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Life. Property. Environment.

BPAD Bushfire Planning & Design

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: East of the Beach Western Precinct (part Lot 9001)

Suburb: Eglinton **State:** WA **P/code:** 6034

Local government area: City of Wanneroo

Description of the planning proposal: Subdivision renewal

BMP Plan / Reference Number: 65238 M01 **Version:** Rev 0 **Date of Issue:** 04/07/2023

Client / Business Name: Urban Quarter

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☒
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☐	☒
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Louisa Robertson	Level 3	BPAD 36748	28/02/2024
Company		**Contact No.**	
JBS&G		08 9792 4797	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner LM Roberton. **Date** 04/07/2023

Name:	Stuart Reside	Date:	4 July 2023
Company:	Urban Quarter	Job/Doc. No.:	65238/152422
Email:	stuart.reside@urbanquarter.net.au	Inquiries:	Louisa Robertson (BPAD 36748, Level 3)

Bushfire Management Plan Addendum: East of the Beach Western Precinct (Lot 9010), Eglinton, subdivision renewal

1. Introduction

Strategen Environmental (now JBS&G) prepared a comprehensive Bushfire Management Plan (BMP) in September 2017 to support Urban Quarter in their subdivision application for the western portion of Lot 6 Taronga Place, Eglinton (East of the Beach [EOTB] Western Precinct) located in the City of Wanneroo. Conditional subdivision approval was granted in December 2017; however this approval has now lapsed. Urban Quarter are now seeking renewal of the subdivision approval over the western portion of Lot 9010 (No. 101K) Scotthorn Drive (the project area) to develop the remaining areas of land within the Western Precinct, as per the subdivision plan (CLE Town Planning + Design 2023; Figure 1).

The proposed subdivision will create 163 residential lots, one grouped housing lot, one area of Public Open Space (POS)/drainage and an internal public road network, as depicted in Figure 1. The balance portions of Lot 9010 are located within the EOTB Central and Eastern Precincts, to the east of the project area.

This BMP is an addendum to the previous Lot 6 Taronga Place, Eglinton subdivision BMP (Strategen 2017) and provides an updated bushfire assessment specific to the current subdivision application area and plan contained in Figure 1 in accordance with contemporary bushfire planning requirements. This BMP addendum should be read in conjunction with the previous Strategen BMP (2017).

This BMP addendum includes the following information:

1. A revised bushfire assessment including:
    a. an updated Vegetation Classification and Effective Slope map (Figure 2) depicting the potential post-development vegetation classifications and exclusions specific to the updated plan of subdivision and project area extent.
    b. an updated BAL Contour map (Figure 3) specific to the updated plan of subdivision and post-development vegetation conditions mapped from Item 1a above.
2. An updated assessment against the bushfire protection criteria of version 1.4 of the Guidelines (Table 3) including updated statements of compliance against acceptable solutions to demonstrate compliance within the boundary of the current subdivision site.
3. A works program (Table 4) outlining responsibilities and timing for implementation of the bushfire management actions specific to the proposed subdivision.

This BMP addendum has been prepared to accompany the subdivision renewal application for the western portion of Lot 9010 (No. 101K) Scotthorn Drive and address requirements under Policy Measure 6.4 of *State*

Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7; WAPC 2015) in accordance with *Guidelines for Planning in Bushfire-Prone Areas Version 1.4* (the Guidelines; WAPC 2021).

The project area is designated as bushfire prone on the Map of Bush Fire Prone Areas (DFES 2021; Plate 1); therefore, bushfire risk considerations and a BAL assessment are required to inform proposed subdivision design and the planning application, as per Policy Measure 6.2 of SPP 3.7.

Plate 1: Bushfire prone area designation (DFES 2021)

All road carriageway detail where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.

All dimensions and areas depicted on this plan are subject to pre-cal and final survey and will vary from the figures shown. This plan remains the property of CLE.

FUTURE MITCHELL FREEWAY RESERVE

RAIL RESERVE

Balance of Lot 9010
74.7333ha
(121.3827ha)

Balance of Lot 9010
35.4763ha
(121.3827ha)

Public Open Space /Drainage
2578m²

Public Open Space /Drainage
1.7518ha

4.0m ROAD WIDENING OF BLUEWATER DRIVE.

LEGEND

- Lot 9010 - 121.3827ha
- Subject Area - 11.1731ha
- Balance of Lot 9010 - 110.2096ha

YIELD

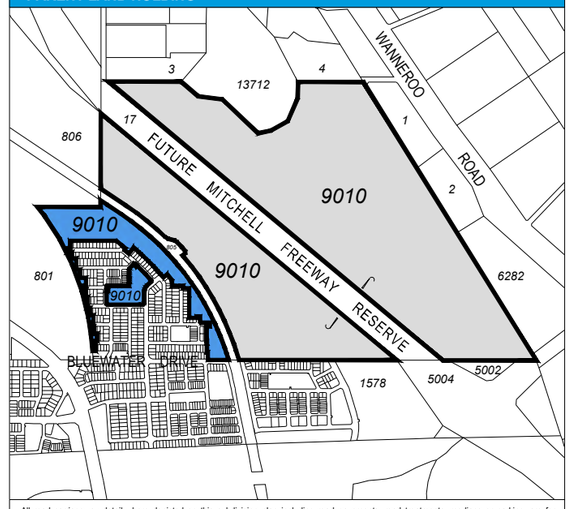
Residential	-	163 lots
Group	-	1 lot
Balance	-	1 lot
Total	-	165 lots

LOT SUMMARY (Residential)

Size	No. Lots
180m² - 234m²	7
235m² - 319m²	23
320m² - 449m²	87
450m² - 499m²	26
500m² - 549m²	9
550m² - 599m²	4
600m² - 699m²	7
Total Lots	**163**

Minimum Lot Size	-	180m²
Maximum Lot Size	-	659m²
Average Lot Size	-	392m²
Total Lot Area	-	6.3962ha

PARENT LAND HOLDING



All road carriageway detail where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.

All dimensions and areas depicted on this plan are subject to pre-cal and final survey and will vary from the figures shown. This plan remains the property of CLE.

0 50 100 150 200m

CLE Town Planning + Design

PROPOSED FREEHOLD SUBDIVISION

101K Scotthorn Drive (Lot 9010), Eglinton

plan no: **3109-275G-01**
date: 30 May 2023
scale: 1:3,000 @ A3, 1:1,500 @A1

N

2. Bushfire assessment results

2.1 Bushfire Attack Level contour assessment

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

- state-adopted FDI 80 rating
- vegetation classification
- effective slope
- distance maintained between proposed development areas 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 future development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts and/or deliver compliance with the bushfire protection criteria of the Guidelines.

The BAL contours are based on:

- the vegetation classifications and effective slope observed during the original site inspection and updated desktop review of current site conditions,
- consideration of the proposed on-site clearing extent, proposed low threat POS area/drainage, low threat staging buffers and resultant separation distances achieved in line with the subdivision plan.

2.2 Assessment inputs

2.2.1 Vegetation classifications and exclusions

JBS&G assessed classified vegetation and exclusions within the 150 m assessment area as part of the original BMP (Strategen 2017) in accordance with *AS 3959-2009 Construction of Buildings in Bushfire-Prone Areas* (AS3959; SA 2009) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). Site photos from the original site inspection can be viewed in Appendix 1 of the previous BMP.

JBS&G has carried out numerous site inspections over the project area since the 2017 BMP was prepared during preparation of BMP compliance reports to certify that the previous subdivision release stages have been designed and constructed as intended under the BMP. JBS&G therefore maintains a high level of familiarity with the project area and surrounding vegetation classifications. Although the vegetation extents have been modified significantly through clearing of vegetation, JBS&G is satisfied that vegetation structure remains consistent with the 2017 BMP. This is supported by a desktop review of on-ground conditions via recent Nearmap imagery, dated 23 April 2023.

Classified vegetation and exclusions are depicted in Figure 2. Classified vegetation comprises banksia woodland with a continuous horizontal fuel profile between 2–6 m in height to the north and west of the project area and to the east of the railway reserve. This vegetation was classified as Class B Woodland within the previous BMP in accordance with AS 3959-2009, however has been reclassified as Class D Scrub to align with the now current AS 3959-2018.

Vegetation within Lot 801 adjacent to the west/north is within the future Eglinton Village Estate, which is undergoing staged subdivision by Cedar Woods. Vegetation at these interfaces is therefore only temporary in nature but needs to be considered within the BAL assessment which is based on current site conditions.

Existing cleared areas occupied by residential dwellings, roads, laydowns, and the rail corridor, as well as land being maintained in a low threat state (such as POS and cleared vacant lots) was assessed as being excluded from classification under Clauses 2.2.3.2 (e) and (f) of AS 3959.

Rail reserve

The rail reserve is currently in a non-vegetated condition and future revegetation by the Public Transport Authority (PTA) is expected to comprise locally occurring scrub type vegetation limited to a narrow corridor (approximately 10 – 12 m) on either side of the train line, which is consistent with landscaping further down in the line in Butler. In the context of a highly built-up landscape, this is not considered to represent a significant bushfire threat to surrounding development as once the surrounding land has been cleared, the rail vegetation will be largely isolated from any substantial areas of bushfire prone vegetation.

Exclusion of the rail corridor and placement of lots at the reserve interface is a consistent precedent within the surrounding area, including within the suburb of Butler. Review of the DFES Map of Bush Fire Prone Areas shows that the rail reserve south of the project area (from the divergence with Mitchell Freeway reserve in Butler) is consistently not classified as being bushfire prone vegetation by the City of Wanneroo, therefore there is existing recognition of the limited risk associated with the rail reserve.

Bushfire prone areas within the portion of rail reserve adjoining the Western Precinct (see Plate 1) largely respond to land that has recently been cleared for construction of the Western Precinct (given the map was last updated in 2021) or land set to be cleared for construction of Eglinton Village (to the west) and future stages of the Central Precinct (to the east). It is anticipated that bushfire prone designation will eventually be removed from the rail reserve (and sites themselves) with only the northern portion of rail responding to vegetation retained within Central Precinct Conservation POS.

2.2.2 Effective Slope

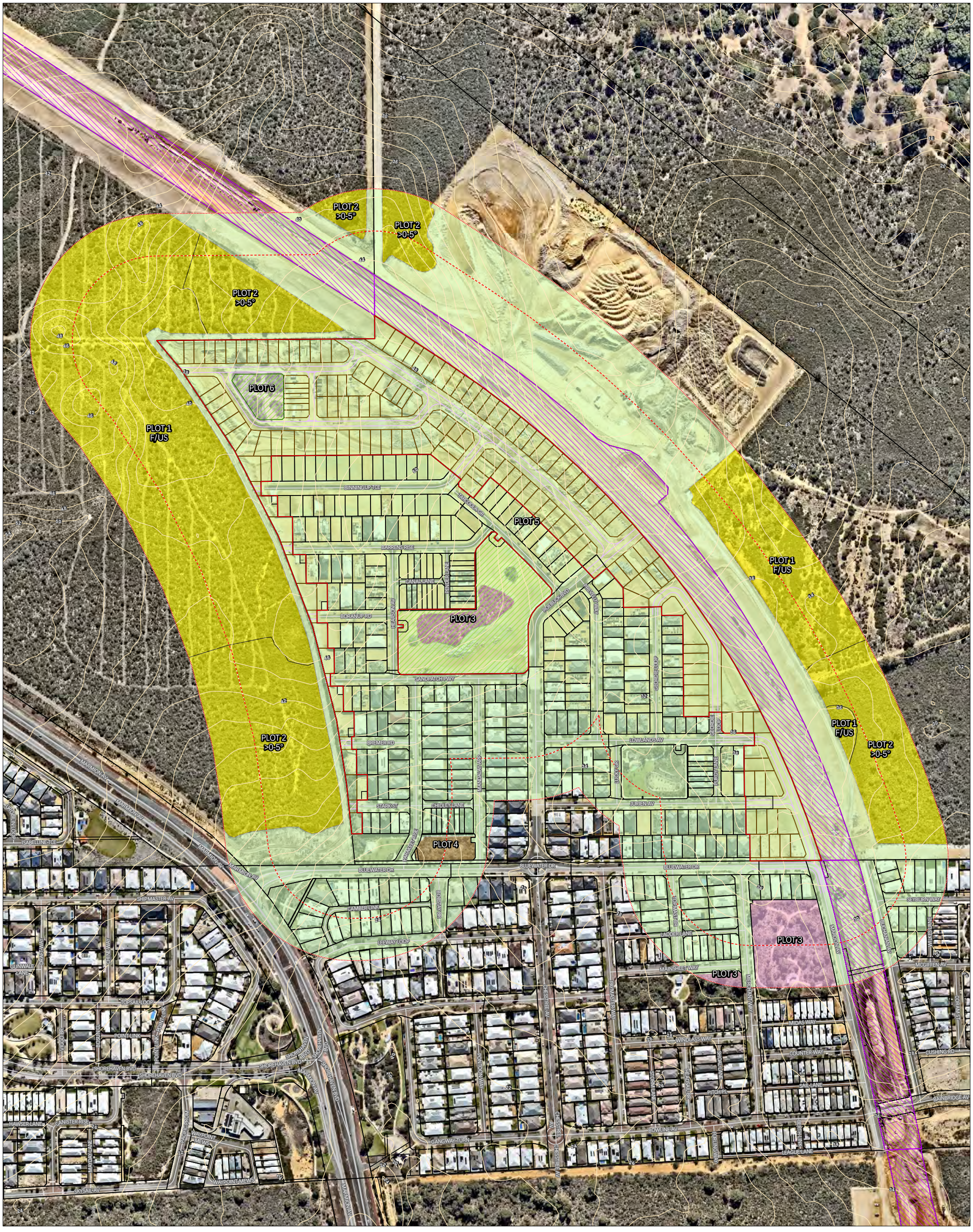
Effective slope under classified vegetation was assessed as part of the 2017 BMP through on ground verification in accordance with AS 3959. Results were cross referenced with DPIRD 2m contour data initially as part of the 2017 assessment and have since been validated as part of 2023 desktop review, as depicted in Figure 2. Effective slope under classified vegetation was assessed to be flat/up-slope (i.e. 0 degrees) or with an effective down slope of >0 – 5 degrees.

2.2.3 Post-development inputs

Figure 2 illustrates the anticipated post-development vegetation classifications and exclusions following completion of subdivisional works and implementation of low threat POS landscaping and staging buffers as required. The post-development vegetation classifications/exclusions and effective slope are summarised in Table 1.

Table 1: Summary of post-development vegetation classifications, exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class D Scrub	Flat/upslope (0°)	Remnant banksia scrub to the north, east and west of the project area boundaries that is flat/upslope.
2	Class D Scrub	Downslope >0–5°	Remnant banksia scrub with an effective downslope to the east, west and north of the project area.
3	Excluded – Clause 2.2.3.2 [b]	N/A	Vegetation within POS less than 1ha in area and not within 100m of other areas of classified vegetation.
4	Excluded – Clause 2.2.3.2 [c]	N/A	Multiple areas of vegetation less than 0.25 ha in area and not within 20m of the site or each other or of other areas of classified vegetation.
5	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing low threat and non-vegetated areas, including cleared vacant lots, cleared balance land, existing residential development, the rail corridor, and laydown area to the east of the rail.
6	Area to be modified to a low threat state (Exclusion 2.2.3.2)	N/A	Small area of future POS in the northwest of the project area, to be modified to a low threat state.



Legend

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Proposed POS
- Proposed lots
- Rail reserve

Vegetation classification

- Class D Scrub
- Clause 2.2.3.2 (b)
- Clause 2.2.3.2 (c)
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state

- Proposed roads
- Topographic contours (mAHD)
- Major road
- Minor road

JBS&G

0 100 metres

Job Number: 65238

Scale 1:4,200 at A3

Client: Urban Quarter

Coord. Sys. GDA2020 MGA Zone 50

Drawn By: jcrute | Checked By: ZC | Version: Rev A | Date: 14-Jun-2023

Lot 9010 (No. 101K)
Sco t horn Drive,
Eglinton, WA

POST-DEVELOPMENT
VEGETATION CLASSIFICATION
AND EFFECTIVE SLOPE

FIGURE: 2

Document Path: C:\Users\jcrute\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Urban Quarter\65238 EOTB Western Precinct BMP Addendum\GIS\02_MapProjects\65238_EOTB Western Precinct BMP Addendum M01_v01\65238_EOTB Western Precinct BMP Addendum M01_v01.aprx

Image Reference: www.nearmap.com© - Imagery Date: 29. April 2023.

2.3 Assessment outputs

2.3.1 BAL contour assessment results

The results of the BAL contour assessment are detailed in Table 2 and illustrated in Figure 3. The determined worst case BAL impact to future habitable development within the project area is BAL–FZ. Through the implementation of temporary quarantining of lots (see Figure 3 and Section 2.3.2), the highest modified BAL applicable to the proposed lots is BAL–29.

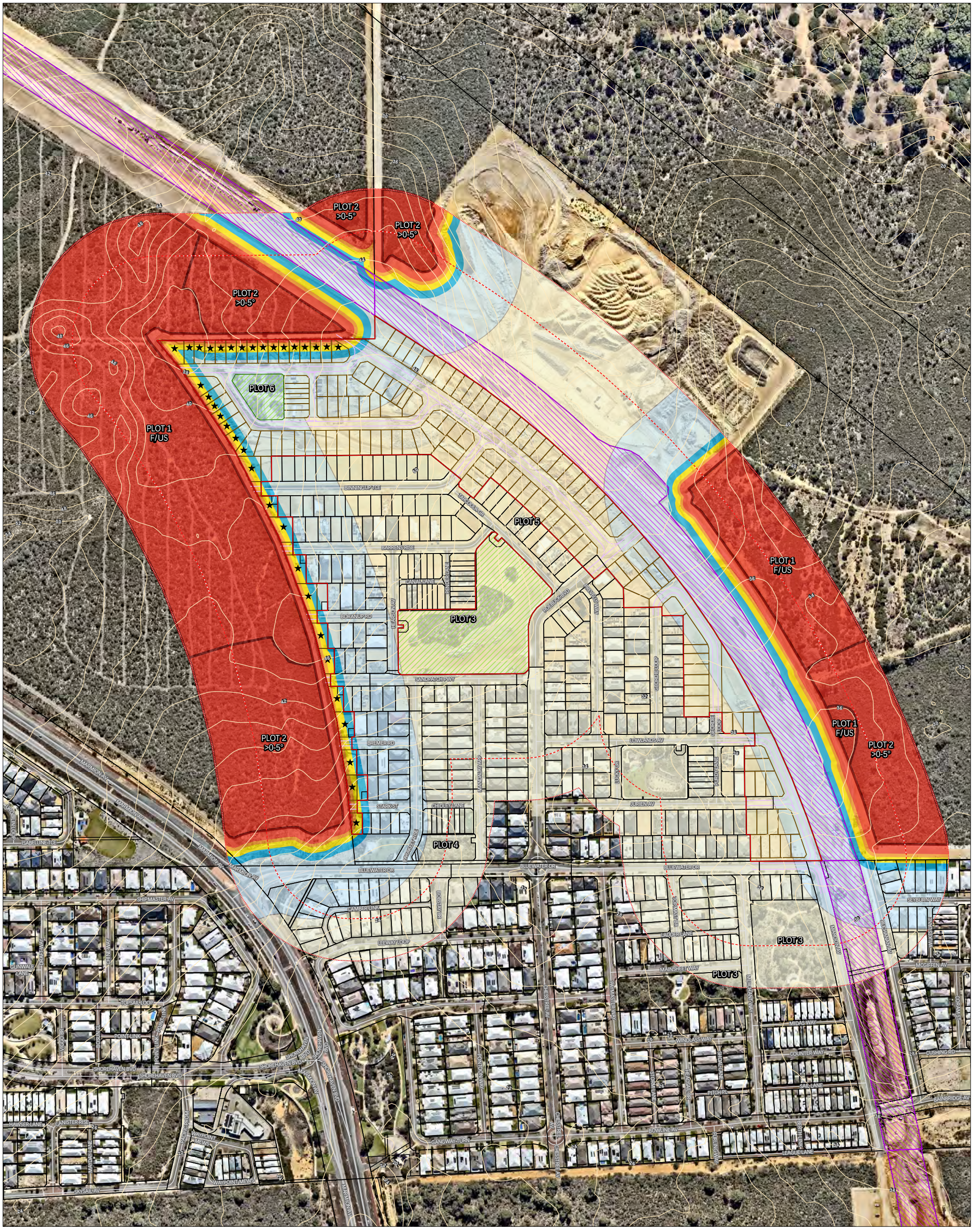
Table 2: BAL contour assessment results

Method 1 BAL determination					
Vegetation plot	**Vegetation classification**	**Effective slope**	**Separation distance**	**Highest BAL (to lot boundary)**	**Modified BAL (with temporary quarantining (see Figure 3)**
1	Class D Scrub	Flat/upslope (0°)	<10 m	BAL–FZ	BAL–29 (Explained in Section 2.3.2 for temporary quarantining measures)
2	Class D Scrub	Downslope >0–5°	<11 m	BAL–FZ	BAL–29 (Explained in Section 2.3.2 for temporary quarantining measures)
3	Excluded – Clause 2.2.3.2 [b]	N/A	N/A	N/A	N/A
4	Excluded – Clause 2.2.3.2 [c]	N/A	N/A	N/A	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	Area to be modified to a low threat state (Exclusion 2.2.3.2)	N/A	N/A	N/A	N/A

2.3.2 Temporary BAL-40/FZ impacts from temporary vegetation on adjoining land

As noted previously, Lot 801 to the west/north is currently vegetated but will be eventually cleared to facilitate construction of the adjoining Eglinton Village residential estate. In the meantime, the lots abutting the west and north cadastral boundaries of the project area are affected by BAL-40/FZ impacts and will need to be temporarily excluded from title issuance until it can be demonstrated that the land has been cleared and will be permanently maintained in a low threat state.

Urban Quarter are currently working with Cedar Woods (owners of Lot 801) to resolve a boundary development agreement which will provide for authorisation of clearing, and maintenance of a low threat buffer external to the west and north boundaries of the project area. Implementation of the agreement and subsequent demonstration that the affected lots can achieve BAL-29 or below, will enable the lots to be titled through the subdivision clearance process. A plan showing the proposed area of clearing within Lot 801 is included in Appendix A and depicts a 35 m wide buffer around the subdivision perimeter. This would equate to worst case bushfire attack level rating of BAL-12.5 for the interfacing lots. A BAL Contour map depicting the proposed 35 m wide low threat buffer is included in Appendix B.



Legend

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Proposed POS
- Proposed lots
- Rail reserve
- Classified vegetation

BAL contours

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

- Topographic contours (mAHD)
- Major road
- Minor road
- ★ Lot to be temporarily excluded from title issue until vegetation on adjoining land is permanently removed and managed

JBS&G

0 100 metres

Lot 9010 (No. 101K) Sco t horn Drive, Eglinton, WA

Job Number: 65238 | Scale 1:4,200 at A3

BAL CONTOUR MAP

Client: Urban Quarter | Coord. Sys. GDA2020 MGA Zone 50

Drawn By: jcrute | Checked By: ZC | Version: Rev A | Date: 14-Jun-2023

FIGURE: 3

Document Path: C:\Users\jcrute\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Urban Quarter\65238 EOTB Western Precinct BMP Addendum\GIS\02_MapProjects\65238_EOTB Western Precinct BMP Addendum M01_v01\65238_EOTB Western Precinct BMP Addendum M01_v01.aprx

Image Reference: www.nearmap.com© - Imagery Date: 29. April 2023.

3. Assessment against bushfire protection criteria

3.1 Compliance with Elements 1-4

Compliance with Elements 1–4 of the bushfire protection criteria of the Guidelines (Version 1.4) is demonstrated by meeting the acceptable solutions, as detailed in Table 3.

Table 3: Compliance with the bushfire protection criteria of the Guidelines (Elements 1–4)

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
Element 1: Location	**Performance Principle P1** The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL–29 or below, and the risk can be managed. For unavoidable development in areas where BAL–40 or BAL–FZ applies, demonstrating that the risk can be managed to the satisfaction of the decision-maker.	**A1.1 Development location** The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	The BAL contour assessment (see Figure 3 and Table 2) shows that lots directly adjacent to the west and north boundary of the project area are subject to temporary BAL-40/FZ impacts as a result of temporary vegetation hazards on adjoining Lot 801. However, these lots will be temporarily quarantined from title issuance, until the vegetation is permanently removed and managed and the affected lots are able to achieve BAL-29 or below (as discussed in Section 2.3.2). This temporary quarantining of lots will ensure all future development will be located in area subject to BAL-29 or below which achieves compliance with A1.1.	✓
Element 2: Siting and design	**Performance Principle P2** The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. The proposal incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.	**A2.1 Asset Protection Zone** Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the requirements set out in Schedule 1.	Formal Asset Protection Zones (APZs) are not required to deliver BAL-29 or lower given the suitable extent of permanently low threat or non-vegetated land (Clause 2.2.3.2 (e) and (f) exclusions) which exist within the wider Western Precinct, rail reserve, and adjoining Central Precinct (to the east). Lots with a rating of BAL–40/FZ are being quarantined until a non-vegetated buffer can be installed and maintained permanently (as discussed in Section 2.3.2), which will enable future habitable development to achieve BAL–29 or lower. The cleared buffer is to be established and maintained in a low threat state in perpetuity in accordance with Clause 2.2.3.2 (f) of AS 3959 and Schedule 1 APZ standards of the Guidelines (refer to Appendix C).	✓

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
Element 3: Vehicular access	**Performance Principle P3i** The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.	**A3.1 Public roads** *The minimum requirements under this acceptable solution are applicable to all proposed and existing public roads.* Public roads are to meet the minimum technical requirements in Table 6, Column 1. The trafficable (carriageway/pavement) width is to be in accordance with the relevant class of road in the Local Government Guidelines for Subdivisional Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroad standards and/or any applicable standards for the local government area.	All proposed public roads will be constructed to the minimum technical requirements of the Guidelines (see Appendix D) and in accordance with relevant federal, State and local government requirements.	✓
		A3.2a Multiple access routes Public road access is to be provided in two different directions to at least two different suitable destinations with an all-weather surface (two-way access). If the public road access to the subject site is via a no-through road which cannot be avoided due to demonstrated site constraints, the road access is to be a maximum of 200 metres from the subject lot(s) boundary to an intersection where two-way access is provided. The no-through road may exceed 200 metres if it is demonstrated that an alternative access, including an emergency access way, cannot be provided due to site constraints and the following requirements are met: • the no-through road travels towards a suitable destination; and • the balance of the no-through road, that is greater than 200 metres from the subject site, is wholly within BAL-LOW, or is within a residential built-out area – Figure 23.	Proposed subdivision design indicates public vehicular access connections to the surrounding public road network. Three connections will be provided to Bluewater Drive: one in the southeast via Lowlands Avenue, and two in the southwest via Parakeet Rise and Mandalay Approach. Bluewater Drive connects with Marmion Avenue which lead north to the localities of Eglinton and Yanchep, and south to Alkimos which are suitable destinations for evacuation residents. The Western Precinct itself also forms a suitable destination given the large areas of BAL-Low land. This will be even more evident once Lot 801 (Eglinton Village) is cleared to the west. The proposed vehicular access network will ensure residents and visitors of the site are provided a minimum of two vehicular access routes in multiple directions to multiple suitable destinations.	✓

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
		A3.2b Emergency access way *Where it is demonstrated that A3.2a cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution.* An emergency access way is to meet all the following requirements: • requirements in Table 6, Column 2; • provides a through connection to a public road; • be no more than 500 metres in length; and • must be signposted and if gated, gates must open the whole trafficable width and remain unlocked.	No permanent Emergency Access Ways (EAWs) are proposed or required as part of development design. Any temporary EAWs required to deliver compliant secondary access routes during staged development will be constructed to comply with relevant technical requirements of the Guidelines (Appendix D).	N/A
		A3.3 Through-roads All public roads should be through-roads. No-through roads should be avoided and should only be considered as an acceptable solution where: • it is demonstrated that no alternative road layout exists due to site constraints; and • the no-through road is a maximum length of 200 metres to an intersection providing two-way access, unless it satisfies the exemption provisions in A3.2a of this table. A no-through road is to meet all the following requirements: • requirements of a public road (Table 6, Column 1); and • turn-around area as shown in Figure 24.	There are seven temporary no-through roads on the western side of the project area which are earmarked for future extension into Eglinton Village (Lot 801) to the west, providing access to Marmion Avenue. Only one of these will be longer than 200 m (Binningup Terrace, ~220 m), however, the balance of the no-through road longer than 200 m from the furthest lot is within a residential built-out area and within BAL–Low, which achieves compliance with the A3.3.	✓
	Performance Principle P3ii The design of vehicular access and egress provides:	**A3.4a Perimeter roads** A perimeter road is a public road and should be provided for greenfield or infill development where 10 or more lots are being proposed (including as part of a staged subdivision) with the aim of:	The public road network has been designed to integrate into future subdivisions to the west and north of the project area (i.e. within Eglinton Village residential estate). Perimeter roads have not been incorporated into the current development design at these boundaries, due to the curved nature of the	✓

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
	• access and egress for emergency service vehicles while allowing the community to evacuate; • a defendable space for emergency services personnel on the interface between classified vegetation and development site; and • hazard separation between classified vegetation and the subject site to reduce the potential radiant heat that may impact a lot(s).	• separating areas of classified vegetation under AS3959, which adjoin the subject site, from the proposed lot(s); and • removing the need for battle-axe lots that back onto areas of classified vegetation. A perimeter road is to meet the requirements contained in Table 6, Column 1. A perimeter road may not be required where: • the adjoining classified vegetation is Class G Grassland; • lots are zoned for rural living or equivalent; • it is demonstrated that it cannot be provided due to site constraints; or • all lots have frontage to an existing public road.	Lot 8010 cadastral boundary and the need to consider road and lot placement within the adjoining subdivision on Lot 801. Scrub vegetation hazards currently exist within adjoining Lot 801 and perimeter access to the hazards via provision of temporary fire service access routes (FSARs) will need to be considered for each stage of subdivision until the vegetation hazards are permanently removed. This is discussed under A3.4b below. Perimeter roads are not proposed at the interface with the future rail reserve as the corridor is considered low threat (see section 2.2.1).	
	Performance Principle P3iii Vehicular access is provided which allows: • access and egress for emergency service vehicles; • defendable space for emergency services • personnel on the interface between classified vegetation and development; and • hazard separation between classified vegetation and the site to reduce the potential radiant heat that may impact a lot(s).	**A3.4b Fire service access route** *Where proposed lots adjoin classified vegetation under AS3959, and a perimeter road is not required in accordance with A3.4a, a fire service access route can be considered as an acceptable solution to provide firefighter access, where access is not available, to the classified vegetation.* A fire service access route is to meet all the following requirements: • requirements in Table 6, Column 3; • be through-routes with no dead-ends; • linked to the internal road system at regular intervals, every 500 metres; • must be signposted; • no further than 500 metres from a public road; • if gated, gates must open the required horizontal clearance and can be locked by the local government and/or emergency services, if keys are provided for each gate; and • turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres.	Perimeter access to the temporary vegetation hazards at the west and north project area interfaces is to be addressed for each stage of subdivision through provision of temporary fire service access routes (FSARs) located within adjoining Lot 801, and with regular connections into the Western Precinct subdivision area via the existing and proposed temporary no-through roads. Since the temporary FSARs would be on adjacent land, this will need to be negotiated via a development boundary agreement with the landowners of Lot 801. Temporary FSARs will need to comply with provisions of the Guidelines (see Appendix D). Alternatively, the proponent has advised that a boundary development agreement is currently being prepared to clear an approximately 35 m wide buffer into Lot 801 (see Section 2.3.2). If these works (and ongoing low threat management) are enacted, then the scrub vegetation hazards will no longer adjoin the north and west interfaces and access will no longer be required directly at the site perimeter. This outcome is considered suitable until such a time that Lot 801 is permanently developed with public roads and residential lots.	✓

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
	Performance Principle P3iv Vehicular access is provided which allows emergency service vehicles to directly access all habitable buildings and water supplies and exit the lot without entrapment.	**A3.5 Battle-axe access legs** *Where it is demonstrated that a battle-axe cannot be avoided due to site constraints, it can be considered as an acceptable solution.* There are no battle-axe technical requirements where the point the battle-axe access leg joins the effective area of the lot, is less than 50 metres from a public road in a reticulated area. In circumstances where the above condition is not met, or the battle-axe is in a non-reticulated water area, the battle-axe is to meet all the following requirements: • requirements in Table 6, Column 4; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres).	No battle-axe lots are proposed as part of the subdivision.	N/A
		A3.6 Private driveways There are no private driveway technical requirements where the private driveway is: • within a lot serviced by reticulated water; • no greater than 70 metres in length between the most distant external part of the development site and the public road measured as a hose lay; and • accessed by a public road where the road speed limit is not greater than 70 km/h. In circumstances where all of the above conditions are not met, or the private driveway is in a non-reticulated water area, the private driveway is to meet all the following requirements: • requirements in Table 6, Column 4;	A3.6 is applicable to development applications only.	N/A

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
		• passing bays every 200 metres with a minimum length of 20 metres and a minimum • additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres); and • turn-around area as shown in Figure 28 and within 30 metres of the habitable building.		
Element 4: Water	No performance principle applies	**A4.1 Identification of future water supply** Evidence that a reticulated or sufficient non-reticulated water supply for bushfire fighting can be provided at the subdivision and/or development application stage, in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2. Where the provision of a strategic water tank(s) is required a suitable area within a road reserve or a dedicated lot the location should be identified, should be identified on the structure plan, to the satisfaction of the local government.	A4.1 is applicable to strategic planning applications only.	N/A
	Performance Principle P4 Provide a permanent water supply that is: • sufficient and available for firefighting purposes; • constructed from non-combustible materials (e.g. steel), or able to maintain its integrity throughout a bushfire; and • accessible, with legal access for maintenance and re-filling by tankers and emergency service vehicles.	**A4.2 Provision of water for firefighting purposes** Where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these specifications cannot be met, then the following applies: • The provision of a water tank(s), in accordance with the requirements of Schedule 2; and Where the provision of a strategic water tank(s) is applicable, then the following requirements apply: • land to be ceded free of cost to the local government for the placement of the tank(s); • the lot or road reserve where the tank is to be located is identified on the plan of subdivision;	The proposed development will be connected to a reticulated water supply via extension of services from adjacent development in accordance with Water Corporation Design Standard 63 requirements.	✓

Bushfire protection criteria	Performance Principle	Method of compliance Acceptable solutions	Statement of development compliance	Compliance achieved
		• tank capacity, construction, and fittings, provided in accordance with the requirements of Schedule 2; and • a strategic water tank is to be located no more than 10 minutes from the subject site (at legal road speeds). Where a subdivision includes an existing habitable building(s) that is to be retained, a water supply should be provided to this existing habitable building(s), in accordance with the requirements listed above.		

3.2 Additional management measures

3.2.1 Lots impacted by temporary BAL-40/FZ requiring temporary quarantining

Lots abutting the west and north boundaries of the project area are proposed to adjoin temporary classified vegetation within adjacent Lot 801 to the west and north, which will result in temporary BAL impacts on these lots of BAL-40/FZ (refer to 2.3.2 and Figure 3). Vegetation within Lot 801 has been classified as Class D Scrub until such a time that the vegetation is modified to a cleared or low threat state under Clauses 2.2.3.2 (e) and (f) and permanently managed.

The lots affected by temporary BAL-40/FZ impacts will be subject to a condition of subdivision stating the following (or similar wording):

'Proposed lots adjacent to the west and north boundaries of the project area affected by BAL-40 and/or BAL-FZ impacts are not to be titled until it can be adequately demonstrated, via a suitably qualified bushfire consultant, that the lots can be developed to a rating of BAL-29 or lower. (Western Australian Planning Commission).'

Whilst the temporary land quarantining and associated condition of subdivision precludes the titling of lots, it does not preclude the land from being subject to subdivisional works (e.g. clearing, earthworks, installation of services, noise attenuation, etc).

3.2.2 Maintenance of cleared buffer within Lot 801

The developer of the current subdivision (Urban Quarter) will be responsible for ongoing management of the cleared buffer within adjoining Lot 801 until the land is permanently developed by the developer of Lot 801 (Cedar Woods). Management responsibilities are to be documented within the boundary development plan.

3.2.3 Temporary fire service access routes

Temporary FSARs will be required around the west and north perimeters of the project area, within adjoining Lot 801 if the proposed clearing of a buffer (approx. 35 m wide) does not occur within this land. The location of the FSAR on adjoining land will need to be negotiated via preparation of a boundary development agreement with the landowners of Lot 801. Ongoing management responsibilities (by the developer) are also to be outlined in this agreement.

3.2.4 Fuel management within cleared vacant lots

Cleared vacant lots are to be managed on a regular and ongoing basis by the developer until sale of lots after which time landowners will be responsible for ongoing management. Maintenance is to be in accordance with Clause 2.2.3.2 (f) of AS 3959 and Schedule 1 of the Guidelines (refer to Appendix C) and will involve slashing/mowing of grassland and weeds to height of less than 100 mm.

3.2.5 Road verge fuel management

Existing and proposed road verges that have been excluded as low threat are to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management is the responsibility of the City.

3.2.6 Notification on title

A notification, pursuant to Section 165 of the Planning and Development Act 2005, is to be placed on the certificates of title of the proposed lots subject to BAL-12.5 or higher to ensure landowners/proponents and prospective purchasers are aware that their lot is located within a bushfire prone area and is subject to an approved BMP. The notification is to state as follows:

'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land (Western Australian Planning Commission).'

3.2.7 Building construction standards

Future Class 1, 2, 3 and associated 10a buildings in areas subject to BAL-12.5 or higher are required to comply with the bushfire specific building construction requirements of AS 3959, where located within a designated bushfire prone area.

3.2.8 BMP compliance report at future stages

A BMP compliance report is to be prepared prior to issue of title to validate and confirm that relevant management measures of this BMP have been implemented appropriately to achieve the intended bushfire management outcomes and compliance with bushfire protection criteria.

3.2.9 Landscape Plan

A detailed Landscape Plan will be prepared as a condition of subdivision to demonstrate that the landscaping assumptions made within this BMP will be implemented as intended. The Landscape Plan will need to demonstrate the extent and structure of revegetation within POS is consistent with a low threat outcome consistent with Clause 2.2.3.2 of AS 3959.

Responsibilities for establishment and maintenance of low threat landscaping are discussed in Section 4.

3.2.10 Compliance with annual firebreak notice

The developer and prospective land purchasers are to comply with the current City of Wanneroo annual firebreak notice as amended (refer Appendix E).

4. Responsibilities for implementation and management of the bushfire measures

Implementation of the BMP addendum applies to the developer, prospective landowners and the City to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 4 to drive implementation of all relevant bushfire management works associated with the previous Strategen (2017) BMP and this addendum.

Table 4: Responsibilities for implementation and management of the bushfire measures

Implementation/management table	
Developer – prior to issue of titles	
No.	Implementation action
1	Enter into boundary development agreement with Cedar Woods and clear buffer to west and north boundaries within adjoining Lot 801 to demonstrate a low threat condition (and ongoing maintenance responsibilities) and enable issuance of title for interfacing lots, as stated in the BMP.
2	Construct (or have works bonded) the public roads (including any temporary no-through-roads) to the standards stated in this BMP addendum.
3	Construct temporary fire service access routes (FSARs) along the north and west project area interfaces (within Lot 801) if clearing of the proposed buffer within adjoining Lot 801 does not occur. Ensure provisions for siting of the FSAR within Lot 801 and ongoing management responsibilities (by the developer) are outlined in the boundary development agreement.
4	Construct (or have works bonded) the reticulated water supply to the standards stated in this BMP addendum.
5	Prepare detailed POS landscaping plans that demonstrate the anticipated Clause 2.2.3.2 exclusions throughout on-site POS areas in accordance with the requirements of this BMP addendum (as depicted in Figure 2).
6	Establish the development footprint and on-site POS areas in a non-vegetated/low threat state in accordance with the requirements of this BMP addendum.
7	Comply with the relevant requirements of the City of Wanneroo annual firebreak notice (refer to Appendix E).
8	Prepare a BMP compliance report to demonstrate the relevant bushfire management measures have been implemented to deliver compliance in accordance with this BMP addendum.
Developer – until sale/transfer of lots	
No.	Implementation action
1	If established, maintain the cleared buffer within adjoining Lot 801 in a low threat state until the adjoining subdivision stages are permanently cleared and developed by Cedar Woods. Regular slashing is likely to be required within the buffer to prevent natural revegetation of scrub vegetation.
2	If required to be established, maintain temporary FSARs constructed within adjoining Lot 801 to the standards stated in the BMP.
3	Maintain the development footprint and on-site POS areas to a non-vegetated/low threat state in accordance with the requirements of this BMP addendum.
4	Comply with the relevant requirements of the City of Wanneroo annual firebreak notice (Appendix E).
Landowner/occupier – prior to building construction and ongoing	
No.	Implementation action
1	Comply with the relevant requirements of the City of Wanneroo annual firebreak notice (Appendix E), including maintenance of cleared vacant titled lots in a low threat state.
2	Comply with AS3959 building constructions standards relevant to the assessed BAL, where required.
Local government – ongoing management	
No.	Implementation action
1	Maintain urban street verges in a low threat state as per exclusions under Clause 2.2.3.2 of AS 3959.
2	Maintain POS areas in a low threat state as per exclusions under Clause 2.2.3.2 of AS 3959.

5. References

CLE Town Planning + Design 2023, *Proposed freehold subdivision – 101K Scotthorn Drive (Lot 9010), Eglinton*, Plan No. 9109-275E-01 (24 May 2023), CLE Town Planning + Design, Perth.

Department of Fire and Emergency Services (DFES) 2021, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: https://maps.slip.wa.gov.au/landgate/bushfireprone/, [13/06/2023].

Department of Planning (DoP) 2016, *Visual guide for bushfire risk assessment in Western Australia*, Department of Planning, Perth.

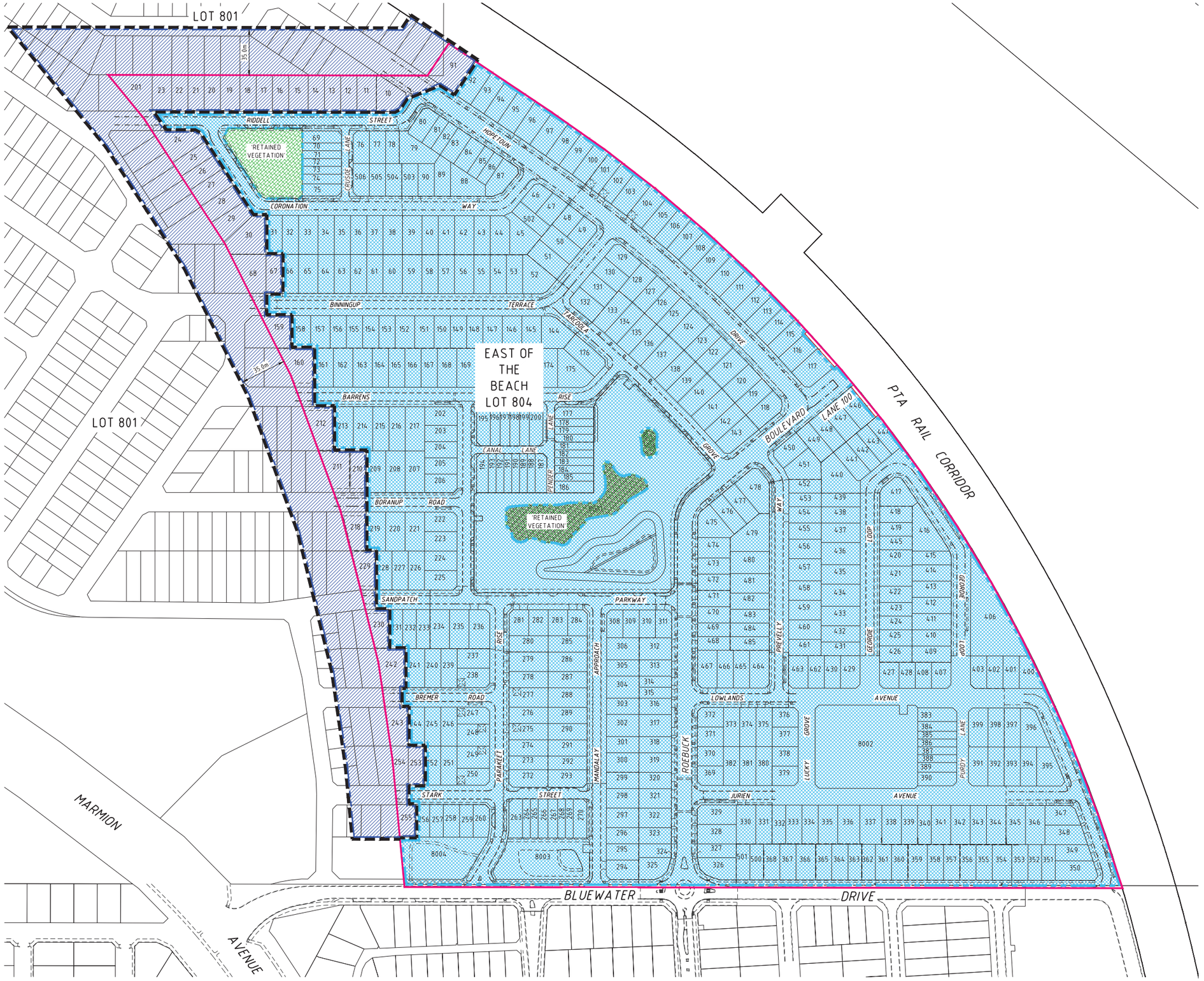
Standards Australia (SA) 2018, *Australian Standard AS 3959–2018 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Strategen Environmental (now JBS&G) 2017, *Bushfire Management Plan – Lot 6 Taronga Place, Eglinton*, report prepared for Urban Quarter, September 2017.

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2021, *Guidelines for Planning in Bushfire Prone Areas*, Version 1.4 December 2021, Western Australian Planning Commission, Perth.

Appendix A Clearing and siteworks plan – Lot 801 interface



LEGEND

DESCRIPTION	SYMBOL
LIMIT OF WORKS BOUNDARY	
AREA TO BE CLEARED	
EXISTING CLEARED AREA	
EXISTING VEGETATION TO BE RETAINED (NO CLEARING)	
EAST OF THE BEACH SITE BOUNDARY	

NOTES

1. ALL LEVELS IN METRES TO AHD. SURVEY BY MNG.
2. EXTENT OF CLEARING TO BE LIMITED TO THE LIMIT OF CLEARING BOUNDARY UNLESS AGREED WITH THE SUPERINTENDENT.
3. ALL UNSUITABLE MATERIAL TO BE REMOVED BY THE CONTRACTOR TO APPROVED TIPPING SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION. ALL FEES TO BE PAID BY CONTRACTOR.
5. THE CONTRACTOR SHALL PROVIDE A FENCE TO THE EXISTING 'VEGETATION TO BE RETAINED' PRIOR TO COMMENCING CLEARING.
6. EXTENT OF WORKS TO BE LIMITED TO THE WORKS STAGE BOUNDARY UNLESS AGREED WITH THE SUPERINTENDENT.
7. ALL CLEARED MATERIAL TO BE MULCHED AND STOCKPILED ON SITE AT A LOCATION AGREED WITH THE SUPERINTENDENT. NO REMOVAL OF MULCHED MATERIAL OFFSITE TO OCCUR UNLESS APPROVED BY THE SUPERINTENDENT.
8. CONTRACTOR TO LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS ON SITE.
9. EXCESS CUT FROM EARTHWORKS SHALL BE PLACED ON SITE AS DIRECTED BY THE SUPERINTENDENT.
10. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION AND EXISTING SERVICES ON SITE.
12. TOPSOIL GENERATED FROM SITE SHALL BE BLENDED AND RE-USED AS STRUCTURAL FILL AT THE RATIO NOMINATED IN THE GEOTECHNICAL REPORT.
14. THE CONTRACTOR SHALL ENSURE APPROPRIATE MEASURES ARE TAKEN TO PROVIDE CONTINUOUS STABILIZATION OF EARTHWORKED AREAS THROUGHOUT THE COURSE OF THE WORKS.
15. THE CONTRACTOR IS TO VERIFY EXISTING CONTOURS AND LEVELS ARE CORRECT AND ACCURATE PRIOR TO THE STRIPPING OF TOPSOIL. FAILURE TO DO SO ABSOLUTELY VOIDS ANY CLAIM ASSOCIATED WITH THE ACCURACY OF EXISTING SURVEY INFORMATION. IF THE CONTRACTOR BELIEVES THE LEVELS ARE NOT CORRECT AND ACCURATE THEY SHALL IMMEDIATELY INFORM THE SUPERINTENDENT AND DELAY TOPSOIL STRIPPING UNTIL SUCH TIME THAT AGREEMENT IS REACHED WITH RESPECT TO EXISTING SURFACE LEVELS.

WARNING TO CONTRACTOR UXO

THE SITE IS IDENTIFIED AS HAVING RISK OF UNEXPLODED ORDNANCE.

"NO EXCAVATION OR OTHER DISTURBANCE OF THE SOIL ON THIS SITE SHOULD BE CARRIED OUT WITHOUT FIRST OBTAINING CLEARANCE FROM THE UNEXPLODED ORDNANCE BRANCH OF THE W.A. POLICE DEPARTMENT."

NOTICE TO CONTRACTOR

IT IS THE CONTRACTORS RESPONSIBILITY TO INVESTIGATE THE NATURE AND LOCATION OF ALL SERVICES WHICH MAY BE ENCOUNTERED AND TO CONSULT WITH THE RELEVANT SERVICE AUTHORITIES PRIOR TO COMMENCEMENT OF EXCAVATIONS. FAILURE TO DO SO OR TO TAKE DUE CARE SHALL NOT LIMIT THE CONTRACTORS LIABILITY FOR REPAIR OF ALL SERVICES DAMAGED BY HIM DURING CONSTRUCTION WORKS THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY FOR THE PROTECTION OF ALL EXISTING SERVICES.

REV	DATE	DRN	CKD	APP	AMENDMENT
A	21 09 22	RR	-	-	ISSUED FOR APPROVAL

N

DIAL BEFORE YOU DIG www.1100.com.au

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1:1500

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CLIENT: PRIME EGLINTON PTY LTD

APPROVED: CHECK PRINT

DESIGNED: RR

SCALE: 1:1500

PROJECT: EAST OF THE BEACH

TITLE: CLEARING AND SITEWORKS PLAN LOT 801 AND 804 INTERFACE

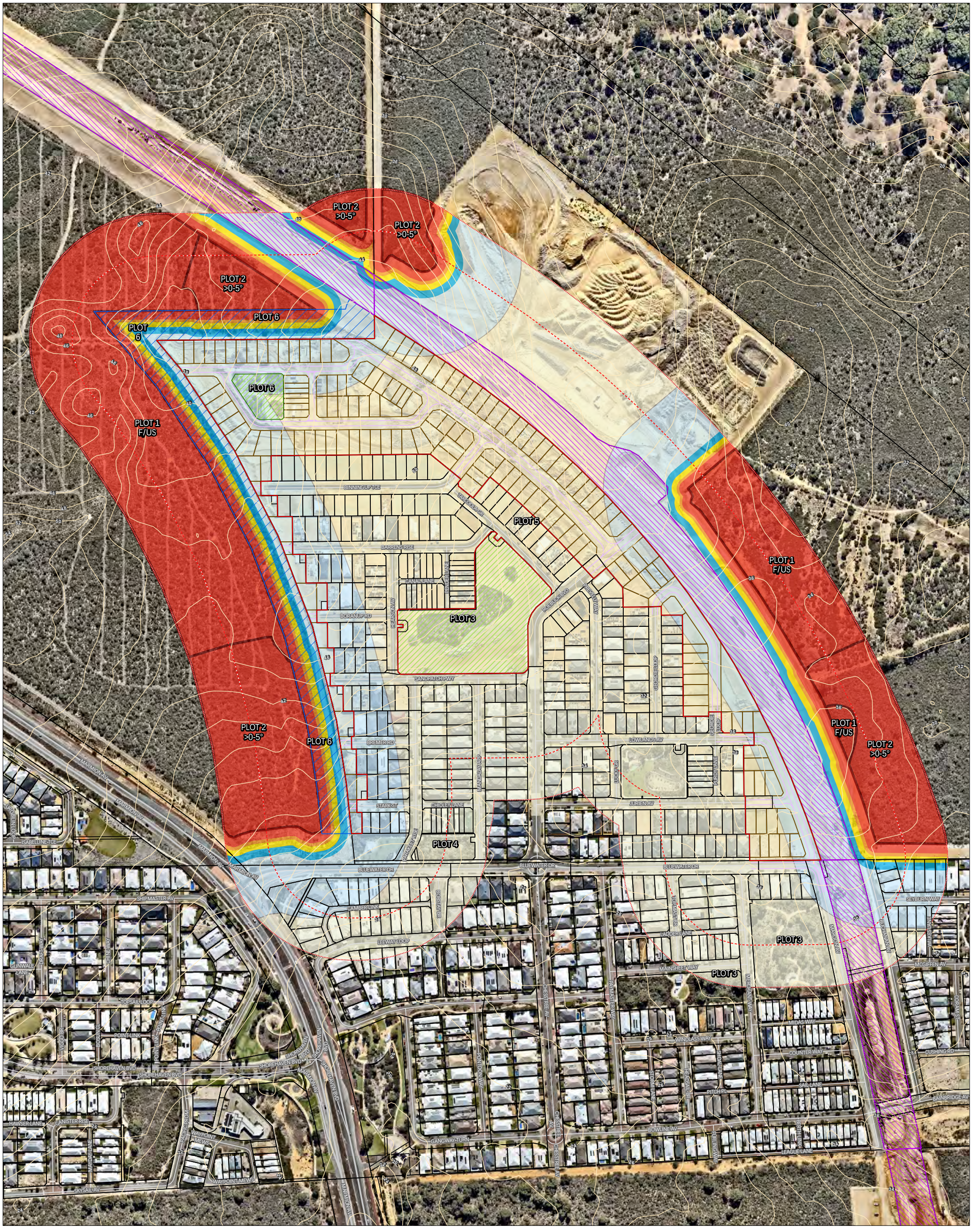
WAPC No. 155700

DRAWING No. 5826-00-110

REVISION A

ORIGINAL SIZE A1

Appendix B BAL Contour map showing proposed low threat buffer



Legend

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Proposed POS
- Proposed lots
- Rail reserve

BAL contours

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

- Classified vegetation
- Low threat buffer within Lot 801
- Proposed roads
- Topographic contours (mAHD)
- Major road
- Minor road

JBS&G

0 100 metres

Job Number: 65238

Scale 1:4,200 at A3

Client: Urban Quarter

Coord. Sys. GDA2020 MGA Zone 50

Drawn By: jcrute | Checked By: ZC | Version: Rev A | Date: 30-Jun-2023

Lot 9010 (No. 101K)
Sco t horn Drive,
Eglinton, WA

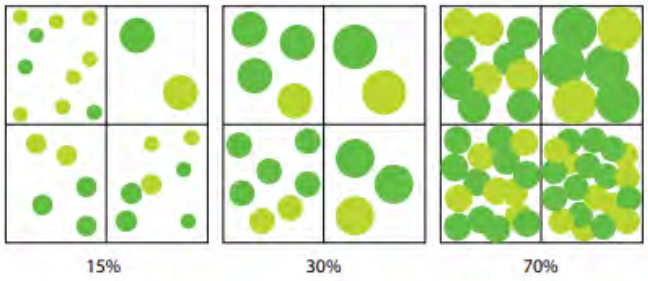
BAL CONTOUR MAP SHOWING CLEARING WITHIN LOT 801

FIGURE: A2

Document Path: C:\Users\jcrute\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Urban Quarter\65238 EOTB Western Precinct BMP Addendum\GIS\02_MapProjects\65238_EOTB Western Precinct BMP Addendum D01_v01.aprx

Image Reference: www.nearmap.com© - Imagery Date: 29. April 2023.

Appendix C APZ standards (Schedule 1 of the Guidelines)

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.

Schedule 1: Standards for Asset Protection Zones	
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 (WAPC 2021)*

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.

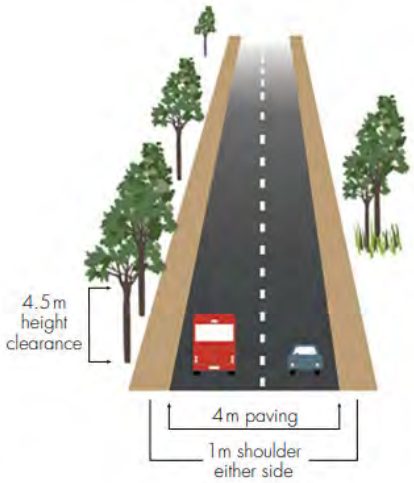
Schedule 1: Standards for Asset Protection Zones
A copy of the firebreak notice and Schedule 1 should be included in a BMP specifically as a how-to guide for the landowner, and to demonstrate to decision-makers that the measures outlined in the BMP to achieve the appropriate BAL rating through provision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

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.

Schedule 1: Standards for Asset Protection Zones
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 (WAPC 2021)*

Appendix D Vehicular access technical requirements of the Guidelines

Acceptable Solution A3.1 – Public Roads
Explanatory Note E3.1
These Guidelines do not prescribe values for the trafficable (carriageway/pavement) width of public roads as they should be in accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards and/or any applicable standard in the local government area. The IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards do not prescribe a horizontal clearance. However, it is recommended that a traversable verge is provided to allow for emergency services vehicles to stop and operate on the side of the public road, specifically where the public road may traverse large areas of classified vegetation. Where local government roads are proposed to be widened by the proponent, they must obtain approval from the local government.    **Figure 20:** Example of a public road

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

Acceptable Solution A3.2a – Multiple access routes
Explanatory Note E3.2a

Two-way public road access is public road access from a lot in at least two different directions to two suitable destinations, and provides residents and the community, as well as emergency services, with access and egress from both the subdivision and individual habitable buildings/development in the event of a bushfire emergency. A single road provides no alternative route if the access becomes congested or is unable to be traversed due to smoke and/or fallen trees during a bushfire.

Two-way public road access applies to access/egress routes leading into a subdivision, as well as those within a subdivision. A road that loops back onto itself does not constitute the option of two different directions.

Two-way public road access should always be the first option. Where the site is not able to achieve two-way access within 200 metres of the lot boundary, due to demonstrated site or environmental constraints, the proponent should identify options for an emergency access way from the subject site to a suitable destination. Where an emergency access way cannot be provided, the proponent should demonstrate compliance with the performance principle.

Subject sites or proposed lots greater than 200 metres from an intersection, which provides two-way access, do not satisfy the requirement for two-way access unless they meet the provisions which allow for no-through roads greater than 200 metres in A3.2a.

To demonstrate compliance with the performance principle for two-way access, the bushfire planning practitioner may have regard to:

a. the extent of the bushfire hazard, location and vegetation classification, the likelihood, potential severity and impact of bushfire to the subject site and the road network;
b. time between fire detection and the onset of conditions in comparison to travel time for the community to evacuate to a suitable destination;
c. available access route(s) travelling towards a suitable destination; and
d. turn-around area for a fire appliance for no-through roads.

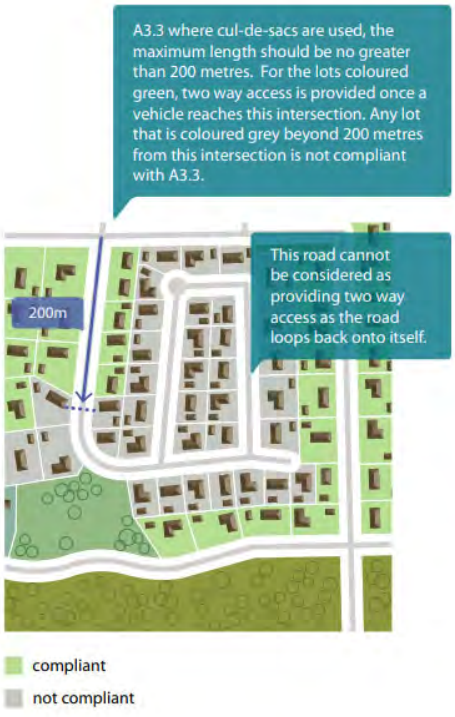


Figure 21: Example of compliant and non-compliant two-way

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

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

Acceptable Solution A3.3 – Through roads

Explanatory Note E3.3

In bushfire prone areas, a proposed structure plan or subdivision that incorporates no-through roads should be avoided because they do not provide a connected and legible design that allows for easy access and egress by the community, residents and emergency services in the event of a bushfire. No-through roads also reduce the options available for access and egress in the event of a bushfire emergency.

There will however be situations where a subject site is accessed via an existing or proposed no-through road and alternative access cannot be provided. In these situations, the proponent should demonstrate to the decision-maker, that all efforts have been made with the local government and/or adjoining landowners to secure alternative public road access or an emergency access way and that a redesign has been explored. The bushfire planning practitioner may need to develop a performance principle-based solution or address the non-compliance and demonstrate to the decisionmaker why discretion should be exercised in accordance with section 2.6 of these Guidelines.

No-through roads will only be considered an acceptable solution where it is demonstrated by the proponent, to the satisfaction of the decision maker, that a no through-road cannot be avoided due to site constraints. For example, the internal road design of a structure plan or subdivision where site constraints, such as a water body or Bush Forever, prevent the ability to create a through-road and a no through road may be a more appropriate road layout.

No-through roads should be a maximum of 200 metres from the lot(s) boundary to an intersection where two-way access is provided and may only exceed 200 metres if it meets the provisions which allow for no-through roads greater than 200 metres in A3.2a.

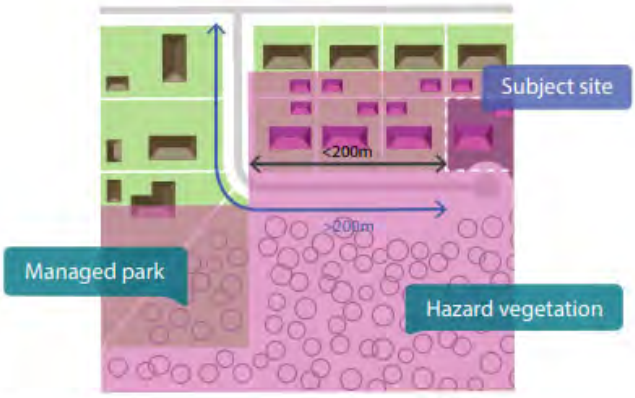


Figure 23: Example of a site on a no-through road greater than 200 metres from the intersection, but within 200 metres of BAL-LOW

Acceptable Solution A3.3 – Through roads

Explanatory Note E3.3

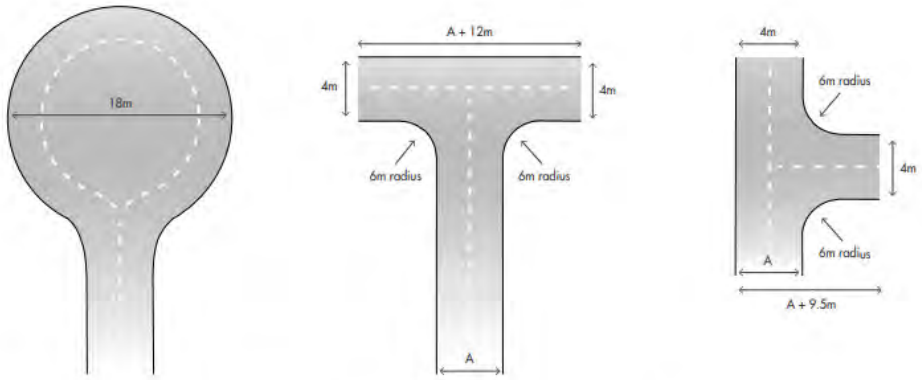


Figure 24: Turn-around area dimensions for a no-through road

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

Acceptable Solution A3.4a – Perimeter roads

Explanatory Note E3.4a

Where a planning proposal includes the creation of 10 or more lots adjacent to each other, which adjoin classified vegetation under AS 3959 with the exception of Class G Grassland, as part of a greenfield development or large urban infill site, hazard separation and defendable space should be provided in the form of a perimeter road. Greenfield is 'undeveloped or minimally developed areas that have been identified for urban development'; and urban infill is 'the redevelopment of existing urban areas at a higher density than currently exists'. The creation of 10 or more lots includes cumulative subdivision applications where the subdivision application may be part of a staged subdivision.

A perimeter road should be in accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards and/or any applicable standard in the local government area as per the requirements of a public road in Table 6, Column 1.

As the road is likely to function as a key neighbourhood distributor, or similar, consideration should be given to the provision of additional width to allow for emergency services vehicles to stop and operate on the side of the perimeter road, whilst simultaneously proving for the evacuation of the community (Figure 20).

When designing a strategic planning proposal and/or subdivision, creating a large setback between classified vegetation and proposed lots with a perimeter road, and orientating habitable buildings to front onto (rather than back onto) areas of vegetation has many benefits, including:

- passive surveillance;
- defendable space for firefighting and emergency management purposes;
- reducing the potential radiant heat that may impact a habitable building in a bushfire event;
- reducing the need for battle-axe lots; and
- unconstrained public access/egress for the community in the event of a bushfire.

In developments where no perimeter road exists, property defence in a bushfire event is difficult and can be impossible. Where proposed lots have frontage to an existing public road and abut the hazard at the rear or side, it may be an undesirable planning outcome to create lots which front the existing public road

Acceptable Solution A3.4a – Perimeter roads
Explanatory Note E3.4a
and back onto a perimeter road. In this instance, consideration should be given to a fire service access route. Refer to E3.4b below.

Figure 25: Example of a perimeter road

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

Acceptable Solution A3.4b – Fire service access route

Explanatory Note E3.4b

Where a subdivision adjoins classified vegetation and where A3.2a has been satisfied, hazard separation and defendable space across multiple lots may be required in the form of a fire service access route.

A fire service access route is not intended to provide residents and the general public with emergency egress and therefore is not a suitable second access or substitute for a public road. A fire service access route is to provide access for emergency services to classified vegetation for firefighting and fire management purposes.

A fire service access route can be provided as either an easement in gross over private or Crown land, or ceded to the Crown as a reserve. In both approaches, the management of the fire service access route is by the local government as the grantee of the easement or management body of the reserve. Determining which approach to take is dependent on what the intended tenure of the fire service access route is, which is explained further below. The proponent must obtain written consent from the local government that the local government will accept care, control and management of the easement or reserve and agree to the terms of the Management Order Conditions (if applicable); this must be provided to the decision-maker prior to granting planning approval. The approach taken is at the discretion of the decision-maker and/or the local government. Consultation with Land Use Management at the Department of Planning, Lands and Heritage should also be considered if the land is to be ceded to the Crown or if the local government is uncertain of which approach to take.

Figure 26: Example of a fire service access route

Acceptable Solution A3.4b – Fire service access route
Explanatory Note E3.4b
Where gates are used, these should be double gates wide enough to access the full required horizontal clearance and accommodate type 3.4 fire appliances with the design and construction to be approved by the relevant local government. Gates on fire service access routes may be locked to restrict access, provided a common key system is used, and such keys are made available for emergency services and designated fire officers within the local government area and/or surrounding district. Gates should be installed where fences cross fire service access routes. If an easement in gross is proposed, such arrangements for gates should be included in the deed of easement and be agreed to by the local government. **Fire service access route to remain in private ownership of multiple landowners** Where a fire service access route is proposed to traverse multiple private lots and they are intended to remain in the private ownership of the multiple landowners, it should be provided as an easement in gross under section 196 of the Land Administration Act 1997, to ensure accessibility for fire emergency services and not for use by the public. The easement is to be granted to the local government and/or public authority for firefighting and emergency management purposes. **Fire service access route to be created under State ownership** Where a fire service access route is proposed to traverse multiple private lots, but the decision-maker and/or local government prefer for the fire service access route to remain in one ownership under the State for management purposes, the fire service access route can be vested in the Crown under section 152 of the Planning and Development Act 2005 as a reserve, such land to be ceded free of cost without any payment or compensation by the Crown. The purpose of the reserve should be for a public purpose specified in the condition related to the subdivision, for example for vehicular access for emergency services and the local government only, or for vehicular access for emergency services and the local government and recreation. A reserve for emergency services access and recreation can optimise the land-use as a dual purpose, where it provides vehicular access for emergency services, but can be accessed by the public (on foot) on a day-to-day basis as a recreation link. Appropriate signage will ensure the general public is aware of the purpose of the reserve. The approach taken is at the discretion of the decision-maker and/or local government.

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

Technical requirement	1	2	3	4
	Public road	Emergency access way[1]	Fire service access route[1]	Battle-axe and private driveways[2]
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (m)	N/A	6	6	6
Minimum vertical clearance (m)	4.5	4.5	4.5	4.5
Minimum weight capacity (t)	15	15	15	15
Maximum grade unsealed road[3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%, 6°)	1:10 (10%, 6°)	1:10 (10%, 6°)
Maximum grade sealed road[3]		1:7 (14.3%, 8°)	1:7 (14.3%, 8°)	1:7 (14.3%, 8°)
Maximum average grade sealed road		1:10 (10%, 6°)	1:10 (10%, 6°)	1:10 (10%, 6°)
Minimum inner radius of road curves (m)		8.5	8.5	8.5

[1] To have crossfalls between 3 and 6%

[2] 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

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

Appendix E City of Wanneroo Firebreak Notice

City of Wanneroo

IMPORTANT
FIRE MITIGATION NOTICE

Fire mitigation measures must be in place by 1 NOVEMBER and maintained until 30 APRIL EACH YEAR.

This is a requirement under the Bush Fires Act 1954 Section 33.

Failure to comply with this Notice may incur penalties of up to $5,000 and the works required by this Notice will be carried out at the expense of the owner/occupier.

Fire management requirements for land LESS than 4000sqm

- Maintain grasses and inflammable materials with the exception of living trees on the entire property to a height of no more than 50 millimetres. The entire property is required to be maintained below 50 millimetres from 1 November each year until 30 April the following year.

  OR

- A 3 metre wide trafficable firebreak as close as possible to all external boundaries of the property must be installed by 1 November each year and maintained until 30 April the following year.
  - If it is not possible to install the firebreak adjacent to the external boundary of the property due to naturally occurring obstacles, it is acceptable to install the firebreak around the obstacle. If this requires the firebreak to be greater than 5 metres away from the external boundary, a firebreak variation is required.
  - Ensure a minimum vertical clearance of 4 metres is maintained along the firebreaks to enable vehicles to drive along the firebreaks without access being obstructed.
- 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.

Fire management requirements for land GREATER than 4000sqm

- A 3 metre wide trafficable firebreak as close as possible to all external boundaries of the property must be installed by 1 November each year and maintained until 30 April the following year.
  - If it is not possible to install the firebreak adjacent to the external boundary of the property due to naturally occurring obstacles, it is acceptable to install the firebreak around the obstacle. If this requires the firebreak to be greater than 5 metres away from the external boundary, a firebreak variation is required.
  - Ensure a minimum vertical clearance of 4 metres is maintained along the firebreaks to enable vehicles to drive along the firebreaks without access being obstructed.
- Install and maintain a 20 metre bare earth area around all hay stacks and/or fuel dumps.
- 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.

Important Fire Mitigation Notice

All vacant land GREATER than 4000sqm

- A 3 metre wide trafficable firebreak as close as possible to all external boundaries of the property must be installed by 1 November each year and maintained until 30 April the following year.
- Ensure a minimum vertical clearance of 4 metres is maintained along the firebreaks to ensure vehicles can drive along the firebreaks without being impeded by tree branches.
- If the land is an area of 50,000sqm (5 hectares) or greater, the grass must be maintained on the land to a height no greater than 50 millimetres for a distance of 10 metres from any firebreak.

Frequently asked questions

I live in a residential area, does this notice apply to me?

Yes. All City of Wanneroo property owners must comply with the Bush Fires Act 1954.

Please refer overleaf for fire management requirements to be in place by 1 November to ensure your property is compliant.

Most properties under 1000sqm will automatically comply if gardens are maintained.

How will inspections be carried out?

Inspections will be carried out by trained Fire Control Officers who are authorised to enter a property by foot, vehicle, quad bike and /or drone.

Do I need a Bushfire Survival Plan?

If you live in, on or near bushland, you are at risk from a bushfire and developing a bushfire survival plan is critical.

Visit the Department of Fire and Emergency Services website for information on how to develop a plan for your property **dfes.wa.gov.au**

I am concerned my neighbour's property is not compliant, what can I do?

All properties are required to be compliant by 1 November.

If you think your neighbour's property does not comply with the requirements as outlined in this Notice, please contact the Community Safety and Emergency Management team on **9405 5000**.

I own a vacant lot, do I need a firebreak?

Yes. A 3 metre wide trafficable firebreak as close as possible to all external boundaries of the property must be installed by 1 November each year and maintained until 30 April the following year.

I am unable to meet the requirements outlined, what should I do?

If it is considered impracticable for any reason to implement any of the requirements of this Notice, an application for a firebreak variation must be made to the City of Wanneroo by no later than 18 October of each year.

If permission is not granted, the requirements of this Notice must be complied with.

Visit the City's website **wanneroo.wa.gov.au/firebreakvariation** to apply for a variation.

Where can I learn more about this Notice and bushfire management?

Visit the City's website **wanneroo.wa.gov.au/fireinformation** to learn more.

Please note, in addition to the requirements of this Notice, if a City of Wanneroo Fire Control Officer considers further works are necessary to reduce the risk of bushfire, Landowners will be notified via letter to the address shown on the City of Wanneroo rates record for the relevant land.

For further information call the City of Wanneroo Community Safety and Emergency Management Team on **9405 5000** or visit **wanneroo.wa.gov.au/fireinformation**

000 EMERGENCY

TO REPORT ALL FIRES CALL 000