

APPENDIX 5

**BUSHFIRE
MANAGEMENT
PLAN**

(STRATEGEN JBS&G)

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: Pt Lot 594 Wanneroo Road

Suburb: Hocking

State: WA

P/code: 6069

Local government area: City of Wanneroo

Description of the planning proposal: Structure Plan amendment

BMP Plan / Reference Number: RDP19114.01

Version: R001 Rev 0

Date of Issue: 9/09/2019

Client / Business Name: Barnao & Co

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)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strategic planning proposal (including rezoning applications)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Minor development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
High risk land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vulnerable land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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.)? The proposal is a Structure Plan amendment, which constitutes a strategic planning proposal.

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
Zac Cockerill	Level 2	37803	31/08/2020
Company	Contact No.		
Strategen-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



Date 9/09/2019

Pt Lot 594 Wanneroo Road, Hocking

Bushfire Management Plan (Structure Plan amendment)

Prepared for
Barnao & Co.
by Strategen-JBS&G

September 2019



Pt Lot 594 Wanneroo Road, Hocking

Bushfire Management Plan (Structure Plan amendment)

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September 2019

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This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, Strategen-JBS&G reserves the right to review the report in the context of the additional information.

Document control

Client: Barnao & Co.

Report Version	Revision No.	Purpose	Strategen-JBS&G author	Strategen reviewer	Submitted to Client	
					Form	Date
Draft Report	Rev A	For client review	Brodie Mastrangelo (BPAD 45985, Level 1)	Zac Cockerill (BPAD 37803, Level 2)	Electronic (email)	3/09/2019
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Filename: RDP19114_01 R001 Rev 0 - 9 September 2019

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- Appendix 4 Vehicular access technical standards of the Guidelines
- Appendix 5 Water technical standards of the Guidelines
- Appendix 6 City of Wanneroo Firebreak Notice (2018/2019)

1. Proposal details

1.1 Background

Barnao & Co., on behalf of the Catholic Archdiocese of Perth, is seeking to lodge an application for a Structure Plan amendment to guide future residential and commercial development within the western portion of Lot 594 (30) Ranworth Road, Hocking (the project area), located in the City of Wanneroo. The Structure Plan amendment (Figure 1) identifies:

- proposed residential cells
- a proposed business/commercial cell
- proposed road layout
- a central Public Access Way (PAW)
- PAW/Emergency Access Way (EAW) to the northeast
- areas of Public Open Space (POS), conservation and drainage.

1.2 Site description

The project area comprises approximately 6.79 ha within Lot 594 and is surrounded by (see Figure 2):

- existing residential development to the north
- Kirkstall Drive and existing residential development to the south
- St. Elizabeth's Catholic Primary School (under ownership of the proponent and represents the eastern balance portion of Lot 594), remnant vegetation and existing residential development to the east
- Wanneroo Road and existing large lot residential development to the west.

The project area is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2019; see Plate 1).

1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to address requirements under Policy Measure 6.3 of *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) and *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2017).

1.4 Other plans/reports

PGV Environmental has prepared the environmental report for the site, which includes provisions for bushland conservation. Recommendations from the environmental report have been factored into this BMP as required, mainly in relation to the post-development classified vegetation extent.

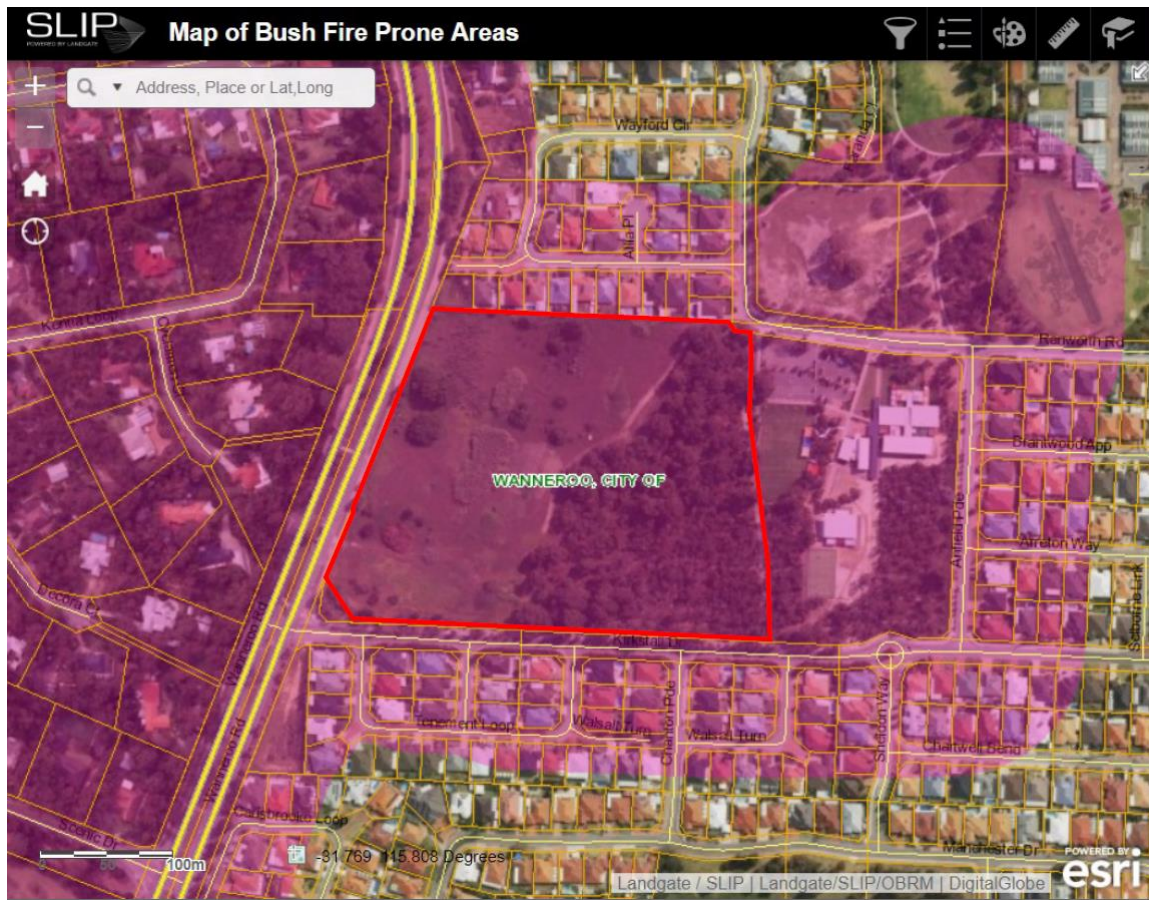


Plate 1: Map of Bush Fire Prone Areas (DFES 2019)



Figure 2: Site overview

Scale 1:2,500 at A3
 0 25 50 m
 Coordinate System: GDA 1994 MGA Zone 50
 Date: 14/08/2019

- Legend**
- Project area
 - 100m assessment area
 - 150m assessment area
 - Cadastre boundaries
 - Drainage
 - POS
 - Roads



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2. Environmental considerations

2.1 Native vegetation – modification and clearing

Proposed development of the project area will be focussed predominantly towards those areas of the site that are already cleared/degraded. A portion of remnant bushland in the southeast of the site will be retained within conservation POS to account for the existing banksia and eucalyptus woodland environmental values, with various landscape treatments proposed around the periphery of the bushland cell. The design of POS will be determined at future planning stages (subdivision) through the development of a detailed landscape plan. The concept landscape plan prepared to support the Structure Plan amendment (refer to Appendix 1) caters indicatively for the following:

- dedicated drainage basin with retained trees, where possible
- passive recreation area to be partially cleared/turfed amongst a retained Jarrah-Marri overstorey
- 3.8 m wide perimeter low fuel zone to be cleared and landscaped/managed to a low threat standard along the northern, eastern and western boundaries of the POS.

A search of publicly available environmental data relating to the project area has been undertaken and is summarised in Table 1.

Table 1: Summary of environmental values

Environmental value	Present within or adjacent to project area	Description
Environmentally Sensitive Area	Adjacent	Yellagonga Regional Park located 1 km to the west of the Project Area is an Environmentally Sensitive Area (ESA). Numerous ESAs are located 2 km to the northeast, east and southeast; however, none are situated within the project area.
Swan Bioplan Regionally Significant Natural Area	N/A	There are no Swan Bioplan Regionally Significant Natural Areas located within or adjacent to the Project Area.
Wetlands	Adjacent	There are no Ramsar Sites located within or adjacent to the Project Area. Conservation Category wetlands occur to the west as part of the Yellagonga Regional Park, while conservation category wetlands and multiple use wetlands occur 2 km to the east.
Waterways	Adjacent	Yellagonga Regional park is located to the west of the Project Area, while another wetland occurs 2 km to the east.
Threatened Ecological Communities listed under the EPBC Act	Within and adjacent	Threatened Ecological Communities are mapped within and adjacent to the Project Area. Tuart Woodlands are mapped within the Project Area as well as on the western fringes of the Yellagonga Regional Park. Banksia Woodlands of the Swan Coastal Plain are mapped as likely to occur within and adjacent to the Project Area. There are no Proteaceae dominated Kwongan Shrublands mapped within or adjacent to the Project Area.
Threatened and priority flora	Adjacent	A Priority 4 Flora species (<i>Jacksonia sericea</i>) occurs to the east as part of the Yellagonga Regional Park and will be retained as part of the proposal.
Fauna habitat listed under the EPBC Act	Within and adjacent	Potential Black Cockatoo roosting areas and potential feeding areas occur both within and adjacent to the Project Area. Potential Quenda habitat occurs within and adjacent to the Project Area. These values will be retained within on-site conservation POS.
Threatened and priority fauna	Potentially within, and adjacent	A Threatened Fauna species occurs within the vicinity of the Project Area (exact location unable to be determined due to buffer zones), while Priority Fauna species, Threatened and Other Specially Protected Fauna species occur within a 2 km radius from the Project Area.

Environmental value	Present within or adjacent to project area	Description
Bush Forever Site	Adjacent	Bush Forever (BF) site BF 299 (Yellagonga Regional Park) is located 1 km to the west, BF 407 is located 2.8 km to the south-west. BF 471 is located 2 km to the north-east, BF 327 is located 2.5 km to the south-east.
DBCA managed lands and lands and waters (includes legislated lands and waters and lands of interest)	Adjacent	Lake Joondalup Nature Reserve (Yellagonga Regional Park) and Woodvale Nature Reserve are located to the east and southeast of the site, respectively.
Conservation covenants	N/A	N/A.

No Aboriginal Heritage Places were identified within or adjacent to the project area.

2.2 Revegetation / Landscape Plans

As previously mentioned, the landscape concept plan (refer to Appendix 1) provides an indicative layout of the proposed POS cell to the southeast, including provisions for drainage, passive recreation, bushland conservation and a perimeter low fuel zone. These items will be subject to detailed landscape planning at the subdivision stage to firm up the likely post-development vegetation classifications, exclusions and relevant boundaries of each to inform detailed BAL contour assessment.

At this stage, a worst case assumption has been made regarding post-development vegetation classifications throughout the southeast POS cell, resulting in the broad application of Class B woodland throughout the entire cell, except for the 3.8 m wide perimeter low fuel zone, which will be excluded from classification. The vegetation classification throughout the POS cell will be refined at the subdivision stage provided there is sufficient justification outlined in a detailed landscape plan. Post-development vegetation classifications and exclusions are considered further in Section 3.1.

Any future landscaping outside of the identified POS cell in the southeast will likely consist of low threat managed gardens, street-scaping and a minor drainage cell in the northwest, which are all considered readily excludable under standard exclusion clauses of AS 3959.

3. Bushfire assessment results

3.1 Assessment inputs

3.1.1 Pre-development vegetation classification

Strategen-JBS&G assessed classified vegetation and exclusions within 150 m of the project area through on-ground verification on 21 March 2019 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* ([AS 3959]; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). A spatial depiction of pre-development classified vegetation is provided in Figure 3 and a summary of pre-development classified vegetation is contained in Table 2. Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 2.

Regional vegetation surveys and mapping of the Swan Coastal Plain indicate the project area and adjacent land is contained within the Karrakatta Complex – Central and South. This vegetation complex is described as:

- predominantly open forest of tuart (*E. gomphocephala*), jarrah (*E. marginata*) and marri (*E. calophylla*) and woodland of jarrah (*E. marginata*) and Banksia (*Banksia spp.*).

This is consistent with on-site observations and the landscape plan, which have identified portions of the POS as dominated by Jarrah-Marri and Banksia woodlands. Intact vegetation retained within 150 m of the project area is also largely consistent with the Karrakatta Complex. A summary of the key plots of classified vegetation is provided below:

- vegetation to the west of site occurs on large residential properties and is a vast mixture of native and introduced plant and tree species (palm) with a canopy of native eucalypts (jarrah, marri, tuart). The fuels throughout these large residential lots are highly modified and fragmented through residential building construction and establishment of gardens and lawns. Forest fire behaviour is not expected within this vegetation as the predominant vegetation structure features managed and unmanaged grass underneath trees, characteristic of Class B woodland
- vegetation within Gungurru Park to the northeast and on-site POS is consistent with a banksia woodland fuel profile, with the majority of the plot being dominated by banksia without a multi-tiered fuel profile. Sparse jarrah trees are also present but do not constitute the dominant species and do not provide a linked canopy sufficient to carry fire attributable to forest fire behaviour
- vegetation within the St. Elizabeth's Primary School site to the east is consistent with a banksia woodland fuel profile. The plot is dominated by banksia without significant coverage of mid-storey shrubs and is also void of overstorey trees.
- cleared land within the project area and linked drainage basin to the northwest contain unmanaged grassland fuels commensurate with a Class G grassland fuel classification
- pre-development exclusions are depicted in Figure 3 and consist of existing built-up areas catering for residential development, roads and infrastructure, along with a small, fragmented drainage basin to the southwest, excluded under a combination of Clauses 2.2.3.2 (c), (e) and (f) of AS3959.

Pre-development vegetation classifications/exclusions and effective slope are summarised in Table 2.

Table 2: Summary of pre-development vegetation classifications, exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class B Woodland	Downslope >0–5°	West of the project area beyond Wanneroo Road
2	Class B Woodland	Flat/upslope (0°)	Northwest of the project area beyond Wanneroo Road
3	Class D Scrub	Flat/upslope (0°)	North of the project area within Wanneroo Road reserve
4	Class B Woodland	Flat/upslope (0°)	Southeast of the project area
5	Class B Woodland	Flat/upslope (0°)	Northeast of the project area beyond Ranworth Road within Gungurru Park
6	Class B Woodland	Flat/upslope (0°)	Within the project area
7	Class C Shrubland	Flat/upslope (0°)	Within the project area
8	Class D Scrub	Flat/upslope (0°)	Within the project area
9	Class G Grassland	Flat/upslope (0°)	Within the project area
10	Class G Grassland	Flat/upslope (0°)	Northwest of the project area
11	Excluded – Clause 2.2.3.2 [c]	N/A	Southwest of the project area
12	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	Flat/upslope (0°)	All other areas adjacent to the project area which are not classifiable

3.1.2 Effective slope

Strategen-JBS&G assessed effective slope under classified vegetation through on-ground verification on 21 March 2019 in accordance with AS 3959. Results were cross-referenced with DPIRD 2 m contour data and are depicted in Figure 3. Site observations indicate that the land generally rises from west to east, resulting in a slight downslope effect (0–5 degrees) from vegetation retained within the large residential lots west of the project area. The remainder of classified vegetation within and adjacent to the project area is largely flat/up-slope.

3.1.3 Post-development vegetation classification and effective slope

This section describes the proposed post-development modifications to the pre-development vegetation extent discussed in Section 3.1.1 to inform BAL contour assessment. Post-development vegetation classifications and effective slope are depicted in Figure 4 and summarised below:

1. A proportion of on-site vegetation will be modified to a non-vegetated and/or low threat managed state as part of development, which will result in the majority of the site being excluded under Clauses 2.2.3.2 (c), (e) and (f) of AS3959, including:
 - (a) built form, road reserves, carparks excluded under Clause 2.2.3.2 (e)
 - (b) firebreaks, manicured lawns, residential gardens and street-scaping excluded under Clause 2.2.3.2 (f)
 - (c) 3.8 m wide perimeter low fuel zone around the northern, western and eastern boundaries of the POS cell excluded under Clause 2.2.3.2 (f)
 - (d) the small drainage basin to the northwest will be less than 0.25 ha in area and not within 20 m of other areas of vegetation being classified, thus excluded under Clause 2.2.3.2 (c).
2. As previously mentioned, remnant vegetation will be retained within the on-site POS cell, which will exhibit a Class B woodland fuel profile. The extent of vegetation classification within on-site POS is subject to change as landscaping detail becomes available at the subdivision stage.

3.1.4 Summary of post-development inputs

Figure 4 illustrates the anticipated post-development vegetation classifications and exclusions following completion of subdivision works and landscaping throughout the project area. The post-development vegetation classifications/exclusions and effective slope are summarised in Table 2.

Table 3: Summary of post-development vegetation classifications, exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class B Woodland	Downslope >0–5°	West of the project area beyond Wanneroo Road
2	Class B Woodland	Flat/upslope (0°)	Northwest of the project area beyond Wanneroo Road
3	Class D Scrub	Flat/upslope (0°)	North of the project area within Wanneroo Road reserve
4	Class B Woodland	Flat/upslope (0°)	Southeast of the project area
5	Class B Woodland	Flat/upslope (0°)	Northeast of the project area beyond Ranworth Road within Gungurru Park
6	Class B Woodland	Flat/upslope (0°)	Within the project area
11	Excluded – Clause 2.2.3.2 [c]	N/A	Southwest of the project area
12	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	Flat/upslope (0°)	All other areas adjacent to the project area which are not classifiable
13	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	N/A	Area to be modified to a low threat state as part of development within the project area



Figure 3: Pre-development vegetation and effective slope

<p>Scale 1:2,500 at A3</p> <p>0 25 50 m</p> <p>Coordinate System: GDA 1994 MGA Zone 50</p> <p>Date: 9/08/2019</p>	Legend		Vegetation class	
	<ul style="list-style-type: none"> Project area 100m assessment area 150m assessment area Cadastre boundaries 	<ul style="list-style-type: none"> Photo point and direction Proposed development Surface elevation (mAHD) Roads 	<ul style="list-style-type: none"> Class B Woodland Class C Shrubland 	<ul style="list-style-type: none"> Class D Scrub Class G Grassland Excluded under Clause 2.2.3.2 (c) Excluded under Clauses 2.2.3.2 (e) and (f)

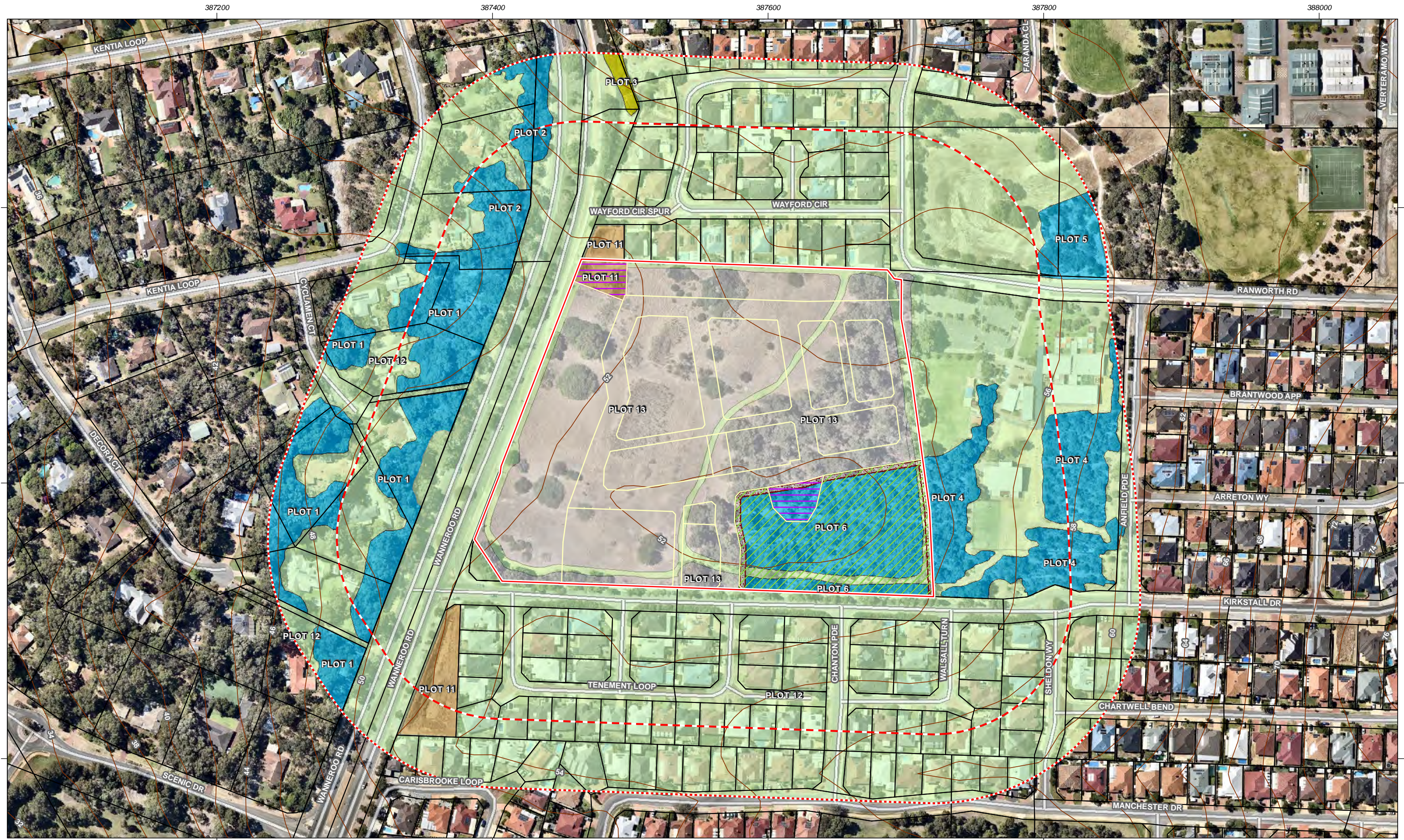


Figure 4: Post-development vegetation and effective slope

<p>Scale 1:2,500 at A3</p> <p>0 25 50 m</p> <p>Coordinate System: GDA 1994 MGA Zone 50</p> <p>Date: 14/08/2019</p>	Legend		Vegetation class Class B Woodland Class D Scrub	Area to be modified to low threat state Excluded under Clause 2.2.3.2 (c) Excluded under Clauses 2.2.3.2 (e) and (f)
	Project area 100m assessment area 150m assessment area Cadastre boundaries	Drainage POS 3.8m wide low fuel zone		



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3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

Strategen-JBS&G has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the project area (refer to Figure 5). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 rating
- post-development vegetation classifications/exclusions
- 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 proposed future development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts.

The mapped BAL contours are based on the vegetation classifications and effective slope observed at the time of inspection, consideration of the proposed post-development exclusions and consideration of proposed landscaping/vegetation retention throughout POS areas.

Results of the BAL contour assessment are detailed in Table 4 and illustrated in Figure 5. The highest BAL applicable to proposed development lot boundaries is BAL-29; however, BAL-19 or lower is considered readily achievable for future buildings following consideration of mandatory building setbacks.

Table 4: Post-development BAL contour assessment results

Method 1 BAL determination						
Plot	Vegetation classification	Effective slope	BAL contour width	Highest BAL (to lot boundary)	Building setback to achieve lower BAL	Indicative modified BAL rating [^]
1	Class B Woodland	Downslope >0-5°	35-<100 m	BAL-12.5	N/A	N/A
2	Class B Woodland	Flat/upslope (0°)	29-<100 m	BAL-12.5	N/A	N/A
3	Class D Scrub	Flat/upslope (0°)	27-<100 m	BAL-12.5	N/A	N/A
4	Class B Woodland	Flat/upslope (0°)	29-<100 m	BAL-12.5	N/A	N/A
5	Class B Woodland	Flat/upslope (0°)	29-<100 m	BAL-12.5	N/A	N/A
6	Class B Woodland	Flat/upslope (0°)	14-<20 m	BAL-29	2 m	BAL-19
11	Excluded – Clause 2.2.3.2 [c]	N/A	N/A	N/A	N/A	N/A
12	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A	N/A
13	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A	N/A
Determined highest BAL						BAL-29

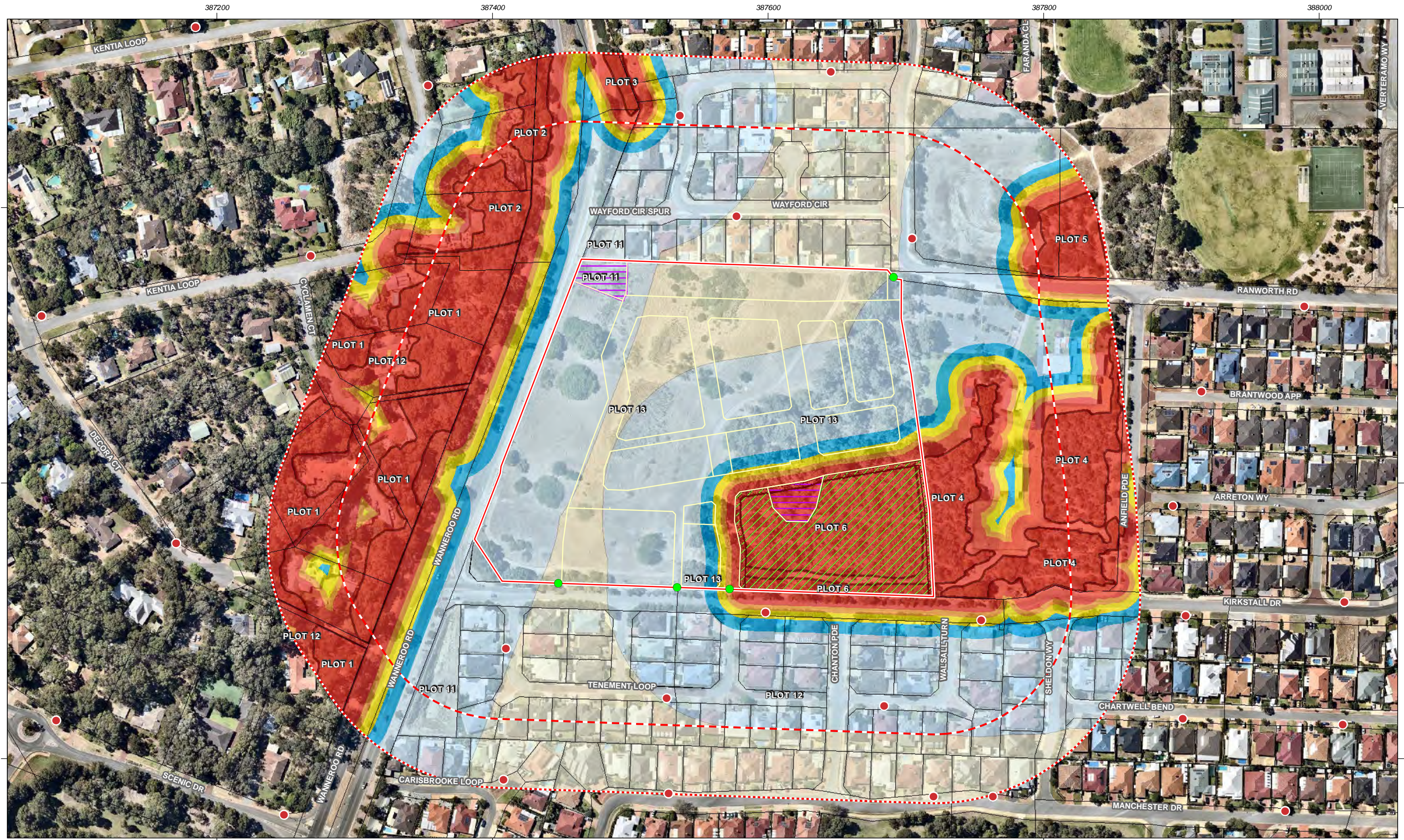


Figure 5: BAL contour map and bushfire management measures

<p>Scale 1:2,500 at A3</p> <p>0 25 50 m</p> <p>Coordinate System: GDA 1994 MGA Zone 50</p> <p>Date: 15/08/2019</p>	Legend		Proposed development Water hydrant Connection to existing public road network	BAL contours BAL FZ BAL 19 BAL 40 BAL 12.5 BAL LOW
	Project area 100m assessment area 150m assessment area Cadastral boundaries	Drainage POS 3.8m wide low fuel zone Classified vegetation		

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4. Identification of bushfire hazard issues

4.1 Bushfire context

Land to the north and south of the project area constitutes existing urban residential development in the form of roads, residential buildings and low threat managed landscaping that does not pose a bushfire threat.

Land to the east of the project area is the site of St Elizabeth's Catholic Primary School and represents land under ownership of the proponent and the balance portion of Lot 594. This site contains a fragmented woodland vegetation extent that has the potential to result in moderately elevated levels of radiant heat and ember attack should bushfire occur. However, the bushfire risk is readily manageable through proposed interfacing roads and increased building construction standards where applicable.

Land to the west of the project area consists of larger lot residential development that comprises a potential bushfire threat; albeit significantly fragmented by dwellings and the 45 m wide Wanneroo Road reserve interface. The potential bushfire impacts from this vegetation extent would be predominantly related to ember attack and small to moderate elevations in radiant heat, which are deemed readily manageable via a combination of the interfacing road reserve separation (Wanneroo Road) and increased building construction standards where applicable.

The on-site woodland extent proposed to be retained within POS to the southeast is considered to be the most significant bushfire threat to the site due to its proximity to proposed development. Bushfire behaviour has the potential to exhibit elevated levels of radiant heat and ember attack. On completion of development and landscaping, the retained vegetation component may well be less than 1 ha in size, but consideration has been given to potential fire spread to/from additional vegetation linkages to the east. On this basis, the bushfire treatment response has largely focussed on initial separation and access at the POS interface through provision of a 14.2 m wide road reserve, plus a 3.8 m wide low threat fuel zone. This will provide a total of 18 m separation to proposed lot boundaries. Furthermore, minimum R-code building setbacks of 2 m will likely be enforced to increase this separation to 20 m and achieve a subsequent rating of BAL-19 building construction standard for future dwellings at this bushland interface.

4.2 Bushfire hazard issues

Examination of strategic development design in accordance with the Structure Plan amendment (Figure 1) and post-development BAL contours has identified the following bushfire hazard issues to be considered at future planning stages:

1. Based on the proposed post-development vegetation extent and location of lots/internal roads, all future lots/habitable buildings will achieve a compliant rating of BAL-29 or lower, as demonstrated in Figure 5.
2. The existing and proposed public road network will provide the necessary low threat separation to ensure a compliant BAL-29 rating or lower is achieved for all habitable development without the need to enforce additional Asset Protection Zone (APZ) provisions. Notwithstanding, any POS areas proposed to be landscaped as low threat will meet APZ standards (refer to Appendix 3), including any excludable drainage areas, active turfed POS and the proposed 3.8 m wide low fuel zone. Low threat staging buffers will also need to be considered to manage any on-site temporary vegetation/BAL impacts during rollout of individual stages.
3. Detailed landscaping plans will be required at the subdivision stage to confirm the extent of post-development classified vegetation/exclusions and subsequent BAL impacts imposed by on-site POS to the southeast. The proposed drainage site to the northwest will remain excluded based on size and proximity to other areas of classified vegetation.

4. The concept design makes provisions for future public access connections to Ranworth Road in the northeast and Kirkstall Drive in the south. Wanneroo Road will also provide future road connections for the proposed commercial precinct to the west, ensuring that the proposed development exceeds the requirements for provision of two different public access routes to two different destinations. Provision/construction of public access in advance (both permanent and temporary) may need to be considered during rollout of staging to ensure each individual stage of development is serviced by two different vehicular access routes.
5. The proposed public access connection to Ranworth Road in the northeast will consist of a 15 m long compliant Emergency Access Way (EAW) in consideration of the sight/view constraints associated with the road elbow at this location and subsequent constraints on providing a formal public road intersection.
6. Proposed development will be connected to a reticulated water supply and network of hydrants, design and engineered to comply with relevant Water Corporation standards.

Based on the above information, Strategen-JBS&G considers the bushfire hazards within and adjacent to project area and the associated bushfire risks are readily manageable through standard management responses outlined in the Guidelines and AS 3959. These responses will be factored into proposed subdivision design as early as possible to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life, property and environmental assets.

5. Assessment against the bushfire protection criteria

5.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 5.

Table 5: Compliance with the bushfire protection criteria of the Guidelines

Bushfire protection criteria	Method of compliance	Proposed bushfire management strategies
	Acceptable solutions	
Element 1: Location	A1.1 Development location	The BAL contour assessment (see Figure 5 and Table 4) identifies all proposed development cells as having capacity to achieve a rating of BAL-29 or lower.
Element 2: Siting and design	A2.1 Asset Protection Zone	Existing and proposed public roads will achieve the necessary separation provisions for a rating of BAL-29 or lower to be achieved without requiring the enforcement of any formal APZs. Notwithstanding, any POS areas that are to be excluded as being low threat managed will need to meet the provision of the APZ standards as outlined in Appendix 3.
Element 3: Vehicular access	A3.1 Two access routes.	On completion of development, the existing public road network and proposed internal access will provide all occupants with the option of travelling to more than two different destinations. Two access points are proposed along Kirkstall Drive to the south for the residential component with a third point of public access proposed as an EAW to the northeast via connection with Ranworth Road. Two access points are also proposed for the commercial precinct via connections to Wanneroo Road. Two vehicular access routes are also to be provided during all stages of development.
	A3.2 Public road	All public roads will be constructed to the relevant technical requirements of the Guidelines (see Appendix 4).
	A3.3 Cul-de-sac (including a dead-end-road)	No permanent cul-de-sacs are proposed as part of the development and the project area is not serviced by an existing cul-de-sac. Any temporary cul-de-sacs required as part of internal staging will be less than 200 m in length, will include minimum 17.5 m diameter turn-around heads and are to be constructed to the relevant technical requirements of the Guidelines (see Appendix 4).
	A3.4 Battle-axe	N/A – no battle-axes are proposed as part of the development and the project area is not serviced by an existing battle-axe.
	A3.5 Private driveway longer than 50 m	N/A – no private driveways longer than 50 m will be required as part of development.
	A3.6 Emergency access way	A 15 m long EAW will be implemented in the northeast of the site via connection with Ranworth Road. The EAW will be constructed to the relevant technical requirements of the Guidelines (see Appendix 4).
	A3.7 Fire service access routes (perimeter roads)	N/A - no permanent fire service access routes are proposed or required.

Bushfire protection criteria	Method of compliance	Proposed bushfire management strategies
	Acceptable solutions	
	A3.8 Firebreak width	<p>Development is required to comply with the requirements of Acceptable Solution A3.8 and the annual City Firebreak Notice (refer to Appendix 6) and below:</p> <p>Vacant residential land with an area of less than 4000 m²</p> <ul style="list-style-type: none"> individual lot boundary firebreaks will not be required given individual lots will be subject to slashing and maintenance to a height of no more than 50 mm and removal of all flammable materials. <p>Land with an area of 4000 m² or more</p> <ul style="list-style-type: none"> a 3 m wide bare earth and cleared 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 where 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 fire break around the obstacle. If this variation requires the firebreak to be greater than 5 m away from the external boundary, a 'firebreak variation' is required ensure a minimum vertical clearance of 3.5 m is maintained along the firebreaks to ensure vehicles can drive along firebreaks without being impeded by tree branches. <p>Firebreak requirements (as per the above provisions) for the proposed on-site POS cell in the southeast are considered to be already in place, as mapped in Figure 5.</p>
Element 4: Water	A4.1 Reticulated areas	The proposed development will be connected to a reticulated water supply and network of street hydrants via extension from surrounding development in accordance with Water Corporation's Design Standard 63 requirements. Existing street hydrants are located along the surrounding road network as depicted in Figure 5.
	A4.2 Non-reticulated areas	N/A – the proposed development is located within an existing reticulated area.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A – the proposed development is located within an existing reticulated area.

6. Responsibilities for implementation and management of the bushfire measures

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. Aside from the preparation of future BMPs to accompany future subdivision and development applications where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Future BMPs prepared for subsequent subdivision and development applications are to meet the relevant commitments outlined in this strategic level BMP where appropriate, address the relevant requirements of SPP 3.7 (i.e. Policy Measures 6.4 and 6.5 respectively) and demonstrate in detail how the proposed development will adhere to the relevant acceptable solutions or meet the performance requirements of the Guidelines. Future BMPs are to include the following detailed information:

- proposed lot layout (for subdivisions) or development layout (for DAs), including any POS and drainage areas
- detailed landscaping design/plans in regard to POS and drainage areas that provide justification/confirmation of the post-development classified vegetation/exclusion extent, consistent with the provisions of this BMP
- detailed mapping of the post-development classified vegetation extent and effective slope
- BAL contour mapping demonstrating that proposed development areas will achieve BAL–29 or lower
- width and alignment of compliant APZs/setbacks where required
- confirmation of how bushfire management will be addressed during development staging, in particular with regards to low threat staging buffers and vehicular access
- proposed approach to fuel management for post-development exclusions where required
- proposed approach to AS 3959 application in response to any post-development classified vegetation
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of development in accordance with Acceptable Solution A3.1
- water supply provisions with regards to reticulated water
- requirements for any future vulnerable land uses, such as provision of a Bushfire Emergency Evacuation Plan (if relevant)
- requirements for any future high-risk land uses, such as provision of a Bushfire Risk Management Plan (if relevant)
- provisions for notifications on Title for any future lots with a rating of BAL–12.5 or greater as a condition of subdivision
- compliance requirements with the current City's annual firebreak notice
- construction of Class 1, 2, 3 or associated 10a buildings in accordance with AS 3959 to the assessed BAL rating
- requirements for a BMP/BAL compliance report as a condition of subdivision
- compliance assessment against the bushfire protection criteria of the Guidelines
- proposed implementation and audit program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation.

On the basis of the information contained in this BMP, Strategen-JBS&G considers the bushfire hazards both within and adjacent to the project area, and the associated bushfire risks are readily manageable through standard management responses outlined in the Guidelines and AS 3959. Strategen-JBS&G considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

7. References

- Department of Fire and Emergency Services (DFES) 2018, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from:
<https://maps.slip.wa.gov.au/landgate/bushfireprone/>, [14/08/2019].
- 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.
- 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) 2017, *Guidelines for Planning in Bushfire Prone Areas*, Version 1.3 August 2017, Western Australian Planning Commission, Perth.

Appendix 1
Landscape Plan

LEGEND

- Structure Plan Boundary
- POS Boundary
- Informal Pedestrian Path
- Jacksonia Sericea (P4)
- Clearing Permit Protection Area
- 3.8m perimeter Low Fuel Zone
- Retained Black Cockatoo Significant Tree



INDICATIVE POS CONCEPT PLAN

LOT 594 WANNEROO ROAD, HOCKING

our ref: BAR HOC_DES_ILL_002 A POS CONCEPT PLAN



Appendix 2
Vegetation plot photos and
descriptions



Photo ID: 1a

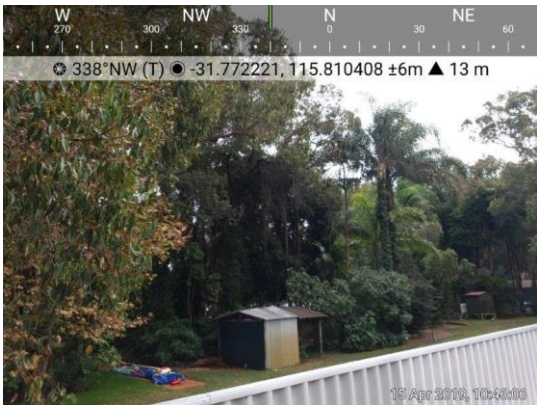


Photo ID: 1b

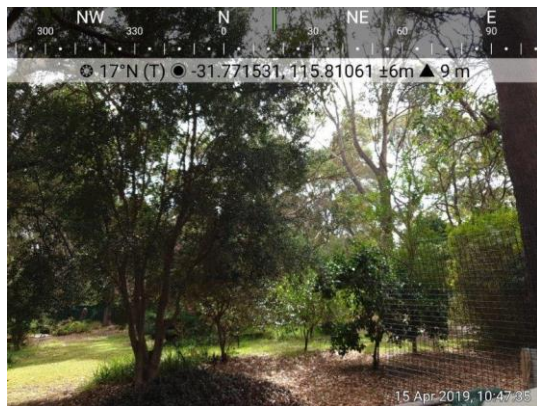


Photo ID: 1c



Photo ID: 1d

Plot number		Plot 1
Vegetation classification	Pre-development	Class B Woodland
	Post-development	Class B Woodland
Description / justification		Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)

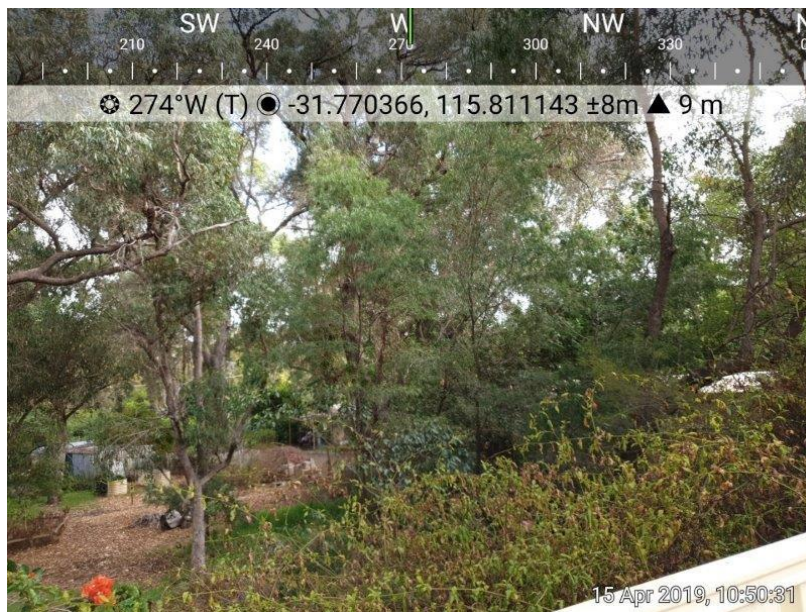


Photo ID: 2

Plot number		Plot 2
Vegetation classification	Pre-development	Class B Woodland
	Post-development	Class B Woodland
Description / justification		Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)

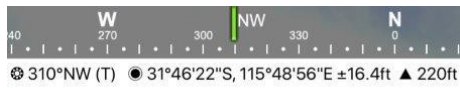


Photo ID: 4a



Photo ID: 4b



Photo ID: 4c

Plot number		Plot 4
Vegetation classification	Pre-development	Class B Woodland
	Post-development	Class B Woodland
Description / justification		Dominated by a mixture of eucalypts and banksia with a grassy understorey, lacking a shrubby middle layer.

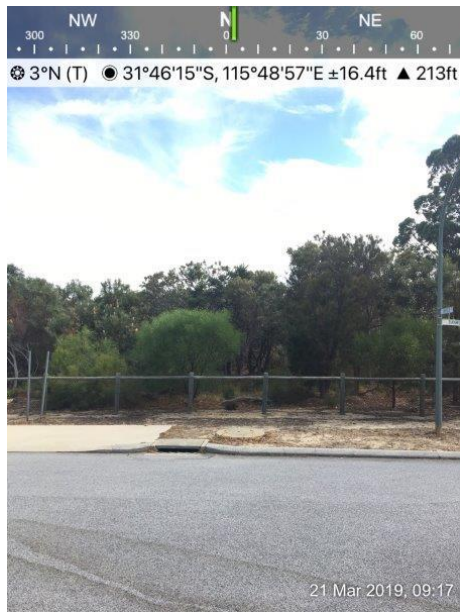


Photo ID: 5

Plot number		Plot 5
Vegetation classification	Pre-development	Class B Woodland
	Post-development	Class B Woodland
Description / justification		Dominated by a mixture of eucalypts and banksia with a grassy understorey, lacking a shrubby middle layer.

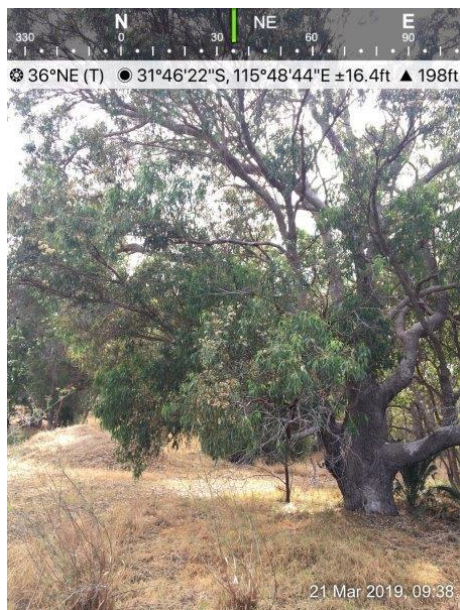


Photo ID: 6a

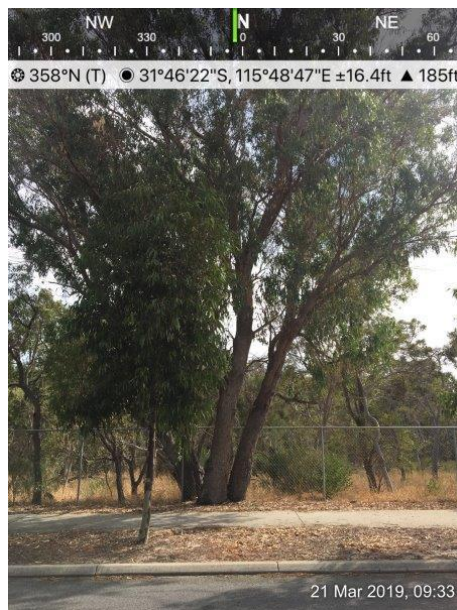


Photo ID: 6b

Plot number		Plot 6
Vegetation classification	Pre-development	Class B Woodland
	Post-development	Class B Woodland
Description / justification		Dominated by a mixture of eucalypts and banksia with a grassy understorey, lacking a shrubby middle layer.

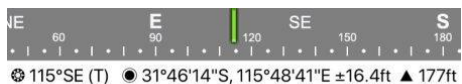


Photo ID: 7

Plot number		Plot 7
Vegetation classification	Pre-development	Class C Shrubland
	Post-development	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])
Description / justification		Dominated by shrubs less than 2 m in height with a continuous fuel profile.



Photo ID: 8a



Photo ID: 8b

Plot number		Plot 8
Vegetation classification	Pre-development	Class D Scrub
	Post-development	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])
Description / justification		Dominated by shrubs greater than 2 m in height with a continuous fuel profile.



Photo ID: 9

Plot number		Plot 9
Vegetation classification	Pre-development	Class G Grassland
	Post-development	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])
Description / justification		Dominated by grasses, weeds and a fine fuel structure greater than 10 cm in height.



Photo ID: 10

Plot number		Plot 10
Vegetation classification	Pre-development	Class G Grassland
	Post-development	Excluded – Clause 2.2.3.2 [c]
Description / justification		Dominated by grasses, weeds and a fine fuel structure greater than 10 cm in height. Post-development conditions will isolate this drainage cell to achieve Clause 2.2.3.2 (c) exclusion (i.e. less than 0.25 ha in size and greater than 20 m to any other classified vegetation).



Photo ID: 11

Plot number		Plot 11
Vegetation classification	Pre-development	Excluded – Clause 2.2.3.2 [c]
	Post-development	Excluded – Clause 2.2.3.2 [c]
Description / justification		Vegetation less than 0.25 ha in size and greater than 20 m to any other classified vegetation.



Photo ID: 12a

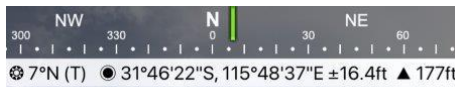


Photo ID: 12b



Photo ID: 12c

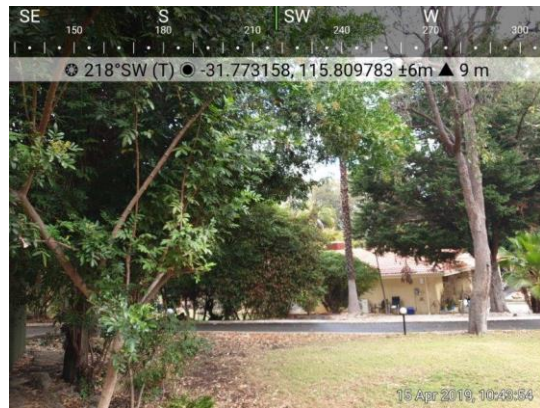


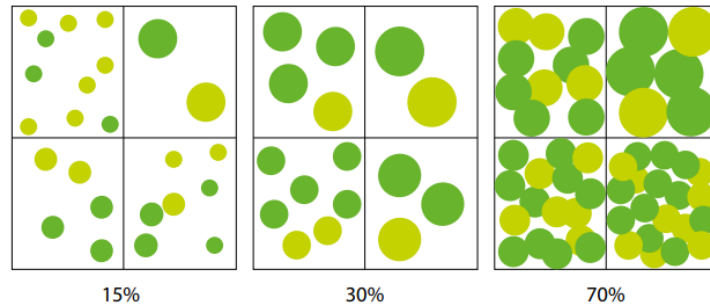
Photo ID: 12d

Plot number		Plot 12
Vegetation classification	Pre-development	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])
	Post-development	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])
Description / justification		Existing non-vegetated and low threat areas surrounding the project area.

Appendix 3
APZ standards (Schedule 1 of the
Guidelines

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.



- **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 5m² 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 4
Vehicular access technical standards of
the Guidelines

Public roads

Acceptable solution A3.2

A public road is to meet the requirements in Table 1, Column 1.

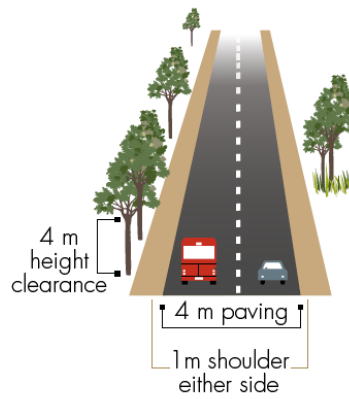
Explanatory note E3.2

Trafficable surface:

Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders. In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services.

Public road design:

All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them.



Cul-de-sac (including a dead-end road)

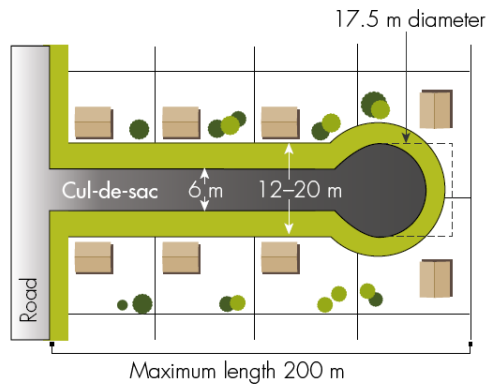
Acceptable solution A3.3

A cul-de-sac and/ or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/ or will need to be demonstrated by the proponent), the following requirements are to be achieved:

- Requirements in Table 1, Column 2
- Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres)
- Turn-around area requirements, including a minimum 17.5 metre diameter head.

Explanatory note E3.3

In bushfire prone areas, a cul-de-sac subdivision layout is not favoured because they do not provide access in different directions for residents. In some instances it may be possible to provide an emergency access way between cul-de-sac heads to a maximum distance of 600 metres, so as to achieve two-way access. Such links must be provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency. A cul-de-sac in a bushfire prone area is to connect to a public road that allows for travel in two directions in order to address Acceptable Solution A3.1.



Emergency access way

Acceptable solution A3.6

An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet all of the following requirements:

- Requirements in Table 1, Column 4
- No further than 600 metres from a public road
- Provided as right of way or public access easement in gross to ensure accessibility to the public and fire services during an emergency
- Must be signposted.

Explanatory note E3.6

An emergency access way is not a preferred option however may be used to link up with roads to allow alternative access and egress during emergencies where traffic flow designs do not allow for two-way access. Such access should be provided as a right-of-way or easement in gross to ensure accessibility to the public and fire emergency services during an emergency.

The access should comply with minimum standards for a public road and should be signposted. Where gates are used to control traffic flow during non-emergency periods, these must not be locked. Emergency access ways are to be no longer than 600 metres and must be adequately signposted where they adjoin public roads.

Where an emergency access way is constructed on private land, a right of way or easement in gross is to be established.

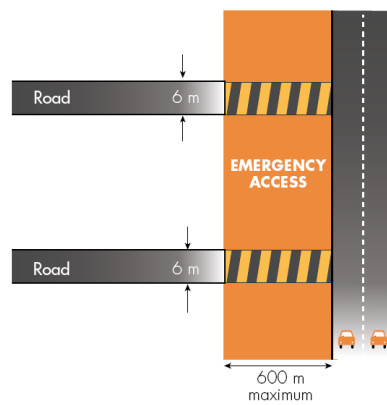


Table 1: Vehicular access technical requirements

Technical requirement	1	2	3	4	5
	Public road	Cul-de-sac	Private driveway longer than 50 m	Emergency access way	Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15			
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5

* Refer to E3.2 Public roads: Trafficable surface

Appendix 5
Water technical standards of the
Guidelines

Reticulated areas	
Acceptable solution A4.1	The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.
Explanatory note E4.4	Water supply authorities in Western Australia include the Water Corporation, Aqwest and the Busselton Water Board. The Water Corporation's 'No. 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply.

Appendix 6
City of Wanneroo Firebreak Notice
(2018/2019)

Under the Bushfires Act (1954), all owners and occupiers of land in Western Australia must establish and maintain fire breaks.

Fire breaks and protection measures are vital in assisting the prevention of fires spreading and to allow safer access for bushfire fighters and vehicles.

Land with an area of less than 4,000m²

- A fire break, not less than three (3) metres wide must be cleared immediately inside (or as close as possible) around all external boundaries of the land.
- All tree branches that over-hang a fire break must be trimmed back to a minimum height of three and a half (3.5) metres above ground level and the growth on the fire break cannot exceed fifty (50) millimetres high.

Land with an area of 4,000m² or more

- A fire break, not less than three (3) metres wide, must be cleared immediately inside (or as close as possible) around all external boundaries of the land.
- All tree branches that over-hang a fire break must be trimmed back to a minimum height of three and a half (3.5) metres above ground level and the growth on the fire break cannot exceed fifty (50) millimetres high.

Buildings

- Install and maintain a twenty (20) metre building protection zone surrounding all buildings, large hay stacks and fuel storage areas. A building protection zone includes undertaking measures such as pruning all lower tree branches to prevent fire entering the trees, ensuring three (3) metre spacing between tree canopies to prevent treetop fires spreading between trees, keeping all grasses to a height of not more than fifty (50) millimetres and storing all firewood piles more than twenty (20) metres away from the buildings.

APPLICATION TO VARY THE ABOVE REQUIREMENTS

If it is considered impracticable for any reason to implement any of the requirements of this Notice, application may be made not later than the 18th of October 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.

ADDITIONAL WORKS

In addition to the requirements of this Notice, you may be required to carry out further works which are considered necessary by an Authorised Officer and specified by way of a separate written notice forwarded to the address of the owner/s as shown on the City of Wanneroo rates record for the relevant land.



Minimum clearances 3.5m above ground level dependent upon land area.



Non-compliant: no fire break installed inside boundary fence



Compliant: grass slashed to ground level



Non-compliant: mineral earth fire break showing grass/weed regrowth



Compliant: mineral earth fire break



Non-compliant: thick scrub creates a fire hazard around power poles



Compliant: cleared buffer zone around power poles



