Yarrimbah Heights Stage 4 Lot 13

Detailed Bushfire Design Guide

6 May 2025

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Introduction

This Detailed Bushfire Design Guide has been prepared to assist the landowner/s of Lot 13 in mitigating bushfire risk to people, property and the environment. This guide captures bushfire management requirements specific to Lot 13 that are to be implemented by the landowner/s to comply with their legal bushfire management obligations in accordance with the approved subdivision stage Bushfire Management Plan (BMP) and City of Swan Fire Hazard Reduction Notice.

This guide includes:

- results of a Bushfire Attack Level (BAL) contour assessment to demonstrate the indicative BAL impacts across the lot to inform future Development Application (DA) and building stage requirements
- indicative Asset Protection Zone (APZ) location to inform future DA stage and building requirements
- bushfire management obligations of the City of Swan Fire Hazard Reduction Notice specific to Lot 13, including firebreak and fuel management requirements
- requirements for private driveways
- requirements for fire-fighting water supply
- general bushfire safety information.

Bushfire Attack Level (BAL) contour assessment

A Bushfire Attack Level (BAL) contour assessment has been undertaken for Lot 13 in accordance with Method 1 of AS 3959–2018. The Method 1 procedure incorporates the following factors:

- state-adopted Fire Danger Index (FDI) 80 rating
- vegetation classification
- effective slope
- distance maintained between proposed habitable development and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by the proposed building envelope and subsequently informs the width of the APZ and standard of building construction required for proposed buildings.

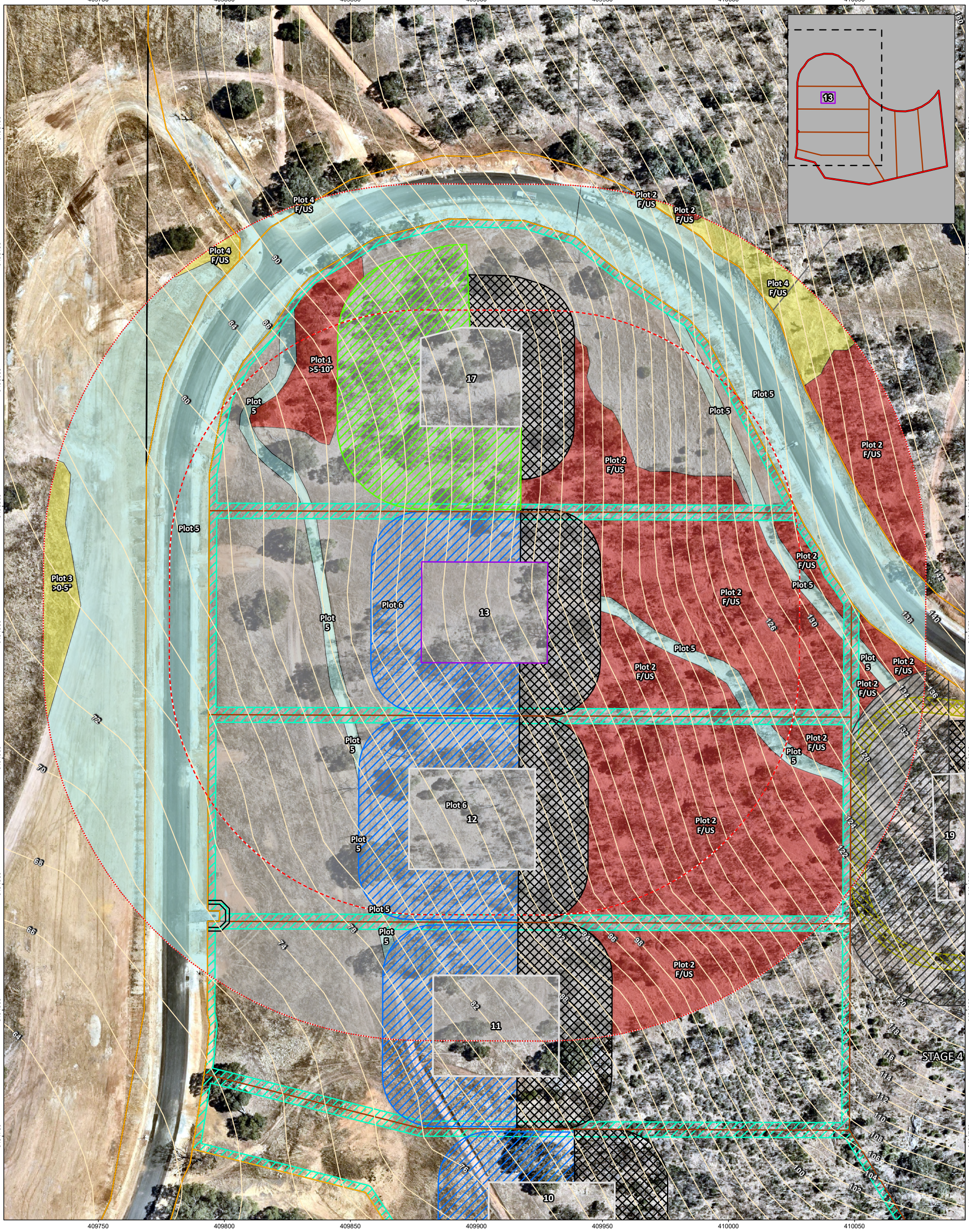
The BAL contour assessment and APZ location are indicative at this stage and should be used to inform future DA and building stage requirements. Final BAL assessment and APZ location will be dependent on final building location, to be confirmed as part of future DA/building stages.

BAL Contour assessment results

Figure 1 illustrates the anticipated post-development vegetation classifications and exclusions within Lot 13 and the surrounding 150 m. Results of the BAL contour assessment are detailed in Figure 2. The highest indicative BAL applicable to the proposed building envelope is BAL–29, subject to provision of a 21 m wide APZ.

Table 1: BAL contour assessment results

Plot	Vegetation classification	Effective slope	Separation distance to building envelope boundary (including APZ)	Highest BAL rating to building envelope boundary	Potential to achieve lower BAL (subject to final siting of buildings)
1	Class A Forest	Downslope >5–10°	59 m	BAL–19	Yes
2	Class A Forest	Flat/upslope (0°)	21 m	**BAL–29**	Yes
3	Class G Grassland	Downslope >0–5°	>50 m	BAL–Low	N/A
4	Class G Grassland	Flat/upslope (0°)	>50 m	BAL–Low	N/A
5	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A
6	Modified to non-vegetated and/or low threat (Clauses 2.2.3.2 [e] and/or [f])	N/A	N/A	N/A	N/A
Indicative worst case BAL rating to building envelope boundary				**BAL–29**	**Yes, BAL–12.5 is achievable subject to final dwelling location**



Legend

- 100m assessment area
- 150m assessment area
- Cadastral boundary (LGATE - 002)
- Building envelope
- Building envelope not subject to this assessment
- 6m wide strategic firebreak
- 3m wide firebreak as per firebreak notice provisions
- 20m wide APZ
- 21m wide APZ
- 33m wide APZ
- 42m wide APZ
- Proposed lots
- Indicative future subdivisions on adjacent stages
- Stage boundaries

Vegetation classification

- Class A Forest
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state
- Topographic contours (mAHD)

JBS&G

0 50 metres

Yarrimbah Stage 4, Bullsbrook, WA

VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE (LOT 13)

Job Number: 68700		Scale 1:1,400 at A3		
Client: Qube Property Group		Coord. Sys. GDA2020 MGA Zone 50		
Drawn By: jcrute	Checked By: ZC	Version: Rev A	Date: 02-May-2025	FIGURE: 1

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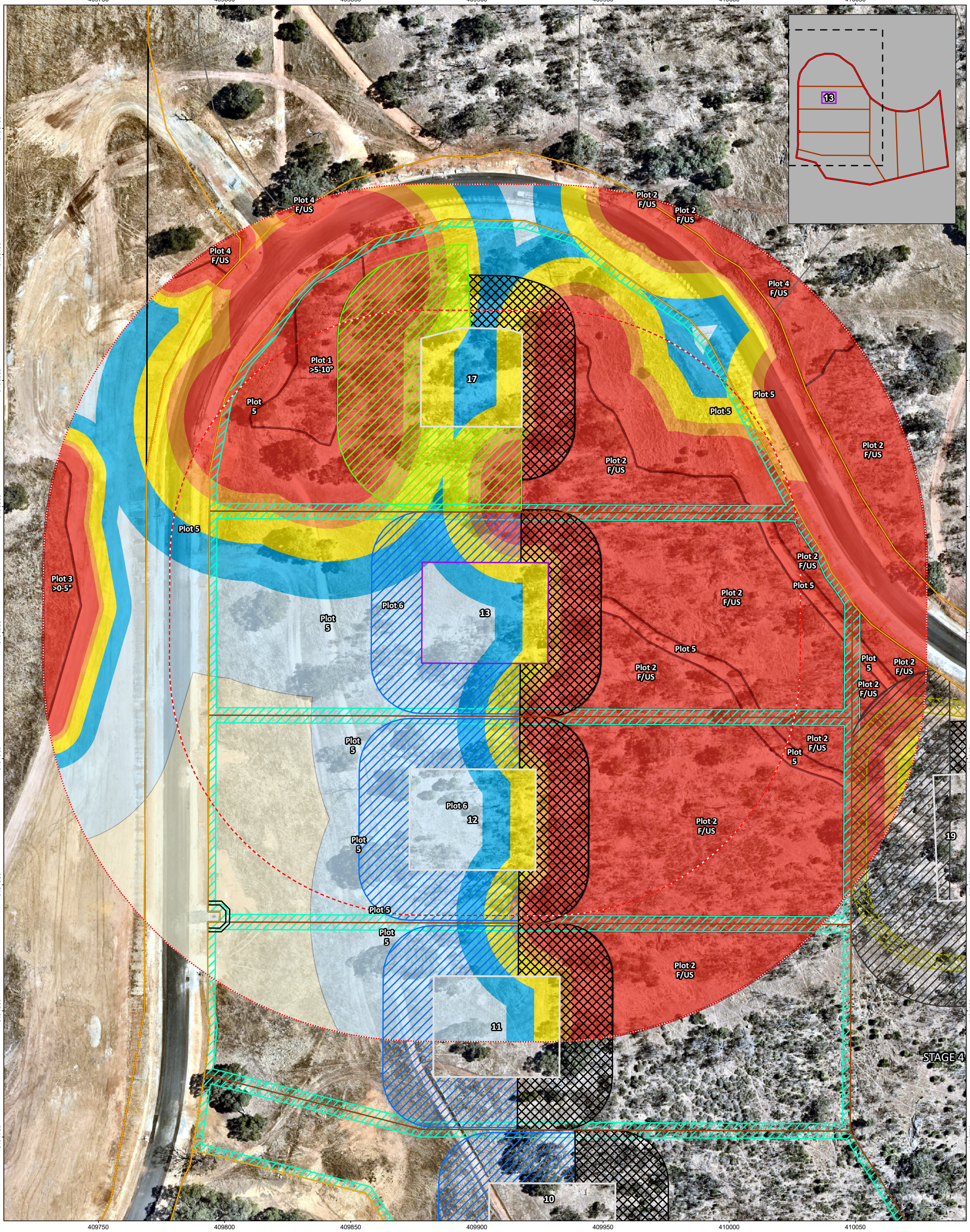
Image Reference: www.nearmap.com© - Imagery Date: 07. December 2024.



Legend

- 100m assessment area
- 150m assessment area
- Cadastral boundary (LGATE - 002)
- Building envelope
- Building envelope not subject to this assessment
- 6m wide strategic firebreak
- 3m wide firebreak as per firebreak notice provisions
- 20m wide APZ
- 21m wide APZ
- 33m wide APZ
- 42m wide APZ
- Proposed lots
- Indicative future subdivisions on adjacent stages
- Stage boundaries
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

JBS&G

0 50 metres

Yarrimbah Stage 4, Bullsbrook, WA

BAL CONTOUR MAP (LOT 13)

Job Number: 68700		Scale 1:1,400 at A3	
Client: Qube Property Group		Coord. Sys. GDA2020 MGA Zone 50	
Drawn By: jcrute	Checked By: ZC	Version: Rev A	Date: 02-May-2025

FIGURE: 2

Document Path: C:\Users\jcrute\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Qube\68700 Yarrimbah Stage 4\GIS\02_MapProjects\68700_Yarrimbah_Stage4_M01.aprx

Image Reference: www.nearmap.com© - Imagery Date: 07. December 2024.

Lot 13 bushfire management requirements

Table 2 summarises the bushfire management requirements applicable to Lot 13 (i.e. land greater than 5000 sqm [0.5 ha or 1.2 acres]), which the landowner is obligated to comply with under the approved BMP and City of Swan Fire Hazard Reduction Notice (see Appendix A).

Table 2: Bushfire management requirements

Bushfire management requirement	Action required
21 m wide Asset Protection Zone (APZ)	Install and maintain APZ in accordance with Schedule 1 APZ standards (see Appendix B and Section 8 of Appendix A). The final location of the APZ may vary dependent on final location of buildings and final BAL assessment.
Firebreaks	Install firebreaks as close as practicable inside of, but no more than 10 m from the property's external boundaries. Firebreaks need to be 3 m wide with 4 m vertical height clearance, free from flammable materials and overhanging branches (refer to Sections 2b and 7 of Appendix A).
Fuel management outside of APZ	Maintain all grass to a height no greater than 10 cm (refer to Section 2c of Appendix A). Maintain areas of natural vegetation within 100 m of relevant buildings to at or below 8 tonnes per hectare fuel load by passive methods of fuel reduction (refer to Section 2d of Appendix A). Any replanting/revegetation within 100 m of buildings including attached and adjacent structures and essential infrastructure shall be undertaken and maintained in accordance with APZ standards (refer to Appendix B).
BAL rated construction	Construct Class 1, 2, 3 and associated 10a buildings in accordance with the final BAL rating assessment under AS3959–2018 (to be confirmed at DA/building stage).
Private driveway	Comply with requirements in Table 3 of Appendix C. If required, construct passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of 2 metres (i.e. the combined trafficable width of the passing bay and constructed private driveway is to be a minimum 6 metres). Construct a turn-around area (as shown in Appendix C) within 30 m of the habitable building.
On-site fire-fighting water supply	Provide 10,000 litres of firefighting water through a dedicated tank or by incorporating it into the domestic water supply. If incorporated into the domestic supply, the domestic outlet must be offset above the fire water outlet to ensure domestic use does not impede on the 10,000 litres reserved for firefighting (refer to Appendix D for further information).

General bushfire safety advice

Know your risk

Lot 13 is situated within a designated bushfire prone area, as per the WA State Map of Bush Fire Prone Areas. There is a bushfire risk to life and property due to the extent of vegetation within the lot and surrounding area.

Prioritise your and your community's safety

It is recommended that early evacuation is adopted as best practice. Firefighters cannot be guaranteed to defend your home and property. It is your responsibility to be prepared, to give your home and property the best possible chance of surviving a bushfire. BAL-rated construction in accordance with AS3959 (where required), ongoing compliance with the City of Swan Fire Hazard Reduction Notice and implementation of Schedule 1 APZ Standards are minimum bushfire management obligations on your property.

In addition, every household should have their own Bushfire Survival Plan. DFES has published a Bushfire Preparation Toolkit that provides useful information on developing a Bushfire Survival Plan, equipment required to stay and defend, pets and livestock and travelling in a bushfire. This information can be accessed here:

- https://www.dfes.wa.gov.au/hazard-information/bushfire/prepare

Know your warnings

Understanding the Bushfire Warning Systems before a fire threatens your property is crucial. The alerts give information on how severe a bushfire is once it has started. Alerts have three warning levels indicating the increasing risk to your life or property, and the decreasing amount of time you have until the fire arrives. For all current bushfire alerts and warnings visit:

- https://www.emergency.wa.gov.au/

Appendix A City of Swan Fire Hazard Reduction Notice

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Bush Fires Act 1954

Fire Hazard Reduction Notice (Firebreak Notice)

Notice to Owners and/or Occupiers of land situated within the City of Swan.

To assist in the control of bushfires, and pursuant to Section 33 of the Bush Fires Act 1954, all owners and occupiers of land within the City of Swan are required on or before November 1, 2024, or within 14 days of becoming an owner or occupier of land after that date, to meet the fire hazard reduction conditions described in this notice and maintain these conditions up to and including April 30, 2025.

1. **All land equal to or less than 5,000 sqm (0.5 ha or 1.2 acres)**
    a. Install and maintain an asset protection zone in accordance with the requirements specified in clause 8
    b. Maintain all grass to a height of no greater than 10cm
    c. Maintain areas of natural vegetation to at or below eight tonnes per hectare.
2. **All land greater than 5,000 sqm (0.5 ha or 1.2 acres)**
    a. Install and maintain an asset protection zone in accordance with the requirements specified in clause 8
    b. Install firebreaks as close as practicable inside of, but no more than 10m from, the property's external boundaries firebreaks need to be 3m wide with 4m vertical height clearance free from flammable materials and overhanging branches (see clause 7 for further details):
        i. A boundary firebreak is not required where the land is 90 per cent or more covered by buildings, other non-vegetated areas, and/or irrigated orchards/vineyards. All grass must be maintained to 10cm or less
        ii. Properties over 100 ha require additional firebreaks to divide the land into areas not exceeding 100 ha.
    c. Maintain all grass:
        i. On land between 5,000 sqm and 25,000 sqm (0.5-2.5 ha) or (1.2-6.2 acres) all grass must be reduced to a height no greater than 10cm
        ii. On land greater than 25,000 sqm (2.5 ha or 6.2 acres) all grass immediately adjacent to any firebreak must be reduced to a height of no greater than 10cm for a minimum width of 3m
        iii. If the land is stocked, compliance with conditions 2(a) and 2(b) can postponed until December 1.
    d. Maintain areas of natural vegetation within 100m of relevant buildings to at or below eight tonnes per hectare fuel load, by passive methods of fuel reduction.
3. **Bushfire management plans**
    a. Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.
4. **Fuel storage areas/haystacks/stockpiled flammable material**
    a. Remove all flammable material within 10m of the storage area
    b. Install a firebreak (to the specifications outlined in clause 7) immediately adjacent to any haystacks or stockpiled flammable material.
5. **Fire service access routes (strategic firebreaks) and emergency access ways**

Where under a written agreement with the City, or where depicted on an approved bushfire management plan, fire service access routes (FSARs) or emergency access ways (EAWs) are required on the land, you are required to:

a. Clear and maintain the FSAR/EAW to 6m wide free from flammable material with a 4m vertical height clearance above the full 6m width
b. The FSAR/EAW must remain unimpeded by obstructions at all times, including boundary fences and gates unless approved in writing by the City
    i. Approved gates on FSARs may be secured with a City of Swan fire service padlock. Private padlocks may be added if approved in writing by the City
    ii. Approved gates on EAWs must always remain unlocked
c. FSARs must provide a continuous 4-wheel drive trafficable surface for the full 6m width
d. EAWs must provide a continuous 2-wheel drive trafficable surface for the full 6m width.

6. Driveways

Where a dwelling is situated more than 70m from a public road

a. Driveways must be maintained clear of all obstacles and flammable materials to create a minimum 3m wide trafficable surface suitable for all types of 2-wheel drive vehicles
b. Overhanging branches must be pruned to provide 4m vertical clearance above the driveway.

7. Firebreak specification

a. Firebreaks are to be installed and maintained clear of all obstacles and flammable materials (e.g. maintained to mineral earth, gravel, limestone, bitumen, or green lawn to a height no greater than 25mm) to create a minimum 3m wide trafficable surface suitable for 4-wheel drive vehicles
b. Overhanging branches must be pruned to provide 4m vertical clearance above the full width of the firebreak
c. Firebreaks must not terminate in a dead-end
d. Firebreaks may be constructed by ploughing, grading, raking, burning, chemical spraying or any other method that achieves the required standard.

8. Asset protection zone specification

Asset protection zones must be installed around relevant buildings (see section 12) and must meet the following requirements:

a. Extend 20m out from the external walls of the relevant building. Note: Asset protection zone requirements only apply within the boundaries of the lot on which the relevant building is located
b. The average fuel loads must be reduced and maintained at two tonnes per hectare or lower
c. All grass is maintained to under 10cm
d. Tree canopy coverage is no greater than 15 per cent. The crowns of trees must have clear separation distance between one another
e. A small group of trees within proximity to one another may be treated as one crown provided the combined crowns do not exceed the area of a large or mature crown size for that species
f. Trees must be low-pruned (or under-pruned) to at least a height of 2m from the ground
g. No tree or shrub over 2m high is planted within 3m of a building

h. There are no tree crowns or branches hanging over buildings

i. Scrub is reduced to a sparse density (able to walk through vegetation with relative ease and minimal deviation)

j. Install paths or clear flammable or dry vegetation, debris, and materials immediately adjacent to the building

k. Wood piles and flammable materials are stored a safe distance from buildings.

9. Application to vary firebreak and hazard reduction requirements

a. If it is considered impractical for any reason to clear firebreaks in a manner or location required by this notice, or to carry out any fire hazard reduction work or measures required by this notice, you may apply in writing on or before November 1 for approval to provide firebreaks in alternative positions or to take alternative measures to abate fire hazards on the land

b. If permission is not granted in writing by the City prior to December 1, you shall comply with the requirements of this notice

c. When permission for alternative firebreaks or fire hazard reduction measures has been granted, you shall comply with all conditions on the approved plan and maintain the land to the required standard throughout the period specified by this notice.

10. Environmental and heritage considerations

It is the responsibility of the landowner to ensure appropriate environmental and heritage due diligence relating to any works required by this notice is undertaken. Please refer to the Department of Water and Environmental Regulation (DWER), the Department of Planning, Lands and Heritage, and/or the Department of Fire and Emergency Services (DFES) websites for further information.

11. Compliance

a. In addition to the requirements of this notice, further works which are considered necessary by an authorised officer of the City may be required as specified in writing in a subsequent notice addressed to the landowner

b. Where the owner or occupier of the land fails or neglects to comply with the requirements of this notice or a subsequent notice addressed to the landowner, the City of Swan may enter onto the land with workers, contractors, vehicles, and machinery to carry out the requisitions of the notice at the expense of the landowner

c. Failure to comply with this notice and subsequent written notices may result in a penalty not exceeding $5,000, or the issue of a $250 infringement notice and liability for any costs incurred by the City in relation to works undertaken on behalf of the landowner.

12. Definitions

'Alternative firebreak' is a firebreak that is in an alternative position or alignment to the requirement specified in paragraphs 2 and 3 of this notice.

'Asset protection zone (APZ)' is a low fuel area that is reduced of flammable vegetation and materials surrounding relevant buildings to minimise the likelihood and impact that direct flame contact, radiant heat or ember attack may have on buildings and assets in the event of a bushfire.

'Bushfire management plan' or **'fire management plan'** is a plan that may be placed on the certificate of title(s) of land that has been developed as a condition of development or subdivision.

'Emergency access way' is a two-wheel drive trafficable, 6m wide access route to provide local residents, general public and emergency services alternative links to road networks at the end of cul-de-sacs or areas where access is limited during an emergency incident.

'Firebreak' is an area of land cleared of flammable material to minimise the spread of a bushfire and to provide access for firefighting vehicles.

'Fire service access route (strategic firebreaks)' is a firebreak that is 6m wide established to provide strategic access and links to road networks whilst providing a wider control/ containment line for emergency services use only.

'Flammable material' is anything that is easily able to catch on fire including, but not limited to, grasses, leaves, branches, scrub and trees.

'Irrigated' means an area that is watered and maintained, with all vegetation in an alive, green, and non-flammable state.

'Natural vegetation' means natural areas of forest, woodland, shrubland, scrub, mallee, or mulga.

'Passive fuel reduction' means lowering the amount of available fuel that will burn under prevailing conditions by means that will not permanently reduce or modify the structure or life cycle of plant, shrub, scrub, or tree communities within a treated area.

'Relevant building' is classified under the building code as one of the following:

i. Single dwelling such as a detached house, duplex, villa or townhouse (class 1a)
ii. Small boarding house, guest house or hostel (class 1b)
iii. Dwellings such as apartments and flats in a building containing two or more units (class 2)
iv. Accommodation for unrelated people such as a hotel, motel, residential part of a school, accommodation for the aged, children or people with disabilities (class 3)
v. Building of a public nature such as a health care building (9a), an assembly building such as a school (9b) or an aged care building (9c)
vi. Private bushfire shelters associated with a single dwelling (class 10c) or
vii. Non-habitable buildings including sheds, carports, and private garages (class 10a) when within 6m of a class 1a, 1b, 2, 3 or 9 building.

By order of the Council,

Mark Bishop

Acting Chief Executive Officer

Appendix B Schedule 1 APZ standards and explanatory notes

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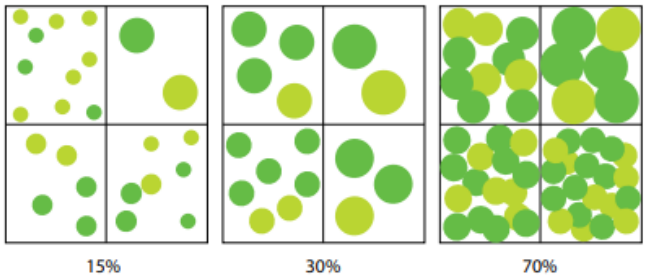
Schedule 1: Standards for Asset Protection Zones	
Object	**Requirement**
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity 
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. The pressure relief valve should point away from the house. No flammable material within six metres from the front of the valve. Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

Source: *Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC 2021)*

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Element 2 Explanatory Notes

E2 Managing an Asset Protection Zone (APZ) to a low threat state

An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defendable space and reducing the potential for direct flame contact, radiant heat exposure and ember attack.

Vegetation management within an APZ should provide defendable space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined in Schedule 1.

The width of an APZ varies with slope and vegetation type, however it should only be as wide as needed to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29), or 10kW/m² where a building is identified for use as an on-site shelter. An APZ is generally not required where a building or development site achieves 29kW/m² (BAL-29) or lower in its pre-development state (prior to any vegetation clearing or modification).

An APZ should include an area of defendable space immediately adjoining a building, that is kept free from combustible items and obstructions, within which firefighting operations can be undertaken to defend the structure. Where a lot contains a building envelope, it may not be necessary for the entire building envelope to achieve 29kW/m² (BAL-29) as this may result in significant unnecessary clearing. It is recommended that the BMP identifies that a sufficient APZ can be accommodated within the building envelope, with the development site and associated APZ to be determined at the development approval stage.

An APZ should be contained within the boundaries of the lot on which the building is situated, except in instances where it is demonstrated that the vegetation on the adjoining land is managed in a low threat state, as per cl. 2.2.3.2 of AS 3959, such as a road, managed park, rocky outcrop or a water body.

The siting of a habitable building and associated APZ should aim to minimise the clearing of vegetation. The BMP should demonstrate that the proposed APZ has minimised the unnecessary loss of vegetation or potential for conflict with landscape or environmental objectives; and complies with environmental approvals/exemptions (where necessary). A re-design or reduction in lot yield may be necessary to minimise the removal and modification of remnant vegetation.

It is recommended that development be located on flat areas or slopes less than 20 degrees (especially where classified vegetation is located downslope to a building) and away from ridge tops, crests or narrow gullies, as bushfire can spread rapidly in these areas. Circumstances where these locations may be suitable for development to occur include where the land is already cleared, and 29kW/m² (BAL-29) or lower can be achieved for the whole development site without the use of an APZ. To ensure soil stability within an APZ, vegetation removal on slopes exceeding 18 degrees is discouraged.

Fine fuel load should be maintained to less than two tonnes per hectare, however this is often a subjective assessment. Reducing fuel load levels does not necessarily require the removal of existing vegetation. A combination of methods can be utilised to reduce fuel load such as raking, weed removal, pruning, mulching and/or the removal of plant material.

A simple method to estimate fuel load is to roughly equate one tonne of fuel load per hectare as 100 grams per square metre. For example, two tonnes per hectare of leaf litter is roughly 200 grams of leaf litter per square metre and eight tonnes per hectare is roughly 800 grams. Eucalyptus leaf litter is approximately 100 grams per handful, so two handfuls of litter per square metre will roughly equate to two tonnes per hectare. Different types of fine fuel, like mulch or pine needles may be more or less than a handful, however the 100 grams per square metre rule of thumb can still be used.

The landowner or proponent is responsible for maintaining an APZ in accordance with Schedule 1 - Standards for Asset Protection Zones. Ongoing maintenance of an APZ is usually enforced through the local government firebreak notice issued under section 33 of the Bushfires Act 1954, and/or through a condition of a development approval, which requires the implementation of measures identified within a BMP.

A copy of the firebreak notice and Schedule 1 should be included in a BMP specifically as a how-to guide for the landowner, and to demonstrate to decision-makers that the measures outlined in the BMP to achieve the appropriate BAL rating through provision and ongoing management of an APZ, can be implemented.

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Element 2 Explanatory Notes

E2 Landscaping and design of an Asset Protection Zone

Landscaping, design, and maintenance of an APZ in a bushfire prone area can significantly improve the bushfire resilience of a building. An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that gives holistic consideration to how existing or proposed vegetation or non-combustible features interact with, or affect the building's bushfire resilience.

A well designed APZ provides a greater level of vegetation management within the first few metres of a building with, for example, less vegetation or inclusion of non-combustible materials. The vegetation within the remainder of an APZ can increase further away from the building with carefully considered plant selection and landscaping techniques.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation (refer to E2 Plant Flammability) to create horizontal and vertical separations between the retained vegetation. The accumulation of fine fuel load from different plants is an important consideration for ongoing maintenance in accordance with Schedule 1. For example, when planting ground covers under deciduous trees within an APZ, the total fine fuel load prescribed in Schedule 1 will include any dead plant material from ground covers and leaf litter from the trees.

Plant density and final structure and form of mature vegetation should be considered in the initial landscaping stages. For example, clumps of sapling shrubs planted at a density without consideration of future growth, may increase the bushfire risk as a clump will quickly grow to exceed $5m^2$. It should be noted that in some cases, a single shrub in a mature state may be so dense as to fill a $5m^2$ clump alone.

The location of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material, will break up fuel continuity and reduce the likelihood of a bushfire running through an APZ and subjecting a dwelling to radiant heat or direct flame contact. It is important to note, where mature trees are separated from a building by six metres, but the canopy has grown to extend or overhang a building, maintenance and pruning to remove the overhanging branches should be undertaken without the entirety of the tree being removed.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, rock and crushed mineral earth is encouraged. Wood mulch >6mm in thickness may be used, however it is recommended that it is used in garden beds or areas where the moisture level is higher by regular irrigation. These materials could be sourced from non-toxic construction and demolition waste giving the added benefit of reducing the environmental impact of any 'hard landscaping' actions.

Combustible objects, plants, garden supplies such as mulches, fences made from combustible material, should be avoided within 10 metres of a building. Vines or climbing plants on pergolas, posts or beams, should be located away from vulnerable parts of the building, such as windows and doors. Non-flammable features can be used to provide hazard separation from classified vegetation, such as tennis courts, pools, lawns and driveways or paths that use inorganic mulches (gravel or crushed rock). Consider locating firewood stacks away from trees and habitable buildings.

Incorporation of landscaping features, such as masonry feature walls can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection within areas of $29kW/m^2$ (BAL-29) or below, or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged.

In addition to regular maintenance of an APZ, further bushfire protection can be provided at any time by:

- ensuring gutters are free from vegetation;
- installing gutter guards or plugs;
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps;
- trimming and removing dead plants or leaf litter;
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors;
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank; and/or
- following the requirements of the relevant local government section 33 fire break notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

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Element 2 Explanatory Notes
Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. As embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building, best practice recommends that objects within the APZ are moved away from the building prior to any bushfire event. Objects may include, but are not limited to: • door mats; • outdoor furniture; • potted plants; • shade sails or umbrellas; • plastic garbage bins; • firewood stacks; • flammable sculptures; and/or • playground equipment and children's toys.
E2 Plant flammability
There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire. There are many terms for plant flammability that should not be confused, including: • Fire resistant – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk. • Fire retardant – plants that may not burn readily or may slow the passage of a bushfire. • Fire wise – plants that have been identified and selected based on their flammability properties and linked to maintenance advice and planting location within a garden. Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire retardant plant species that suit the environmental characteristics of an area. When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat. When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics: • grow in a predicted structure, shape and height; • are open and loose branching with leaves that are thinly spread; • have a coarse texture and low surface-area-to-volume ratio; • will not drop large amounts of leaves or limbs, that require regular maintenance; • have wide, flat, and thick or succulent leaves; • trees that have bark attached tightly to their trunk or have smooth bark; • have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed); • do not produce or hold large amounts of fine dead material in their crowns; and/or • will not become a weed in the area. Refer to the WAPC Bushfire and Vegetation Fact Sheet for further information on clearing and vegetation management and APZ landscaping, design and plant selection reference material.

Source: *Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC 2021)*

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Appendix C Private driveway technical standards and explanatory notes

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Acceptable Solution A3.6 – Private driveways
Explanatory Note E3.6

In areas serviced by reticulated water, where the road speed limit is not greater than 70 km/h, and where the distance from the public road to the further part of the habitable building is no greater than 70 metres, emergency service vehicles typically operate from the street frontage.

In the event the habitable building cannot be reached by hose reel from the public road, then emergency service vehicles will need to gain access within the property. Emergency service vehicles will also need to gain access within the property, where access to reticulated water (fire hydrants) is not possible. In these situations, the driveway and battle-axe (if applicable) will need to be wide enough for access for an emergency service vehicle and a vehicle to evacuate.

Turnaround areas should be available for both conventional two-wheel drive vehicles of residents and Type 3.4 fire appliances. Turn-around areas should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Note that the design requirements for a turn-around area for a private driveway or battle-axe differ to a cul-de-sac.

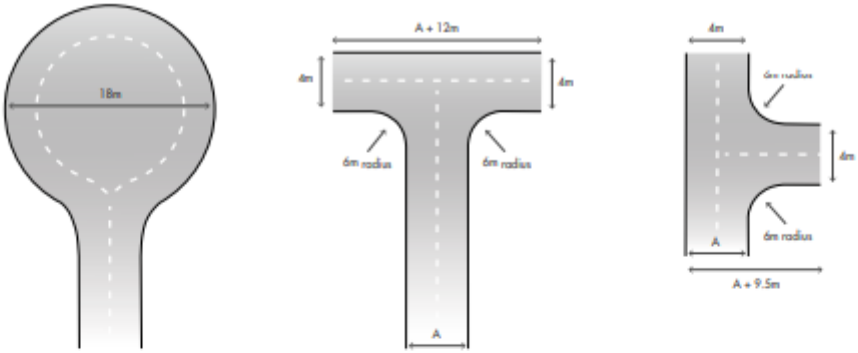

Figure 28: Design requirements for a turn-around area for a private driveway or battle-axe

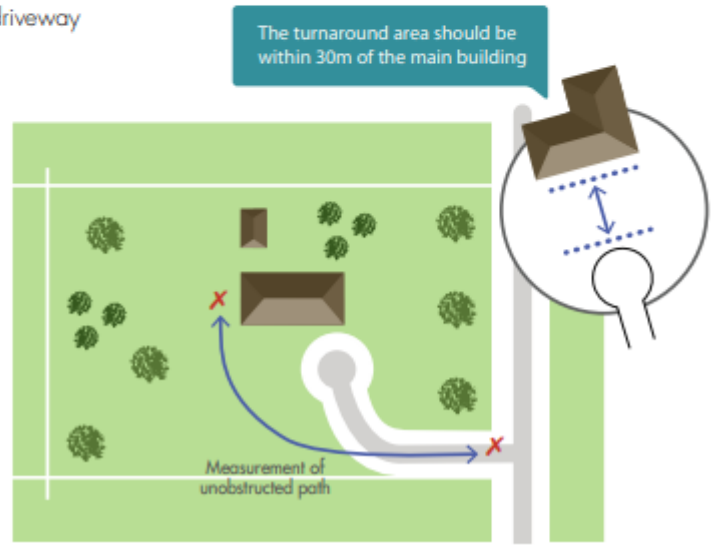

Figure 29: Design requirements for a private driveway where required under A3.6

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Table 3: Private driveway technical requirements

Technical requirement	Private driveways[1]
Minimum trafficable surface (m)	4
Minimum horizontal clearance (m)	6
Minimum vertical clearance (m)	4.5
Minimum weight capacity (t)	15
Maximum grade unsealed road[2]	1:10 (10%, 6°)
Maximum grade sealed road[2]	1:7 (14.3%, 8°)
Maximum average grade sealed road	1:10 (10%, 6°)
Minimum inner radius of road curves (m)	8.5

[1] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision

[2] Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

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Appendix D Schedule 2 Water supply dedicated for bushfire firefighting purposes

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Schedule 2: Water supply dedicated for bushfire firefighting purposes		
Technical requirements		
2.2.1 Construction and design		An above-ground tank and associated stand should be constructed of non-combustible material. The tank may need to comply with AS/NZS 3500.1:2018. Below ground tanks should have a 200mm diameter access hole to allow tankers or emergency service vehicles to refill direct from the tank, with the outlet location clearly marked at the surface. The tank may need to comply with AS/NZS 3500.1:2018. An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. If the tank is required under the BCA as part of fire hydrant installation, then the tank will also need to comply with AS 2419. Where an outlet for an emergency service vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.
2.2.2 Pipes and fittings	**2.2.2.1 Fittings for above-ground water tanks**	All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire attack and be in accordance with the applicable section below, unless otherwise specified by the local government. • Commercial land uses: 125mm Storz fitting; or • Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or • Standalone water tanks: 50mm male camlock coupling with full flow valve; or • Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.
	2.2.2.2 Remote outlets	In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In such instances in which a remote outlet is used, the applicant should consult the local government and DFES on their proposal.

Source: *Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC 2021)*

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