



BUSHFIRE MANAGEMENT STATEMENT



**Prepared by Regional Planning & Design Pty
Ltd**

64 Pine Court, Porcupine Ridge 3461
Phone 0447 073 107
s.thompsondesign@bigpond.com

**17 Eldridge Court Kangaroo Flat
Ref No. 18.15**

Disclaimer

This report has been made with careful consideration and with the best information available to Regional Planning and Design Pty Ltd at the time of writing. Before relying on information in this report, users should evaluate the accuracy, completeness and relevance of the information provided for their purposes. Regional Planning and Design Pty Ltd do not guarantee that it is without flaw or omission of any kind and therefore disclaim all liability for any error, loss or other consequence that may arise from you relying on any information in this report.

Requirements detailed in this document do not guarantee survival of the buildings or the occupants. The client is strongly encouraged to develop and practice a bushfire survival plan.

Information and assistance including a template for a Bushfire Survival Plan is provided as part of the 'Fire Ready Kit' available through the CFA website at <http://www.cfa.vic.gov.au> or through your local CFA Regional office.

Version Control

Report Version	Description	Date Completed	Issued to
A	Issued as a draft for discussion	3/7/2018	Client
B	General revisions	9/8/2018	Client
C	Revisions to lot layout	7/12/2018	Client

1 SUMMARY

Summary	
Proposal	13 lot residential subdivision
Date of site visit:	6 th February 2018
Broad landscape setting (Technical Guide Planning Permit Applications – Bushfire Management Overlay)	3
Access requirements can be met	Internal access road to be provided joining Eldridge Court
Water Supply Requirements	2500 litres in non combustible tanks for each lots 1 to 10 and 12 and 14. and 10,000 litres for Lot 11
Defendable Space requirements can be met	BAL 29, 19 and 12.5 within property boundaries
Proposed BAL construction level	BAL 12.5 for Lots 1 to 5, 12 and 13, BAL 19 for Lot 6 and BAL 29 for Lots 7 to 11.
Is native vegetation removal required:	No

2 INTRODUCTION

This Bushfire Management Statement (BMS) has been prepared to enable Tom Carra to respond to the requirements of Clause 44.06 *Bushfire Management Overlay* (known from this point on as Clause 44.06), and associated Clause 53.02 *Bushfire Protection: Planning Requirements* (known from this point on as Clause 53.02) for the proposed subdivision at 17 Eldridge Court Kangaroo Flat

Methodology

The BMS is in two parts

Part 1 Site description, hazard assessment and locality description

Part 2 A Bushfire Management Statement describing how the proposed development responds to the requirements in Clause 53.02 and 44.06.

3 ZONING AND OVERLAYS

Clause Number	Name
32.08	General Residential Zone
44.06	Bushfire Management Overlay
53.02	Planning for Bushfire

Figure 1 Zoning Township Zone

Planning Zone

GENERAL RESIDENTIAL ZONE (GRZ)
SCHEDULE TO THE GENERAL RESIDENTIAL ZONE (GRZ)



4 LOCATION

The site is located on the western edge of the residential area of Kangaroo Flat, to the south west of Bendigo. There are extensive areas of woodland to the north west and south west of the site.

The site could be vulnerable to runs of fire from the north west and south west. This is described in further detail in the Bushfire Hazard Landscape Assessment

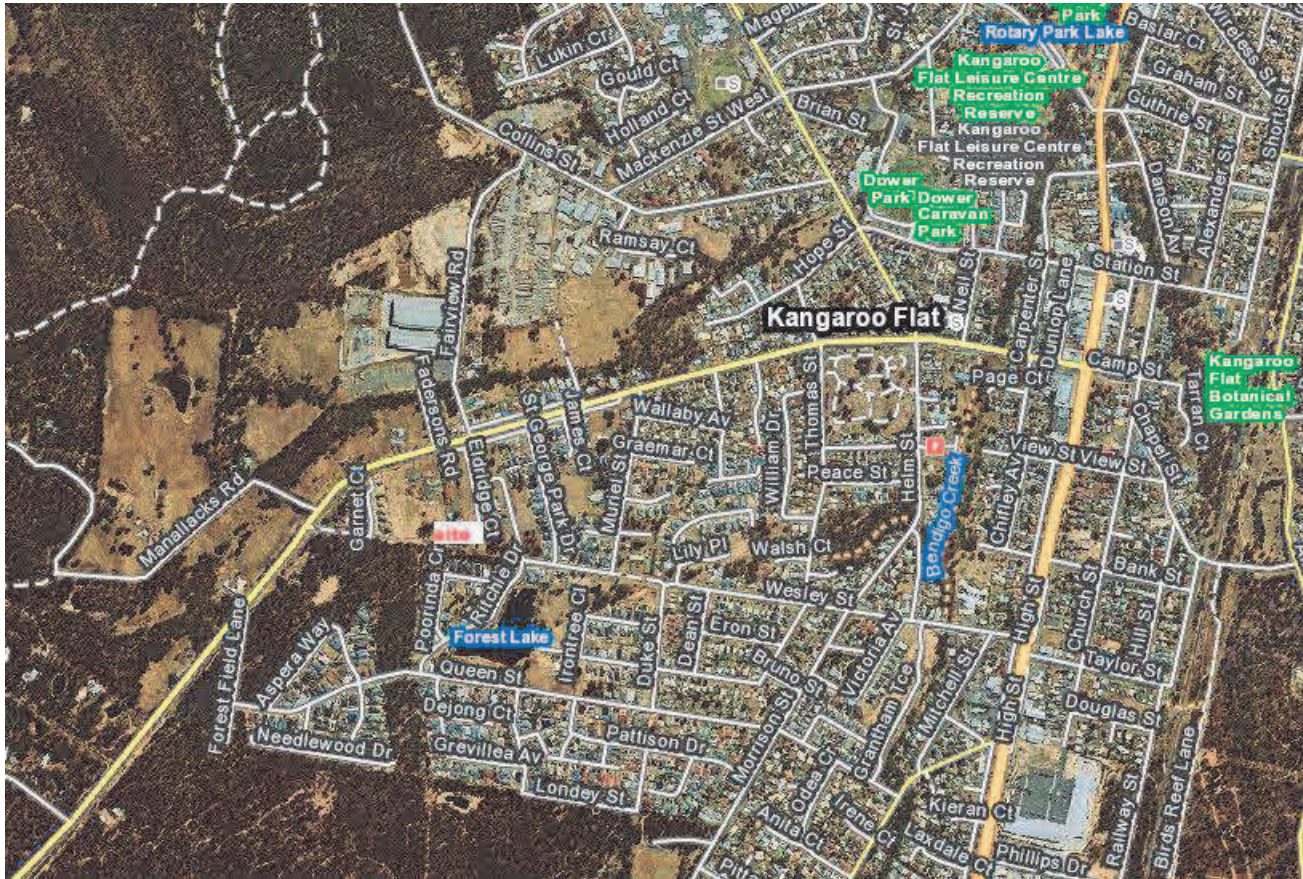


FIGURE 2 LOCATION

5 SITE DESCRIPTION

Site shape, dimensions, size , existing use and buildings and works	
The shape of the site is:	Irregular
The site has a total area of:	0.63 ha
The current use of the site is	Vacant
The buildings or works located on the site are:	Nil
Site topography	There is an overall 1 degree downslope to the north across the site
Services and infrastructure	The site is connected to mains power and water supply



Site Photos



Photo 2 Looking east from the south western part of the site



Photo 3 Looking west from the central part of the site



FIGURE 3 EXISTING CONDITIONS

6 ACCESS

The vehicle access is from Eldridge Street on the east boundary (photo 4). This provides good access to Lockwood Road to the north. The site also has access to Wesley Street to the west (photo 5).

Access Photos



Photo 4 Looking north along Eldridge Court on the east boundary of site



Photo 5 Looking west along Wesley Street to the west of the site

7 BUSHFIRE HAZARD SITE ASSESSMENT

As shown in Figure 4 and described in Appendix 1, within the 150 metre assessment area there are managed gardens in developing and established residential land to the immediate north , east and west of the site (photos 8 and 9). To the south is a mix of woodland, shrubs and grassland in a strip along the shared trail (photo 6 and 7). This is described in Appendix 4. There are large areas of woodland to the south west (photo 11)



FIGURE 4 150 METRE ASSESSMENT PLAN

Surrounding Landscape Photos



Photo 6 Looking west to a strip of woodland along the south boundary



Photo 7 Looking east through the strip of woodland beyond the south boundary

Surrounding Landscape Photos



Photo 8 Looking south across managed gardens to the south of the site beyond the strip of woodland of site



Photo 9 Looking north across recently cleared land to the west of the site to be developed for residential used

Surrounding Landscape Photos



Photo 10 Looking east developing residential land to the east of the site



Photo 11 Looking south west through woodland to the south west of site beyond Wesley Street

9 Bushfire Hazard Landscape Assessment

There are extensive areas of woodland to the north west and west of Kangaroo Flat (Figure 5), however, there is partly managed farm land and grassland to the north west beyond Lockwood Road (Figure 6) which will reduce the intensity of an approaching bushfire. The site would be classed as a Landscape type 3 in accordance with Broad landscape setting (Technical Guide Planning Permit Applications – Bushfire Management Overlay).

On high fire danger days there are often strong north westerly winds followed by a gusty south west change which can turn the east flank of a fire approaching from the north west into a long fire front. The threat from the south west is significant with extensive areas of woodland on public land.

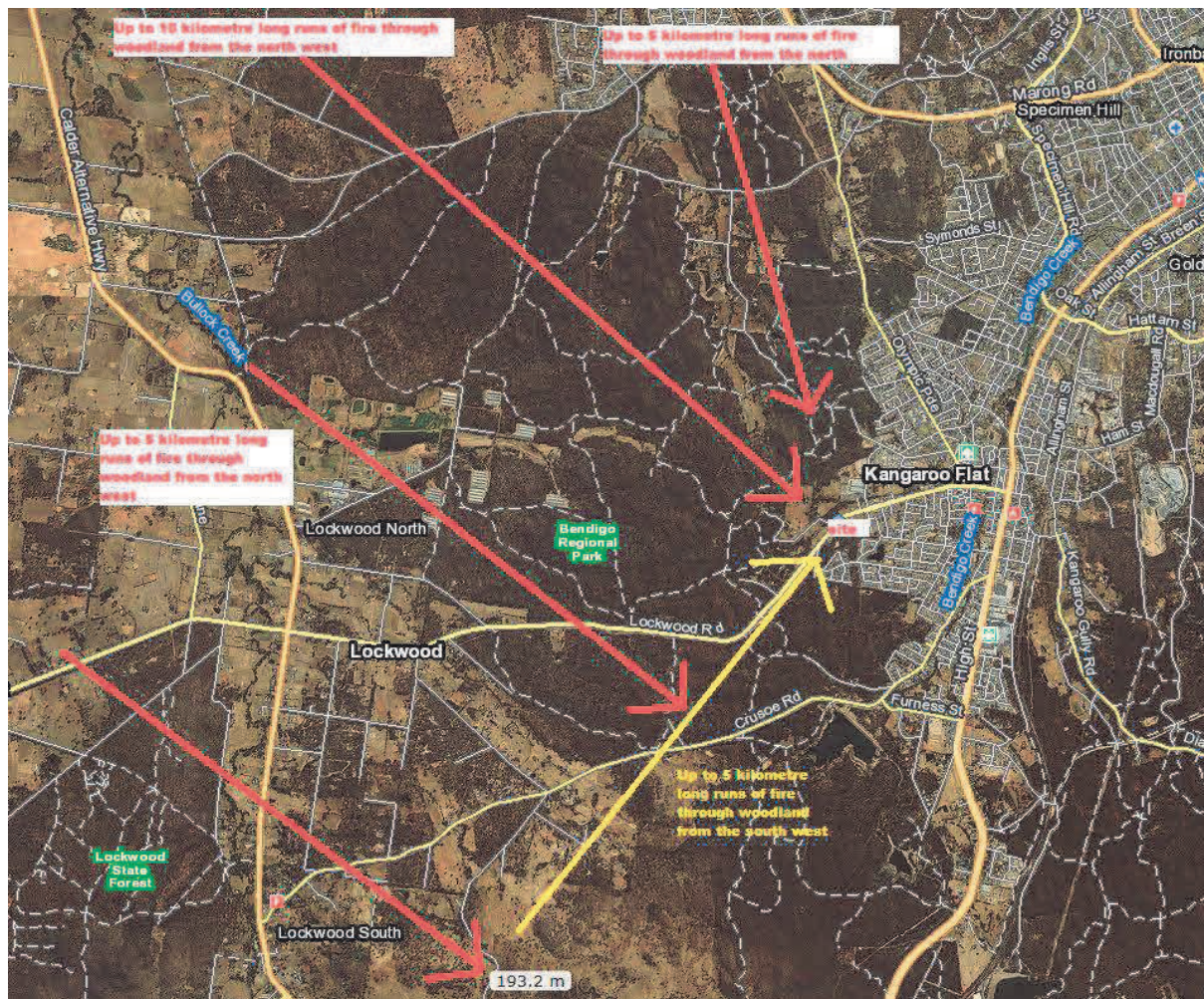


FIGURE 5 BUSHFIRE CONTEXT PLAN



FIGURE 6 LOCAL BUSHFIRE CONTEXT PLAN

Within 1 kilometre of the site woodland and forest becomes fragmented interspersed with areas of grazed farmland and developing residential land, which would help to reduce the width and intensity of an approaching fire front. (See Figures 6 and 7)



FIGURE 7 BUSHFIRE NEIGHBOURHOOD CONTEXT PLAN

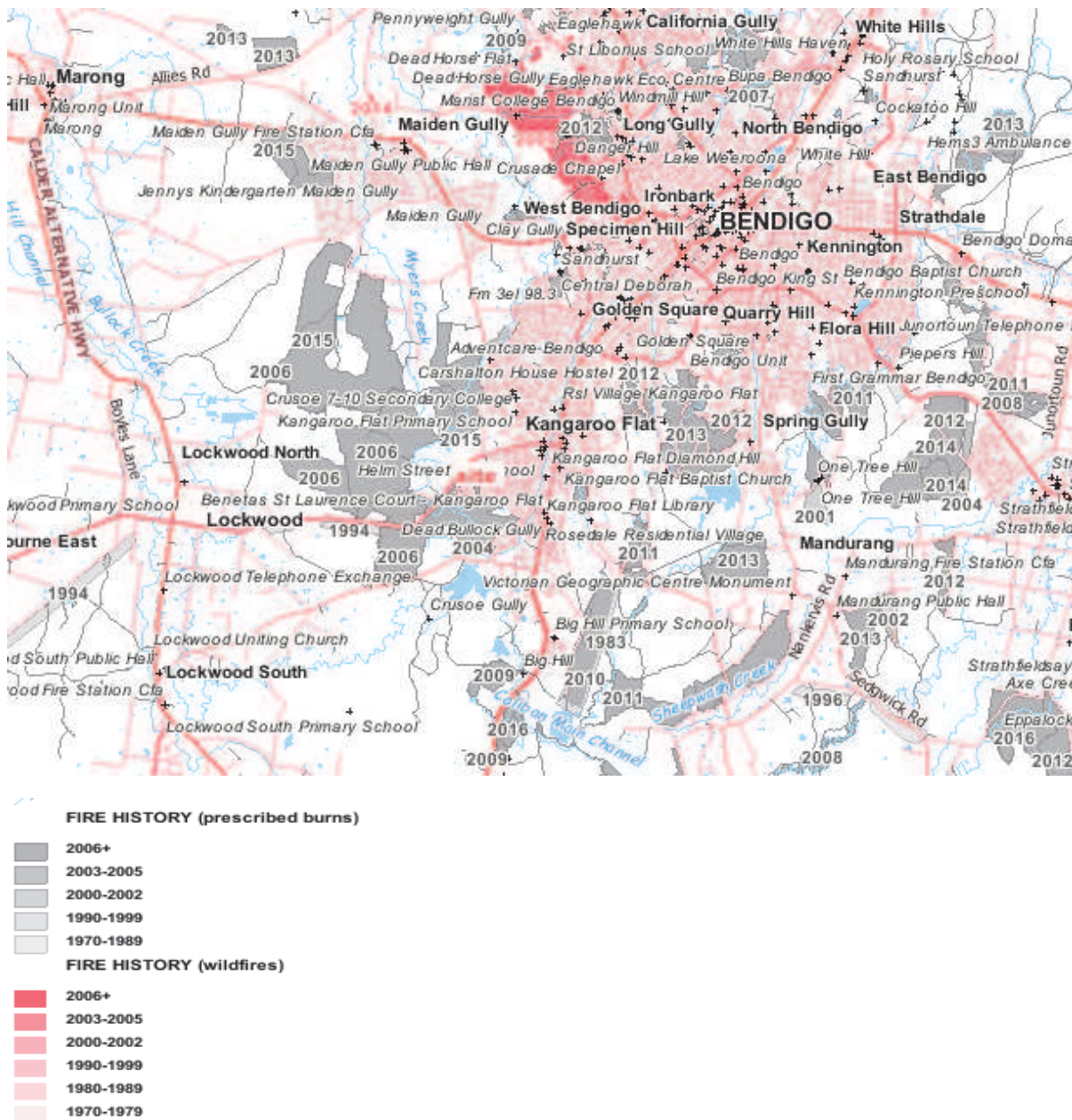
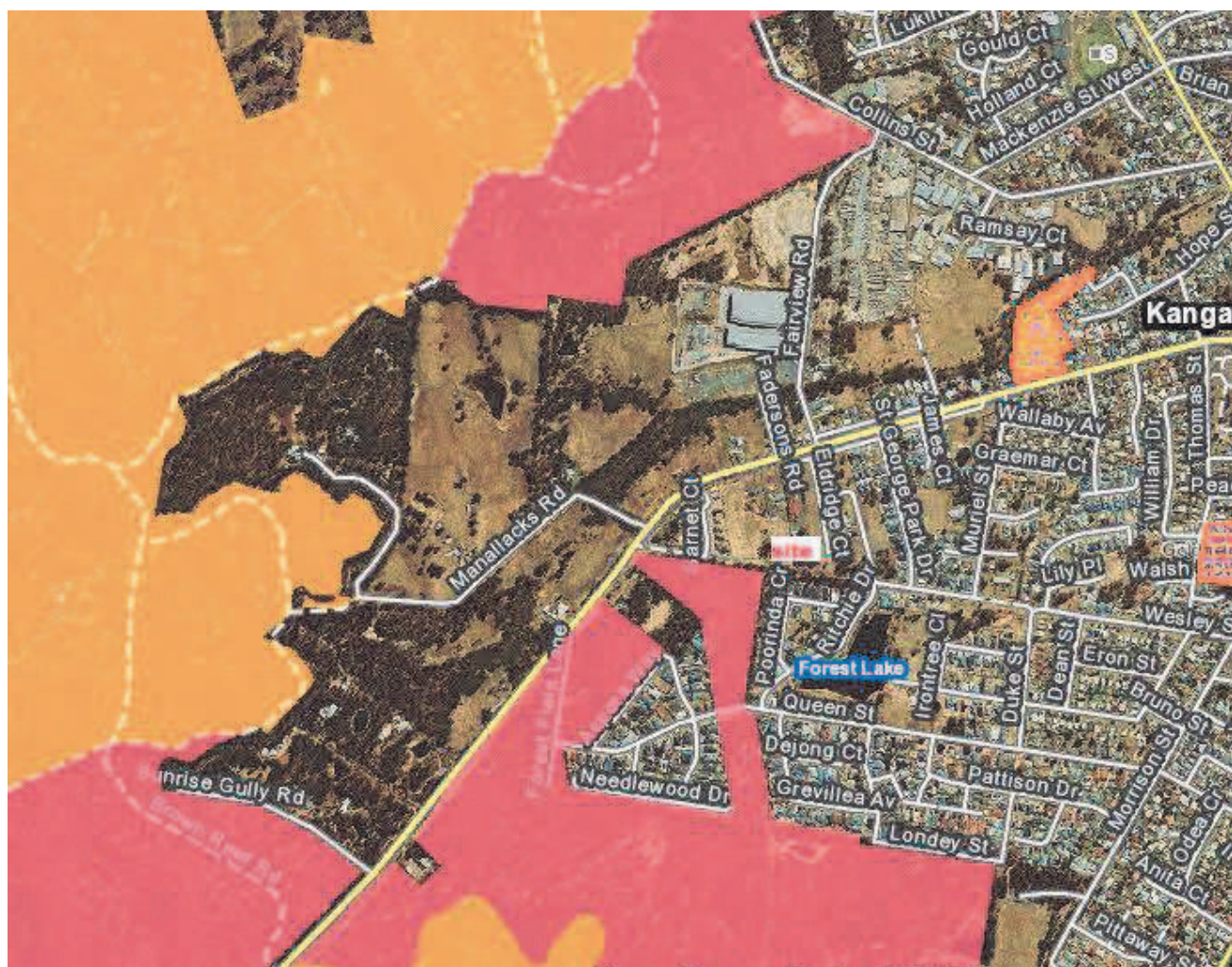


FIGURE 8 BUSHFIRE HISTORY MAP

The Fire History Map above shows the most significant recent fire occurred to the north west in 2009. However there has not been a major fire closer than 5 kilometres to the site in the last 40 years. There have been fuel reduction burns to the north west and south west which will help reduce the risk to the site. Public land surrounding the site is also zoned as Bushfire Moderation and Landscape Management by DELWP (in particular on public land to the north east and south west) which will mean there is some fuel management to reduce the risk.

In summary ,while the site is at risk of fire, the fragmentation of woodland closer to the site (particularly from the grassland and managed farmland to the north west) reduces the risk



Fire Operations Plan

Burn Year

	2017/2018
	2018/2019
	2019/2020

Category

	Fire History - Last 5 Years
	Mechanical Works

Fire Management Zones

	1 - Asset Protection
	2 - Bushfire Moderation
	3 - Landscape Management
	4 - Planned Burn Exclusion

FIGURE 9 PLANNED BURNS AND FIRE MANAGEMENT ZONES

10 DESCRIPTION OF DEVELOPMENT

The proposed subdivision will divide two lots into 13 blocks. There is sufficient space to allow construction of a dwelling on lots 1 to 5 and 12 and 13 to achieve BAL 12.5, lot 6 to BAL 19 and BAL 29 defensible space for Lots 7 to 11 (see building envelopes on Figure 11). Defensible space has been based on the hazard of low threat vegetation to the north and east, grassland to the west and woodland to the south (See Appendices 1 and 4)

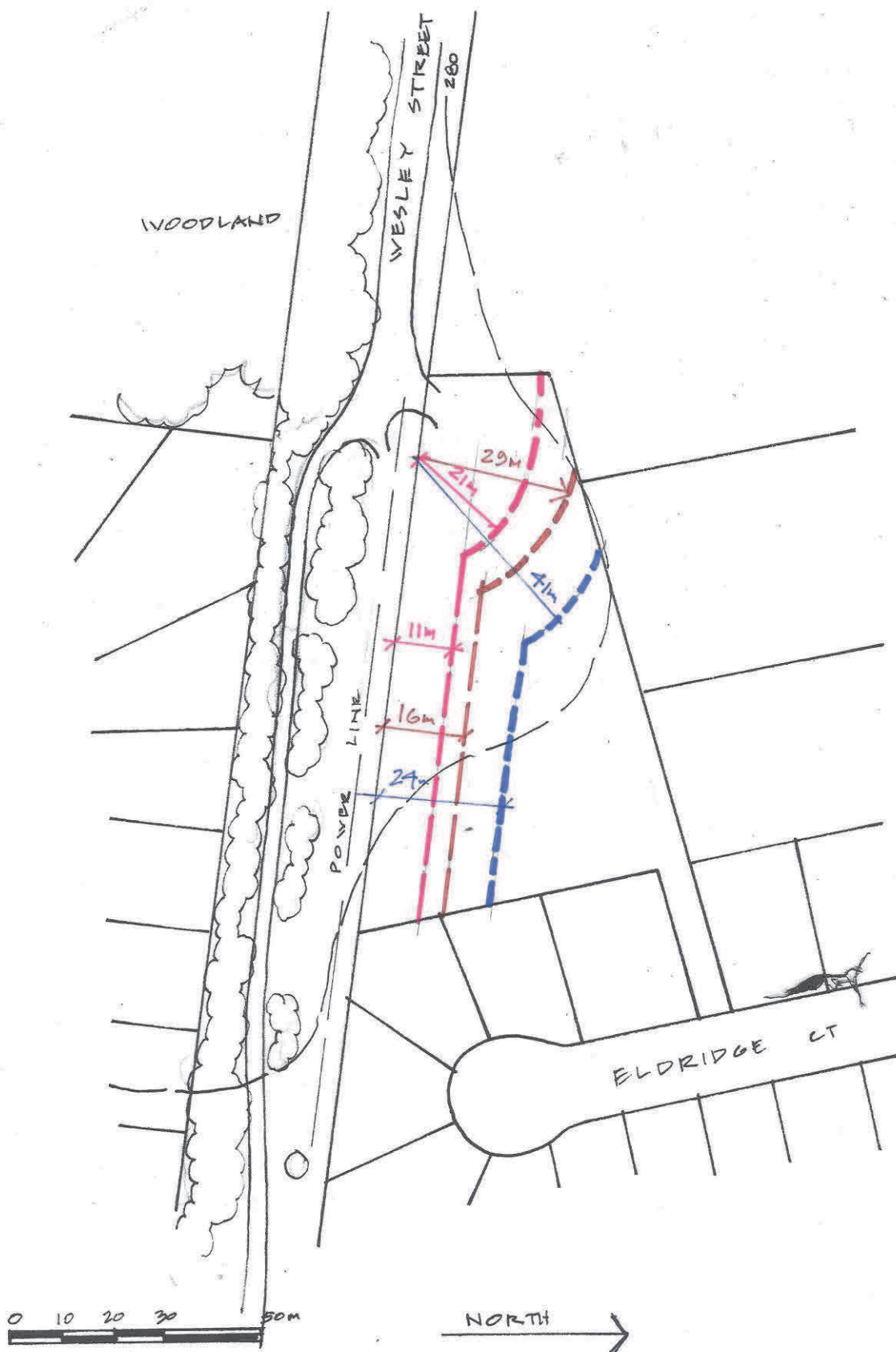


FIGURE 10 BAL 29, 18 AND 12,5 DEFENDABLE SPACE SET BACKS

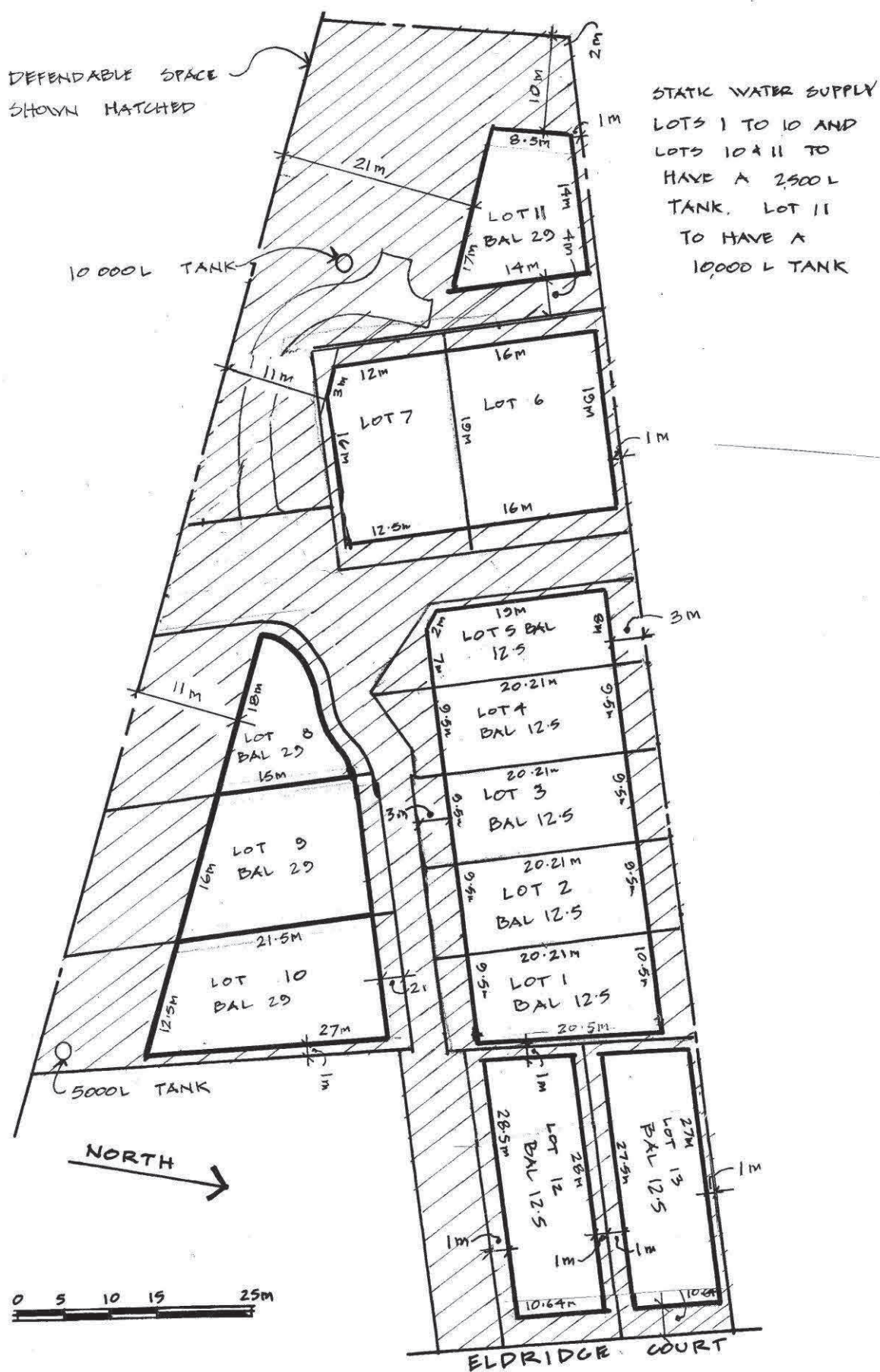


FIGURE 11 DEFENDABLE SPACE AND BUILDING ENVELOPES

SCHEDULE OF BUSHFIRE PROTECTION MEASURES

Defendable Space

Defendable space is provided within and extending from the outer edge of the building envelope to the property boundaries. All vegetation (and other flammable materials) will be modified and managed in accordance with the following requirements:

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

Construction standards

The buildings will be designed and constructed a minimum Bushfire Attack Level of (BAL) 12.5 for Lots 1 to 5, 12 and 13, BAL 19 for Lot 6 and BAL 29 for Lots 7 to 11

Water supply

Lots 1 to 10 and 12 and 13 will each have a non combustible tank that will hold 2500 litres of effective water supply for fire fighting purposes and Lot 11 will have a 10,000 litre tank which meets the following requirements:

- Is stored in an above ground water tank constructed of concrete or metal.
 - All fixed above-ground water pipes and fittings required for fire fighting purposes must be made of corrosive resistant metal.
 - Include a separate outlet for occupant use
- The water supply for Lot 13 must also
- Incorporate a ball or gate valve (British Standard Pipe (BSP) 65mm) and coupling (64 mm CFA 3 thread per inch male fitting).
 - The outlet/s of the water tank must be within 4m of the access way and be unobstructed.
 - Be readily identifiable from the building or appropriate identification signage to the satisfaction of CFA must be provided.
 - Any pipework and fittings must be a minimum of 65 mm (excluding the CFA coupling).

Access

The internal road will meet the following access requirements

All-weather construction.

A load limit of at least 15 tonnes.

Provide a minimum trafficable width of 3.5 metres.

Be clear of encroachments for at least 0.5 metres on each side and at least 4 metres vertically.

Curves must have a minimum inner radius of 10 metres.

The average grade must be no more than 1 in 7 (14.4%) (8.1°) with a maximum grade of no more than 1 in 5 (20%) (11.3°) for no more than 50 metres.

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

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

A turning circle with a minimum radius of eight metres.

The provision of other vehicle turning heads – such as a T or Y head – which meet the specification of Austroad Design for an 8.8 metre Service Vehicle.

11 BUSHFIRE MANAGEMENT STATEMENT

Clause 53.02 contains a range of sub clauses with objectives, approved measures (AM), alternative measures (AltM) and decision guidelines. The table below details which clauses are relevant to this application. The following section demonstrates how the requirements have been met for the relevant standards.

Relevant clauses and measures applicable to the proposed development.

Clause	Approved Measure	Achieved / Applicable	Justification
Clause 53.02 -1 – Dwellings in existing settlements – Bushfire protection objective	AM 1.1	Not Applicable	This is a subdivision so clauses are not applicable.
	AM 1.2	Not Applicable	
	AM 1.3	Not Applicable	
Clause 53.02 -2.1 Landscape, siting and design objectives	AM 2.1	Applicable	This development must address this clause.
	AM 2.2	Applicable	
	AM 2.3	Applicable	
Clause 53.02 -2.2 Defendable space and construction objectives	AM 3.1	Not Applicable	This is a residential subdivision and not applicable
	AM 3.2	Not Applicable	
	AltM 3.3	Not Applicable	This is a subdivision and not applicable.
	AltM 3.4	Applicable	See Appendix 4
	AltM 3.5	Not Applicable	
	AltM 3.6	Not Applicable	
Clause 53.02 -2.3 Water supply and access objectives	AM 4.1	Applicable	This development must address this clause.
	AM 4.2	Not Applicable	This is a subdivision and not applicable.
Clause 53.02 -2.4 Subdivision objectives	AM 5.1	Applicable	The site is zoned GRZ
	AM 5.2	Applicable	This development must address these clauses.
	AM 5.3	Applicable	More than 9 lots are proposed
	AM 5.4	Applicable	Common areas are proposed in the road verge
	AM 5.5	Applicable	More than 9 lots are proposed

53.02 -2.1 Landscape, siting and design objectives

Development is appropriate having regard to the nature of the bushfire risk arising from the surrounding landscape.

Development is sited to minimise the risk from bushfire.

Development is sited to provide safe access for vehicles, including emergency vehicles.

Building design minimises vulnerability to bushfire attack.

Approved Measure	Requirement
AM 2.1	<p>The bushfire risk to the development from the landscape beyond the site can be mitigated to an acceptable level.</p> <p>Response:</p> <p>The site is located to the south west of Bendigo and is surrounded by a mix of grassland, shrubland, woodland and managed gardens. The surrounding public land is managed to reduce fuel loads and fire risk.</p> <p>Proposed house sites would be able to meet the defendable space requirements for a minimum BAL 29 ,19 and 12.5 as per Method 1 and 2 assessment of AS 3959-2009 within the property boundaries.</p>
AM 2.2	<p>A building is sited to ensure the site best achieves the following: The maximum separation distance between the building and the bushfire hazard. The building is in close proximity to a public road. Access can be provided to the building for emergency service vehicles.</p> <p>Response:</p> <p>The subdivision has been planned so that building envelopes can be sited to enable enough defendable space surrounding the dwellings to achieve a minimum 29,19 and 12.5 defendable space.</p> <p>The defendable space is contained within the property boundaries</p> <p>The proposed houses will be located within 30 metres of the proposed access court which runs off the Eldridge Court. This will be a 5.5 metre wide road way with 4m vertical clearance.</p>
AM 2.3	<p>A building is designed to be responsive to the landscape risk and reduce the impact of bushfire on the building.</p> <p>Response:</p> <p>The new buildings will be required to meet minimum BAL of 29, 19 and 12.5 according to the construction requirements of AS 3959-2009. The construction requirements minimise the ability for ember penetration and radiant heat exposure to compromise the building integrity.</p>

Alternative Measure	Requirement
Alt M 3.4	<p>Defendable space and the bushfire attack level is determined using Method 2 of AS3959:2009 Construction of buildings in bushfire prone areas (Standards Australia) subject to any guidance published by the relevant fire authority.</p> <p>Response:</p> <p>Vegetation to the south is in a strip that is approximately 20 metres wide along the shared path.</p> <p>An Alternative assessment method (described in Appendix 4) has been used to calculate radiant heat levels emitted from this strip of vegetation.</p>

53.02 -2.3 Water supply and access objectives

A static water supply is provided to assist in protecting property.

Vehicle access is designed and constructed to enhance safety in the event of a bushfire.

Approved Measure	Requirement
AM 4.1	<p>A building used for a dwelling (including an extension or alteration to a dwelling), a dependent person's unit, industry, office or retail premises is provided with:</p> <ul style="list-style-type: none"> A static water supply for fire fighting and property protection purposes specified in Table 4 to Clause 53.02 -3. Vehicle access that is designed and constructed as specified in Table 5 to Clause 53.02 -3. <p>The water supply may be in the same tank as other water supplies provided that a separate outlet is reserved for fire fighting water supplies.</p> <p>Response:</p> <p>The proposed lots 1 to 10 and 12 and 13 will each have a fire resistant (concrete or steel) tank that will hold 2500 litres of water for fire fighting purposes as the lots are less than 500m². Lot 11 will have a 10,000 litre tank. CFA access to tank outlet on Lot 11 is not required as the is larger than 1000 square metres..</p> <p>The proposed houses will be located within 30 metres of the proposed access road. There will be a 5.5 m wide road way with 4m clearance.</p>

53.02 -2.4 Subdivision objectives

To provide lots that are capable of being developed in accordance with the objectives of Clause 53.02 .
To specify at the subdivision stage before protection measures to develop a lot with a single dwelling on land zoned for residential or rural residential purposes.

Approved Measure	Requirement
AM 5.1	NA as the site is zoned GRZ
AM 5.2	<p>An application to subdivide land zoned for residential or rural residential purposes must be accompanied by a plan that shows:</p> <ul style="list-style-type: none">• A building envelope for a single dwelling on each lot that complies with AM 2.2 and provides defensible space in accordance with:<ul style="list-style-type: none">– Columns A or B of Table 2 to Clause 53.02 -3 for a subdivision that creates 10 or more lots; or– Columns A, B or C of Table 2 to Clause 53.02 -3 for a subdivision that creates less than 10 lots.• Defensible space wholly contained within the boundaries of the proposed subdivision. Defensible space may be shared between lots within the subdivision. Defensible space for a lot may utilise communal areas, such as roads, where that land can meet the requirements for defensible space.• Vegetation management requirements, including inner zone standards (as appropriate), to implement and maintain the defensible space required under this approved measure.• Water supply and vehicle access that complies with AM 4.1. <p>Response:</p> <p>Lots can achieve minimum BAL 29, 19 and 12.5 defensible space within the boundaries based on the hazard of woodland and grassland (See Appendix 1 and 4) in accordance with Columns A , B and C of Table 3 to Clause 53.02 -3 and an alternative assessment method.</p> <p>Water supply and access requirements can be met, as previously described under AM 4.1.</p>

Approved Measure	Requirement
AM 5.3	<p>An application to subdivide land to create 10 or more lots provides a perimeter road adjoining the hazardous vegetation to support fire fighting.</p> <p>Response;</p> <p>The narrow width of the lot would make it impractical to construct a perimeter road. It is also worth noting the land to the west is privately owned and is zoned General Residential and therefore likely to be developed providing a link to Lockwood Road.</p>
AM 5.4	<p>A subdivision manages the bushfire risk to future development from existing or proposed landscaping, public open space and communal areas</p> <p>Response;</p> <p>The road reserve will be managed to meet the defensible space requirements</p>
AM 5.5	<p>A building envelope for a subdivision that creates 10 or more lots required under AM 5.2 may show defensible space in accordance with Column C of Table 2 to Clause 53.02 -3 where it can be demonstrated that:</p> <p>All other requirements of AM 5.2 have been met.</p> <p>Less defensible space and a higher construction standard is appropriate having regard to the bushfire hazard landscape assessment.</p> <p>Response:</p> <p>Lots 7 to11, can achieve minimum BAL 29 defensible space within the boundaries. The closest woodland to the proposed house to the south is in a strip adjacent to power lines and along a shared trail.</p> <p>This considered acceptable as the land beyond this strip of woodland is already established residential land which decreases the fire risk. There is also good access to managed residential land to the north</p>

6 CONCLUSION

53.02 -2.2 Decision guidelines

The proposed development meets the decision guidelines as follows:

The State Planning Policy Framework (SPPF) outlines the broad framework for bushfire protection policy and provisions in the planning scheme. The following policies are included in this;

Clause 13.05 *Bushfire planning*

Objective

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

Strategies

Protection of human life

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.

This proposal has been prepared having regard for this over arching policies

The bushfire hazard site assessment, and bushfire management statement submitted with the application meets the objectives of Clause 53.02.

Land surrounding the site is a mix of woodland, grassland and modified vegetation. The proper establishment and maintenance of defendable space on site will reduce the overall bushfire risk.

The proposed measures can be practically implemented and maintained in conjunction with the ongoing use of the land for rural residential purposes

7 REFERENCES

CFA (2011). FSG LUP 0003 Assessing vegetation in a bushfire management overlay (BMO). Country Fire Authority, Burwood East, Victoria.

CFA (2011). Landscaping for Bushfire: Garden design and plant selection. Country Fire Authority, Burwood East, Victoria.

CFA (2012). FSG LUP 0002 Requirements for water supply and access in the Bushfire Management Overlay (BMO). Country Fire Authority, Burwood East, Victoria.

Standards Australia (2009). AS 39359-2009 Construction of Buildings in Bushfire Prone Areas. Standards Australia, North Sydney, New South Wales.

DTPLI (2017) Technical Guide | Planning Permit Applications – Bushfire Management Overlay
Clause 13.05-1 Bushfire planning strategies and principles

Planning and Local Infrastructure (DTPLI)

https://www.planning.vic.gov.au/_data/assets/pdf_file/0015/80016/Technical-Guide_Planning-Permit-Applications-Bushfire-Management-Overlay_Sept-2017.pdf

Clause 53.02 Planning for Bushfire (2018) Department of Transport,
Planning and Local Infrastructure (DTPLI)
<<http://planningschemes.dpcd.vic.gov.au/schemes>>.

Clause 44.06 Bushfire Management Overlay (2017) Department of Transport, Planning and Local Infrastructure, Melbourne (DTPLI)
<http://planningschemes.dpcd.vic.gov.au/schemes>

Clause 13.02-1S Bushfire planning (2018) Department of Transport,
Planning and Local Infrastructure (DTPLI)
<<http://planningschemes.dpcd.vic.gov.au/schemes>>.

<http://www.depi.vic.gov.au/fire-and-emergencies/planned-burns/fire-operations-plans/current-approved-fop>

<http://mapshare2.dse.vic.gov.au/MapShare2EXT/imf.jsp?site=bim>

<http://www.api.maps.vic.gov.au/vicmapapi/>

http://www.cfa.vic.gov.au/fm_files/attachments/plan_and_prepare/BMO/Remote-Outlet-Guidelines-V2-Sep2017.pdf

APPENDIX 1– BUSHFIRE SITE ASSESSMENT

Lots 1 to 5, 12 and 13

Component	North	South	East	West
Vegetation Type	Low threat vegetation	Woodland	Low threat vegetation	Grassland
Slope under vegetation	0 – 5	0- 5	0 - 5	0 - 5
Distance to vegetation from existing building edge	Excludable	29	Excludable	40 - 120
Required defensible space for BAL 12.5	NA	24 (See Appendix 4)	NA	22

Lot 6

Component	North	South	East	West
Vegetation Type	Low threat vegetation	Woodland	Low threat vegetation	Grassland
Slope under vegetation	0 – 5	0- 5	0 - 5	0 - 5
Distance to vegetation from existing building edge	Excludable	29	Excludable	28
Required defensible space for BAL 19	NA	16 (See Appendix 4)	NA	22

Lots 7 to10

Component	North	South	East	West
Vegetation Type	Low threat vegetation	Woodland	Low threat vegetation	Grassland
Slope under vegetation	0 – 5	0- 5	0 - 5	0 - 5
Distance to vegetation from existing building edge	Excludable	29	Excludable	30 to 100
Required defensible space for BAL 29	NA	11 (See Appendix 4)	NA	10

Lot 11

Component	North	South	East	West
Vegetation Type	Low threat vegetation	Woodland	Low threat vegetation	Grassland
Slope under vegetation	0 – 5	0- 5	0 - 5	0 - 5
Distance to vegetation from existing building edge	Excludable	29	Excludable	30 to 100
Required defensible space for BAL 29	NA	21	NA	10

APPENDIX 2DEFENDABLE SPACE CHECKLIST FOR HOUSE SITES
(TABLE 6, CLAUSE 53.02 -3)

Requirement	Compliance	Comment	Is a permit required to remove vegetation
All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period.	Yes		No
Grass must be short cropped and maintained during the declared fire danger period.	Yes		No
Within 10 metres of a building, flammable objects must not be located close to the vulnerable parts of the building.	Yes		No
Plants greater than 10 centimetres in height must not be placed within 3m of a window or glass feature of the building.	Yes		No
Shrubs must not be located under the canopy of trees.	Yes		No
Individual and clumps of shrubs must not exceed 5 sq. metres in area and must be separated by at least 5 metres.	Yes		No
Trees must not overhang or touch any elements of the building.	Yes		No
The canopy of trees must be separated by at least 5 metres.	Yes		No
There must be a clearance of at least 2 metres between the lowest tree branches and ground level.	Yes		No

APPENDIX 3 ACCESS AND WATER SUPPLY REQUIREMENTS

Table 4 Water supply requirements

Capacity, fittings and access

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

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

Fire Authority requirements

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

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

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

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

Table 5 Vehicle access design and construction

Vehicle access (or part thereof) of a length specified in Column A implements the design and construction requirements specified in Column B.

Column A	Column B
Length of access is less than 30 metres	There are no design and construction requirements if fire authority access to the water supply is not required under AM4.1.
Length of access is less than 30 metres	Where fire authority access to the water supply is required under AM4.1 fire authority vehicles should be able to get within 4 metres of the water supply outlet.
Length of access is greater than 30 metres	<p>The following design and construction requirements apply:</p> <ul style="list-style-type: none"> ▪ All-weather construction. ▪ A load limit of at least 15 tonnes. ▪ Provide a minimum trafficable width of 3.5 metres. ▪ Be clear of encroachments for at least 0.5 metres on each side and at least 4 metres vertically. ▪ Curves must have a minimum inner radius of 10 metres. ▪ The average grade must be no more than 1 in 7 (14.4%) (8.1°) with a maximum grade of no more
	<p>than 1 in 5 (20%) (11.3°) for no more than 50 metres.</p> <ul style="list-style-type: none"> ▪ Dips must have no more than a 1 in 8 (12.5 per cent) (7.1 degrees) entry and exit angle.
Length of access is greater than 100 metres	<p>A turning area for fire fighting vehicles must be provided close to the building by one of the following:</p> <ul style="list-style-type: none"> ▪ A turning circle with a minimum radius of eight metres. ▪ A driveway encircling the dwelling. ▪ The provision of other vehicle turning heads – such as a T or Y head – which meet the specification of Austroad Design for an 8.8 metre Service Vehicle.
Length of access is greater than 200 metres	<ul style="list-style-type: none"> ▪ Passing bays must be provided at least every 200 metres. ▪ Passing bays must be a minimum of 20 metres long with a minimum trafficable width of 6 metres.

Note 1: The length of access should be measured from a public road to either the building or the water supply outlet, whichever is longer.

APPENDIX 4 ASSESSMENT OF ROW OF TREES ON THE SOUTH WEST BOUNDARY

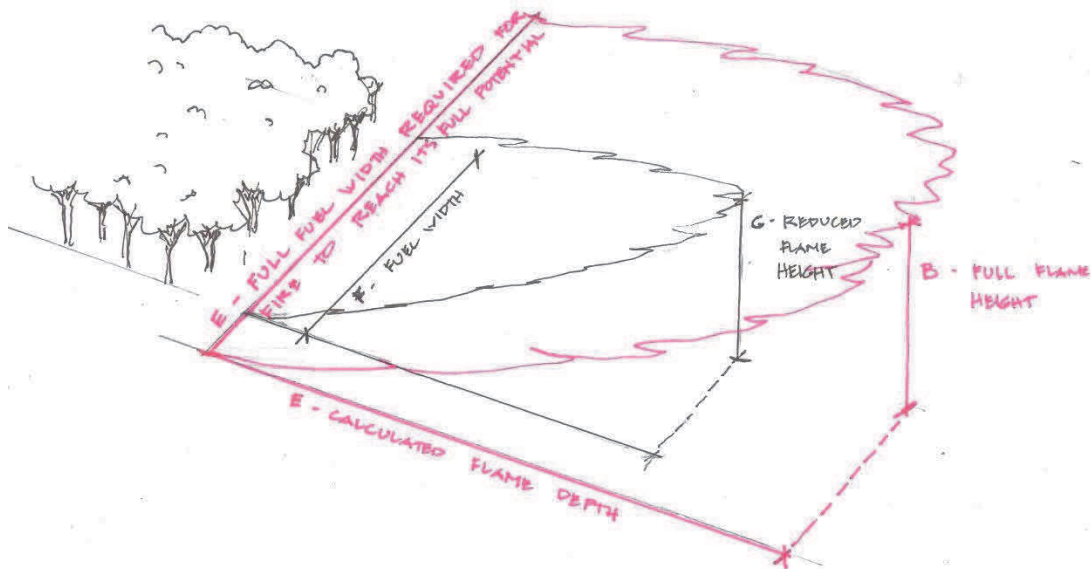
Fuel width

Table 3 on the following page illustrates that according to the standard ,woodland within 11 metres of the proposed dwelling will expose the house to more than 46 kw/m2 of radiant heat, however AS 3959 is based on a continuous run of fire through Woodland that is at least 100 metres wide.

As the trees are in a strip less than 100 metres wide, the specific width has been considered based on the analysis “Estimating Reduced Flame Height in Narrow bands of Fuel” by Kevin Tolhurst at the University of Melbourne on 4th August 2014. Table 1 below illustrates an expected reduction in flame height, volume and heat flux that would be reasonably expected where the width of the fuel restricts the fire from reaching its full potential . The flame depth is calculated on forward rate of spread (metres / second) based on a 40 second residence time (McCarthy, 1967, leaflet 107, Fig 11). Where the expected flame depth (and therefore volume) is deeper than the available width of fuel, a percentage reduction has been applied to the flame length and radiant heat flux.

This is explained in the formula below where

- B Flame Height calculated using the CFA’s FDI calculator
- C Forward Rate of Spread (Using the CFA’s FDI calculator)
- D Residency Time (40 seconds based on McArthur model)
- E Calculated Flame Depth (D x C)
- F Fuel width (metres based on width of vegetation on site)
- G Calculated Reduced Flame Height ($G = F/ExB$)



Section	FDI	Flame Height (m)	Forward Rate of Spread (m/s)	Residency Time (sec)	Flame Depth (m)	Fuel Width (m)	Actual Flame Height (m)	Percentage Reduction in heat emission	Radiant Heat Flux (kw/m2) as per CSIRO Calculator	Estimated radiant heat flux (BAL level)	FRS (km/h)
17 Eldridge Ct Kangaroo Flat BAL 12.5	100.00	41.87	0.87	40.00	34.67	20.00	24.16	0.58	19.66	11.34	3.12
17 Eldridge Ct Kangaroo Flat BAL 19	100.00	41.87	0.87	40.00	34.67	20.00	24.16	0.58	31.16	17.98	3.12
17 Eldridge Ct Kangaroo Flat BAL 29	100.00	41.87	0.87	40.00	34.67	20.00	24.16	0.58	46.85	27.03	3.12

Table 2 Reduced Radiant heat level calculations based on a 20 metre fuel width

Forest, Woodlands & Rainforest											
FDI				100							
Vegetation classification				Woodlands							
Surface Fuel Load (t/ha)				15	*1						
Overall Fuel Load (t/ha)				25	*1						
Effective slope under the classified vegetation (degrees)				1	Downslope						
Slope between the site and classified vegetation (degrees)				1							
Distance of the site from classified vegetation (m)				24			Rate of spread		1.8	(km/h)	
Flame Width (m)				100	*2		Slope ROS		1.928585	(km/h)	
Flame Temperature (K)				1090	*3		Flame length		15.5358	(m)	
Flame Emissivity				0.95	*4		Flame angle		71		
Ambient Temperature (K)				308	*4		View Factor		0.312668		
Relative humidity (%)				25%	*4		Height of Receiver		3	(m)	
Direction				E			Path length		21.47102	(m)	
Assessment date				6/2/2018			Atmospheric Transmissivity		0.826789		
Assessment performed by				Sam Thompson			Radiant heat flux		19.66	(kW/m ²)	
Site Location				17 Eldridge Ct Kangaroo Flat			BUSHFIRE ATTACK LEVEL		BAL -29		

Table 3a Standard CSIRO AS3959 Calculator, 24m set back

<u>Forest, Woodlands & Rainforest</u>			
FDI	100		
Vegetation classification	Woodlands		
Surface Fuel Load (t/ha)	15	*1	
Overall Fuel Load (t/ha)	25	*1	
Effective slope under the classified vegetation (degrees)	1	Downslope	
Slope between the site and classified vegetation (degrees)	1		
Distance of the site from classified vegetation (m)	16		
Flame Width (m)	100	*2	
Flame Temperature (K)	1090	*3	
Flame Emissivity	0.95	*4	
Ambient Temperature (K)	308	*4	
Relative humidity (%)	25%	*4	
Direction	E		
Assessment date	6/2/2018		
Assessment performed by	Sam Thompson		
Site Location	17 Eldridge Ct Kangaroo Flat		
		Rate of spread	1.8 (km/h)
		Slope ROS	1.928585 (km/h)
		Flame length	15.5358 (m)
		Flame angle	61
		View Factor	0.478724
		Height of Receiver	3 (m)
		Path length	12.23405 (m)
		Atmospheric Transmissivity	0.855948
		Radiant heat flux	31.16 (kW/m²)
		BUSHFIRE ATTACK LEVEL	BAL -40

Table 3b Standard CSIRO AS3959 Calculator, 16m set back

<u>Forest, Woodlands & Rainforest</u>			
FDI	100		
Vegetation classification	Woodlands		
Surface Fuel Load (t/ha)	15	*1	
Overall Fuel Load (t/ha)	25	*1	
Effective slope under the classified vegetation (degrees)	1	Downslope	
Slope between the site and classified vegetation (degrees)	1		
Distance of the site from classified vegetation (m)	11		
Flame Width (m)	100	*2	
Flame Temperature (K)	1090	*3	
Flame Emissivity	0.95	*4	
Ambient Temperature (K)	308	*4	
Relative humidity (%)	25%	*4	
Direction	E		
Assessment date	6/2/2018		
Assessment performed by	Sam Thompson		
Site Location	17 Eldridge Ct Kangaroo Flat		
		Rate of spread	1.8 (km/h)
		Slope ROS	1.928585 (km/h)
		Flame length	15.5358 (m)
		Flame angle	46
		View Factor	0.699464
		Height of Receiver	3 (m)
		Path length	5.603962 (m)
		Atmospheric Transmissivity	0.8809
		Radiant heat flux	46.85 (kW/m^2)
		BUSHFIRE ATTACK LEVEL	BAL -FZ

Table 3c Standard CSIRO AS3959 Calculator, 11m set back

Forest Fire Danger Meter McArthur Mk5

The following are Javascript/VBScript exercises and though they have been tested no guarantees regarding the accuracy of the calculations are made.

Click here to get [Current Victorian AWS observations from BoM](#)

or [Fire Weather Forecast](#)

ENTER THE COEFFICIENTS IN APPROPRIATE BOXES					
Temperature (0 - 100 °C)	Rel. Humidity (0 - 100%)	Wind Speed (0 - 100 km/hr)	Fuel Load (0 - 50 tonnes/ha)	Drought Factor (0 to 10)	Ground Slope (°)
40	10	45	25	10	1

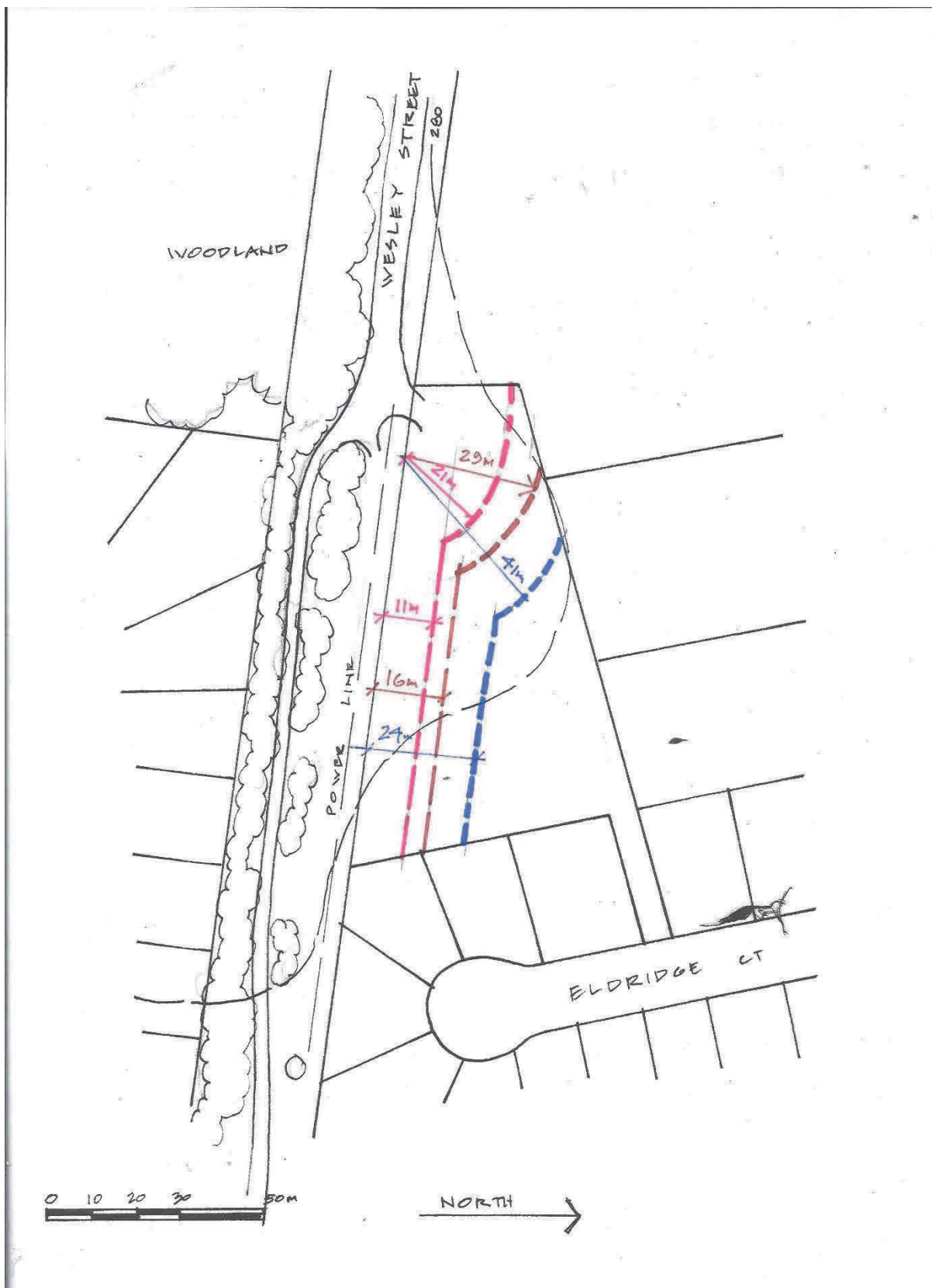
FOREST FDI			
McArthur Mk 5	Flame Height	Spotting Distance	Rate of Spread
97 EXTREME	41.87 m	9.39 km	3.12 km/hr

Drought Factor is available from the [BoM Ground Moisture Page](#)

This is a Registered users service

Table 4 FFDI Calculator (http://www.cfa4wd.org/information/Forest_FDI.htm)

In conclusion ,as the 20 metre wide row of trees are calculated to emit radiant heat levels of less than 12.kilowatts per square metre (kw/m2) at a distance of 24 metres, 19kw/m2 at 16m and 29 km/m2 at 11m,(See Table 2) the proposed set backs are shown on the attached plan



BAL 29, 19 AND 12.5 SET BACKS FROM THE SOUTH WEST BOUNDARY

SCHEDULE OF BUSHFIRE PROTECTION MEASURES

Defendable Space

Defendable space is provided within and extending from the outer edge of the building envelope to the property boundaries. All vegetation (and other flammable materials) will be modified and managed in accordance with the following requirements:

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

Construction standards

The buildings will be designed and constructed a minimum Bushfire Attack Level of (BAL) 12.5 for Lots 1 to 5,12 and 13, BAL 19 for Lot 6 and BAL 29 for Lots 7 to 11.

Water supply

Lots 1 to 10 and 12 and 13 will each have a non combustible tank that will hold 2500 litres of effective water supply for fire fighting purposes and Lot 11 will have a 10,000 litre tank which meets the following requirements:

- Is stored in an above ground water tank constructed of concrete or metal.
- All fixed above-ground water pipes and fittings required for fire fighting purposes must be made of corrosive resistant metal.
- Include a separate outlet for occupant use

The water supply for Lot 11 must also

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

Access

The internal road will meet the following access requirements

All-weather construction.

A load limit of at least 15 tonnes.

Provide a minimum trafficable width of 3.5 metres.

Be clear of encroachments for at least 0.5 metres on each side and at least 4 metres vertically.

Curves must have a minimum inner radius of 10 metres.

The average grade must be no more than 1 in 7 (14.4%) (8.1°) with a maximum grade of no more

than 1 in 5 (20%) (11.3°) for no more than 50 metres.

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

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

A turning circle with a minimum radius of eight metres.

The provision of other vehicle turning heads – such as a T or Y head – which meet the specification of Austroad Design for an 8.8 metre Service Vehicle

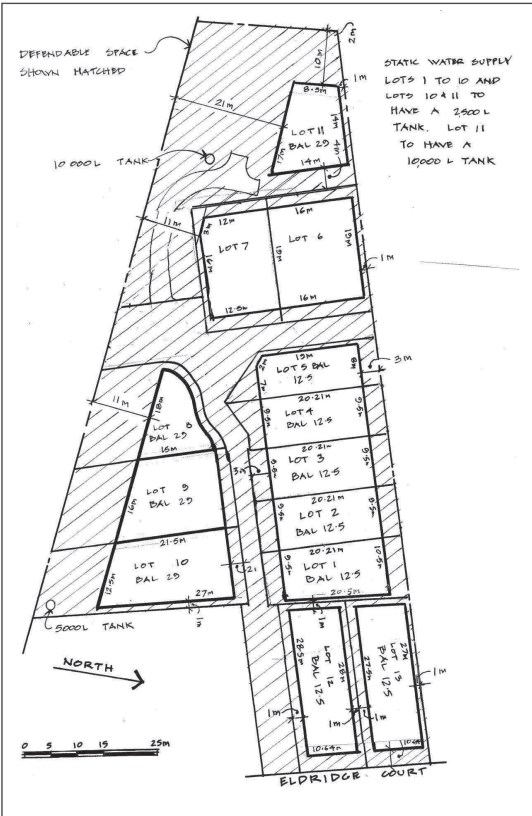
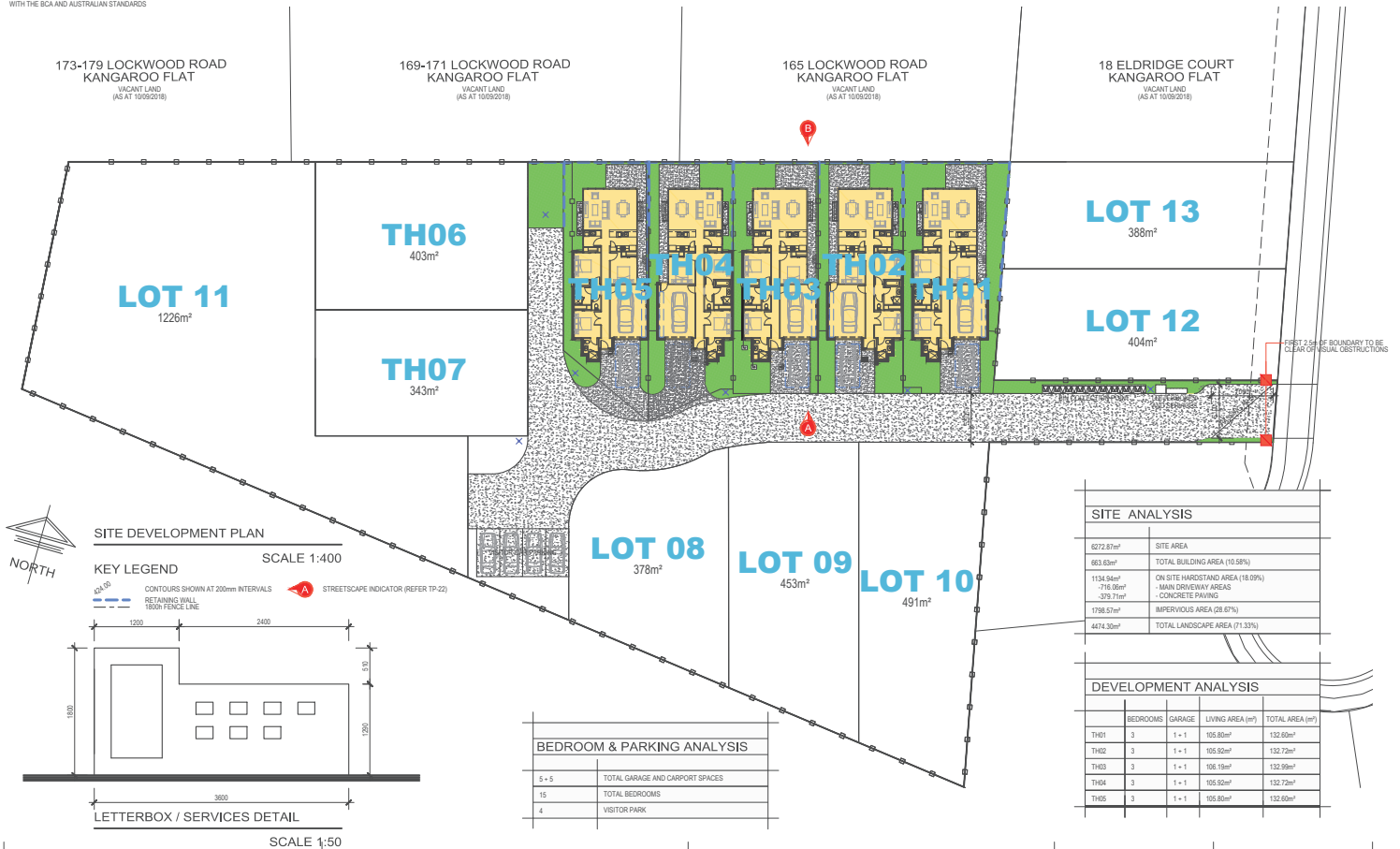


FIGURE 11 BUSHFIRE MANAGEMENT PLAN

DRAWING NOTES
VERIFY ALL DIMENSIONS PRIOR TO
ORDERING OR SHOP FABRICATION
ALL WORKS AND MATERIALS ARE TO COMPLY
WITH THE BCA AND AUSTRALIAN STANDARDS

VERSION DATE AMENDMENT
01 28/11/2018 ISSUED FOR TOWN PLANNING



project
now

REGISTERED
Level 1, 214 Main Street
03 5332 3397
PO BOX 627 Balaclava VIC 3153
www.projectnow.net.au

SITE DEVELOPMENT PLAN
PROPOSED TOWNHOUSE DEVELOPMENT AT LOT 8 LOCKWOOD ROAD, KANGAROO FLAT

PROJECT NUMBER: 2016-107
DATE: NOVEMBER 2018
DRAWN BY: A.HYNES
CHECKED BY: L.JENNINGS
DRAWING NUMBER: TP-03
ISSUED: FOR TOWN PLANNING
SHEET: 03 OF 27
SCALE: AS SHOWN @ A3
REGISTERED BUILDING PRACTITIONER - LUKE JENNINGS DP-AD 30593