Bushfire Management Plan

Proposed Subdivision

Lot 9193 Joseph Banks Boulevard
Banksia Grove

City of Wanneroo

bushfiresafety CONSULTING
Science. Culture. Solutions.

Prepared For:
LWP Group Pty Ltd
10 March 2021
Version 4.0

bushfiresafetyconsulting.com.au

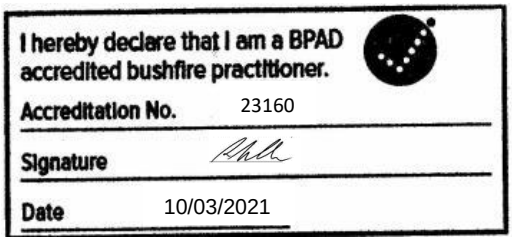
Document Information

Prepared for: LWP Group Pty Ltd

Project Name: Residential Subdivision

Site Address: Lot 9193 Joseph Banks Boulevard, Banksia Grove

Prepared by: Bushfire Safety Consulting Pty Ltd



Document Control

Bushfire Management Plan – Lot 9193 Joseph Banks Boulevard, Banksia Grove			
REPORT VERSION	**PURPOSE**	**AUTHOR/REVIEWER AND ACCREDITATION DETAILS**	**DATE SUBMITTED**
V1	Draft for Review	Dr Karen Brown (Level 1 BPAD 48364) Rohan Carboon (Level 3 BPAD 32160)	15/09/2020
V2	Amended for Submission	Rohan Carboon (Level 3 BPAD 32160)	25/9/2020
V3	Submission to DPLH	Rohan Carboon (Level 3 BPAD 32160)	11/02/2021
V4	Final Submission	Rohan Carboon (Level 3 BPAD 32160)	10/03/2021

Front cover photo: Proposed Subdivision

Bushfire Safety Consulting Pty Ltd
PO Box 84
STONEVILLE WA 6081

Tel: 0429 949 262
Email: hello@bushfiresafetyconsulting.com.au
Web: www.bushfiresafetyconsulting.com.au

EXECUTIVE SUMMARY

This Bushfire Management Plan (BMP) has been prepared to support a Scheme Amendment, LSP Amendment and future subdivision application for 23 lots at Lot 9193 Joseph Banks Boulevard, Banksia Grove. A subdivision approval has been issued over the subject area (and remains valid) for 5000m² lots. This BMP also updates a previously prepared plan by consultants Bushfire West and responds to feedback received from both DFES and DPLH.

An existing residential development occurs to the north and east of the site, with an operating market garden present to the north-west. Remnant native vegetation containing Class A Forest is present on rural residential lots adjoining the site to the west, and small areas of remnant vegetation exist to the south and south-east.

The area is reticulated and there is good vehicular access from the site with a public road adjacent to each lot and on the north and east interface of the site. Three lots are accessed via a short 50 metre section of Harden Park Trail to the south and a cul-de-sac head is provided for fire appliances to turn around.

A method 1 and method 2 BAL assessment has been undertaken to determine predicted radiant heat flux levels into the site, with results demonstrating no future dwellings will be exposed to predicted radiant heat flux levels exceeding 29kW/m² once the APZ has been established over the entire site and setback distances from lot boundaries are observed. Non habitable structures can be sited outside of the BAL-29 contour and will still be subject to AS3959 bushfire construction standards if required under the Building Code of Australia.

The proposed subdivision can achieve all of the Acceptable Solutions and Performance Principles in the Guidelines for Planning in Bushfire Prone Areas V1.3 (2017).

The developer is responsible for establishing and maintaining the Asset Protection Zone until lots are sold. Fuel loads and responsibility for APZ standards then transfers to the new owners / occupiers of the land.

It is expected that the implementation of this BMP will reduce the threat to residents, the public and fire fighters in the area addressed by this BMP. The proposal complies with the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)* and the *Guidelines for Planning in Bushfire Prone Areas* (WAPC 2017 V1.3).

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

TABLE OF APPENDICES

1 PROPOSAL DETAILS

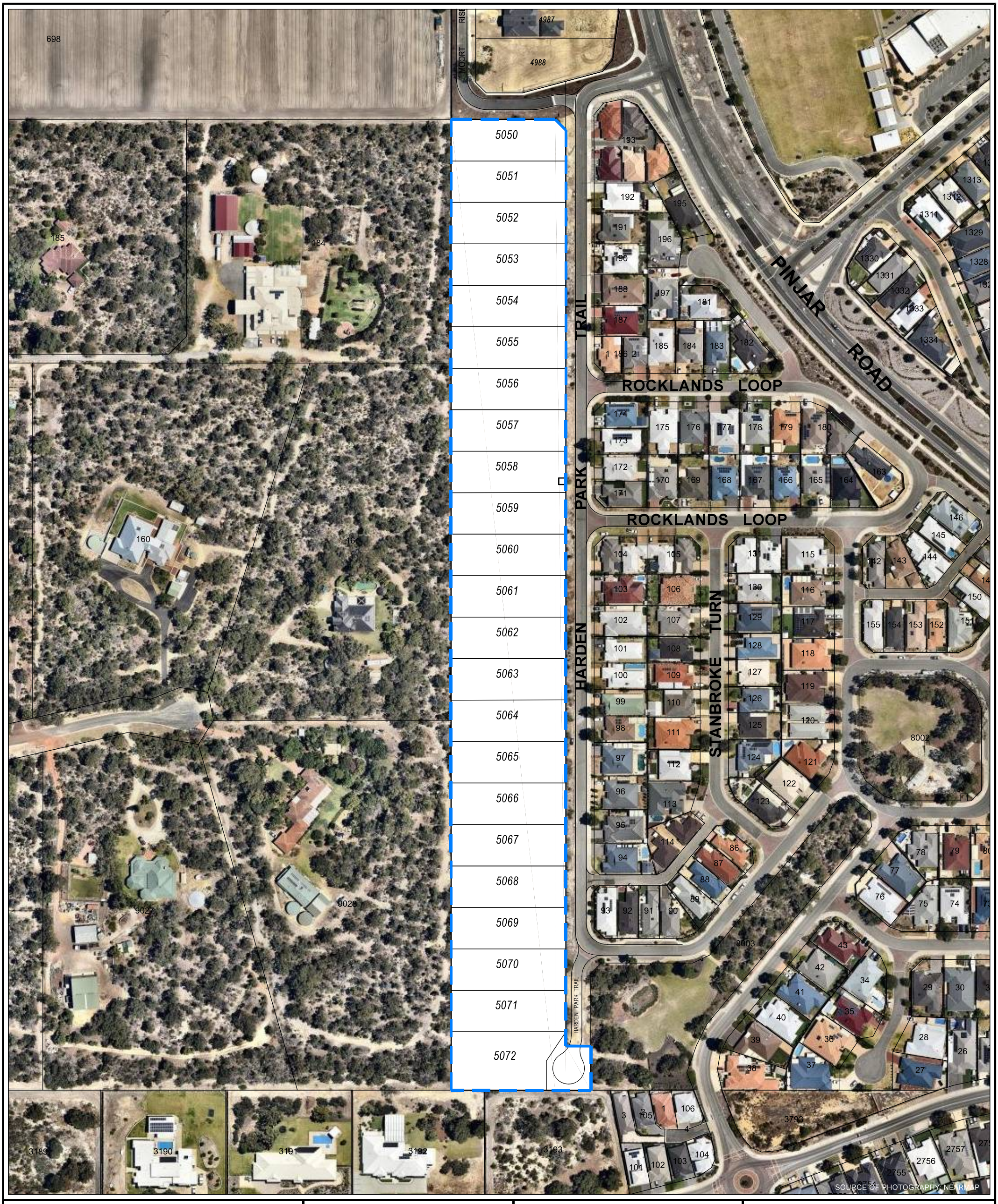
This Bushfire Management Plan (BMP) has been prepared to support to support a Scheme Amendment, LSP Amendment and future subdivision application for 23 lots at Lot 9193 Joseph Banks Boulevard, Banksia Grove (herein referred to as 'the site'). A subdivision approval has been issued over the subject area (and remains valid) for 5000m² lots.

The proposal is to subdivide the site into 23 residential lots, with one lot approximately 2500m^2 in size and the remaining 1500m^2 (Figure 1). The site is located approximately 4 kilometres north-east of Joondalup, and approximately 30 kilometres north-north-west of the Perth Central Business District (CBD). The lot is approximately 67 hectares in size, and is adjacent to rural residential lots contain remnant native vegetation to the west and south, operating market garden to the north-west, and existing urban residential development to the north, east and south (Figure 2). An area of Public Open Space (POS) exists to the south-east of the site.

The site is zoned Special Residential' under the City of Wanneroo District Planning Scheme No.2 (DPS2).

This Bushfire Management Plan (BMP) addresses future subdivision conditions by providing responses to the performance criteria in the *Guidelines for Planning in Bushfire Prone Areas* V1.3 (WAPC et.al. 2017).

If there is a bushfire within or near the site, implementing this BMP will reduce the threat to residents, property and emergency response personnel.



Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2022
Date aerial photo:	December 2020

FIGURE 1
SUBDIVISION PROPOSAL

0 20 40 60 80m

SCALE 1:2000 @ A3

DATE: FEBRUARY 2021

NORTH

LEGEND

SUBJECT LAND

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafetyconsulting.com.au

Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accreditation expiry date:	31st January 2021
Date aerial photo:	December 2020

FIGURE 2
SITE LOCATION

SCALE 1:10 000 @ A4
DATE: AUGUST 2020

LEGEND:
SUBJECT LAND

SOURCE OF PHOTOGRAPHY: NEARMAP

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net

1.1 Policy and Guidelines

1.1.1 Application of SPP 3.7

The *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)* provides the foundation for land use planning to address bushfire risk management in Western Australia. It is used to inform and guide decision makers, referral agencies and land owners / proponents to help achieve acceptable bushfire protection outcomes.

The policy contains objectives and policy measures, as well as reference to the bushfire protection criteria as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 V1.3; the Guidelines). The policy applies to this scheme amendment and subdivision proposal because the subdivision application is located in the designated Bushfire Prone Area on the WA Map of Bushfire Prone Areas (Figure 3).

The following policy measures will need to comply with SPP 3.7:

Table 1. Policy measures

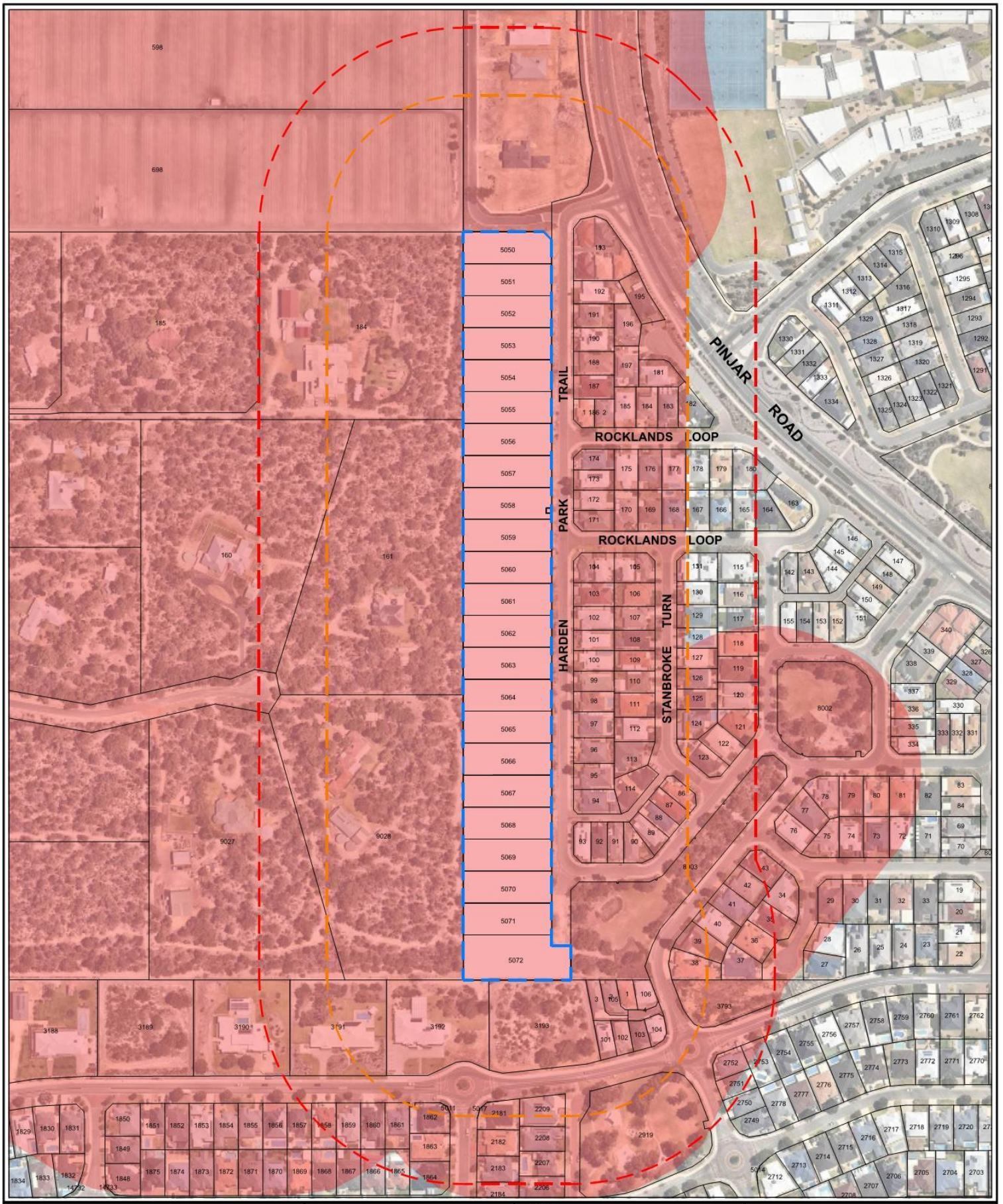
Policy Measure 6.2	The subdivision application is located within a designated bushfire prone area and will have a Bushfire Hazard Level above low and a Bushfire Attack Level rating above BAL-LOW.
Policy Measure 6.4	Policy 6.4 applies meaning the subdivision proposal will be accompanied by: - BAL Contour Plan - Lot specific BAL ratings - Identification of relevant issues; and - Demonstration of compliance with the guidelines

The subdivision proposal does not propose vulnerable or high-risk land use and is not considered as minor or unavoidable development under *SPP 3.7.*

1.1.2 Guidelines for Planning in Bushfire Prone Areas V1.3 (2017)

The Department of Planning have released the *Guidelines for Planning in Bushfire Prone Areas V1.3 (2017).* The requirements of this document are accommodated within this BMP.

The *Guidelines for Planning in Bushfire Prone Areas V 1.3(2017)* is intended to inform and guide decision makers, referral authorities and proponents to achieve acceptable bushfire protection outcomes, including expectations at the different stages of planning.



Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2021
Date aerial photo:	December 2020

FIGURE 3
BUSHFIRE PRONE AREAS

0 20 40 60 80 100m

NOT TO SCALE @ A3
DATE: AUGUST 2020

NORTH

LEGEND

- SUBJECT LAND
- ASSESSMENT AREA (150m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- ASSESSMENT AREA (100m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- BUSHFIRE PRONE AREAS

SOURCE OF PHOTOGRAPHY: NEARMAP

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net

2 ENVIRONMENTAL CONSIDERATIONS

2.1 Native Vegetation – Modification and Clearing

Some on-site modification of native vegetation is required to achieve APZ standards (low threat vegetation), however clearing is permitted for these purposes once the subdivision is approved.

2.2 Re-vegetation/Landscape Plans

There are no revegetation or landscaping plans for the proposed subdivision.

3 BUSHFIRE ASSESSMENT RESULTS

Bushfires are common in the City of Wanneroo and local brigades respond to numerous bushfires in the district annually. Given the bushfire threat in the area this BMP plays a critical role in ensuring that the development of the land appropriately mitigates the risk from bushfire.

3.1 Assessment Inputs

The methodology used to assess the site is outlined in the *Guidelines for Planning in Bushfire Prone Areas V1.3 (2017).* The lot layout is known and a strategic level bushfire hazard assessment is not required. A BAL Contour map is provided in accordance with Appendix 3 of the guidelines.

Assessing bushfire threat at the site-specific level accounts for the predominant class of vegetation on the site and surrounding area for a minimum of 150m, as shown in **Figure 4**.

3.1.1 Vegetation Classification

The site currently contains native vegetation that will be modified to a low threat condition. The area immediately north and east of the site is predominately cleared for urban residential development. Remnant forest vegetation exists on rural residential lots to the west, with small patches of remnant woodland vegetation remaining to the south of the site. Small areas of Class A forest are present in a POS to the south-east of the site (**Figure 4**).

The vegetation plots on and surrounding the site and within 150 metres of the site boundary are found in Figure 4 with plot descriptions below.

Photo ID: 1 **Plot Number:** 1 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	
Photo ID: 2 **Plot Number:** 1 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	
Photo ID: 3 **Plot Number:** 1 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	

Photo ID: 4 **Plot Number:** 2 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	
Photo ID: 5 **Plot Number:** 2 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	
Photo ID: 6 **Plot Number:** 2 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	

Photo ID: 7 **Plot Number:** 2 **Vegetation classification or exclusion clause:** Class A Forest **Description/justification of classification**: Banksia and Allocasuarina trees to 10 metres tall with canopy cover 30 to 70%. Understorey consists of large and small shrubs with Xanthorrhoea, groundcovers and grasses.	
Photo ID: 8 **Plot Number:** 3 **Vegetation classification or exclusion clause:** Class G Grassland **Description/justification of classification**: Grasses and sedges to 0.5m tall. Class A Forest in background of photo.	
Photo ID: 9 **Plot Number:** 3 **Vegetation classification or exclusion clause:** Class G Grassland **Description/justification of classification**: Grasses and sedges to 0.5m tall. Class A Forest in background of photo.	

Photo ID: 10 **Plot Number:** 4 **Vegetation classification or exclusion clause:** Class B Woodland **Description/justification of classification:** Eucalypt trees to 15 metres high with canopy cover 10 to 30%. Understorey consists of large and small shrubs, Xanthorrhoea and grasses.	
Photo ID: 11 **Plot Number:** 4 **Vegetation classification or exclusion clause:** Class B Woodland **Description/justification of classification:** Eucalypt trees to 15 metres high with canopy cover 10 to 30%. Understorey consists of large and small shrubs, Xanthorrhoea and grasses.	
Photo ID: 12 **Plot Number:** 4 **Vegetation classification or exclusion clause:** Class B Woodland **Description/justification of classification:** Eucalypt trees to 15 metres high with canopy cover 10 to 30%. Understorey consists of large and small shrubs, Xanthorrhoea and grasses.	

Photo ID: 13 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including maintained turf and cultivated garden beds in managed Public Open Space.	
Photo ID: 14 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including maintained turf and cultivated garden beds in managed Public Open Space.	
Photo ID: 15 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including maintained turf.	

Photo ID: 16 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including maintained turf and cultivated garden beds.	
Photo ID: 17 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including maintained turf in managed Public Open Space.	
Photo ID: 18 **Plot Number:** 5 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Low threat vegetation including cultivated market gardens.	

Photo ID: 19 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (e) **Description/justification of classification**: Non-vegetated areas including cleared mineral earth.	
Photo ID: 20 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (e) **Description/justification of classification**: Non-vegetated areas including cleared mineral earth on firebreak.	
Photo ID: 21 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (e) **Description/justification of classification**: Predominately non-vegetated areas including roads, footpaths and buildings.	

Photo ID: 22 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (e) **Description/justification of classification**: Predominately non-vegetated areas including roads, footpaths and buildings.	
Photo ID: 23 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (c) **Description/justification of classification**: Area of shrubland and grassland smaller than 0.25 hectares and greater than 20 metres from the site or other areas of classified vegetation.	
Photo ID: 24 **Plot Number:** 6 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (c) **Description/justification of classification**: Area of shrubland and grassland smaller than 0.25 hectares and greater than 20 metres from the site or other areas of classified vegetation.	

Photo ID: 25 **Plot Number:** 7 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Subdivision site to be modified to low threat condition.	
Photo ID: 26 **Plot Number:** 7 **Vegetation classification or exclusion clause:** Exclusion Clause 2.2.3.2 (f) **Description/justification of classification:** Subdivision site to be modified to low threat condition.	

3.1.2 Effective Slope

The site slopes gently from the north to the south with a gentle downslope of 4 degrees under classified vegetation to the north-west, and flat to the south-west and south of the site. The topography and effective slope are outlined in **Figure 4**.

Table 2. Summary of vegetation type and effective slope

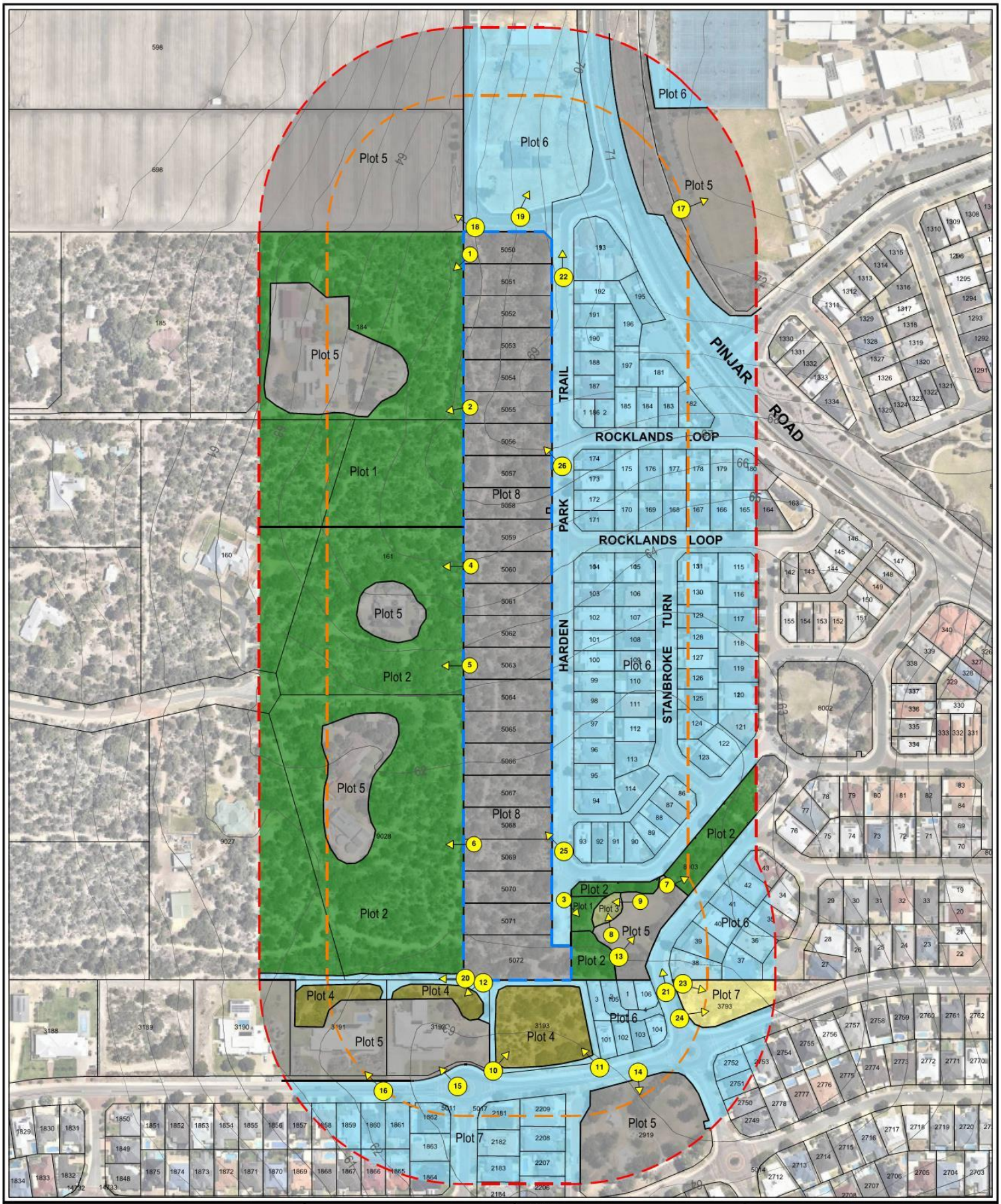
Vegetation Area/ Plot	Applied Vegetation Classification	Effective Slope under the Classified Vegetation (degrees)
1	Class A Forest	Downslope 0 to 5
2	Class A Forest	Flat/ Upslope
3	Class B Woodland	Flat/ Upslope
4	Class G Grassland	Flat/ Upslope
5	Exclusion Clause 2.2.3.2 (f)	N/A
6	Exclusion Clause 2.2.3.2 (e)	N/A
7	Exclusion Clause 2.2.3.2 (c)	N/A
8	Exclusion Clause 2.2.3.2 (f)	N/A

3.2 Assessment Outputs

A BAL contour assessment was undertaken according to Appendix 3 of the Guidelines and the results are found in Table 3 and Figure 5. A Method 1 and Method 2 BAL Assessment was undertaken to determine the BAL contours impacting the site. The method 2 BAL Assessment is comprehensively outlined in Appendix 4.

Table 3. Summary of assessment outputs

Lot	Applied Vegetation Classification	Plot No. & Effective slope (Degrees)	Separation Distance to Classified Vegetation	Highest BAL Contour
5050	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5051	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5052	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5053,	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5054	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5055	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5056	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5057	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5058	West – Class A Forest	Plot 1 – Downslope 0 to 5	24.5m internal lot setback	BAL – 29
5059	West – Class A Forest	Plot 2 – Flat/ Upslope	24.5m internal lot setback	BAL – 29
5065	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5061	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5062	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5063	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5064	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5065	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5066	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5067	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5068	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5069	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
5070	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
	East – Class A Forest	Plot 1 – Downslope 0 to 5	27m (13m internal lot setback)	BAL – 29
5071	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
	East – Class A Forest	Plot 1 – Downslope 0 to 5	27m (13m internal lot setback)	BAL – 29
5072	West – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29
	East – Class A Forest	Plot 2 – Flat/ Upslope	21m internal lot setback	BAL – 29



Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2021
Date aerial photo:	December 2020

FIGURE 4 - VEGETATION CLASSIFICATION MAP (BAL CONTOUR MAP)

0 20 40 60 80 100m

NOT TO SCALE @ A3
DATE: AUGUST 2020

NORTH

LEGEND

- SUBJECT LAND
- ASSESSMENT AREA (150m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- ASSESSMENT AREA (100m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- PLOTS 1 & 2 - CLASS A FOREST
- PLOT 3 - CLASS G GRASSLAND
- PLOT 4 - CLASS B WOODLAND
- PLOT 5 - EXCLUSION CLAUSE 2.2.3.2(f)
- PLOT 6 - EXCLUSION CLAUSE 2.2.3.2(e)
- PLOT 7 - EXCLUSION CLAUSE 2.2.3.2(c)
- PLOT 8 - SUBDIVISION AREA TO BE MODIFIED TO EXCLUSION CLAUSE 2.2.3.2(f)

SOURCE OF PHOTOGRAPHY: NEARMAP

PHOTO LOCATION & DIRECTION

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

The Class A Forest vegetation to the west and south- east of the site, as well as the areas of Class B Woodland to the south, pose the greatest threat to the subdivision because these areas of classified vegetation within 100 metres of the site are permanent and will remain upon completion of development in the area. Predicted radiant heat flux levels impact the predicted lots, with all future dwellings exposed to BAL-29 or lower when the APZ is established and internal lot setbacks are observed.

Fire appliance access is provided on the public road system, future dwellings will be entirely sited between 10-45 metres from the public road reserve where fire fighters can safely undertake defensive tasks at the rural urban interface.

Predicted radiant heat flux levels and ember attack could impact the site as evident in the BAL Contour Plan (**Figure 5**).

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA

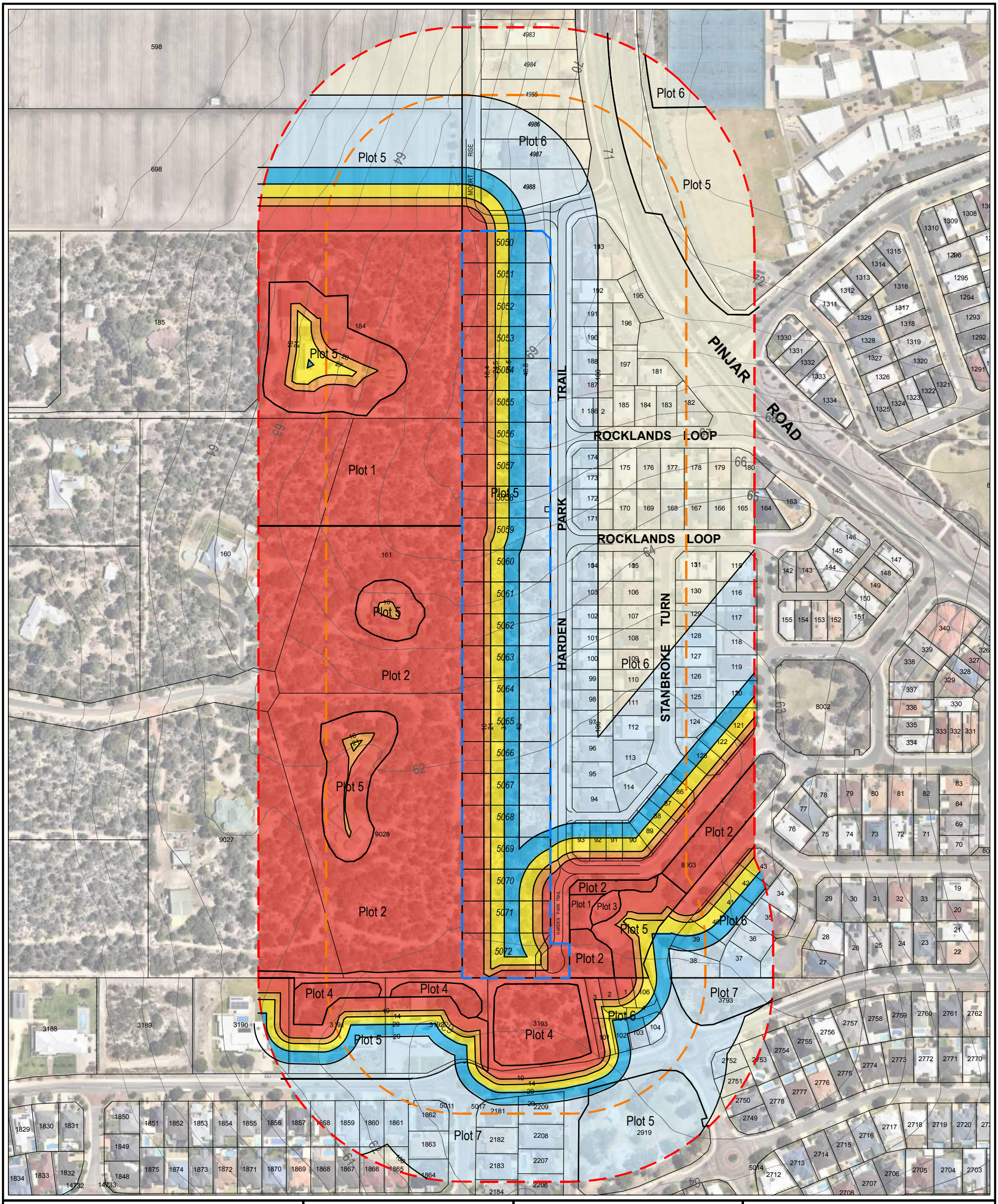
This report adopts an acceptable solution based system of control for each bushfire protection criteria. This methodology is consistent with Appendix 4 of the *Guidelines for Planning in Bushfire Prone Areas, Version 1.3 (2017).* The management issues are:

- Location of the Development.
- Siting and Design of Development.
- Vehicular access.
- Water.

Acceptable solutions are proposed for all of the bushfire protection criteria and each illustrates a means of satisfactorily meeting the corresponding performance criteria.

5.1 Compliance Table

Land use planning bushfire risk mitigation strategies are comprehensively detailed in the following sections by providing responses to the performance criteria that fulfil the intent of the bushfire hazard management issues outlined in the *Guidelines for Planning in Bushfire Prone Areas V1.3(2017).* The compliance checklist is shown in **Table 4**.



Location details:	Lot 9202 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2021
Date aerial photo:	December 2020

FIGURE 5
BAL CONTOUR MAP

0 20 40 60 80 100m

NOT TO SCALE @ A3
DATE: FEBRUARY 2021

NORTH

INDICATIVE BUSHFIRE ATTACK LEVELS

- BAL LOW
- BAL 12.5
- BAL 19
- BAL 29
- BAL 40
- BAL FLAME ZONE

SOURCE OF PHOTOGRAPHY: NEARMAP

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafetyconsulting.com.au

Table 4: Compliance Table

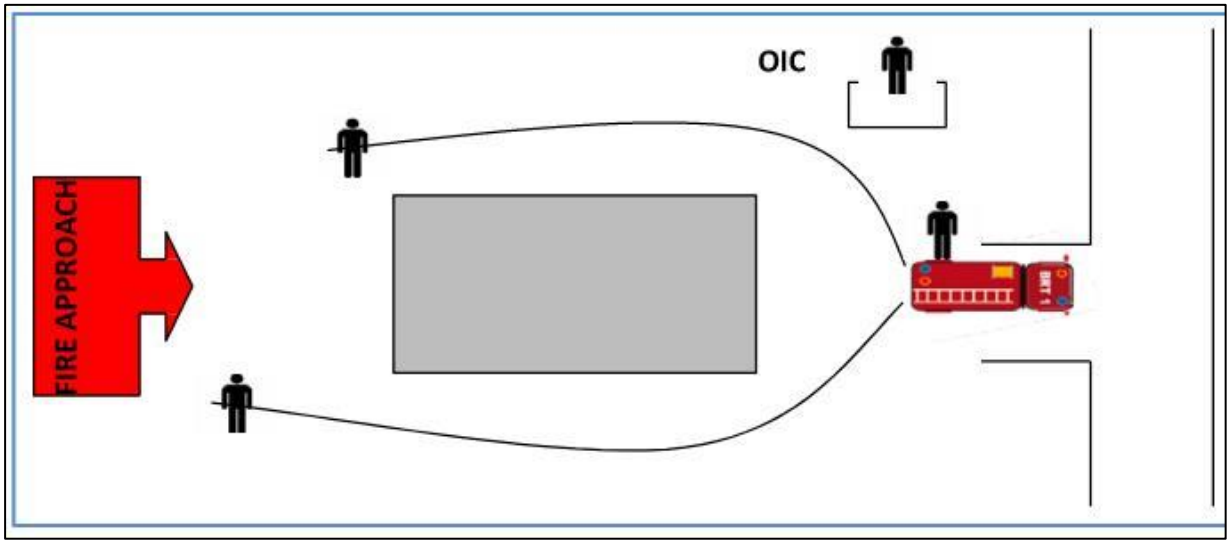
Bushfire Protection Criteria	Method of compliance Acceptable Solutions	Proposed bushfire management strategies
Element 1: Location	AQ1.1 Development Location	The Method 1 and Method 2 (Appendix 4) BAL Assessment in this report demonstrates that radiant heat flux associated with classified vegetation to the west and south does impact the future building envelopes at the site and future dwellings will not exceed BAL-29 when internal lot setbacks are established. A set back of 24.5 metres from the western boundary of lots 5050 to 5059, with a setback distance of 21 metres for lots 5060 to 5072, ensures future dwellings are exposed to radiant heat flux from vegetation to the west that is 29 kw/m^2 or lower (BAL-29). An additional 13 metre set back for lots 5075 and 5071, and 21 metre setback for lot 5072, is required from the eastern boundary and a 10 metre setback is required from the southern boundary for lot 5072 (see Figure 6).
Element 2: siting and Design	A2.1 Asset Protection Zone (APZ)	The Asset Protection Zones (APZ) will be established by the developer and occupy all proposed residential lots. Future dwellings constructed on the lots will be exposed to BAL-29 or lower if APZ and setback conditions are met, as confirmed by the Method 1 BAL assessment. The APZ will be managed in accordance with the requirements of the standards in Appendix 1. Non habitable structures can be sited outside of the BAL-29 contour and will still be subject to AS3959 bushfire construction standards if required under the Building Code of Australia.
Element 3: Vehicular Access	A3.1 Two access routes	All the lots at the site will have direct driveway access to Harden Park Trail which provides access to Pinjar Road to the north, and via Rocklands Loop and Wallcliffe Gate in the east and south-east. Pinjar Road provides good egress to a minimum of two destinations to the north and south-east (see Figure 6).
	A3.2 Public Road	All proposed public roads within and surrounding the site comply with minimum public road standards outlined in Appendix 2.
	A3.3 Cul-de-sac	There is a 50 metre section of Harden Park Trail near the south of the site leading to lots 5070 to 5072. This public road terminates here in a compliant cul-de-sac head for fire appliances.
	A3.4 Battle-axe	There are no battle axes proposed.
	A3.5 Private driveway longer than 50 m	There are no private driveways longer than 50m proposed.
	A3.6 Emergency Access Way	There are no Emergency Access Ways proposed.

Element 3: Vehicular Access (cont)	A3.7 Fire Service Access Ways	There are no Fire Service Access Ways proposed, as outlined below in section 5.2 Fire Appliances are encouraged to park on the lee side of an approaching fire front and conduct fire suppression and building defence strategies from this safer location. Fire Appliances do not park and defend homes between assets and an approaching fire fronts, Appliances park where its safe to operate and safe exits exist. This is outlined in the DFES SOP 3.5.9 and practiced by brigades. No part of any dwelling is constructed more than 45 metres from the public road allowing fire hoses to access the rear of properties from the public road. The proposed lots are coded R10 and require side boundary setbacks to be provided for each side boundary. These will vary between a minimum of 1m and 1.5m subject to the length of wall, and if the wall includes major openings. Dwellings will not be built to the boundary further providing fire fighter access to the rear of properties. A FSAR is not required to increase defendable space at the rear of each lot as each lot has an overlapping APZ and defendable space is achieved. Direct head fire attack does occur when fire behaviour is of a lower intensity and flame heights are approximately 1-2 metres in height. Direct access to the fire front is beneficial on these fire suppression operations and access can be obtained from the rural residential properties west of the site on the firebreak network on each lot perimeter. On westerly wind driven fires towards the site, this would have the beneficial positioning of firefighting from behind the front which is safer for fire fighters. Dwellings constructed to AS3959 standards are modelled on a fire danger indice of 80 so are better positioned to resist ignition on these lower intensity fire fronts. An FSAR on the western side of the lots would increase fire appliance access around the dwellings, however the combination of public road access, building standards, operating procedures and small size of the lots in context to the bushfire threat means the intent of SPP 3.7 and Performance Principle P3 are adequately achieved with the current access arrangements.
	A3.8 Firebreak width	Compliance will be achieved with the current City of Wanneroo Firebreak and Fuel Load Notice (Appendix 3).
Element 4: Water	A4.1 Reticulated areas	The development has access to a reticulated water supply. Three hydrants are sited in Harden Park Trail adjacent to the site. They are spaced according to the Water Corporation's No. 63 Water Reticulation Standards.
	A4.2 Non-reticulated areas	Not applicable
	A4.3 Individual lots	Not applicable

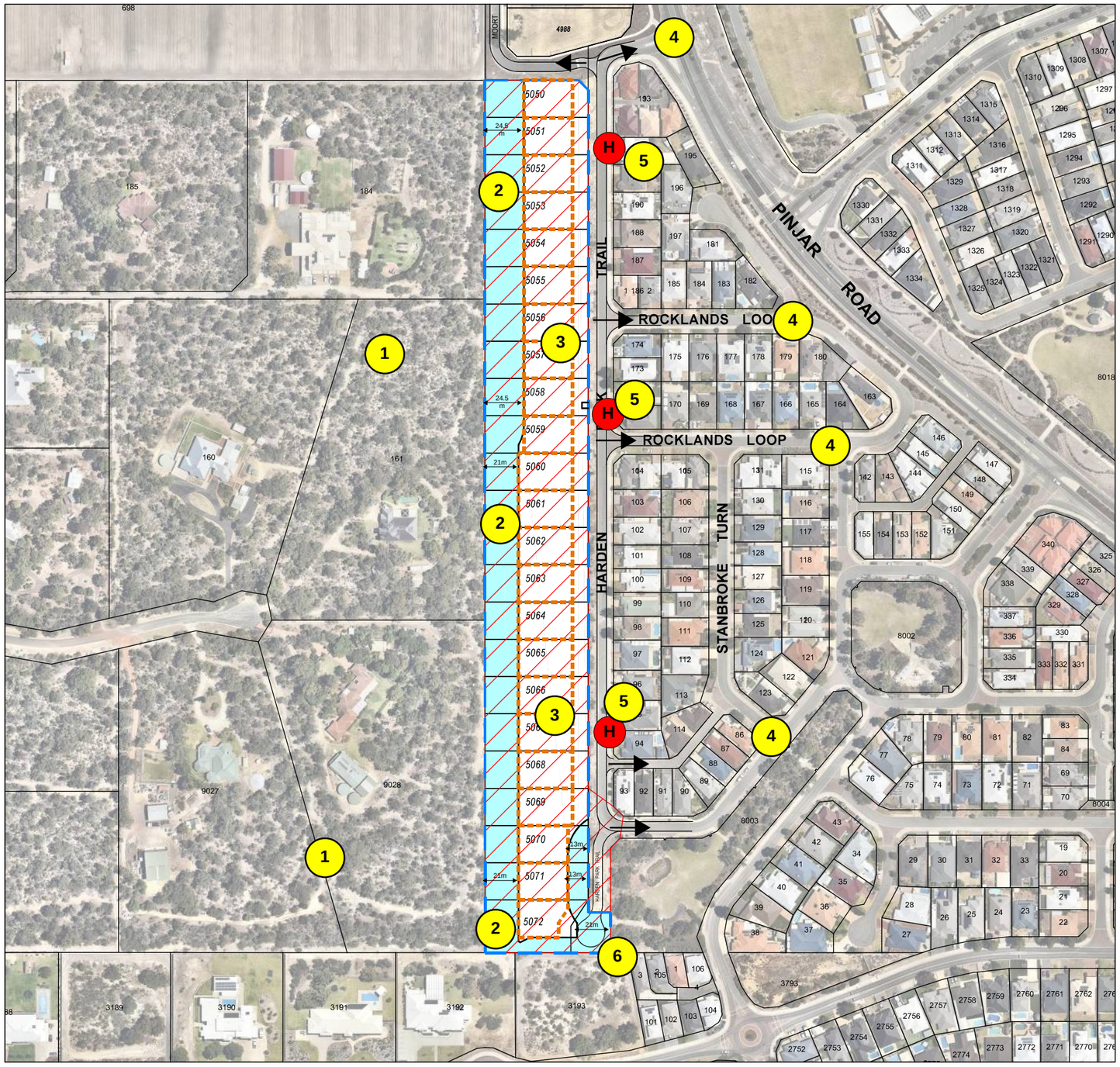
5.2 Additional Management Strategies / Rural Urban Interface SOP

The site will be developed in a single stage. APZ standards within the site will be established and maintained by the developer prior to the creation of titles until the sale of lots. Non habitable structures can be sited outside of the BAL-29 contour and will still be subject to AS3959 bushfire construction standards if required under the Building Code of Australia.

The DFES Standard Operating Procedure (Directive 3.5 Bushfire SOP 3.5.9 Firefighting within Rural-Urban Interface RUI Environments) outlines that the position of a fire appliance should be backed in and located near the structure on the lee side (this may not be in the driveway). In this position appliances are shielded from the heat of any approaching fire and the lengths of hose layouts are minimised. If driveways are short, parking on the street is the next best option ensuring traffic is not blocked. In this position urban pumpers are also located near fire hydrants and have unlimited water supply. This type of appliance position is outlined in the diagram below from the DFES SOP 3.5.9 - Firefighting within Rural-Urban Interface RUI Environments.



A summary of management strategies is outlined in **Figure 6**.



REQUIREMENTS

1. The main threat to the site is the area of Class A Forest in the rural residential lots west of the site.

2. All lots will have an internal perimeter APZ that will be established by the Developer and maintained in perpetuity by the developer and new lot owners. This ensures BAL-29 is not exceeded on future dwellings. Lots 550-559 have a 24.5m APZ and the remaining lots have a 21 m APZ on the western interface.

3. All building envelopes are exposed to BAL-29 and lower.

4. Surrounding public roads provide multiple access options away from the site.

5. The area is provided with a reticulated water supply. The provision of scheme water together with fire hydrants meets the specifications of Water Corporation Design Standard DS63 and DFES requirements. Multiple hydrants are located on Harden Park Trail and comply with minimum standards.

6. Harden Park trail terminates in a compliant minimum 17.5 m cul-de-sac head for fire appliances to turn around.

LEGEND:

- PROPOSED DEVELOPMENT
- DEVELOPMENT EXCLUSION ZONE
- ASSET PROTECTION ZONE
- BUILDING ENVELOPES

FIGURE 6 - SPATIAL REPRESENTATION OF BUSHFIRE MANAGEMENT STRATEGIES

bushfire CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafetyconsulting.com.au

0 20 40 60 80 100 120 140m

SCALE 1:3000 @ A3
DATE: MARCH 2021

NORTH

Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2022
Date aerial photo:	December 2020

6 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE MEASURES

Table 5 outlines the initial and ongoing responsibilities, actions and associated works that need to be undertaken by the developer, future landowners and the City of Wanneroo. The check boxes for implementation actions will be used for subdivision clearance. A Bushfire Planning Practitioner will certify the BAL ratings are correct and necessary implementation actions have been completed.

Table 5. Responsibility for bushfire measures

DEVELOPER – PRIOR TO ISSUE OF CERTIFICATE OF TITLES FOR NEW LOTS			
No.	**Implementation action**	**Local government clearance**	**Bushfire consultant clearance**
1	Establish and maintain fuel loads and vegetation structure to comply with Asset Protection Zone Standards outlined in this report.		☐
2	Ensure that all lots comply with the City of Wanneroo's Firebreak Notice as published.	☐	
3	A notification, pursuant to Section 70A of the Transfer of Land Act 1893 is to be placed on the certificate(s) of title of the lots within the Bushfire Prone Area. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows: 'The lot(s) is/are subject to a Bushfire Management Plan.' (Local Government)".		
LANDOWNER/OCCUPIER – ONGOING MANAGEMENT			
4	Maintain the Asset Protection Zone (APZ) to standards stated in this BMP (Appendix 1).		
5	Ensure the site complies with the City of Wanneroo's Fire Break and Fuel Load Notice as published.		
6	Ensure construction of buildings complies with AS 3959:2018.		
7	If buildings are subject to additional construction in the future, AS 3959:2018 compliance is required.		
CITY OF WANNEROO– ONGOING MANAGEMENT			
8	Maintain public roads to appropriate standards and ensure compliance with the City of Wanneroo's Fire Break and Fuel Load Notice.		
9	Provide fire prevention and preparedness advice to landowners upon request, and the City of Wanneroo's Fire Break and Fuel Load Notice.		

Certification by Bushfire Consultant

I _____ certify that at the time of inspection, the BAL ratings contained within this BMP are correct, and implementation of Action 1 has been undertaken in accordance with the BMP.

Clearance is recommended.

Signature: _____

Date: _____

7 CONCLUSION

This Plan provides acceptable solutions that fulfil the intent of the bushfire hazard management issues outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 V1.3).

However, community bushfire safety is a shared responsibility between governments, fire agencies, communities and individuals.

The subdivision is located in a bushfire prone area (i.e. within 100 m of classified vegetation) and risk is reduced via compliance with *AS 3959:2018* standards. No lots exceed BAL-29 within the site.

A minimum of two access options and dedicated fire hydrant spacings for fire-fighting are provided. The proposed development will fall within the acceptable level of risk.

REFERENCES

Department of Fire and Emergency Services (DFES), Directive 3.5 Bushfire SOP 3.5.9 Firefighting within Rural-Urban Interface RUI Environments.

Standards Australia, 2018, *Construction of buildings in bushfire-prone areas (Amendments 1-3)*, AS 3959-2018, Standards Australia International Ltd, Sydney.

Western Australian Planning Commission (WAPC), 2015, *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP3.7)*, December 2015, Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC), 2017, *Guidelines for Planning in Bushfire Prone Areas*, December 2017 V1.3, Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

APPENDICES

Appendix 1: Asset Protection Zone Standards
Appendix 2: Vehicular Access Technical Requirements
Appendix 3: City of Wanneroo Firebreak and Fuel Load Notice
Appendix 4: Method 2 BAL Assessment – Design Fires x 1

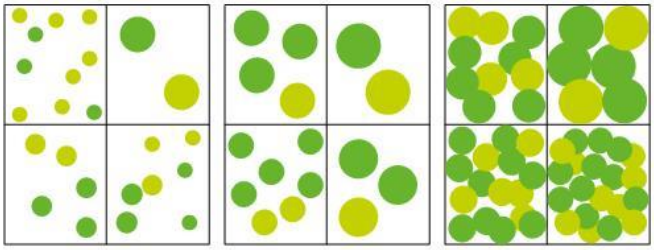
Appendix 1 – Asset Protection Standards

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees (> 5 metres in height):** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

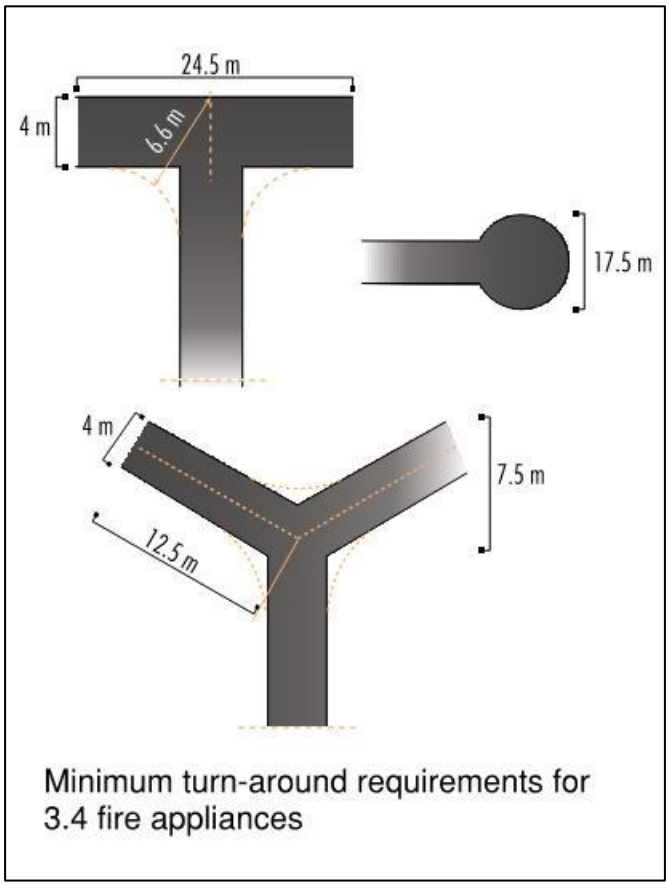
Figure 18: Tree canopy cover – ranging from 15 to 70 per cent at maturity



- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m^2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

Appendix 2 – Vehicular Access Technical Requirements

TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5
*Refer to E3.2 Public roads: Trafficable surface					



Minimum turn-around requirements for 3.4 fire appliances

Appendix 3 – City of Wanneroo Firebreak and Fuel Load Notice

Protect your home and property from bushfires

NOTICE TO ALL OWNERS OR OCCUPIERS OF LAND IN THE DISTRICT OF THE CITY OF WANNEROO REGARDING FIREBREAKS.

The City of Wanneroo hereby gives notice pursuant to Section 33 of the **Bush Fires Act 1954** to all owners or occupiers of land in its district that they are required on or before 15 November, or within 14 days of becoming the owner or occupier of the land if that occurs after the 15 November, to annually plough, cultivate, scarify, or otherwise clear firebreaks as specified in this Notice and thereafter up to, and including the 30 April, annually, to maintain the firebreaks clear of flammable matter.

1. Land having an area of 2000m2 or more
A firebreak not less than 3 metres wide and 3 metres high immediately inside and around all external boundaries of the land must be cleared.

2. Land having an area of less than 2000m²
A firebreak not less than 2 metres wide and 2 metres high immediately inside and around all external boundaries of the land must be cleared.

3. Buildings
A firebreak not less than 3 metres wide immediately around all external walls of every building must be cleared. Whenever a firebreak is cleared by burning the provisions of the Act and Regulations made thereunder must be observed. If pursuant to Item (2) of this Notice, mowing or slashing is carried out the height of vegetation thereafter must not exceed, as far as is reasonably practicable, 20mm over the entire area of the firebreak. The use of chemicals is subject to all restrictions imposed by the Department of Agriculture. Attention is drawn to the Flammable Liquids Regulations made under the Explosives and Dangerous Goods Act 1961,which requires a site on which flammable liquid is stored to be totally cleared of all flammable material for a minimum distance of 5 metres surrounding the site.

If it is considered to be impracticable for any reason to comply with the provisions of this Notice, application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the requirements of this Notice must be complied with.

Penalty
An owner or occupier of land who fails or neglects in any respect to comply with the requirements of this Notice is liable to a maximum fine of $5,000.

DATES TO REMEMBER

- **Firebreaks must be cleared by 15 November** (AND KEPT CLEAR UNTIL APRIL 30)
- **Burning permits required all year round**
- **Burning prohibited between 1 December to 31 March**

When and how to obtain a fire permit

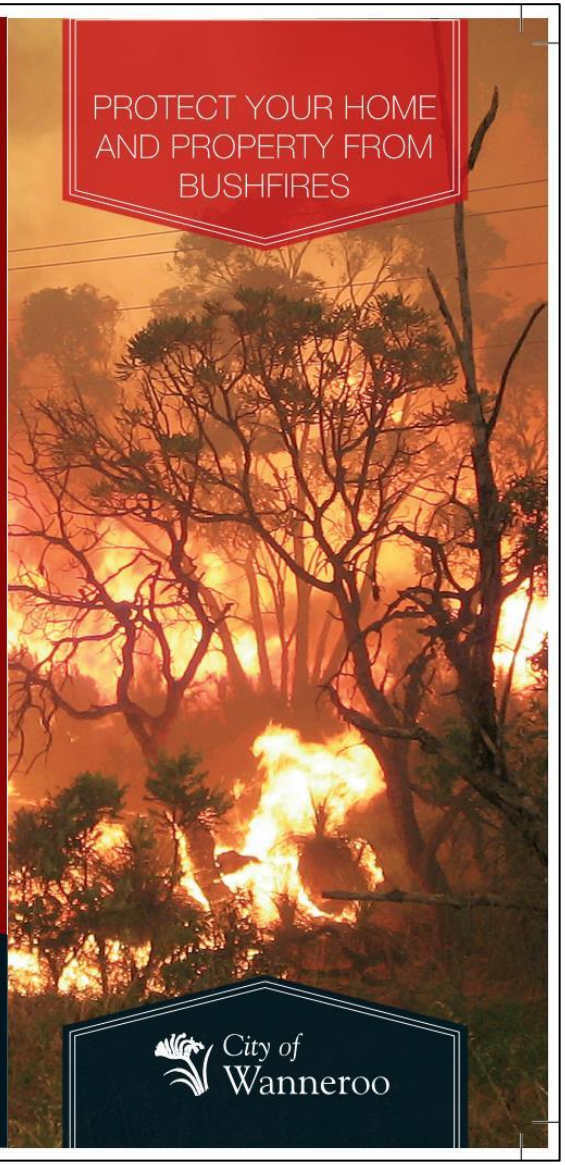
Permits are available from the City of Wanneroo at the following locations:

WANNEROO ANIMAL CARE CENTRE
Located at the rear of the Ashby Operations Centre, 1204 Wanneroo Road, Ashby
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week* from 4pm - 6pm
*Except Good Friday

CITY OF WANNEROO CIVIC CENTRE
23 Dundebar Road, Wanneroo
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

NEED ADVICE?
Further advice about how to protect your home, constructing firebreaks, and when and how to burn off, is available from the City of Wanneroo during office hours on 9405 5000.

City of Wanneroo
23 Dundebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946
T : (08) 9405 5000 F : (08) 9405 5499
After Hours : 1300 13 83 93
E : enquiries@wanneroo.wa.gov.au
wanneroo.wa.gov.au



Keeping your home safe from fire

There are a number of ways you can help keep your home safe from fire:

- Install smoke detectors in your home
- Clear vegetation away from the walls of your home
- Clear all rubbish and flammable material from around your home to create a 20 metre circle of safety
- Store firewood, timber, petrol, and kerosene well away from your home
- Prior to summer, clean all leaves and debris from your gutters
- Don't have flammable trees such as conifers near buildings
- Have branches trimmed that overhang the house or powerlines
- Fit wire insect screens or shutters to windows and glass doors

If a firebreak is impractical along your boundary for environmental or other reasons notify the City of Wanneroo by 1 October to obtain permission to install firebreaks in alternative positions, or of a different nature.

ALTERNATIVE METHODS OF REDUCING FIRE HAZARDS ON VACANT LAND

- For urban land less than 2000m², if mowing or slashing is carried out, the height of the vegetation must not exceed, as far as is reasonably practical, 20mm over the entire area of the firebreak
- The use of chemicals is subject to all restrictions imposed by the Department of Agriculture
- Mulching • Disposal at an authorised rubbish tip site

When and how to burn

NO BURNING FROM 1 DECEMBER - 31 MARCH

Burning off - that is, bush/running fire including grass, on any land is totally prohibited between 1 December and 31 March. Fire permits for burning material other than garden rubbish are required all year round.

A person in control of the fire must stay with the fire until it is completely extinguished.

GARDEN RUBBISH AND REFUSE

The burning of garden refuse is permitted between the hours of 6pm and 11pm, provided the fire danger rating is not VERY HIGH, SEVERE, EXTREME or CATASTROPHIC or a TOTAL FIRE BAN has been declared.

Fire danger rating signs are located at the following locations:

- Corner of Joondalup Drive and Wanneroo Road
- Wanneroo Road, south of the Yanchep Beach Road turn off
- Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
- Neaves Road, Mariginiup • Old Yanchep Road, Pinjar
- Gnangara Road, Landsdale • Country Side Drive, Two Rocks

Other points to remember when burning garden refuse and rubbish are:

- All bush and flammable material must be thoroughly cleared within two metres of all points of the site of the fire
- The material must be on the ground, and be no more than one metre wide and one metre high

Only one heap may be burnt at any one time
Incinerators may be used providing:

- The incinerator is properly constructed and designed to prevent the escape of sparks of burning material
- The incinerator is situated not less than two metres away from a building or fence
- An area of two metres surrounding the incinerator is clear of all flammable material

BARBECUES

Only gas or electric barbecues may be lit during VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger rating or declared TOTAL FIRE BAN. The lighting of solid fuel barbecues is not permitted on these days.

SMOKE NUISANCES

City of Wanneroo residents are advised to be mindful of smoke issues associated with any burning that they conduct. Steps should be taken to avoid undue smoke impact to neighbours and adjacent roads. Smoke across roadways can severely impact motorists' visibility and therefore road safety. Issues of smoke nuisance are regulated by the Waste Avoidance and Resource Recovery Act 2007.

CAMPFIRES

Campfires must not be lit on VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger days or declared TOTAL FIRE BAN. A person must remain in attendance at the site during the whole time the fire is burning. The user must extinguish the fire using water or earth before leaving the area.

Hints for safer burning

- Don't light a fire on a hot or windy day
- Don't burn more than you can control
- Let your neighbours know you'll be burning material
- Make sure smoke and sparks will not affect your neighbour's washing or enter open windows
- Cut or rake long grass around trees, building and fences before burning
- Burn against the wind
- On a sloping block, burn from the top down
- Keep a hose or spray pack at hand to dampen down fierce fires
- If in doubt, don't burn material yourself - call the Volunteer Fire Brigade
- Stay with the fire until it is completely extinguished
- Where possible, don't burn any closer than 20 metres from your home or other buildings

Penalties

Under the Bush Fires Act 1954, failing to comply with regulations can result in a fine ranging from $250 to $250,000 or imprisonment.

Failure to maintain 2/3 metre firebreak as per firebreak order	$250
Offence relating to lighting fire in the open air	$250
Setting fire to bush during prohibited burning times	$250
Failure of occupier to extinguish bush fire	$250

Major offences result in Court action with fines ranging from $250 to $250,000 or imprisonment for 14 years.

THE BIGGEST PENALTY OF ALL

The biggest penalty of all would be losing your loved ones or home to fire. Please ensure you, your family and your home are kept safe by taking the necessary precautions.

Special rural and residential land

Owners and occupiers of special rural and special residential land should be aware of their responsibilities to take bush fire prevention measures, while ensuring they do not contravene Town Planning Scheme provisions which control the removal of vegetation in Special Residential and Special Rural Zones.

These special rural zones were created in areas of natural flora, and the Scheme recognises the importance of preserving the natural environment in these areas. Anyone found cutting down, lopping or damaging trees in these areas without City approval may be guilty of an offence.

However, bush fire prevention, including the installation of firebreaks, is essential regardless of the zoning of the land.

Below are some guidelines for installing firebreaks in special rural zones to prevent bush fires, while minimising damage to the natural environment.

- A 3 metre wide and 3 metre high firebreak should be cleared around the perimeter of special rural or special residential lots
- These firebreaks need not be strictly around the perimeter, but may deviate according to the flora
- The firebreak does not have to be ploughed but can instead be created by clearing and removing all flammable material
- Care should be taken to avoid damaging or removing significant trees and shrubs
- Avoid the build up of undergrowth and leaf litter

Appendix 4: Method 2 BAL Assessment – Design Fires x 1

1. **AIM**

- Provide a bushfire protection outcome that meets the performance requirements for the proposed development and;
    - Approval under State Planning Policy No. 3.7 Planning in Bushfire Areas (2015); and
    - Compliance with the Guidelines for Planning in Bushfire Prone Areas V1.3 and Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas (Standards Australia 2018)
    -

2. **Objectives**

- Demonstrate the Radiant Heat Flux (RHF) exposure profile is < 29kW/m ² contour.
- Demonstrate that an enforceable mechanism has been applied to property Lot 90193 Joseph Banks Boulevard, Banksia Grove to create and maintain a complaint APZ in perpetuity.
- Demonstrate that the exposure profile under specific design fire evaluation that includes:
    - Class A Forest (Classified Vegetation) as default fuels loads specified in AS3959-2018
    - FFDI is set at 80 as documented in AS3959-2018
    - Site specific values for effective slope under classified vegetation and site slope

Determine compliance with the relevant statements of intent and specific performance principles of the guidelines and elements 1 and 2.

3. **Enforceable mechanism to maintain APZ within the site to the dimensions outlined in the BMP.**

A condition of building license will be to re-assess the BAL ratings of proposed dwellings and in doing so certify the dwellings are sited within the BAL-29 or lower zone within the lots.

4. **Design Fires X 2**

The design fire assessment determines the level to which predicted radiant heat flux exposure (ie. BAL rating) from the Class a Forest areas of classified vegetation to the west of the site.

The predicted bushfire attack is reduced by specific site factors that are different to those used in a method 1 BAL assessment in AS3959-2018. The predicted radiant heat flux received by the site is reduced by accurate assessment of the effective and site slope characteristics under the classified vegetation and between the vegetation and the site.

5. Specific Design Fire Inputs

Specific design fire inputs used to evaluate the design fires which is representative of the two separate directions fires can approach the site including to the south-west and east. The area is listed below and detailed in tables 1-4 (provided).

- Site slope analysis using 1m contours calculated using Pythagoras Theorem and confirmed on-site using a forestry pro laser instrument to determine the effective slope and site slope under the area between the site and the adjacent classified vegetation.
- An Asset Protection Zone consisting of the managed area within each residential lot to minimum standards around the buildings.
-

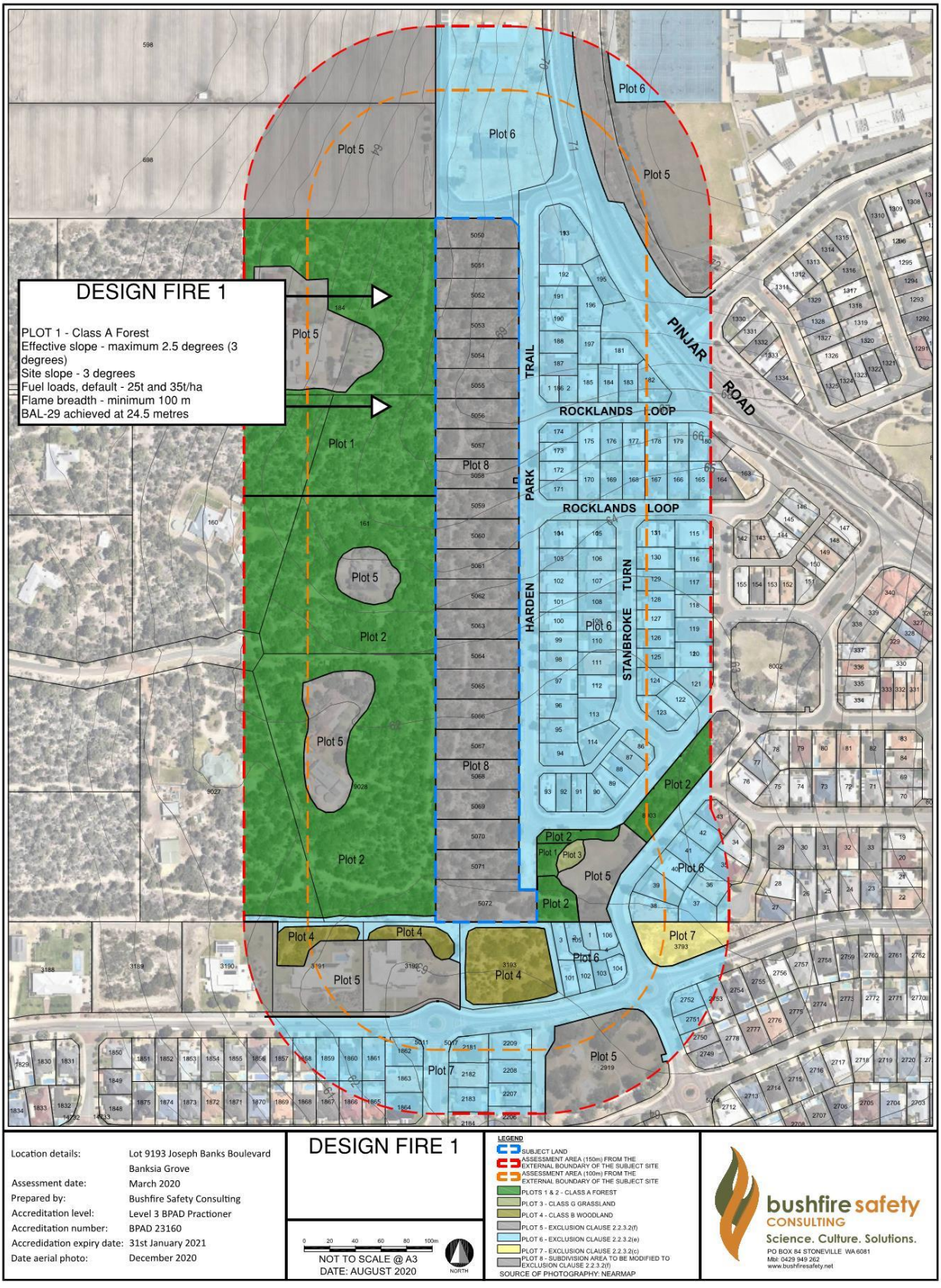
Design Fire No. & Direction from site	Effective slope	Vegetation Classification	Site Slope	Surface fuel load (t/ha)	Overall fuel load (t/ha)	FFDI	Flame width at interface
1 West	3 degrees	Class A Forest	3 degrees	25	35	80	100 metres

Table 1: Summary of design fire Inputs

-

6. Methodology

- The Method 2 Approach to determine the radiant heat flux exposure and corresponding Bushfire Attack Level (BAL) is described in Appendix B Detailed method for determining the Bushfire Attack Level (BAL) – Method 2 in AS3959-2018.
- Site specific inputs and bushfire modelling calculations were undertaken using the software tool Bushfire Attack Level Minimum Distance Calculator (MDc) version 4.8 developed by Flamesol and the Fire Protection Association of Australia
- The Bushfire Attack Level Minimum Distance Calculator (MDc) version 4.8 is a software tool approved for use by the FPAA that implements the Method 2 bushfire behaviour and view factor calculations and heat transfer models to determine the exposure of a site to a radiant heat flux
- Elevation of Receiver used is default value to ensure the maximum predicted radiant heat flux (ie. BAL rating) is received by future proposed dwellings.
- The design fire have been sited in one fire run direction, directly approaching the site through the adjacent Class A Forest vegetation west of the site to ensure an accurate assessment of the direct threat.



Location details:	Lot 9193 Joseph Banks Boulevard Banksia Grove
Assessment date:	March 2020
Prepared by:	Bushfire Safety Consulting
Accreditation level:	Level 3 BPAD Practioner
Accreditation number:	BPAD 23160
Accredidation expiry date:	31st January 2021
Date aerial photo:	December 2020

DESIGN FIRE 1

0 20 40 60 80 100m
NOT TO SCALE @ A3
DATE: AUGUST 2020
NORTH

LEGEND
- SUBJECT LAND
- ASSESSMENT AREA (150m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- ASSESSMENT AREA (100m) FROM THE EXTERNAL BOUNDARY OF THE SUBJECT SITE
- PLOTS 1 & 2 - CLASS A FOREST
- PLOT 3 - CLASS G GRASSLAND
- PLOT 4 - CLASS B WOODLAND
- PLOT 5 - EXCLUSION CLAUSE 2.2.3.2(f)
- PLOT 6 - EXCLUSION CLAUSE 2.2.3.2(e)
- PLOT 7 - EXCLUSION CLAUSE 2.2.3.2(c)
- PLOT 8 - SUBDIVISION AREA TO BE MODIFIED TO EXCLUSION CLAUSE 2.2.3.2(f)

SOURCE OF PHOTOGRAPHY: NEARMAP

bushfire safety CONSULTING
Science. Culture. Solutions.
PO BOX 84 STONEVILLE WA 6081
Mbl: 0429 949 262
www.bushfiresafety.net

7. Results

To assist in determining the BAL outcomes for the chalets at this site, values for BAL-40, BAL-29, BAL-19 and BAL-12.5 have been determined using the same methodology.

The results of the radiant heat flux analysis are summarised below in Table 3 which incorporates the design fire inputs and outputs.

Design Fire	AS3959 Assessment Methodology	Direction of Fire run	Vegetation Classification	Effective Slope (°)	Site Slope	FFDI	Separation - metres	BAL Rating
1	Method 2	West	Class A Forest	3	3	80	18.4	BAL-40
							24.5	BAL-29
							34.5	BAL-19
							46.8	BAL-12.5

Table 3: Radiant Heat Flux analysis and BAL outcomes for the Design Fire.

The predicted RHS exposure summarised in table 3 shows that a fire burning towards the site from the west utilising site specific inputs results in predicted radiant heat flux less than <29kW/m² for future dwellings with a minimum setback of 24.5 metres. The separation and setback distances are outlined in Table 3, the future dwellings require internal APZ setbacks as outlined in the BMP.

8. Compliance with SPP 3.7, the Guidelines and AS 3959-2018

8.1 Intent and Objectives of State Planning Policy 3.7 (SPP 3.7)

The design fires demonstrate that the APZ and BAL bushfire protection measures meet all relevant policy objectives of SPP 3.7.

SPP 3.7 Objective 1: *Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount*.

- The site specific data assess the risk with more accuracy and determined that there is no increase to the predicted threat above BAL-29.

SPP 3.7 Objective 2: *Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process*.

- The bushfire threat and vulnerability has been identified and considered in this assessment including in the BMP and the method 1 and method 2 BAL Assessments

SPP 3.7 Objective 3: *Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures*.

- The bushfire risk has been quantified using a method 2 assessment with site specific inputs and the bushfire protection measures are outlined in the BMP including APZ dimensions and standards.

SPP 3.7 Objective 4: *Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change*.

- The design fire analysis allows the increased retention of existing vegetation west of the future dwellings to APZ standards.
- A 24.5 m wide internal APZ is required and accommodated to APZ standards on the western side of the proposed residential lots.

9. Acceptable Solution A2.1: Asset Protection Zone

A2.1 Asset Protection Zone States: Future dwellings are surrounded by an APZ depicted in this BMP which meet the following requirements (listed below in Table 4):

A2.1 Acceptable Solution	Performance solution	Compliance
Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances.	The provided APZ includes the internal lot setback of 24.5 metres in the western portion of the lots. This will ensure the predicted radiant heat impacts do not exceed 29kW/m² at the building exterior. This was determined using Method 2 of AS3959-2018	Yes – with method 2 BAL Assessment as detailed here.
Location: the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).	The APZ is restricted to internal lot spaces. The APZ is enforced by standards and responsibilities in this BMP and the City of Wanneroo Firebreak Notice. The Acceptable Solution can be achieved.	Yes – full compliance
Management: the APZ is managed in accordance with the requirements of Standards for Asset Protection Zones'.	Acceptable Solution can be achieved.	Yes – full compliance

Table 4: Comparison between acceptable and performance solution.

10. Conclusion

The design fire demonstrates that the site can accommodate the development of dwellings on each lot. The effective slope of 3 degrees with the fie modelling and appropriate APZ dimensions achieves a predicted radiant heat flux exposure of less than 29kW/m².

The proposed development can achieve the Acceptable Solutions for building siting in the Guidelines for Planning in Bushfire Prone Areas V1.3 (2017).

11. Modelling Data - Design Fire 1

FPA AUSTRALIA | FLAMESOL

Calculated April 8, 2020, 10:27 am (MDc v.4.8)

lot 9190 Banksia Grove

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.95 km/h
Vegetation classification	Forest	Flame length	23.38 m
Surface fuel load	25 t/ha	Flame angle	53 °, 63 °, 70 °, 74 °, 76 ° & 83 °
Overall fuel load	35 t/ha	Elevation of receiver	8.359999999999999 m, 9.130000000000001 m, 9.18 m, 8.779999999999999 m, 8.5 m & 5.29 m
Vegetation height	n/a	Fire intensity	53,381 kW/m
Effective slope	3 °	Transmissivity	0.858, 0.833, 0.803, 0.777, 0.765 & 0.71
Site slope	3 °	Viewfactor	0.6125, 0.4566, 0.3103, 0.2108, 0.1714 & 0.0462
Flame width	100 m	Minimum distance to < 40 kW/m²	18.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	24.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	34.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	46.8 m
		Minimum distance to < 10 kW/m²	54.3 m

BAL-29 achieved at 24.5 metre setback

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005