2018 require bushfire construction standards in these areas and these are implemented by the relevant building surveyor as part of the building permit. These construction standards are referred to as bushfire attack levels (BAL).

Where land is included in the Bushfire Prone Area is also included in the Bushfire Management Overlay, the requirements of the Bushfire Management Overlay take precedence. Where this is the case, the building regulations ensure bushfire construction requirements in a planning permit are given effect to by the relevant building surveyor at the time a building permit is issued.

2.7 Use and development control in Bushfire Prone Areas (c13.02-1S)

c13.02-1S *Bushfire Planning* includes planning requirements for Bushfire Prone Areas. These are in the form of a 'use and development control' that applies to certain uses that are in a Bushfire Prone Area.

The use and development control applies to 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.

The use and development control requires that when assessing a planning permit application:

- *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.*

2.8 Bushfire protection permit exemptions (c52.12)

Bushfire related permit exemptions are included in c52.12 *Bushfire protection exemptions*. Exemptions are included for the following matters:

- Permit exemptions to create defensible space around existing buildings used for accommodation. They apply to bushfire prone areas, which includes land subject to the Bushfire Management Overlay. These are commonly known as the 10/30 rule and the 10/50 rule. This exemption applies to accommodation constructed or approved on or before 2009.
- Permit exemptions to create defensible space for a dwelling under the Bushfire Management Overlay, where the defensible space is specified in a planning permit issued after 31 July 2014. The permit exemption only applies to specified zones, which include residential zones. The permit exemption does not apply to defensible space specified in a planning permit for uses other than a dwelling and for any uses outside of the Bushfire Management Overlay.
- Permit exemptions for buildings and works associated with a community fire refuge and a private bushfire shelter (where a Class 10c building).

3. Bushfire context

This section describes the bushfire context of the study area using a range of information sources that help understand bushfire. The matters identified include information typically provided as part of a bushfire hazard landscape assessment as described in *Planning Permit Applications Bushfire Management Overlay Technical Guide* (DELWP,2017).

Spatial information on the bushfire context is included in Attachment 1.

3.1 Bushfire conditions in Victoria

The Department of Environment, Land, Water and Planning (2015) identifies key features relevant to bushfires in Victoria. These include:

- A forest fire danger index of well over 100
- Severe drought conditions
- Temperatures above 40° C
- Relative humidity below 10%
- Strong to gale-force north-westerly winds
- A strong to gale-force west-south-westerly wind change that turns the eastern flank of a running bushfire into a wide new fire front.

DELWP notes that these weather conditions are representative of where a bushfire does most of its damage in a single day. The greatest loss of life and property have historically been caused by such single day bushfires.

DELWP (2020) further notes that climate change is forecast to:

- Extend the bushfire season
- Make bushfires larger, more severe, and more frequent
- Make days with an elevated fire danger rating more frequent
- Start the bushfire season earlier, with more bushfires starting in spring (which may also change fire weather conditions that are experienced, such as wind speed and direction).

3.2 Bushfire management strategy guiding public agencies

The *Loddon Mallee Bushfire Management Strategy* (DELWP 2020) considers the long-term implications of bushfire to direct the activities of bushfire-related public agencies and to reduce bushfire risk to people, property, infrastructure and economic activity.

The bushfire management strategy contains information that assists in appreciating the landscape bushfire risk to the study area. This includes the following extracts:

Destructive bushfire weather in Victoria is generally defined by a high-pressure system over the Tasman Sea and a cold pressure system in the Great Australian Bight. This leads to hot and dry conditions, with strong north-westerly winds followed by a mid-afternoon south-westerly change.

The change brings gusting winds, instability, lightning events and often no rainfall or increase in humidity to provide relief. Under these conditions, in the forests of the southern parts of the Loddon Mallee region, fires may be dominated by powerful convection columns, intense flames and ember storms.

Fires in the region can occur at any time of the year but are most common between October and April, and the most damaging fires have occurred from December through to February. Despite the worst bushfires occurring on days with similar weather patterns, the hot, dry climate of our region means destructive bushfire events can occur under lower fire danger conditions. Days with a fire danger rating of low to moderate — with temperatures of 20° C, surface winds at 20 km/hr and relative humidity of 20% — often support fast-running grass and scrub fires that can significantly impact life, property and other values.

Large fires in the south of the region have often been associated with extended drought periods.

The bushfire management strategy also states that:

- *Nearly 14% of recorded bushfires in Victoria have occurred in the southern part of the Loddon Mallee region, and more than half of these can be attributed to human activities*
- *Fires can start at any time during the day, but most occur in the early afternoon between 14:00 and 15:30 hrs. This is when fire danger approaches its peak, with peak fuel dryness being a significant contributor to bushfire spread at this time of day.*

The bushfire management strategy includes simulations of house loss to identify areas across a landscape where bushfires could have the greatest impact. The outputs from these simulations show that the study area, comparative to other locations in the Loddon Mallee Region, has some of the 20% highest risk of house loss.

See **Attachment 1 Figure A: Modelled house loss bushfire risk (DELWP 2020)**

3.3 Planning scheme bushfire designations

Planning schemes identify bushfire affected land through the inclusion of land into the Bushfire Management Overlay or within a designated bushfire prone area (referenced in *c13.02-1S Bushfire Planning* and approved under the Building Act 1993). All land within a Bushfire Management Overlay is included into the bushfire prone area.

3.3.1 Bushfire Management Overlay

The Bushfire Management Overlay is applied across Victoria based on non-grassland vegetation larger than 4ha, with a 150m buffer applied to account for ember attack. It is also applied to land likely to be subject to extreme bushfire behaviour.

For the study area, the Bushfire Management Overlay applies to most of the outer edges of the study area where larger areas of non-grassland vegetation exist, with the 150m buffer applied.

3.3.2 Schedules to the Bushfire Management Overlay

Some areas of Bushfire Management Overlay are within a schedule. These specify bushfire protection measures to streamline decision making for the development of a lot with a single dwelling.

Schedule 1 applies to various areas around the study area. These provide for a BAL12.5 construction standard. These areas are assumed, because of this, to be exposed to no more than 12.5kw/sq.m of radiant heat. Exposure to bushfire is further considered in later parts of this report.

3.3.3 Bushfire prone area

The Bushfire prone area applies to grassland areas, smaller patches of non-grassland vegetation and land usually within 50m of these areas. Bushfire prone areas also apply as a buffer off Bushfire Management Overlay areas.

For the study area, Bushfire prone areas are applied to grasslands at the outer edges of the study area, to grasslands and smaller patches of vegetation within the study area, and as a buffer to Bushfire Management Overlay areas.

3.3.4 Conclusions

The effect of planning scheme bushfire designations is that most of the study area is considered to be affected by bushfire hazards. Land the planning scheme considers is not affected by bushfire hazards comprises the central part of Castlemaine orientated around the town centre and nearby land.

See **Figure 1D: Bushfire Management Overlay and bushfire prone area**

3.4 Victorian Fire Risk Register

The Victorian Fire Risk Register (VFRR) is a data set prepared by fire authorities and local councils that identifies assets at risk of bushfire. The human settlement data is most relevant to planning scheme decision making.

The VFRR is useful to the extent that it shows current assets (for example, settlements) at risk according to fire authorities and the local council. However, the VFRR should not be over-emphasised in planning decision making as it has not been prepared for this purpose and does not contemplate new risk that might arise because of a planning decisions.

The VFRR identifies:

- Parts of the study area that are within or immediately adjoining forested areas as being an extreme or very high risk. The risks include frequent ignitions and the likelihood of bushfire being almost certain. This designation applies to land on the edges of Castlemaine and Campbells Creek and most of Chewton.
- Parts of the study area away from forested areas and the edges of Castlemaine as being a moderate risk. This includes the balance of the study area, orientated around the centre of Castlemaine.

See **Attachment 1 Figure B: Victorian Fire Risk Register human settlement polygons**

3.5 Regional bushfire planning assessment

The *Regional Bushfire Planning Assessment Loddon Mallee Region 2012* (DPCD) provides information about 'identified areas' where a range of land use planning matters intersect with a bushfire hazard.

Identified areas apply to the following locations:

- Urban / bushfire hazard interfaces where forested areas adjoin the study area.
- Small lots in proximity to bushfire hazards in Chewton.
- Multiple matters throughout Castlemaine and Campbells Creek including lots in proximity to bushfire hazards.

See **Attachment 1 Figure 1E: Regional Bushfire Planning Assessment**

3.6 Joint Fuel Management Program

The Joint Fuel Management Program outlines where Forest Fire Management Victoria, the CFA and (sometimes) other public agencies intend to carry out fire management operations on Victoria's public and private land over the next three years. The Joint Fuel Management Program is articulated by Forest Fire Management Victoria (2021).

The program indicates there are planned burns to the north-west of Castlemaine and in proximity to Chewton, along with non-burning treatments in parts of the corridor of development between Castlemaine and Chewton.

See **Attachment 1 Figure C: Joint fuel management program**

3.7 Bushfire history

Bushfire history can be informative to understanding possible bushfire behaviour, but where bushfire has or has not occurred in the past should not be overemphasised in planning decision making. All bushfire hazards are assumed capable of being part of a bushfire and planning decision making is required to respond to bushfire hazards on this basis.

However, bushfire history can assist in understanding how communities have previously experienced bushfire and can reiterate important features likely to arise in any future bushfire (for example, the effect of the late afternoon wind change typical in Victoria's worst bushfire weather).

Bushfire history includes a range of small to medium sized bushfires (at the landscape scale) on all sides of the study area. A bushfire in 1980 affected an area in the northern part of the study area.

See **Attachment 1 Figure 1D: Bushfire history**

4. Landscape and strategic bushfire considerations

This section describes landscape bushfire hazards that may influence the study area. Having regard to the contextual information in Section 3, it considers how the bushfire hazard in the surrounding landscape may affect different parts of the study area.

Landscape bushfire hazards are important because they help to understand how bushfire may impact on a location, including the likelihood of a bushfire threatening a location, its likely intensity and destructive power, and the potential impact on life and property.

The extent of the surrounding landscape that is relevant is determined by factors such as the extent and continuity of vegetation, potential fire runs and where a bushfire can start, develop and grow large. The extent of bushfire hazard relevant may be 1-2km or up to 50km, depending on the locality.

The landscape analysis in this section takes a similar approach to a bushfire hazard landscape assessment described in *Planning Permit Applications Bushfire Management Overlay Technical Guide* (DELWP,2017). This includes the identification of landscape types that help understand the relative risk between different places.

See **Figure 4A: Overview of landscape types**

The section enables key strategies in *c13.02 Bushfire Planning* to be considered. These strategies include the following:

Landscape bushfire considerations

- *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.*
- *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.*

Availability of safe areas

- *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.*

- *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.*

4.1 Landscape bushfire hazards

The study area sits within a landscape containing extensive bushfire hazards. This includes forested areas with areas of more rugged terrain that has the potential to generate extreme fire behaviour. How this may impact on the study area is variable, and depends on the location within the study area in relation to likely fire runs under prevailing bushfire weather.

Landscape hazards most severely affect the eastern part of the study area, orientated around Chewton. Chewton is a corridor of development adjoining forested areas to the north and south. Larger fire runs may arise and they are on aspects likely to carry a bushfire towards Chewton under prevailing bushfire weather. Slope analysis indicates areas of more rugged terrain, especially in hazards to the south of Chewton.

See **Figure 5B: Slope based on a 10m contour**

Landscape hazards also affect the northern part of the study area and although fire runs in forested areas are relatively small (at the landscape scale) they interact with grasslands and areas of fragmented vegetation which can enable any bushfire to continue to move towards the study area. This is an aspect likely to be carrying a bushfire under prevailing bushfire weather. The short fire runs also mean any bushfire that starts may impact the study area quickly, leaving limited time for warnings or the seeking of shelter.

The western parts of the study area (McKenzie Hill) and southern parts of the study area (Campbells Creek) are affected mostly by grassland hazards and smaller areas of forest (at the landscape scale). The Country Fire Authority (2021) identifies key characteristics of grasslands and grassfires to include:

- *Grassfires can start and spread quickly and are extremely dangerous.*
- *Grassfires can travel up to 25 km per hour and pulse even faster over short distances.*
- *Grass is a fine fuel and burns faster than bush or forests.*
- *Grassfires tend to be less intense and produce fewer embers than bushfires, but still generate enormous amounts of radiant heat.*
- *The taller and drier the grass, the more intensely it will burn.*

Within the much broader landscape, larger forested areas have the potential to generate high levels of ember attack into grassland and other hazard areas closer to the study area. The potential for ignitions is increased because of this.

See **Figure 4C: Landscape bushfire analysis** for an illustration of likely bushfire runs in landscape hazards

4.2 Likely bushfire scenarios

The extent of fire runs in forested areas means there is potential for fire behaviour that may include:

- Bushfire impacting on the edge of settlement areas and where hazards continue, bushfire may penetrate into settlement areas.
- Ember attack into settlement areas, resulting in localised fires. Localise fires may include vegetation in gardens, parks and on roadsides being on fire and structures being on fire.
- Smoke through settlement areas.

Bushfires are most likely to be single day bushfires.

The effect of bushfire in this landscape is that parts of the study area may experience neighbourhood scale destruction (without planning scheme bushfire protection being implemented). This is orientated to Chewton and the edges of other parts of the study area, especially those with fire runs to the north-west. These are shown as 'highest risk interfaces' on Figure 4C.

4.3 Low fuel areas

An assessment has been made of the study areas proximity and access to places that are lower fuel where human life can be better protected from the harmful effects of bushfire. Low fuel areas can provide protection at a settlement and neighbourhood scale as they provide a form of passive mitigation, enabling people to move away from bushfire hazards if they need to.

c13.02-1S Bushfire Planning defines such places as BAL:Low. BAL:Low places are where hazardous vegetation is more than 100m away (50m for grasslands). Hazardous vegetation for the purpose of BAL:Low is defined as vegetation that cannot be excluded under 2.2.3.2 of *Australian Standard AS3959:2018 Construction of buildings in bushfire prone areas* (Standards Australia).

In BAL:Low places, people sheltering in the open air will not be exposed to flame contact and the highest levels of radiant heat from a moving bushfire, although radiant heat from some hazards may still be life threatening. BAL:Low places may also be subject to localised fires which could include gardens and structures on fire. BAL:Low places do not consider ember attack, which may arise into these areas.

BAL:Low places are located as follows:

- In the central area of Castlemaine, correlating with lower fuel urban development and the commercial centre.
- In lower fuel urban development east of the Castlemaine commercial area, along Duke Street / Pyrenees Highway.
- In lower fuel urban development in McKenzie Hill and Campbells Creek. It is noted that these areas of BAL:Low are expanding as urban development proceeds.

See **Figure 4B: BAL:Low place(s)**

(Note: Figure 4B includes the buffer line used to define the vegetation edge and from where the 100m or 50m buffer, as applicable, was applied.)

Beyond these areas, more limited lower fuel areas consistently arise. This reflects the presence of bushfire hazards in many parts of the study area, including as a result of riparian corridors and larger parcels of vacant land (especially in Campbells Creek and Chewton). However, urban development is likely over time to create more low fuel areas. This can be factored into future planning for these areas.

Other places of shelter

A designated neighbourhood safer place is located at:

- Victory Park and Mostyn Street in Castlemaine
- Campbells Creek Community Centre in Campbells Creek.

Consistent with CFA general advice, designated places of safety are not afforded any weight in this bushfire assessment. This is because designated places of safety are designed as a last resort to manage legacy bushfire risks, not as a justification to enable new risk to be introduced.

4.4 Landscape types

Based on the likely bushfire scenarios, the potential for neighbourhood scale destruction and the availability and access to low fuel areas, landscape types can be applied.

The identified landscape types are necessarily strategic and are not intended to be scaled to apply to individual properties. They do however provide an indication of the relative risk in different parts of the study areas based on a neighbourhood scale of assessment.

The following landscape types are assessed for the study area and these are illustrated on Figure 4C.

See **Figure 4C: Landscape bushfire analysis**

Landscape type 2 areas

Landscape type 2 areas arise in the low fuel urban parts of the study area. Landscape 2 is described by DELWP (2017) as follows:

- *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 minimal fuel condition*
- *Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area.*

In these places, a moving bushfire in landscape scale hazards is not likely combined with good access to low fuel areas. Ember attack is likely on the outer edge of these areas that are closer to bushfires burning in the wider landscape, although extreme ember attack in these areas is not likely.

Landscape type 3a areas

Landscape type 3a areas arise on the northern, western and southern interfaces of the study area with landscape hazards. Landscape 3a is described by DELWP (2017) as follows:

- *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 area is located in an area that is managed in a minimal fuel condition*
- *Access to an appropriate place that provides shelter from bushfire is available.*

In these places, there is potential for a moving bushfire to impact on the edges of developed areas. Where continuous fuel paths exist, bushfire may penetrate deep into the study area. However, the extent of fragmentation of the vegetation means a consistent moving bushfire is less likely, in combination with relatively good access to low fuel areas in a direction of travel away from a bushfire.

Ember attack across all areas is likely from bushfires burning in the wider landscape, although extreme ember attack is not likely beyond the immediate interface with bushfire hazards (for example, within 150m of forested areas).

Landscape type 3b

Landscape type 3b areas arise in Chewton, where the study area adjoins landscape scale hazards to the north and south. Landscape 3b is described by DELWP (2017) as follows:

- *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 area is located in an area that is not managed in a minimal fuel condition*
- *Access to an appropriate place that provides shelter from bushfire is not certain.*

In these places, there is potential for a moving bushfire to impact on the edges of developed areas. Due to the lack of clear edges to bushfire hazards, a moving bushfire may penetrate deep into the study area. This is in combination with no locally available BAL:Low areas, meaning travel to the west is required to access low fuel areas. Travel may be on roads affected by bushfire hazards, including the strategic east-west Pyrenees Highway.

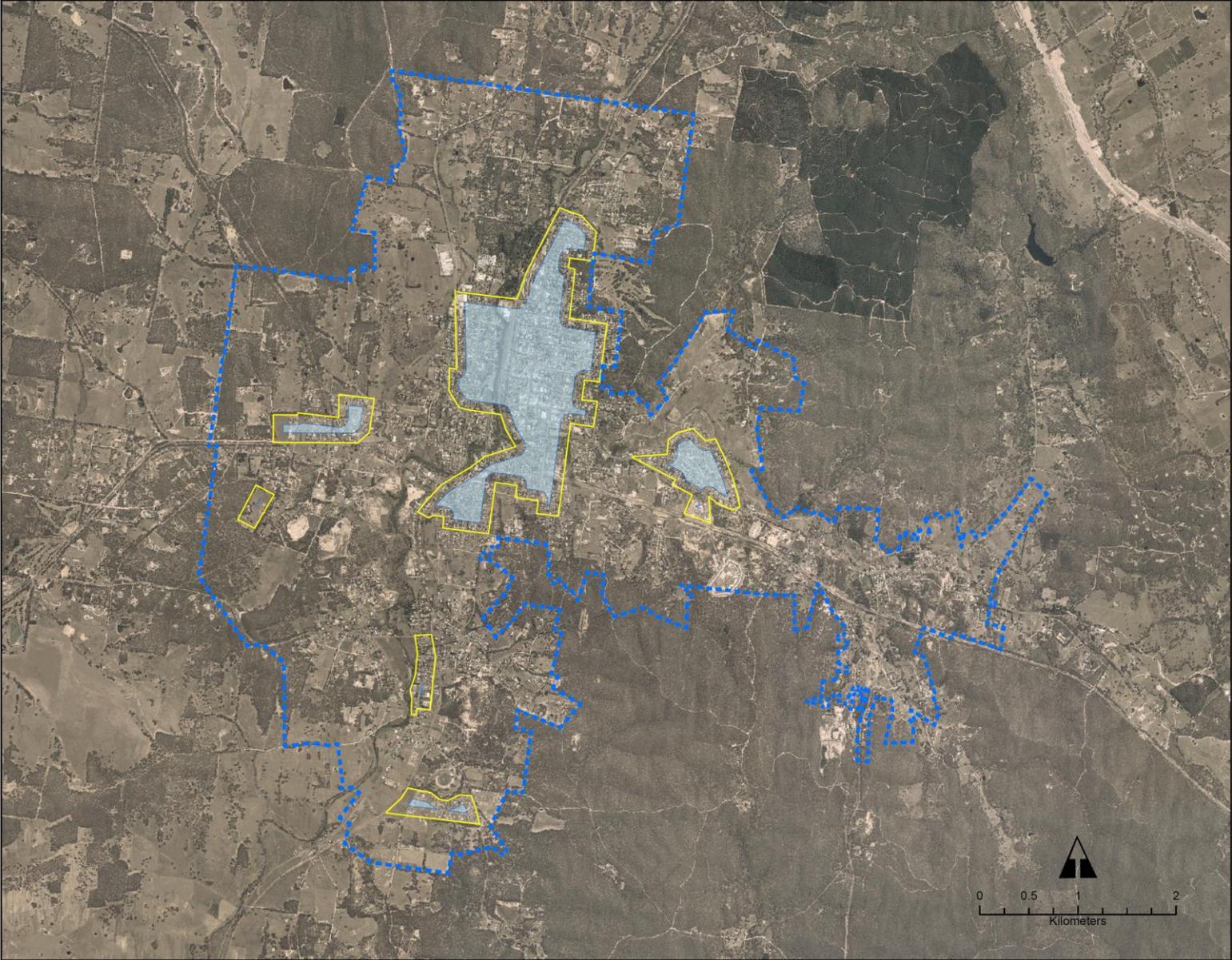
Ember attack across all areas is likely from bushfires burning in the wider landscape, although extreme ember attack is not likely beyond the immediate interface with bushfire hazards (for example, within 150m of forested areas).

4.5 Appreciating how bushfire may affect settlements

Design Guidelines: Settlement Planning at the Bushfire Interface (DELWP 2019) provides design advice on settlement planning. It includes a description of the bushfire threat to settlements, which is generally applicable to the study area. This is reproduced in Figure 4D to assist the reader to appreciate how bushfire may affect the study area.

See **Figure 4D: Generalised Understanding of How Bushfire Threatens Settlements**

FIGURE 4B: BAL:LOW PLACES



-  Study area
-  BAL:Low place
-  BAL:Low buffer line

Note: BAL:Low places in lower fuel urban development in McKenzie Hill and Campbells Creek are expanding as urban development occurs

FIGURE 4C: LANDSCAPE BUSHFIRE ANALYSIS

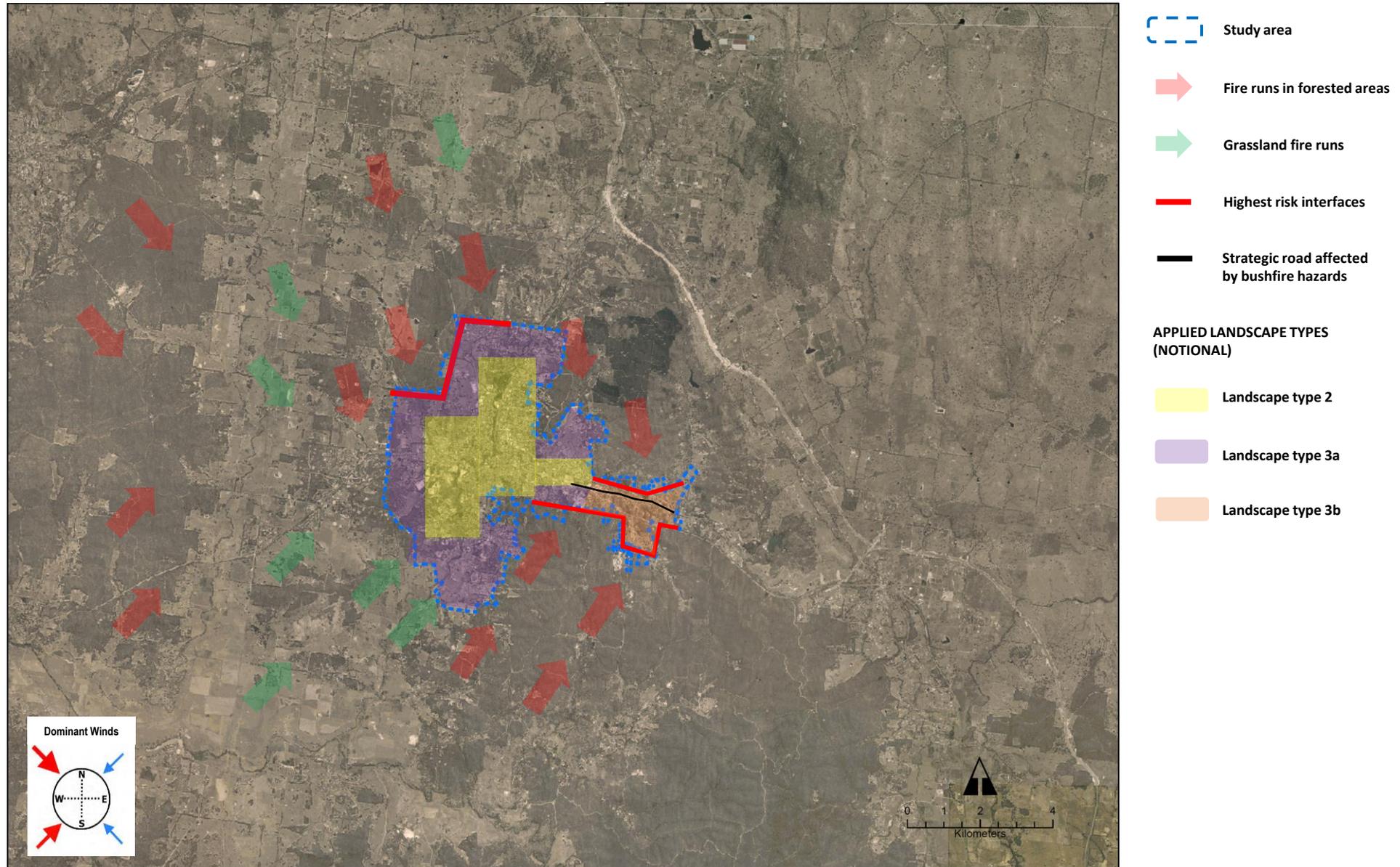
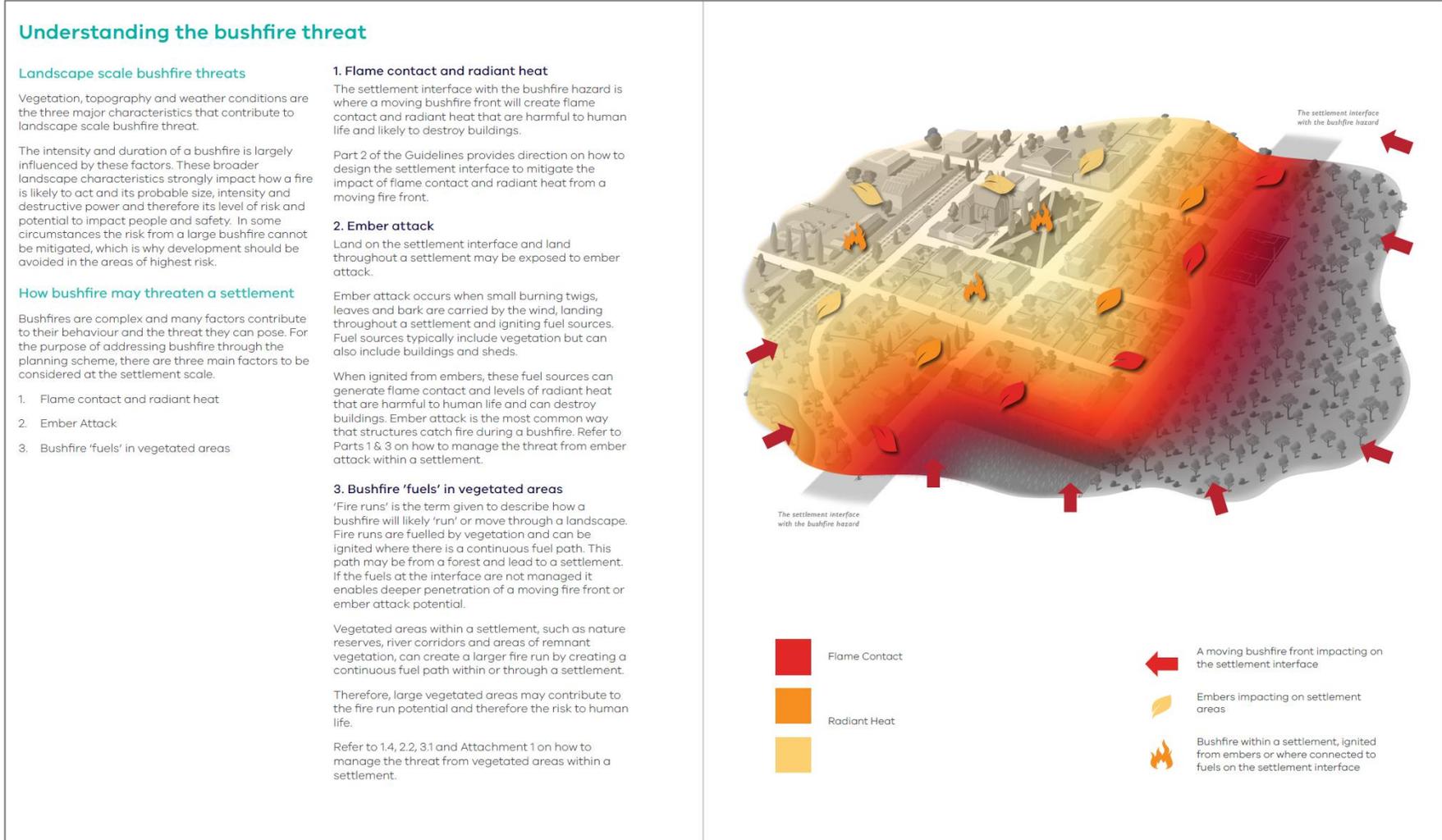


FIGURE 4D: GENERALISED UNDERSTANDING OF HOW BUSHFIRE THREATENS SETTLEMENTS (DEWLP 2019)



5. Exposure to bushfire at the neighbourhood and local scale (12.5kw/sq.m of radiant heat)

Exposure to bushfire at the neighbourhood and local scale assesses the level of radiant heat likely to arise from hazardous vegetation within and in proximity (150m) to the study area. Considering exposure to bushfire enables new development to be separated from hazardous vegetation so that radiant heat of less than 12.5kw/sq.m arises, as required by *c13.02-1S Bushfire Planning* for new development enabled by a planning scheme amendment.

This section enables key strategies in *c13.02 Bushfire Planning* to be considered. These strategies include the following:

Site based exposure

- *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.*
- *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).*

5.1 Methodology to determine exposure to bushfire

The methodology for a bushfire hazard site assessment as described in *Planning Permit Applications Bushfire Management Overlay Technical Guide* (DELWP 2017) and *AS3959-2018 Building in a Bushfire Prone area* (Standards Australia) informs the assessment. Key assumptions include a Fire Danger Rating of 100 and a flame temperature of 1080°C.

The following inputs were used.

5.1.1 Hazard identification

Vegetation types

Hazardous vegetation was identified within and around (150m) the study area using expert judgment based on field work and aerial photography. Ecological vegetation classes (EVCs) were also reviewed.

See **Figure 5A: Ecological vegetation classes**

Low-threat vegetation as described in *AS3959-2018 Building in a Bushfire Prone area* (Standards Australia) was excluded as it is not considered hazardous under the planning scheme.

Slope

Slope under hazardous vegetation was assessed using the 10m contour, having regard to topographical information. Slope under hazardous vegetation informs how fast a bushfire may travel. Where possible, slope is based on vegetation north-west and south-west which are likely bushfire direction of travel in Victoria.

See **Figure 5B: Slope based on a 10m contour**

5.1.2 Applied setbacks

Setbacks from hazardous vegetation were applied based on Column A in Table 2, *c53.02 Bushfire Planning*. This setback provides for exposure to be no more than a radiant heat flux of 12.5 kilowatts/square metre.

See **Figure 5C: Vegetation assessment, applied slope and Column A setback**

5.2 Land likely to be exposed to no more than 12.5kw/sq.m of radiant heat

Land likely to be exposed to no more than 12.5kw/sq.m of radiant heat emerges from applying the above methodology. In these places, exposure to bushfire is likely to satisfy the requirement in *c13.02-1S Bushfire Planning*.

See **Figure 5D: Land likely to be exposed to be more than 12.5kw/sq.m of radiant heat**

At a strategic scale, the difference between assessed vegetation types or slopes used in determining exposure is limited (for example, setbacks may vary 20-30m). The potential for variation on the site-scale should be considered when reading Figure 5D. This necessitates a bushfire hazard site assessment being prepared for any individual planning scheme amendment or development proposal. This is required under the ordinary operation of the Bushfire Management Overlay or as part of preparing a planning scheme amendment, in any event.

5.3 Points to note about exposure to bushfire at the neighbourhood and site scale

It is yet to be fully resolved how exposure is to be considered in every circumstance, especially in locations which are not proposing outward expansion of settlements or where the underlying zone need not change even if a strategic planning document promoted intensification. It is also the case that the Bushfire Management Overlay, which applies to parts of the study area, routinely permits development with higher exposure through its ordinary operation.

Despite these limitations, considered exposure assists to understand the relative risk between different locations and, on a neighbourhood and local scale, lower risk places. It is important to note that the neighbourhood and local risk is always considered alongside landscape and strategic bushfire considerations and is not in isolation determinative of acceptable bushfire outcomes.

Exposure using the bushfire hazard site assessment relates to radiant heat and flame contact. Ember attack is assumed in all areas and the severity of ember attack is not separately assessed at the site scale (for example, the different ember generating potential within a fuel type is not assessed or considered in the bushfire hazard site assessment).

FIGURE 5A: ECOLOGICAL VEGETATION CLASSES

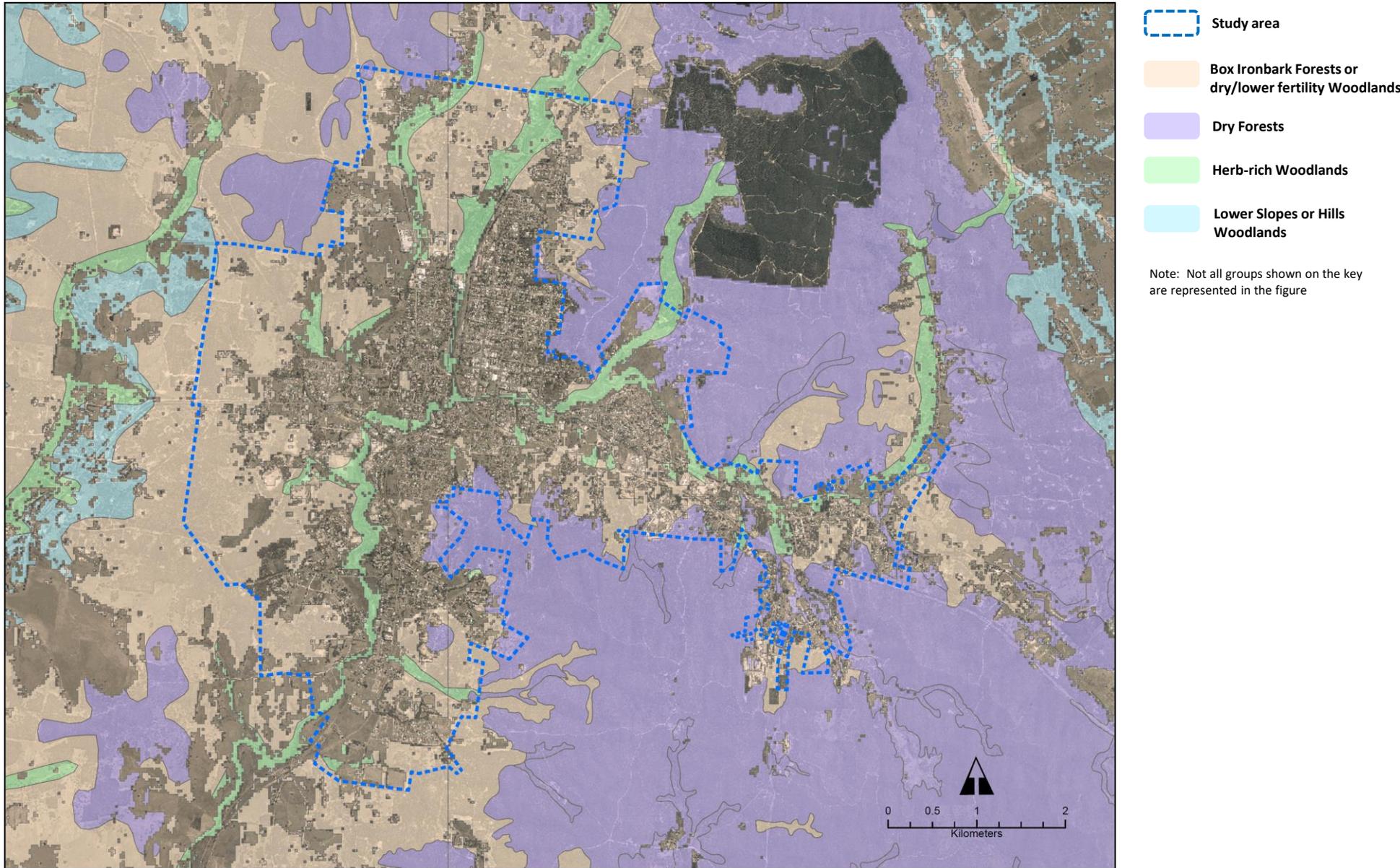


FIGURE 5B: SLOPE BASED ON A 10M CONTOUR

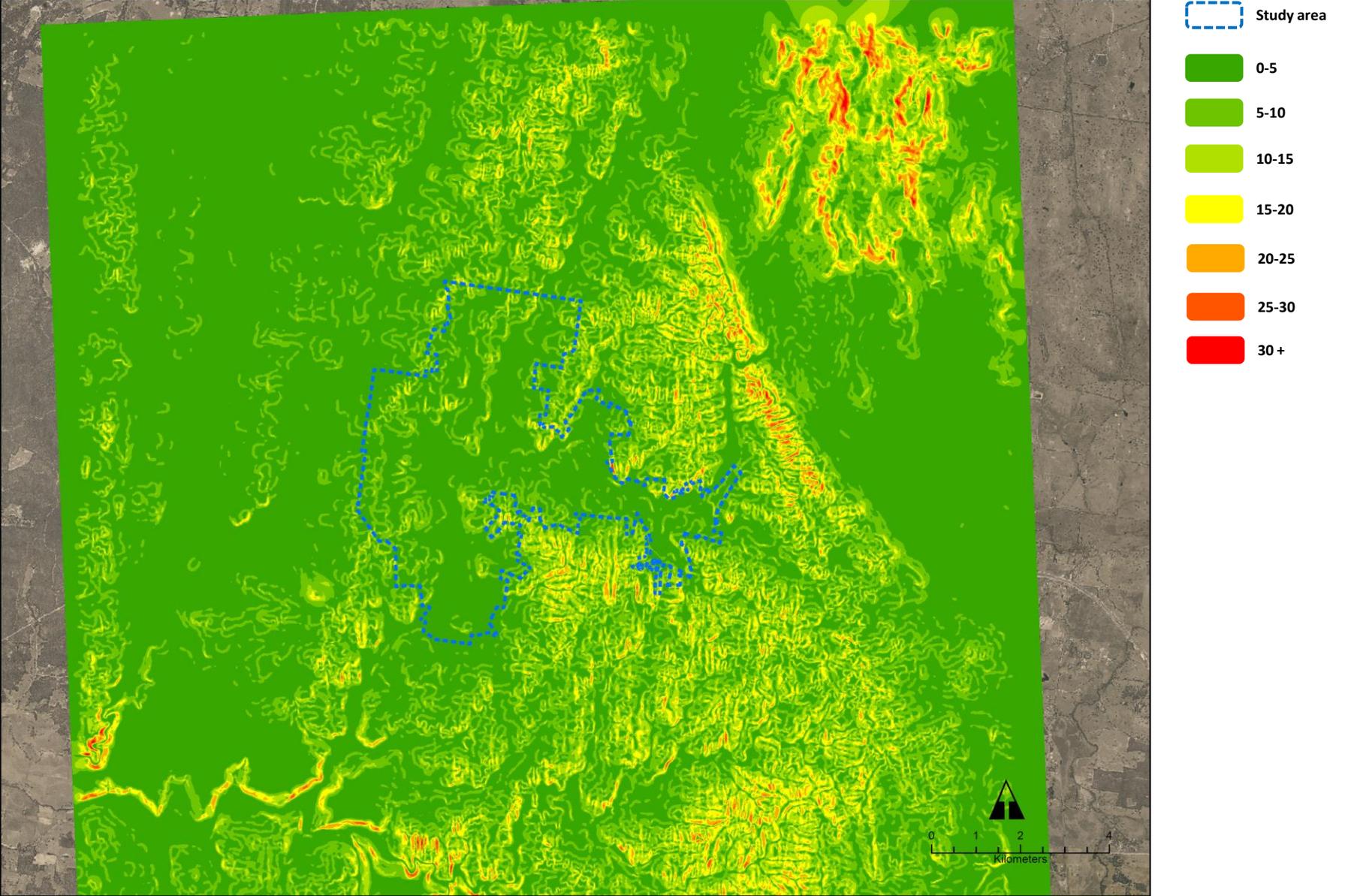


FIGURE 5C: VEGETATION ASSESSMENT, APPLIED SLOPE AND COLUMN A SETBACK

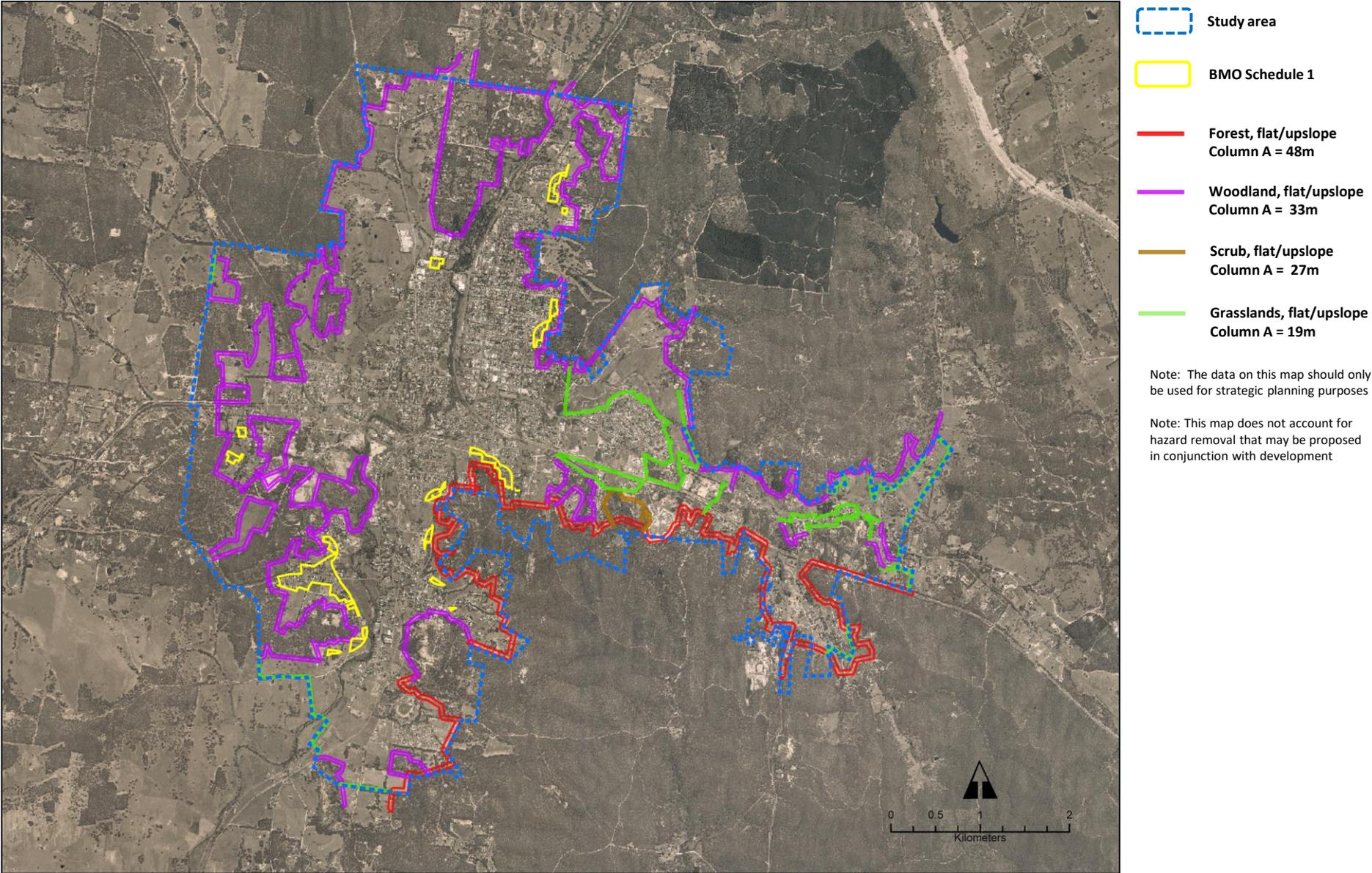
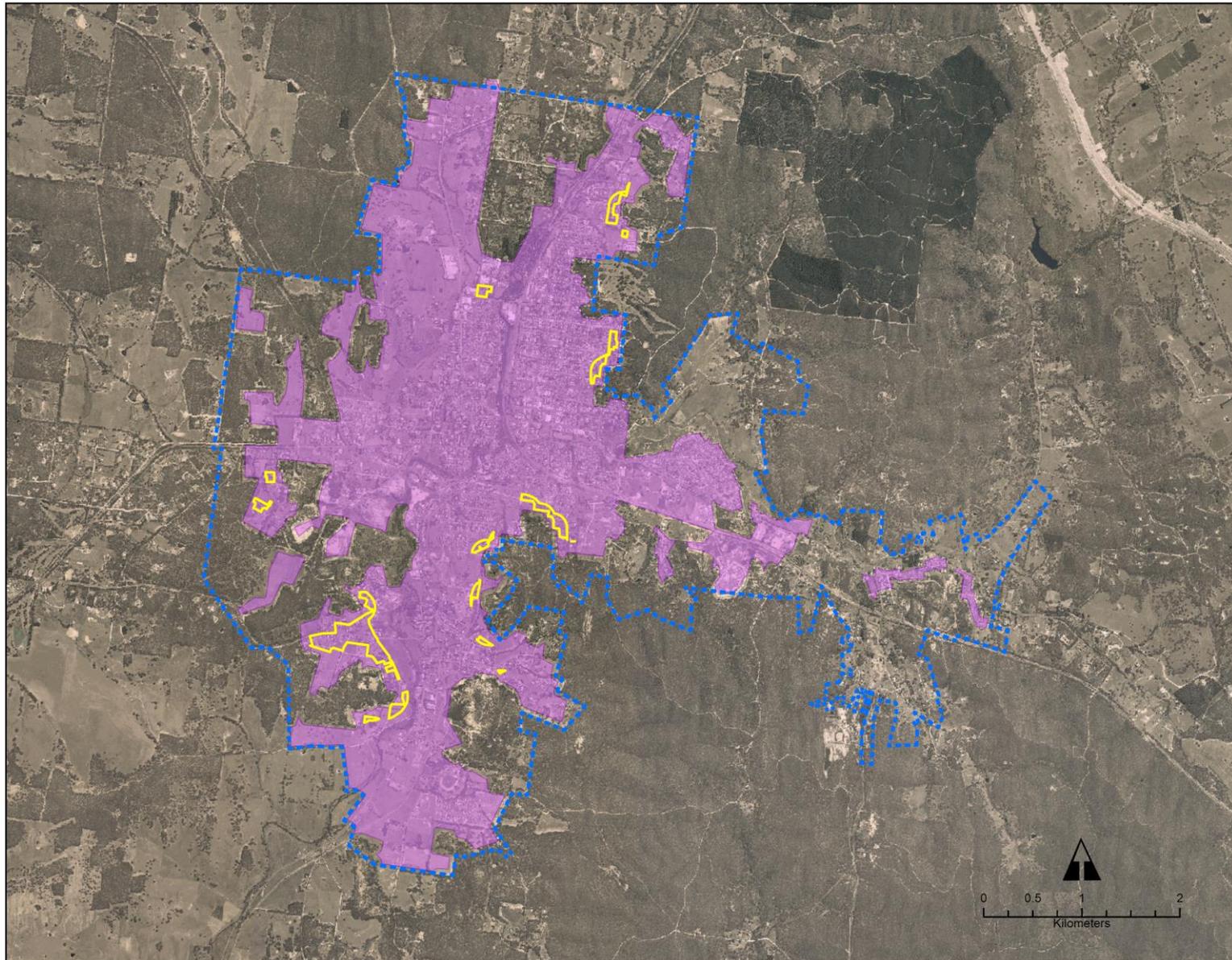


FIGURE 5D: LAND LIKELY TO BE EXPOSED TO NO MORE THAN 12.5KW/SQ.M OF RADIANT HEAT



 Study area

 Land likely to be exposed to no more than 12.5kw/sq.m of radiant heat

 BMO Schedule 1

Note: The data on this map should only be used for strategic planning purposes

Note: This map does not account for hazard removal that may be proposed in conjunction with development

6. Discussion

This report has considered the bushfire context of the study area, the landscape hazard, the availability of low fuel areas and whether there are locations that could satisfy the *c13.02 Bushfire Planning* exposure requirement.

The scope of work for this bushfire assessment includes identifying locations where development could be directed. This would then enable the Council to consider this information, alongside other information relevant, in progressing strategic planning work.

c13.02-1S Bushfire Planning includes strategies that seek to direct new development and to manage bushfire risk overall.

Alternative locations for development

- *Give priority to the protection of human life by [...] directing population growth and development to low risk locations[.]*
- *Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.*

No increase in risk

- *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.*

To apply these strategies, and to draw together the information and assessments in this report, different parts of the study area are considered and provided with a recommended direction relating to development and future growth.

6.1 Castlemaine in a municipal context

Bushfire risk to Castlemaine (including Campbells Creek and Chewton)

The study area is located within a high risk bushfire landscape. This is reflected in bushfire contextual information such as the Victorian Fire Risk Register and advice contained in the *Loddon Mallee Bushfire Management Strategy* (DELWP 2020).

However, parts of study area have favourable characteristics according to planning scheme decision making. This includes areas (especially outside of Chewton) with longer fire runs but which are not dominated by hazards in rugged terrain where extreme bushfire behaviour is likely.

Instead, the hazard around Castlemaine is likely to be consistent with the assumptions for bushfire integrated into the bushfire setbacks included in planning schemes (in *c52.03 Bushfire Planning* based on an FDI100 and flame temperature of 1080'). This means the bushfire protection provided through planning decision making is more likely to be effective.

Castlemaine is also a larger settlement that has favourable bushfire characteristics at the settlement scale. This includes a large low fuel area orientated around the town centre of Castlemaine, enabling people from the edges of the settlement to move inwards towards places of enhanced safety. This includes places reasonable considered to provide absolute safety from the harmful effects of bushfire.

Bushfire risk relative to other settlements

Having regard to the municipal scale of Mount Alexander Shire, the alternative larger settlement to Castlemaine is Maldon. It is similarly affected by bushfire hazards to Castlemaine and also contains lower fuel areas. There is not likely to be any meaningful risk reduction achieved in directing development to Maldon rather than Castlemaine, with similar bushfire outcomes likely achievable in both settlements.

Harcourt, located to the north-east of Castlemaine, is removed from the larger forested areas found in Castlemaine and Maldon. It is nonetheless affected by some larger areas of hazard and from grassfires. Less advantageously, it does not have the large area of low fuel land with large separation from hazards as found in Castlemaine. Whilst it could be developed to achieve these outcomes, the relative risk benefits of directing development to Harcourt are not considered to be significant to de-emphasise the role of Castlemaine in municipal wide growth planning.

Newstead, located in the western part of the Shire, is affected by large forest fire runs to its north and south-west. The presence of bushfire hazards within the settlement and the lack of a large no fuel area means it may be similarly at risk to many parts of Castlemaine. However, the presence of the large, non-fuel area in Castlemaine is an important element supporting growth in Castlemaine, consistent with planning scheme policies emphasising places of shelter in determined places for new development.

Elphinstone and Taradale are much smaller settlements and, even if a focus for development, would be many years before the protective benefits of being within a larger settlement such as Castlemaine would arise. They are also affected by large forested areas to their west, adding to their own bushfire risk.

Conclusions

It is considered that Castlemaine is optimised to be favourably assessed against *c13.02-1S Bushfire Planning* as a location for growth and development on a municipal scale. Whilst not all places within Castlemaine are suitable for growth, there are places where the bushfire risk can be managed to acceptable standards and to levels consistent with, if not lower than, alternative locations for growth on a municipal scale.

6.2 Strategic directions for the study area

The bushfire hazard and bushfire considerations do not uniformly present bushfire risk to the study area, with significant variability arising from the landscape, neighbourhood and local assessments prepared in this report. This section considers different places within the study area based on the landscape types identified in Section 4.

See **Figure 6A: Applied landscape types and strategic directions**

Landscape type 2 areas

The parts of the study area away from forested edges, orientated around low fuel urban areas and sometimes grasslands, are significantly lower risk. This is consistent with landscape type 2 being assessed along with the Bushfire Management Overlay mostly not applying.

Strategic planning that directs development to these areas would be consistent with *c13.02-1S Bushfire Planning* directions. This is because they have favourable bushfire characteristics including:

- A lower landscape bushfire risk
- Low fuel areas and access to low fuel areas from most areas
- Places that can satisfy the bushfire exposure requirement (12.5kw/sq.m).

Design Guidelines: Settlement Planning at the Bushfire Interface (DELWP 2019) provides design advice on settlement planning and can be used for planning in these areas.

In these areas, the risk progressively reduces towards the centre of Castlemaine to the point where land within the core part of Castlemaine is not even within a bushfire prone area.

To assist with strategic planning, landscape type 2 areas have been further defined as land outside of the Bushfire Management Overlay, as shown on Figure 6A.

Landscape type 3a areas

Parts of the study that adjoin or are in close proximity (100-150m) to forested areas in the north, west and south of the study area have an increased bushfire risk. This is consistent with landscape type 3a being assessed. These areas are located on the north-west and south-west aspects of the study area and are likely to be exposed to bushfire under Victoria's dominant bushfire weather.

In these areas, the risk is highest at the immediate interface where a moving bushfire could enter settlement areas if continuous fuel paths are available. Higher levels of radiant heat are likely in these circumstances. However, the risk reduces significantly in places where there is a clearly defined hazard edge, setbacks from bushfire hazards for development and lower fuel areas in the neighbourhood enabling people to move away from hazard areas. This is already present in many of these areas or could be created as part of new development.

Strategic planning that directs development to these areas would be consistent with *c13.02-1S Bushfire Planning* directions. This is because they have favourable bushfire characteristics including:

- A moderate landscape bushfire risk, with most areas only realistically affected by bushfire on one aspect and the lack of rugged terrain meaning extreme fire behaviour is less likely
- Low fuel areas and access to low fuel areas or the potential to achieve this in completed development
- Places that can satisfy the bushfire exposure requirement (12.5kw/sq.m).

To assist with strategic planning, landscape type 3a areas have been further defined as land within the Bushfire Management Overlay in the north, west and south of the study area, as shown on Figure 6A.

Strategic planning that directs development to these areas is subject to the creation of bushfire ready communities. A high level of assurance on achieving this would be necessary to justify directing development to relatively higher risks aspect.

Key to securing acceptable outcomes is the creation of an effecting bushfire interface with hazard areas to reliably ensure that continuous fuel paths are not available, that a moving bushfire will not enter developed areas, creating or confirming access to low fuel areas and confirming that the bushfire exposure requirement is met.

Design Guidelines: Settlement Planning at the Bushfire Interface (DELWP 2019) provides design advice on settlement planning and can be used for this purpose, in combination with key requirements in the Bushfire Management Overlay. Perimeter roads and bushfire vegetation management will be a particularly important design responses on interfaces to permanent bushfire hazards.

A sample typical bushfire interface is included in Figure 6B.

See **Figure 6B: Expected treatment on permanent hazard interfaces**

Landscape type 3b areas

Chewton, located in the eastern part of the study area, is substantially affected by bushfire hazards arising from its linear development pattern. This results in it being exposed to long fire runs to the north and south, combined with bushfire hazards within the study area itself.

This is consistent with landscape type 3b being assessed, driven by the lack of low fuel areas including areas reliably assessed as BAL:Low. There are also only small areas of land where exposure is likely to be less than 12.5kw/sq.m. The risk to this area is reinforced by the Bushfire Management Overlay being applied to all land.

To assist with strategic planning, landscape type 3b areas have been further defined as land within the Bushfire Management Overlay in Chewton as shown on Figure 6A.

Within the study area, Chewton is less favourably assessed against *c13.02-1S Bushfire Planning* and would be assessed as the highest risk part of the study area. However, there are factors that may alter the balance of considerations.

Firstly, Chewton has access to the low fuel areas in Castlemaine within 1-3km. The journey is on roads affected by bushfire hazards but they are substantially modified bushfire hazards. The hazards arise mostly on public land so could be better managed in future. Relative to other parts of Victoria, this proximity to low fuel places is actually reasonable. There is also the opportunity to create low fuel areas in combination with larger subdivisions, meaning travel outside of Chewton should not be necessary in any event.

Secondly, Chewton has bushfire hazards throughout the study area combined with fragmented development, meaning there is not a clearly defined hazard edge. Where one was created as a result of new development, the risk could be more effectively managed (including to benefit existing development).

Thirdly, there are some larger areas of land where a defined hazard edge and low fuel areas, including those capable of being assessed as BAL:Low, are likely to arise in conjunction with new development. Where they did so, development is likely to be acceptable. This includes land already within a Township Zone. Proceeding with development could substantially reduce bushfire risk to existing communities. *c13.02-1S Bushfire Planning* encourages overall risk reductions, where these can be achieved.

On balance, directing growth and development to Chewton could be acceptable subject to neighbourhood scale planning that can coordinate change and manage bushfire risks effectively. Where this was done, it is likely that Chewton could be re-profiled to a landscape type 3a location and better justifying it as a focus for development.

It would be reasonable for the Council to further consider development in Chewton through a structure planning process (or similar) that enables neighbourhood scale bushfire issues to be addressed. This would include expectations on permanent hazard edges, the phasing of development, interventions to be undertaken outside of the planning system to better manage bushfire risks (for example, through fire prevention planning) and a strategic approach to low fuel areas, including where low fuel areas may arise in completed development.

In the absence of this strategic planning, development is less capable of demonstrating that *c13.02-1S Bushfire Planning* is being given effect to. Opportunities that may arise to enhance the resilience of existing development may not be realised or fully exploited if a strategic approach is not progressed.

6.3 Performance framework for potential areas of growth and new development

Areas with potential for growth and new development are not unhindered by bushfire considerations, they are simply more optimised to satisfy planning scheme bushfire policies.

It will be important that the following matters are fully considered in planning for the study area:

- The management of vegetation-related planning scheme requirements concurrently with bushfire considerations, ensuring creating interfaces with bushfire hazards and delivering bushfire vegetation outcomes is achievable.
- Ensuring that existing low fuel areas are not compromised by revegetation and continue to be available to support resilience.
- Barriers to applying planning scheme bushfire vegetation requirements (and creating defensible space) are avoided or minimised.
- Vulnerable uses are further considered, including how future occupants can be managed before, during and after a bushfire, including through bushfire emergency management planning deployed alongside on-going uses.
- The potential for localised burning elements, including structure to structure fires, are managed (including through bushfire construction standards being applied).

It will be important that growth and development being promoted can satisfy the requirements in *c53.02 Bushfire Planning*, although based on the assessments in this report this is likely to be achieved in many parts of the study area.

However, localised and site constraints beyond what has been considered in this report may arise and this reinforces the need for more detailed planning to occur in conjunction with any specific development proposal, as would be required under the Bushfire Management Overlay, the *c13.02-1S Use and development control in a bushfire prone area* or in preparing a planning scheme amendment to enable a specific development proposal.

More detailed planning is also considered necessary in Chewton, if the Council sought to direct development to it, as discussed in Section 6.2.

6.4 Biodiversity considerations

c13.02-1S Bushfire Planning provides directions on situations where bushfire and high biodiversity conservation values correlate:

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.

It is beyond the scope of this report to assess the biodiversity conservation value of vegetation that may need to be removed or managed as a result of bushfire requirements.

Given the greenfield character of many areas and the availability of land within the study area, it is reasonable to assume that development could accommodate the setbacks required from any vegetation that must be retained for biodiversity purposes.

At a strategic level, it is also reasonable to conclude that development can implement bushfire protection measures. However, if any part of the study area cannot accommodate bushfire requirements due to biodiversity factors, then development should not proceed.

6.5 Is additional resilience necessary in the bushfire hazard interface to development?

As referred to above, the recommendations in this assessment do suggest that development could be enabled in many parts of the study area.

It is reasonable to consider whether enhanced resilience should be provided in the permanent bushfire hazard interface with new development. The effect of this would be to further separate development from hazard edges. This would only need to be applied to landscape type 3A and 3B areas.

Based on the *c13.02-1S Bushfire Planning* exposure requirement (12.5kw/sq.m), setbacks to (for example) forested areas are likely to be a minimum of **48m** (based on forest and upslope / flat) in accordance with Column A, Table 2 in *c53.02 Bushfire Planning*. The effect of the *c13.02 Bushfire Planning* exposure requirement is to over-ride higher exposure (19kw/sq.m) otherwise permitted in the Bushfire Management Overlay.

So a level of additional protection could be provided by including the *c13.02-1S Bushfire Planning* exposure requirement into strategic plans and the planning scheme. It is recommended that this occurs to make it clear that a larger setback than that permitted by the Bushfire Management Overlay is required for new subdivisions.

It is an option to use more conservative inputs to the setback distances. Planning schemes, before 2014, provided setback distances based on an FDI120 and a flame temperature of 1200' (compared with the current FDI100 and flame temperature of 1080'). The effect of these inputs would require setbacks (for example) from forested areas to a minimum of **69m** (based on forest and upslope / flat) in accordance with Table 1 in *c52.47* (as contained in the planning scheme until 2014). This larger area would provide a further level of resilience (i.e. an additional setback of **21m**).

In considering whether further resilience is justified, it is material to consider strategic location. As confirmed in this report, landscape type 3a areas and landscape type 3b areas in Chewton subject to a structure planning process will have in completed development access to low fuel areas, enabling people to move away from the hazard interface (i.e. typically by walking 2-3 streets back from bushfire hazards). This provides a form of passive mitigation and would operate alongside the current planning scheme approach to bushfire setbacks.

It is also important to consider whether the hazard presents a risk that warrants more caution. On balance, whilst fire runs are large there is not the level of ruggedness that would indicate the most extreme forms of bushfire behaviour are likely, relative to other parts of the region (i.e. further south in and around Macedon Ranges) or the State (i.e. the Otway Ranges or in parts of Gippsland).

Instead, a bushfire as assumed in the *c13.02-1S Bushfire Planning* exposure requirement is a reasonable basis for setbacks to be derived, in combination with the exposure being set relatively low (12.5kw/sq.m). This assessment does not therefore recommend that increased bushfire setbacks on the bushfire hazard interface are necessary.

However, it may be prudent to require the setback be provided as part of the perimeter road reserve and to not rely in any way on the front of individual lots facing the bushfire hazard. This would have the effect of adding slightly to the setback provided (by approximately 6m for an urban residential lot based on a typical ResCode style front setback).

Given growth is being directed to higher risk landscape areas, this is a reasonable adjustment to accommodate to ensure lower risk outcomes in completed development. The sample typical bushfire interface included in Figure 6B accommodates this.

See **Figure 6B: Expected treatment on permanent hazard interfaces**

It is also noted that all land within the Bushfire Management Overlay will require bushfire vegetation management requirements. This will create a low fuel corridor along the permanent hazard interface where development progressively occurs, reinforcing the hazard edge, managing the impact of ember attack into gardens and supporting the availability of low fuel areas within new development.

6.6 Design response at the permanent hazard interface

The *c13.02 Bushfire Planning* exposure requirement, in combination with *c53.02 Bushfire Planning*, will require setbacks to achieve exposure of no more than 12.5kw/sq.m in combination with a perimeter road and bushfire vegetation management applied to all land within the Bushfire Management Overlay. This is illustrated in Figure 6B.

Strategic planning should accommodate and give effect to this interface design.

See **Figure 6B: Design response at the permanent hazard interface**

6.7 Development enabled by a planning scheme amendment

The *c13.02-1S Bushfire Planning* exposure requirement applies to development enabled by a planning scheme amendment. Much land within the study area is already zoned, and it remains unclear whether a policy emphasis in a strategic document for already zoned land actually enables development and should have the *c13.02-1S Bushfire Planning* exposure requirement applied.

However, there is an opportunity to do so, in any event, to avoid any confusion as to what applies but also to add a level of resilience at the permanent hazard edge in a higher risk settlement.

For subdivisions with more than 10 lots, the difference between the *c13.02-1S Bushfire Planning* required setback for forest / flat & upslope (48m) and the Bushfire Management Overlay setback as contained in *c53.02 Bushfire Planning* for forest / flat & upslope (35m) is likely achievable, in any event, based on the greenfield nature of the interface to permanent bushfire hazards.

Strategic planning should include the *c13.02-1S Bushfire Planning* exposure requirement (12.5kw/sq.m) to ensure it is applied to subdivisions and, if they arise, major development on the permanent hazard edge to the study area.

FIGURE 6A: APPLIED LANDSCAPE TYPES AND STRATEGIC DIRECTIONS

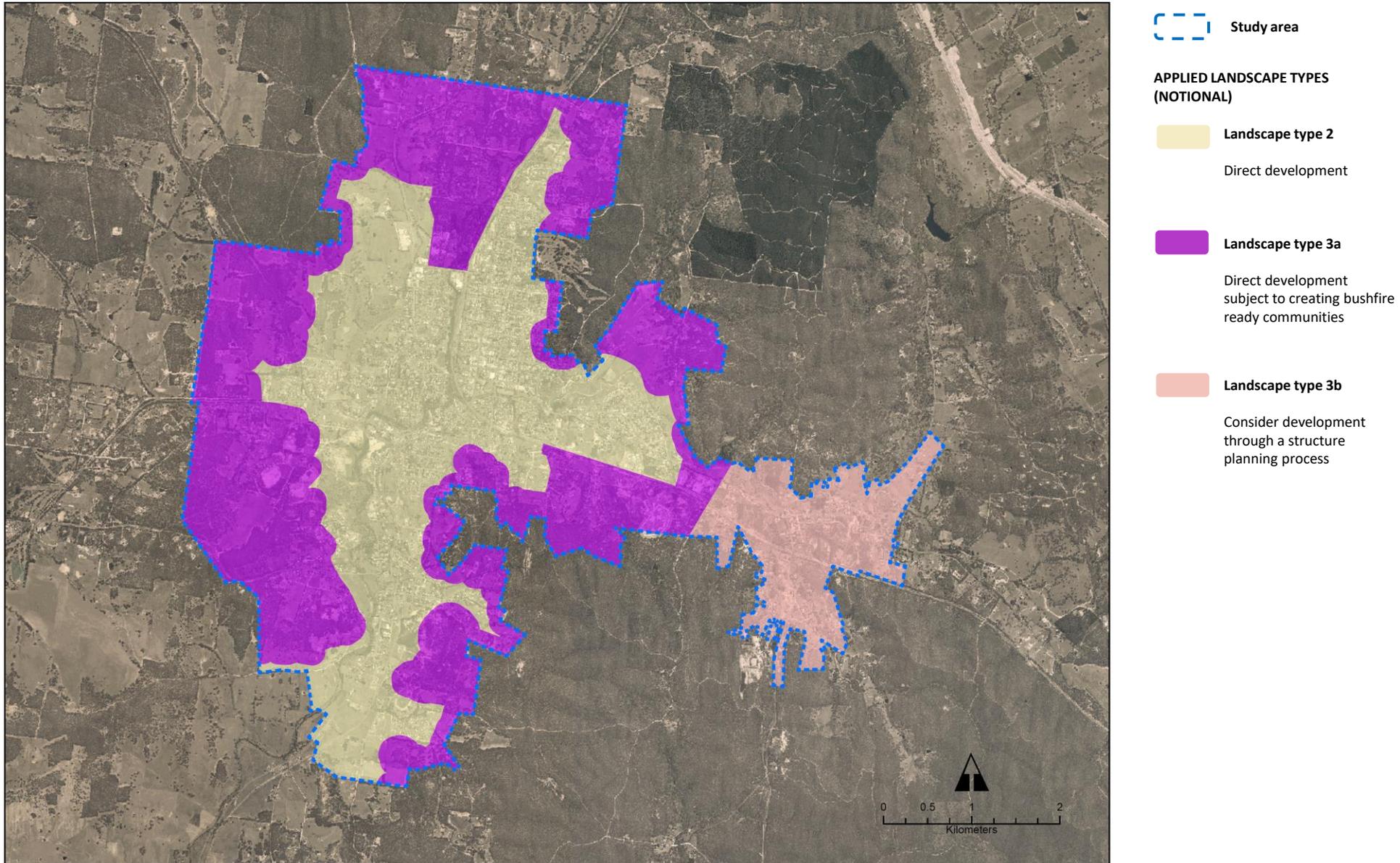
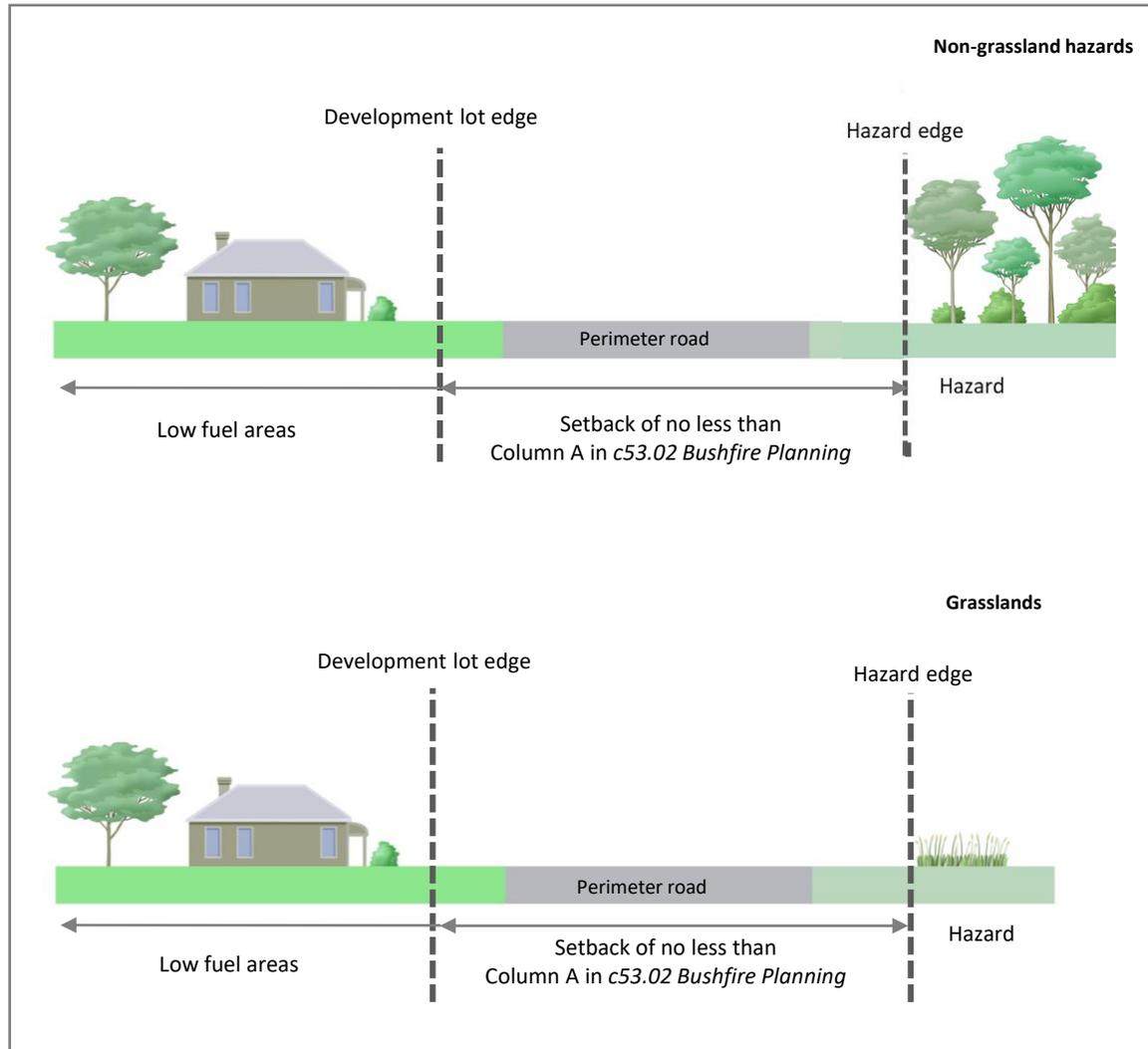


FIGURE 6B: EXPECTED TREATMENT ON PERMANENT HAZARD INTERFACES



6A. Views of the relevant fire authority

c13.02-15 *Bushfire Planning* identifies that a key element of a risk assessment is to:

- *Consult[...] with [...] the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.*

The CFA were provided with a draft of this report on 1 July 2021. CFA provided advice on 11 July 2022.

See **Attachment 2: CFA response dated 11 July 2022**

In relation to the bushfire hazard, CFA reiterated that the Castlemaine / Chewton is within a high bushfire risk location and they agreed with the bushfire assessment included in the report.

In relation to bushfire mitigation measures, they advised:

CFA supports the view that planned development within the Castlemaine footprint must strongly consider the impacts of bushfire exposure. Accordingly, the proposed Landscape Types should provide clarity on the appropriate strategies for future settlement.

The CFA subsequently provided feedback helpfully based on the landscape type areas shown on Figure 6A.

Landscape Type 2 focusing on greater infill development, lessening of open grassland/ bushland areas within the confines of the current urbanized areas should be a priority. This will greatly reduce the likelihood of external fires running into well maintained urbanized areas by “wicks” or “ember attack”.

Landscape 3a on the outskirts of current urbanized areas must be well planned and incorporate appropriate Separation / Buffers to separate future growth areas from the rural landscape. This separation may include the positive use of Open Space – Parks/ Gardens., Public areas – Oval, Golf Courses etc. combined with an external Boulevard Effect Ring Road.

This advice is highly consistent with the recommendations in this report.

In Landscape type 2 and 3a areas, a focus on securing bushfire protection measures is emphasised. Importantly, as recommending in this report, this must extend beyond the Bushfire Management Overlay areas into bushfire prone areas, which is an emphasis outlined in this report. This also reinforces the need for structure planning to specify requirements as the Bushfire Management Overlay will not always apply to deliver the mitigation.

Design Guidelines: Settlement Planning at the Bushfire Interface (DELWP 2019) provides design advice on settlement planning and can be used in these areas. A key change to this report following CFA advice is to reinforce the need to consider this document, even in Landscape type 2 areas.

Higher Risk category 3B locations principally around the Chewton area must be very carefully considered. Further assessment may well conclude the treatments necessary to reduce Bushfire risk exposure may eliminate the viability of future development at those locations.

CFA advice on Landscape type 3b reflects the higher risks in Chewton. CFA caution is warranted. The report recommendations to further consider development in Chewton through a structure planning process (or similar) that enables neighbourhood scale bushfire issues to be addressed remain valid.

However, it must be recognised that the recommended further planning in Chewton may not demonstrate that acceptable outcomes can be achieved. The Council and stakeholders must enter this planning process recognising that further work is to explore options, not to proceed with growth, at least initially and not until bushfire risk is addressed and, where possible, risk reductions can arise.

Engagement with the CFA on all future planning work is likely to be advantageous for the Council. However, the combination of this report and the CFA early advice enables the Council to proceed with further planning with a high level of confidence.

7. Conclusions

This report has considered the bushfire context of the study area, the landscape hazard, the availability of low fuel areas and whether there are locations that could satisfy the c13.02 *Bushfire Planning* exposure requirement. Three landscape areas are derived and recommendations are provided arising from the bushfire assessment.

The information from this bushfire assessment is available to be considered as part of strategic planning for the study area. In taking forward strategic planning, it will be important that planning occurs in a bushfire responsive manner. This would be supported by bushfire considerations be embedded into strategic plans as they are prepared.

References

Country Fire Authority (2020), *Grassfires – Rural* (access at www.cfa.vic.gov.au/plan-prepare/grassfires-rural)

Country Fire Authority (accessed in March 2021), *Victoria Fire Risk Register GIS data*

Department of Environment, Land, Water and Planning (2015), *Measuring Bushfire Risk in Victoria*

Department of Environment, Land, Water and Planning (2017) *Planning Permit Applications Bushfire Management Overlay Technical Guide*

Department of Environment, Land, Water and Planning Melbourne (2020), *Strategic Bushfire Management Plan Loddon Mallee Region*

Department of Planning and Community Development (2012), *Regional Bushfire Planning Assessment - Loddon Mallee Region*

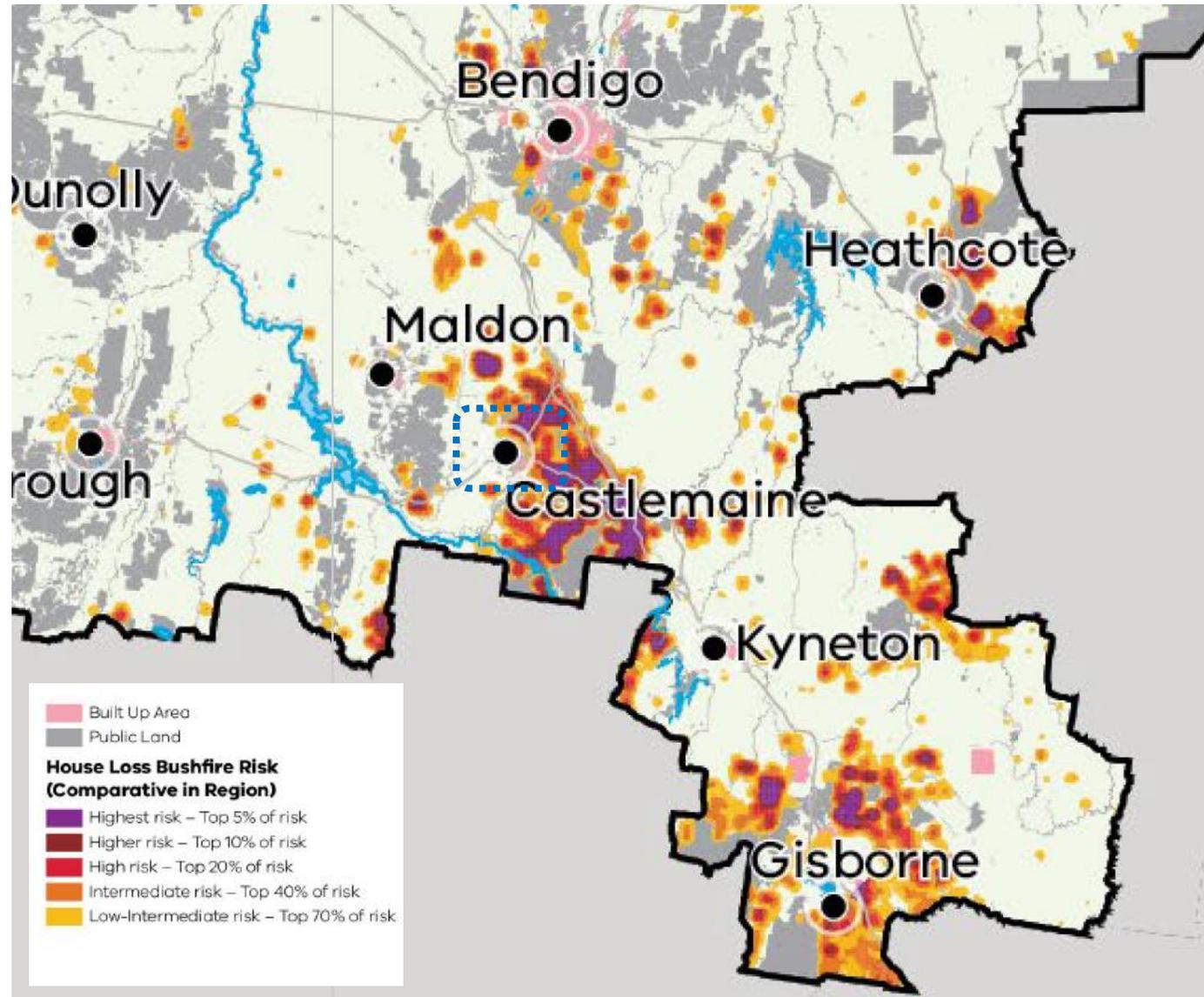
Department of Environment, Land, Water and Planning (2020(1)), *Design Guidelines: Settlement Planning at the Bushfire Interface*

Department of Environment, Land, Water and Planning, (accessed in March 2021), *Nature Kit 2.0* (<https://maps2.biodiversity.vic.gov.au/Html5viewer/index.html?viewer=NatureKit>)

Mount Alexander Planning Scheme

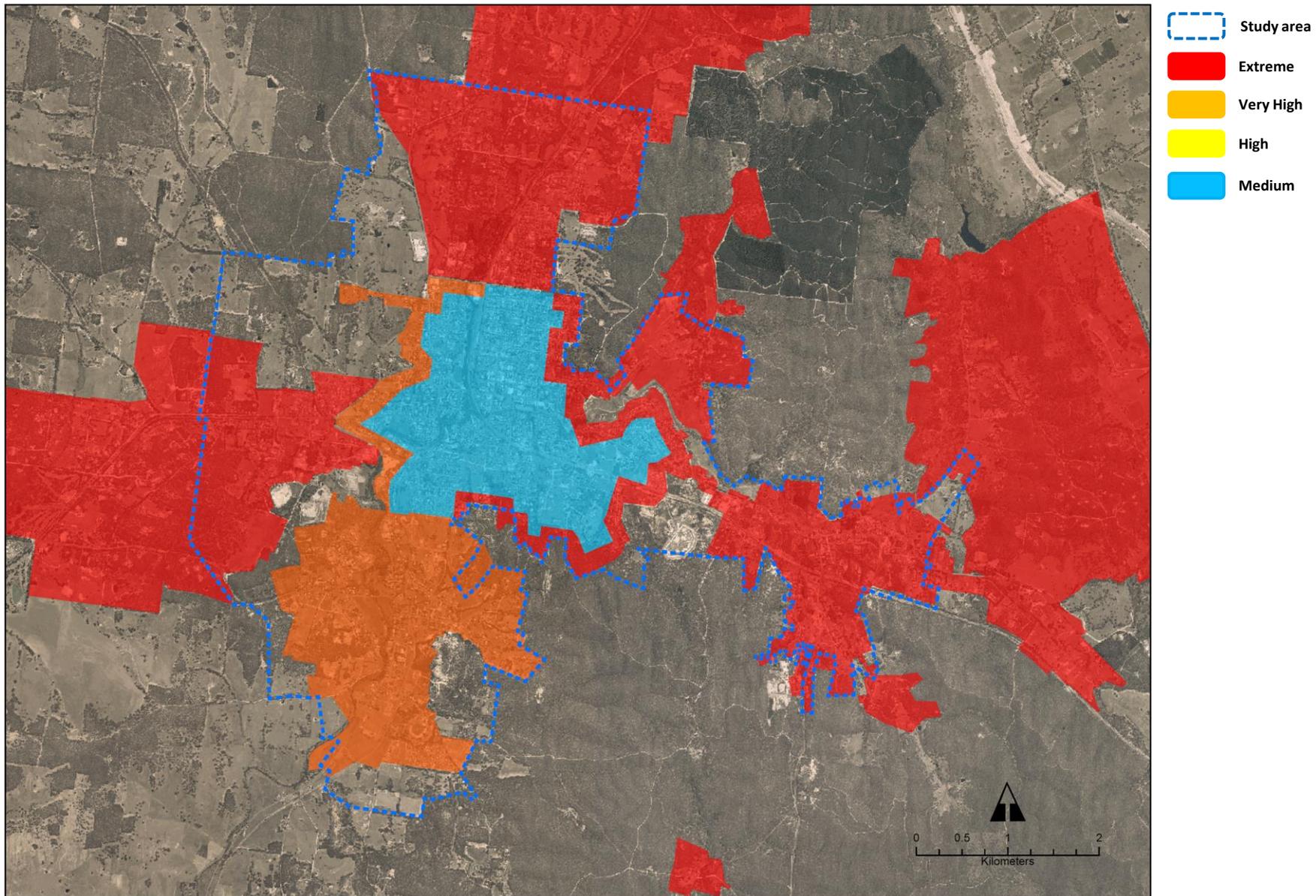
Attachment 1: Bushfire Contextual Information

ATTACHMENT 1 FIGURE A: MODELLED HOUSE LOSS BUSHFIRE RISK (ADAPTED FROM DELWP 2020)

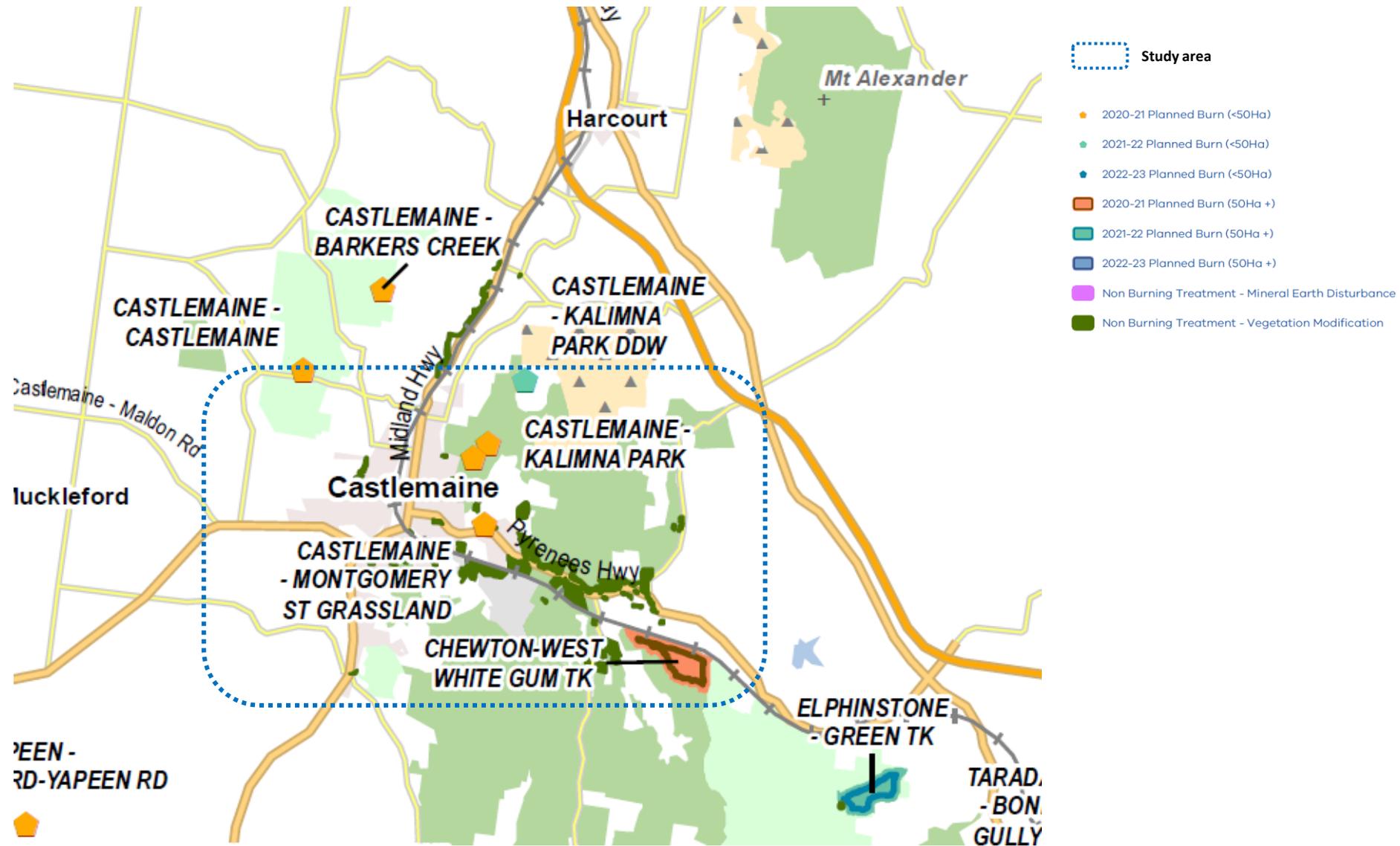


Bushfire risk within the Loddon Mallee region. This map only considers modelled house loss within the Loddon Mallee region and so risk shown on this map can only be compared within this region.

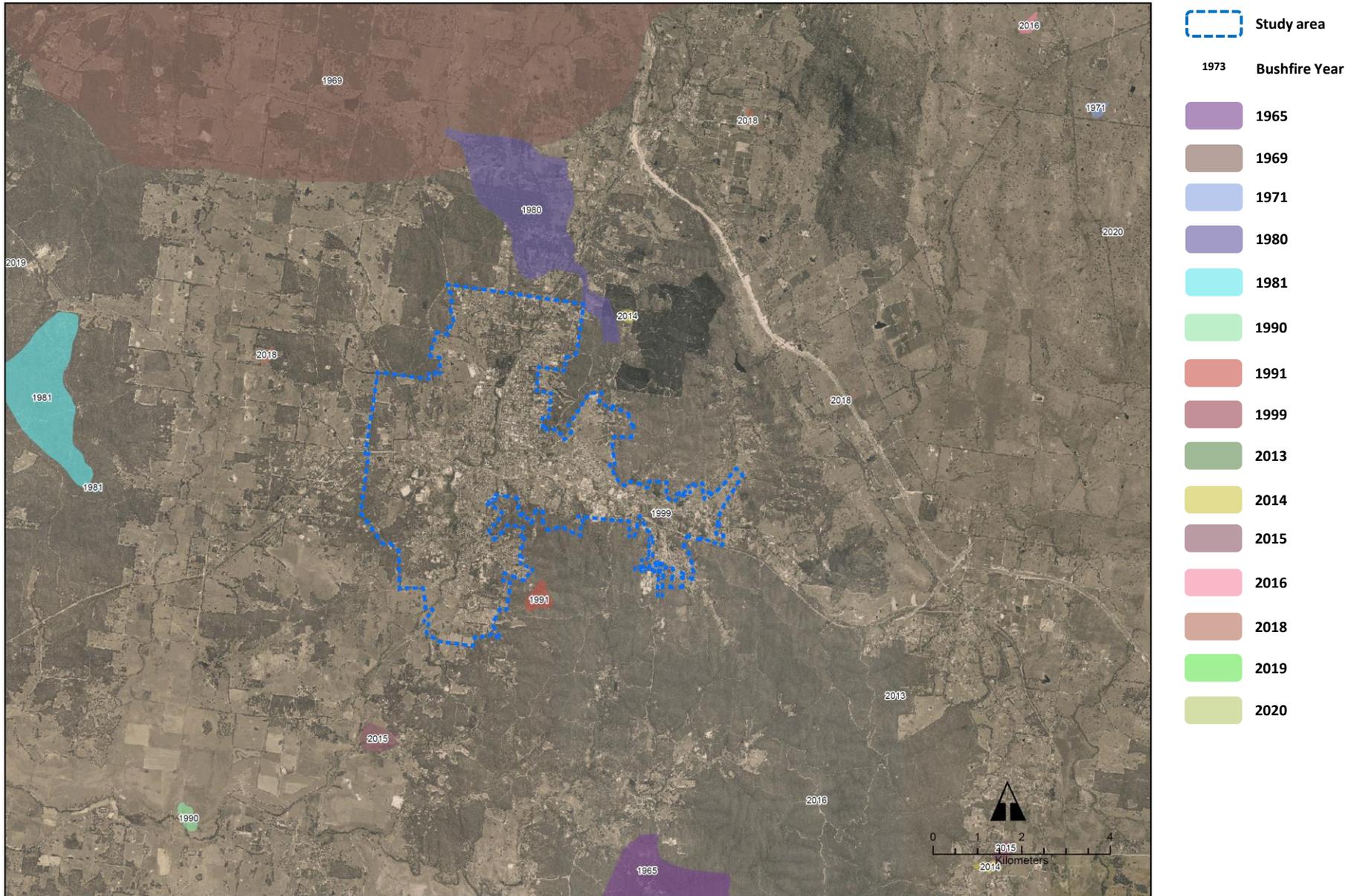
ATTACHMENT 1 FIGURE B: VICTORIAN FIRE RISK REGISTER HUMAN SETTLEMENT (2020)



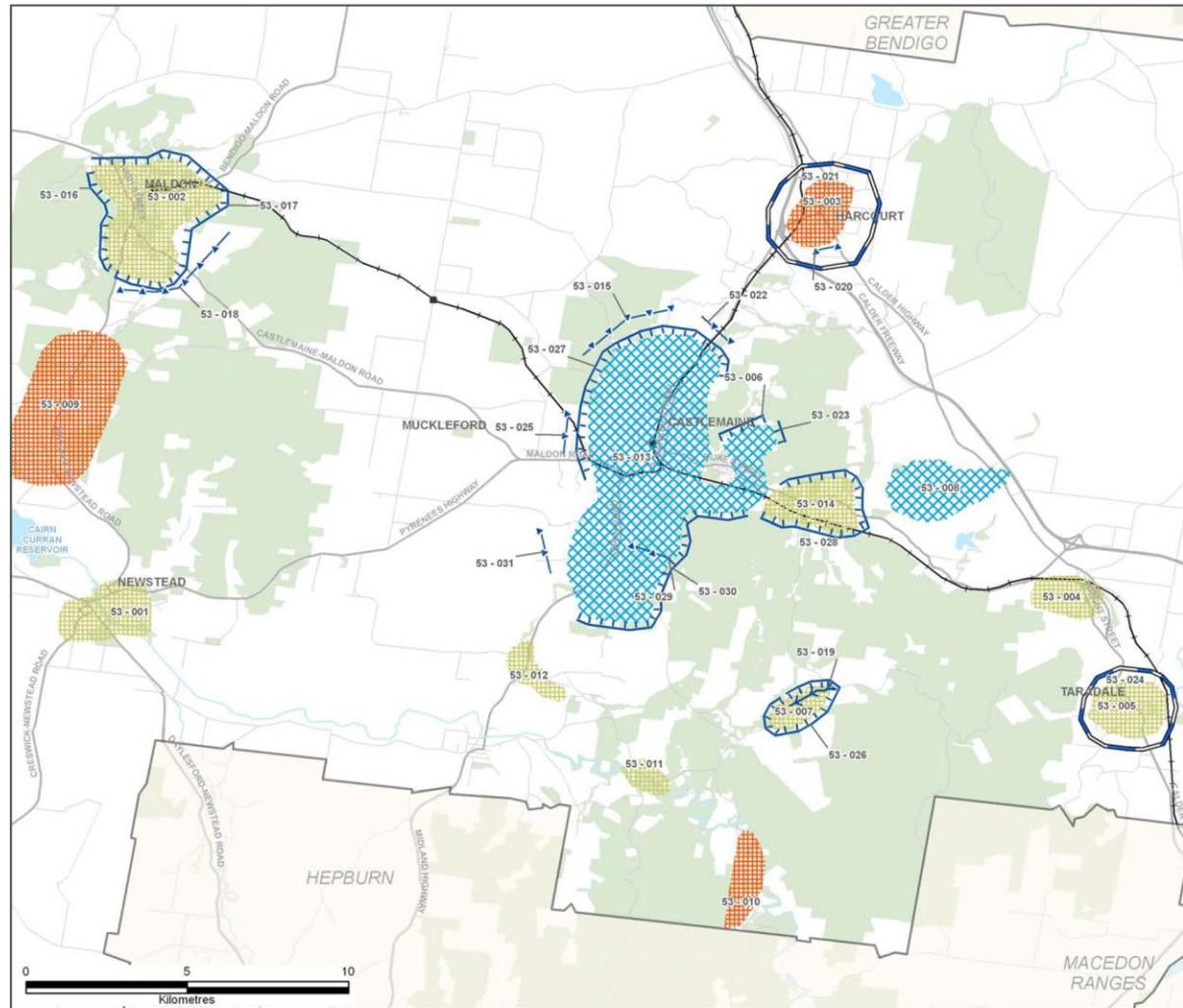
ATTACHMENT 1 FIGURE C: JOINT FUEL MANAGEMENT PLAN 2020 – 2023 (FOREST FIRE VICTORIA 2020)



ATTACHMENT 1 FIGURE D: BUSHFIRE HISTORY



MOUNT ALEXANDER MUNICIPAL MAP – MAP 2



Identified Areas

- Small lots in or close to hazard (0 - 0.4 hectares)
- Medium lots in or close to hazard (0.4 - 4 hectares)
- Specific local knowledge
- Other information of interest to planning
- Multiple matters
- Limited access and egress
- Urban/bushfire hazard interface
- Future strategic directions and bushfire hazard conflict

Features

- Major road
- Road
- Railway
- Railway station
- Watercourse
- Waterbody
- Public land

Attachment 2: CFA response dated 11 July 2022


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Our patron, Her Excellency the Honourable Linda Dessau AC, Governor of Victoria

CFA Fire Prevention and Preparedness
8 Lakeside Drive Burwood East Vic 3151
Email: firesafetyreferrals@cfa.vic.gov.au

CFA Ref: 2000-77044-120991
Telephone:
Council Ref:

11/7/2022

Ursula Van Dyk
Mount Alexander Shire Council
Po Box 185
CASTLEMAINE VIC 3450

Dear Ursula,

SUBMISSION TO PROPOSED STRATEGY

Proposal:
Location: Castlemaine Bushfire Strategy

Thank you for providing the CFA with the opportunity to comment on .

Bushfire Hazard

- The Castlemaine/ Chewton area is within a high bushfire risk location. This is based on the significant vegetation – (bushland) that exists within the footprint, combined with the potential *Landscape risk* from fire building momentum out to 20 kms from the actual footprint.
- The footprint can be exposed to all forms of bushfire attack – *Direct Flame, Radiant Heat and Ember attack*.
- CFA concurs with the bushfire assessment as undertaken by your consultant *Kevin Hazell Bushfire Planning*.

Bushfire Mitigation Measures

- CFA supports the view that planned development within the Castlemaine footprint must strongly consider the impacts of bushfire exposure. Accordingly, the proposed Landscape Types should provide clarity on the appropriate strategies for future settlement.
- Landscape Type 2 focusing on greater infill development, lessening of open grassland/ bushland areas within the confines of the current urbanized areas should be a priority. This will greatly reduce the likelihood of external fires running into well maintained urbanized areas by “wicks” or “ember attack”.
- Landscape 3a on the outskirts of current urbanized areas must be well planned and incorporate appropriate Separation / Buffers to separate future growth areas from the rural landscape. This separation may include the positive use of Open Space – Parks/ Gardens., Public areas – Oval, Golf Courses etc. combined with an external Boulevard

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Effect Ring Road.

- Higher Risk category 3B locations principally around the Chewton area must be very carefully considered. Further assessment may well conclude the treatments necessary to reduce Bushfire risk exposure may eliminate the viability of future development at those locations.

Other strategic considerations

- CFA also requests the Municipality and local Water Authority carefully consider the current / future reticulated water supply needs of the community (including those for operational firefighting.)

In conclusion CFA supports the draft strategy in its current form and requests CFA comments be taken in future considerations.

If you wish to discuss this matter in more detail, please do not hesitate to contact the Manager Community Safety on 0419 878 958.

Yours sincerely,



David Allen AFSM
Manager Community Safety
CFA Fire Prevention and Preparedness

END OF DOCUMENT