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The Grove

Bushfire Management Plan

Prepared for
The Grove (WA) Pty Ltd
by Strategen

May 2018



The Grove

Bushfire Management Plan

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

May 2018

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Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Document control

Client: The Grove (WA) Pty Ltd

Report Version	Revision No.	Purpose	Strategen author	Strategen reviewer and accreditation details	Submitted to Client	
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Draft Report	A	For client review	C Turner	L Wears BPAD19809	Electronic (email)	10/05//2018
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1. Proposal details

The Grove (WA) Pty Ltd (the Proponent) is seeking to lodge a Local Development Plan to facilitate development of aged care housing and an aged care facility at Lot 500 Gavour Road, Wattle Grove (the project area) in the City of Kalamunda (the City). The Local Development Plan (LDP; Figure 1) identifies 193 aged care 'lots', an aged care facility, two club houses and an internal road network.

The project area is approximately 15 ha and as depicted in Figure 2 is surrounded by:

- Welshpool Road, Special Rural properties and Bush Forever Site 50 to the north
- Special Rural properties to the east, south and west.

The project area is designated as Bushfire Prone on the WA *Map of Bush Fire Prone Areas* (DFES 2017; see Plate 1).

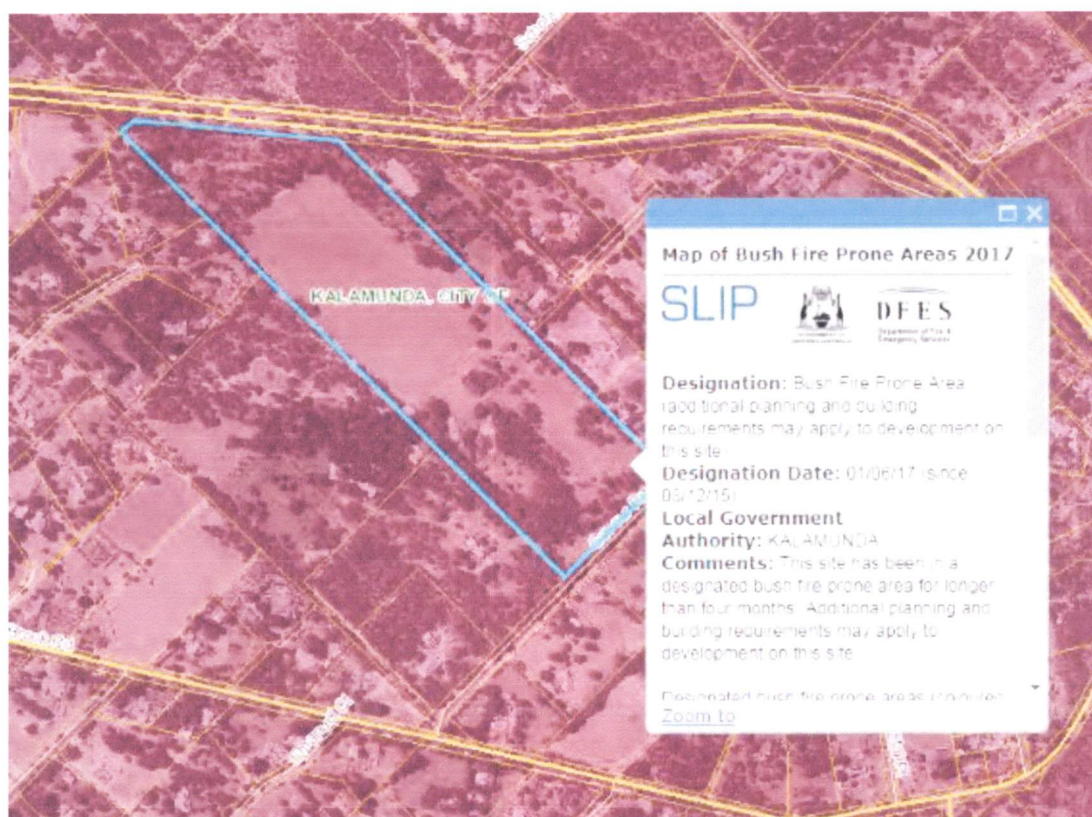


Plate 1: Bush Fire Prone Area mapping across entire lot, as indicated in pink/ purple

Adjacent rural residential lots to the north are being investigated for future urban development.

This BMP has been prepared to accompany the LDP to address the requirements of the City of Kalamunda, *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).

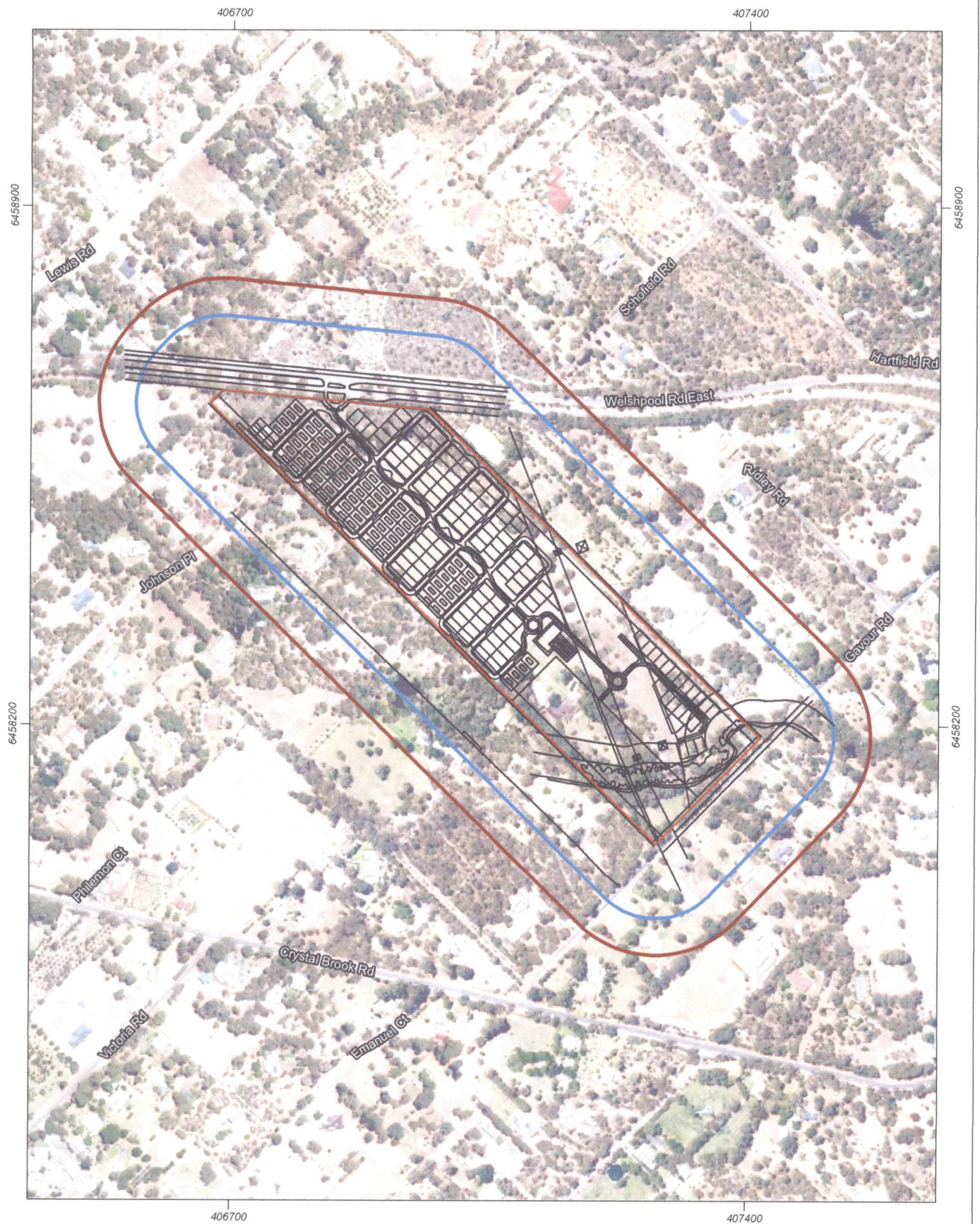


Figure 1: Local Development Plan

Scale: 1:7,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 10/05/2018
 Author: VD
 Source:

Legend

- Development layout
- Project area
- 100m wide assessment area
- 150m wide assessment area

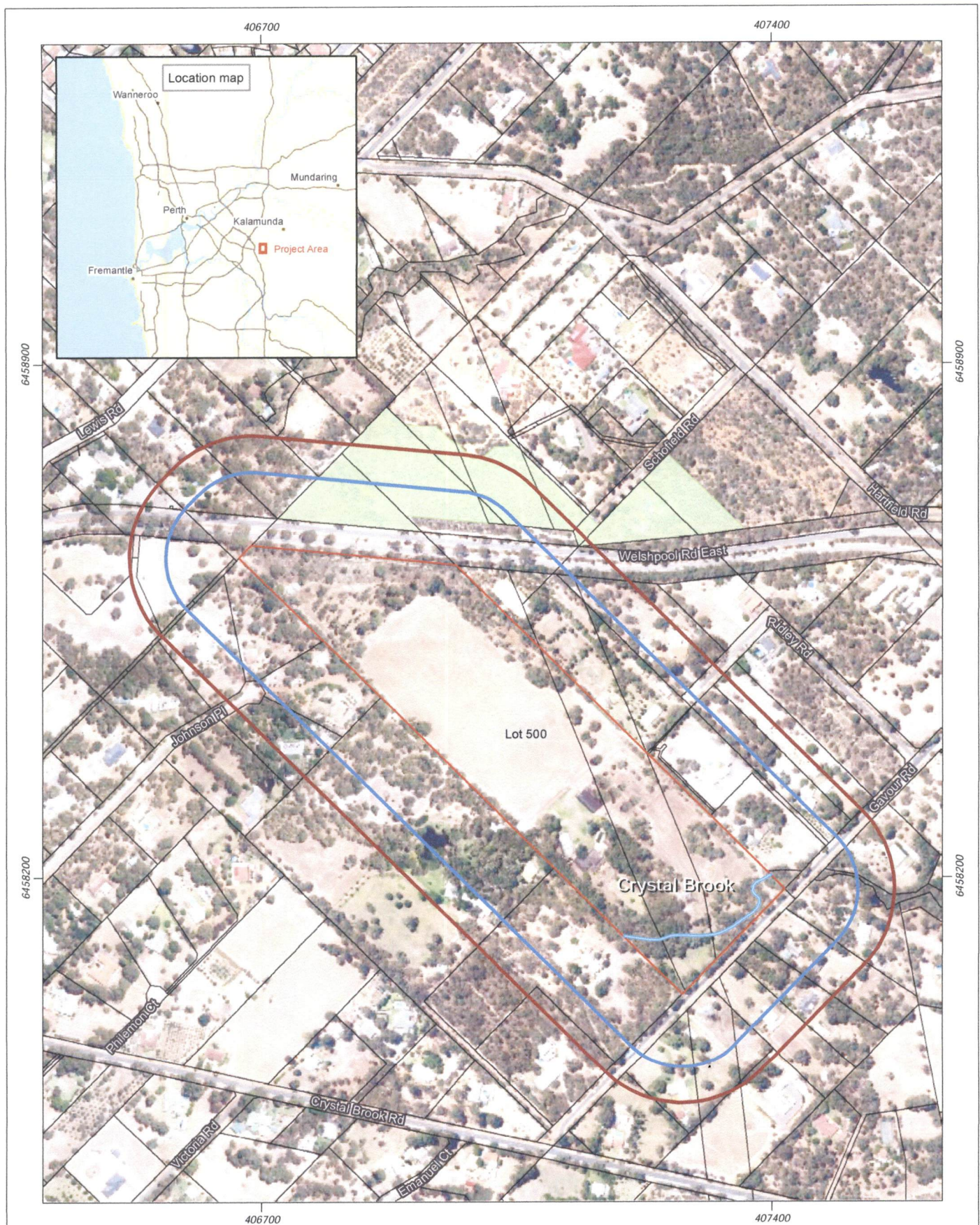


Figure 2: Site overview

Scale 1:7,000 at A4



Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 10/05/2018

Author: VD

Source:

Legend

- Creek line
- Project area
- 100m wide assessment area
- 150m wide assessment area
- Bush Forever site
- Cadastre

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ENVIRONMENTAL
info@strategen.com.au
www.strategen.com.au

2. Environmental considerations

2.1 Native vegetation – modification and clearing

2.1.1 Vegetation and clearing within project area

A flora and vegetation survey was undertaken by Strategen on 3 May 2016 which identified remnant vegetation within the north-west and northern portion of the project area, as well as adjacent to Crystal Brook.

In order to facilitate the development, all vegetation within the project area will be cleared or managed in a low-threat state, consistent with exclusion Clauses 2.2.3.2 (e) and (f) of AS3959, with the exception of vegetation adjacent to Crystal Brook. Vegetation adjacent to Crystal Brook is currently proposed to be remediated to remove exotic species, and thinned to a structure consistent with Class G grassland, including ensuring that canopy cover is reduced to less than 10%.

2.1.2 Vegetation and clearing external to project area

In order to facilitate construction of a cross-over from Welshpool Road to the project area, vegetation within the Welshpool Road will be cleared and/ or managed in a low threat state in accordance with Clauses 2.2.3.2 (e) and (f) of AS3959.

Prior to clearing vegetation within the road reserve, permission from the relevant land manager will be required as well as a clearing permit.

2.2 Environmental approvals

Clearing of native vegetation within the project area and Welshpool Road reserve will require approval (clearing permit) under Part V of the State *Environmental Protection Act 1986* unless a valid exemption applies. The proponent may also wish to submit a referral under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act) at subsequent planning stages, depending on any impacts to Matters of National Environmental Significance (MNES) that may be identified.

2.3 Revegetation / Landscape Plans

The entire project area, with the exception of Crystal Brook, will be landscaped with non-vegetated and low threat elements, consistent with exclusion Clauses 2.2.3.2 (e) and (f) of AS3959. In addition, the portion of the Welshpool Road reserve abutting the project area will also be cleared and landscaped with low threat vegetation to create an entrance statement and cross-over. Where development constraints permit and low threat vegetation can be achieved, existing trees will be retained.

Vegetation adjacent to Crystal Brook is proposed to be 'thinned' to remove exotic and introduced species, and reconfigured to a vegetation structure consistent with Class G grassland, including reducing canopy cover to less than 10% with a grassland understory typically <1 m in height. The landscape concept plan prepared for the project area includes reconfiguration of vegetation adjacent to Crystal Brook which will be subject to approval by the City of Kalamunda.

3. Bushfire assessment results

3.1 Assessment inputs

3.1.1 Classified vegetation

Strategen assessed classified vegetation and exclusions within 150 m of proposed development through on-ground verification on 6 February 2018 in accordance with *AS 3959—2009 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2009). Results are depicted in Figure 3 and georeferenced site photos are contained in Appendix 1.

A summary of the post-development classified vegetation is as follows:

- Class B woodland occurs to the north, west and east within Special Rural landholdings and Bush Forever Site 50, and to the south-east within Gavour Road reserve and adjacent to Crystal Brook
- land to the north and area of proposed on-site POS in the northern corner of the project area and comprises banksia woodland or sparse eucalyptus woodland
- Class G grassland occurs to the south-east within Special Rural landholdings and is also proposed within the project area, adjacent to Crystal Brook.

A large portion of the site has been historically cleared and is currently managed in a low-threat state. Any areas of vegetation existing within the project area, as well as the portion of the Welshpool Road reserve abutting the project area will be subject to vegetation clearing, landscaping and ongoing fuel-load management. This will achieve a low threat state in accordance with Clause 2.2.3.2 (e) and (f) of AS3959 across the entire project area, with the exception of vegetation adjacent to Crystal Brook, which will be consistent with Class G grassland.

A summary of the assessed exclusions are as follows:

- Clause 2.2.3.2 (e) occurs throughout all areas of non-vegetated land such as land cleared for existing roads and proposed internal driveway network, proposed dwellings, club houses and aged care facility, and firebreaks required under the City's *Firebreak and Fuel Load Notice* (Appendix 2)
- Clause 2.2.3.2 (f) occurs throughout all land managed in a minimal fuel low threat condition, such as portions of existing managed Special Rural landholdings surrounding the project area.

3.1.2 Effective slope

Strategen assessed effective slope under classified vegetation through on-ground verification 6 February 2018 in accordance with AS 3959.

Regional topographic contours indicate that elevation across the project area ranges from approximately 36 Australian Height Datum (mAHD) in the north-west to approximately 50 mAHD in the south-east.

Site observations and regional contour data indicate that classified vegetation within the project area and adjacent 150 m is predominantly situated on flat/upslope land. Land beneath classified vegetation to the west of the project area, and adjacent to Crystal Brook was observed as downslope 0 to 5 degrees (Figure 3).

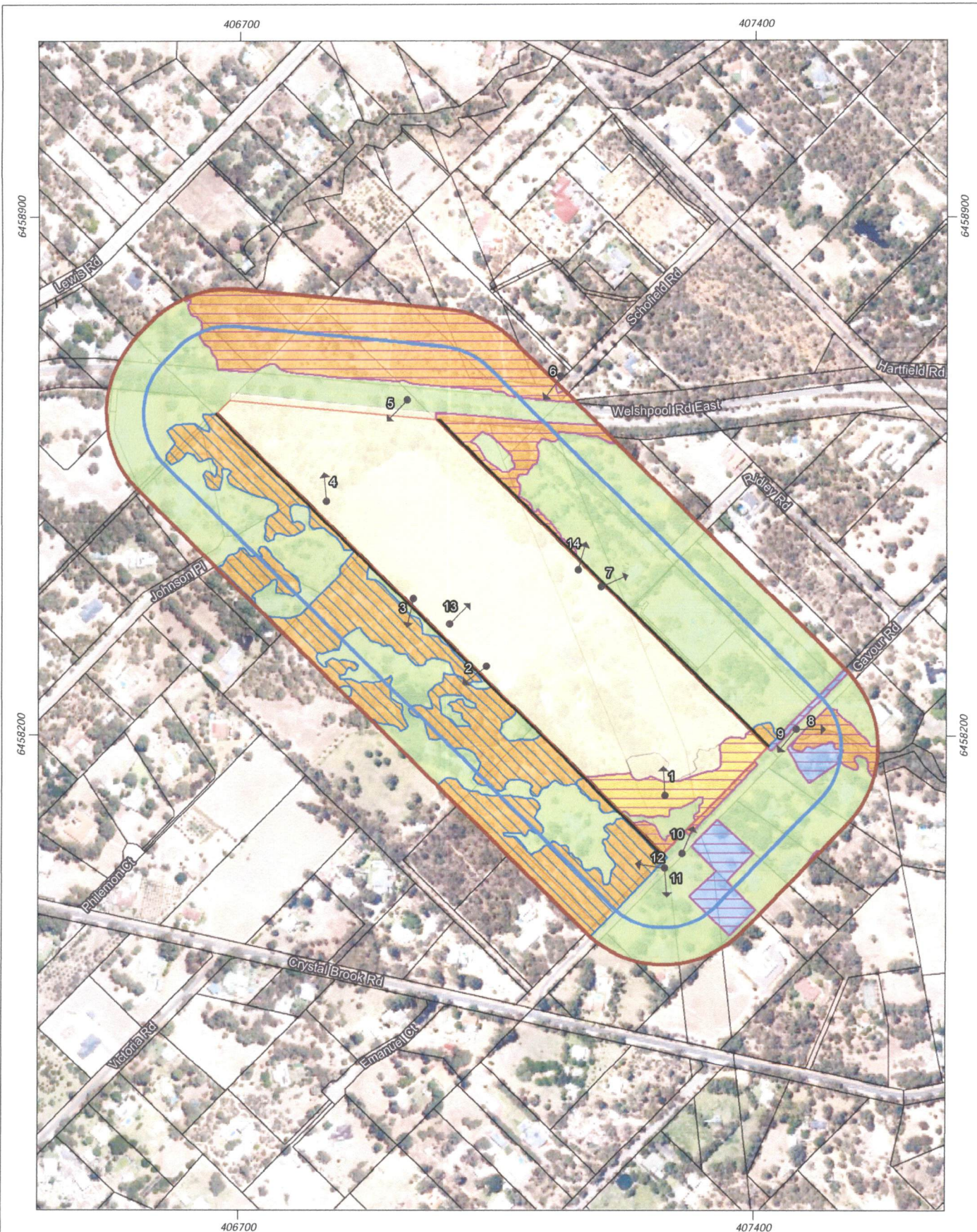


Figure 3: Post-development vegetation class and effective slope

Scale 1:7,000 at A4

0 70 140 210 m

Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 8/05/2018

Author: VD

Source:

Legend

→ Photo direction

□ Cadastre

□ Project area

□ 100m wide assessment area

□ 150m wide assessment area

□ 3m wide firebreak

Slope

□ Flat/Upslope

□ Downslope 0-5 degrees

Vegetation class

□ Class B Woodland

□ Class G Grassland

□ Area to be modified to low threat

□ Area to be modified to Class G Grassland

□ Excluded under Clause (e) or (f)

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www.strategen.com.au

Path: Q:\Consult\2018\RCA\RCA18043\GIS_documents\ArcMap_documents\RCA18043_G005_RevA.mxd

3.2 Assessment outcomes

Any proposed habitable development that cannot achieve 100 m separation from post-development classified vegetation will require application of AS3959 to determine appropriate location and siting of development and potential increased building construction standards in response to the assessed bushfire attack level (BAL).

Strategen has undertaken an indicative BAL contour assessment in accordance with Method 1 of AS 3959 for the project area on the basis that the proposed development layout has been identified. The indicative BAL contour assessment is based on the anticipated post-development conditions within the site and is relies on several clearing and management assumptions (detailed in Section 5). The Method 1 procedure for calculating the BAL (as outlined in AS 3959) incorporates the following factors:

- state-adopted FDI rating
- vegetation class
- 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 development and subsequently informs the standard of building construction (for building Classes 1, 2, 3 and associated 10a) and/or setbacks required for proposed development to potentially withstand such impacts.

The assessed indicative BAL contours are depicted in Figure 4.

The width of each BAL contour in Figure 4 is set in accordance with AS 3959 and reflects the relevant BAL rating applicable to the respective Class B woodland or Class G grassland vegetation types situated on the assessed slope (refer to Table 1). Where BAL contours differ based on the different BAL application distances associated with the vegetation classifications, the highest (worst case) BAL has been applied.

The BAL contours are based on post-development conditions, including the following assumptions:

- clearing, landscaping an ongoing management of the entire project area and portion of the Welshpool Road reserve abutting the site, in a low threat condition in accordance with Clause 2.2.3.2 (f) of AS3959 (with the exception of Crystal Brook vegetation described below)
- reconfiguration of Crystal Brook vegetation to a structure and fuel load consistent with Class G vegetation
- the installation of 3 m bare-earth firebreaks within adjacent land holdings immediately inside the lot boundary.

Given future clearing, management and vegetation modification proposed, the BAL contours can be reassessed at future development stages in accordance with any requirements of the City, prior to issuing of a building licence to confirm that measures specified within this BMP have been implemented. Should there be any additional changes in development design or classified vegetation extent that requires a modified bushfire management response, then the BAL contours will also need to be reassessed.

Table 1: Method 1 BAL calculation

Classified vegetation	Effective slope	BAL contour width (m)	BAL rating
Class B woodland	All up-slopes and flat land (0 degrees)	<10	BAL-FZ
		10-<14	BAL-40
		14-<20	BAL-29
		20-<29	BAL-19
		29-<100	BAL-12.5
	Downslope 0 to 5 degrees	<13	BAL-FZ
		13-<17	BAL-40
		17-<25	BAL-29
		25-<35	BAL-19
		35-<100	BAL-12.5
Class G	All up-slopes and flat land (0 degrees)	<6	BAL-FZ
		6-<8	BAL-40
		8-<12	BAL-29
		12-<17	BAL-19
		17-<50	BAL-12.5
	Downslope 0 to 5 degrees	<7	BAL-FZ
		7-<9	BAL-40
		9-<14	BAL-29
		14-<20	BAL-19
		20-<50	BAL-12.5

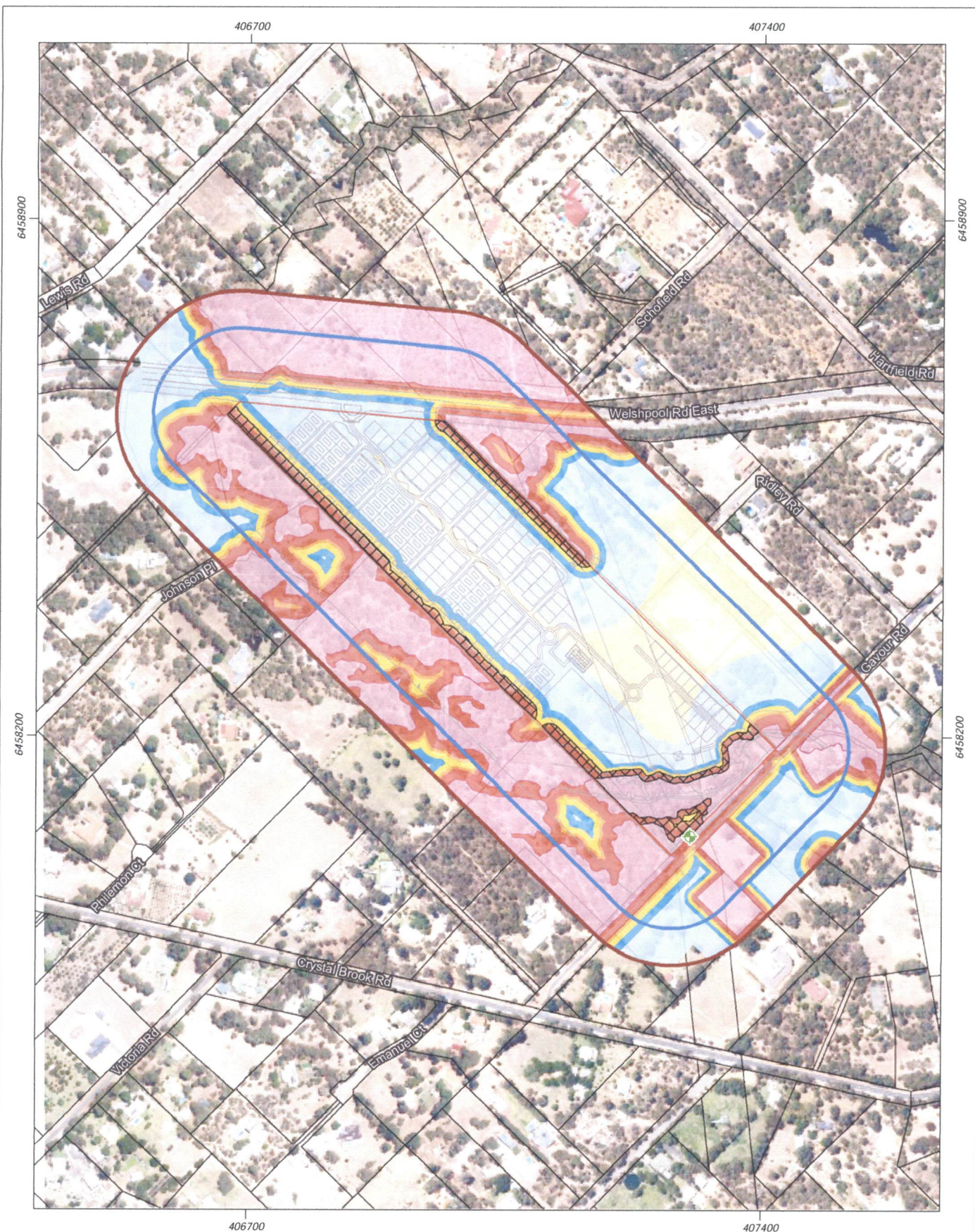


Figure 4: BAL contour map

Scale 1:7,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 10/05/2018
 Author: VD
 Source:

Legend

- | | | | |
|--------------------|---------------------------|--------|----------|
| Proposed EAW | 100m wide assessment area | BAL FZ | BAL 12.5 |
| Development layout | 150m wide assessment area | BAL 40 | BAL Low |
| Cadastre | Indicative APZ | BAL 29 | |
| Project area | Classified vegetation | BAL 19 | |

4. Identification of bushfire hazard issues

While somewhat fragmented, there is a landscape scale bushfire risk associated with vegetation to the east of the project area located within Korung National Park. A bushfire travelling toward the site from the east could have a significant potential fire run through Korung National Park, Banyowla Regional Park and Jarrahdale State Forest.

The localised bushfire risk (within 150 m of the project area) is predominately associated with woodland vegetation within Special Rural landholdings located to the south-west. These areas of vegetation are fragmented and not considered to pose a significant bushfire risk, particularly once mitigation and management measures detailed within this BMP are implemented.

On completion of the development, there will be a reduced bushfire risk to future assets of the site as a result of vegetation clearing and management that will be undertaken to facilitate development. Maintaining cleared or low-threat buffers within the project area, around each stage of development will play an important role in managing the bushfire risk posed to proposed development, and prevention of temporary BAL ratings, from existing onsite vegetation during roll out of individual development stages. This is discussed as a key management measure in Section 5.

In addition, setbacks and Asset Protection Zones (APZs) will be implemented from any classified vegetation to habitable development, resulting in all proposed buildings being located in areas of BAL- 29 or less. This is also discussed as a key management measure in Section 5.

On this basis, Strategen considers the bushfire hazards 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 and management measures outlined in this BMP. These responses will be factored in to proposed development early in the planning process 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

Table 2 below provides an overview of how the 'acceptable solutions' of the Guidelines will be implemented throughout the various stages of the proposed development, to achieve compliance with the bushfire protection criteria.

Table 2: Bushfire protection criteria

Bushfire protection criteria	Method of compliance	Proposed bushfire management	
	Acceptable solutions	Management strategy reference	Management strategy
Element 1: Location	A1.1 Development location	1	Refer to Figure 4, which identifies that all habitable buildings can be located in areas of BAL-29 or lower through the implementation of building setbacks and APZs.
Element 2: Siting and design	A2.1 Asset Protection Zone	2	The BAL contour assessment identifies that the project area can accommodate all proposed buildings in areas of BAL-29 or lower, with the capacity to achieve APZs (as shown indicatively in Figure 4). The final location of APZs will be identified at future planning stages. APZs will be to subject to ongoing management in accordance with standards outlined in the Guidelines (see Appendix 3).
Element 3: Vehicular access	A3.1 Two access routes.	N/A	No public roads are proposed as subdivision of the project area is not proposed. The internal road network is composed of private driveways. The project area will be accessed via the proposed crossover from Welshpool Road which will provide the main entrance to the development. Secondary access/ egress will be provided via an emergency access way (EAW) as discussed against Acceptable solution 3.6.
	A3.2 Public road	N/A	No public roads are proposed as subdivision of the project area is not proposed. The internal driveway network is composed of private driveways.
	A3.3 Cul-de-sac (including a dead-end-road)	N/A	N/A
	A3.4 Battle-axe	N/A	N/A

Bushfire protection criteria	Method of compliance	Proposed bushfire management	
	Acceptable solutions	Management strategy reference	Management strategy
Element 4: Water	A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements contained within the Guidelines	3	The internal driveway network will be constructed to relevant technical requirements under the Guidelines (see Appendix 4). Although not detailed in the current LDP, any 'dead-ends' proposed will be fitted with appropriate turn-around points in accordance with the requirements of the guidelines (see Appendix 4).
	A3.6 Emergency access way	4	An EAW will be provided at the south-eastern end of the project area which will utilise an existing crossover to Gavour Road. The EAW will be constructed to relevant technical requirements under the Guidelines (see Appendix 4).
	A3.7 Fire service access routes (perimeter roads)	N/A	N/A
	A3.8 Firebreak width	5	As the project area is >0.5 ha, a 3-m bare earth firebreak will be required immediately inside the perimeter of the lot boundary, in accordance with the requirements of the City's annual firebreak notice (Appendix 2).
	A4.1 Reticulated areas	6	The project area will be provided a reticulated water supply. Infrastructure proposed within the project area for supply of firefighting water will be determined at each DA stage and may include hydrants, water tanks or a combination of both.
	A4.2 Non-reticulated areas	N/A	N/A
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A	N/A

5.2 Additional management strategies

In addition to the management measures listed in Table 2, the following measures listed in Table 3, should be implemented at subsequent planning and development stages.

Table 3: Additional management strategies

Management strategy reference	Management strategy
7	On-site staging buffers: if development (and therefore clearing) is to occur on a staged basis, clearing in advance will need to occur to ensure building construction is not inhibited by a temporary vegetation extent located within adjacent development stages yet to be cleared. This can be achieved by ensuring that each approved stage subject to construction is surrounded by a 100-m wide, cleared or low threat (in accordance with Clause 2.2.3.2 (e) or (f)) buffer prior to development. Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fine fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage. This will assist in managing the current on-site temporary vegetation hazards.
8	Fuel management within Stages under construction: cleared 'lots' awaiting construction will be managed in a non-vegetated or low threat standard on a regular and ongoing basis by the developer/ land manager until constructed (in accordance with Clauses 2.2.3.2 (e) or (f)). Management will involve slashing/mowing of grassland and weeds to height prescribed under the City of Kalamunda annual firebreak notice (refer to Appendix 4).
9	Fuel management adjacent to Crystal Brook: vegetation adjacent to Crystal Brook is to be remediated to remove exotic species, 'thinned' and landscaped to achieve a Class G grassland vegetation structure in a mature state.
10	Ongoing fuel management across project area: once constructed and landscaped, the project area will be managed on a regular and ongoing basis through slashing, weed control and manual fuel removal to ensure the understorey and surface fuels are kept in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Sparse retention and planting of individual overstorey trees can occur throughout the project area for visual/aesthetic/screening purposes and to retain environmental values where possible. Proposed landscaping plans for the project area will need to reflect the bushfire management measures required under this BMP. Ongoing management will be responsibility of the developer/ land manager.
11	Road verge fuel management: the Welshpool Road reserve abutting the project area will need to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management will be the responsibility of the City.
12	Emergency evacuation plan: a bushfire emergency evacuation plan will be prepared for the proposed aged care facility, which is considered a 'vulnerable land use', at the applicable development application stages.
13	BAL compliance or individual lot BAL assessment at future stages: a BAL compliance report or individual habitable building BAL assessment may be required at the discretion of the City following completion of development works and prior to construction of habitable buildings to confirm the accuracy of BAL assessments depicted in the BMP or demonstrate any change in the assessed BAL or other management measures documented in this BMP, which may occur as a result of changes in building location, vegetation class or bushfire management approach.
14	Building construction standards: all dwellings will be constructed to the assessed BAL rating, either in accordance with this BMP or future reassessment of the BAL to support future planning/building permit stages. AS3959 construction standards are not applicable to the aged care facility building.
15	Compliance with annual firebreak notice: the developer/land manager is to comply with the City's annual firebreak notice (refer to Appendix 2).
16	Preparation of updated BMP or addendum: To support future DAs across the project area, this BMP will need to be updated, or an addendum prepared and submitted in response to any changes in development design, or classified vegetation extent, in accordance with the requirements of SPP3.7.

6. Indicative responsibilities for implementation of bushfire management measures

Proposed management measures identified in this BMP are based on information at the LDP stage. Consequently, a revised BMP(s) including confirmation of the proposed management measures, may be required for proposed development at an appropriate future planning stage (i.e. development application) in response to any changes in development design or classified vegetation extent, to ensure the management measures within the BMP are consistent with the final development proposal.

Implementation of management measures identified in this and subsequent BMPs is the responsibility of the developer(s), prospective land managers and the City on an ongoing basis. Although none of the proposed management measures will be subject to implementation at the LDP stage, an indicative implementation table is provided below to inform any future BMPs and implementation of bushfire management measures at future planning stages.

Table 4: Indicative management measures and responsibilities

Management strategy reference	Management strategy	Timing	Responsibility
1	Ensure all habitable buildings are located in areas of BAL-29 or lower through the implementation of appropriate building setbacks from classified vegetation (refer to Figure 4).	Prior to building occupancy, or final BAL assessment	Developer
2	Ensure the full extent of all APZs are established (as shown indicatively in Figure 4) and managed on a regular and ongoing basis in accordance with standards outlined in the Guidelines (see Appendix 3).	Prior to building occupancy, or final BAL assessment	Developer to establish APZ, relevant land manager to ensure ongoing maintenance
3	Ensure internal driveway network is constructed to relevant technical requirements under the Guidelines (see Appendix 4).	Prior to building occupancy	Developer
4	Provide an EAW at the south-eastern end of the project area, constructed to relevant technical requirements under the Guidelines (see Appendix 4).	Prior to building occupancy	Developer
5	Install and maintain a 3-m bare earth firebreak immediately inside perimeter of lot boundary, in accordance with the requirements of the City's annual firebreak notice (Appendix 2).	Before 1 November and maintained up to and including 31 March, or as published in any subsequent annual firebreak notice.	Developer/ land manager
6	Provide a reticulated water supply to the project area and suitable infrastructure for supplying firefighting water to the development.	Prior to building occupancy	Developer

Management strategy reference	Management strategy	Timing	Responsibility
7	Ensure each development stage is surrounded by a cleared or low threat (in accordance with Clause 2.2.3.2 (e) or (f)) which is and maintained at a fine fuel load less than 2 t/ha buffer of sufficient size as to not increase the expected BAL rating of lots under construction (up to 100 m). Advice on width of buffer area can be provided by a qualified bushfire practitioner.	Prior to building occupancy of each stage, or final BAL assessment of each stage, maintained until the buffer area is developed (in accordance with Clause 2.2.3.2 (e) or (f)).	Developer/ land manger
8	Ensure cleared 'lots' awaiting construction are managed to a cleared or low threat standard on an ongoing basis (in accordance with Clauses 2.2.3.2 (e) or (f)).	Prior to building occupancy of each stage, or final BAL assessment.	Developer/ land manger
9	Ensure vegetation adjacent to Crystal Brook achieves a Class G grassland vegetation structure in a mature state.	Prior to building occupancy of final development stage (or other stages within 100 m of Crystal Brook vegetation), or final BAL assessment.	Developer/ land manger
10	Ensure the project area is managed on a regular and ongoing basis to ensure all areas (with the exception of Crystal Brook vegetation) are maintained in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959.	As part of development works for each stage, and ongoing.	Developer/ land manger
11	Ensure Welshpool Road reserve abutting the project area is constructed and managed to a low threat standard in accordance with Clause 2.2.3.2 (f) of AS 3959.	As part of development works and ongoing	Developer to construct crossover and undertake low threat landscaping, City to manage ongoing
12	Prepare a bushfire emergency evacuation for the aged care facility	Development Application stage of Aged Care Facility	Developer
13	Prepare a BAL compliance report or individual habitable building BAL assessment	At the discretion of the City following completion of development works and prior to construction of habitable buildings	Developer
14	Ensure all dwellings constructed to the final assessed BAL rating	As part of development works	Developer
15	Ensure compliance with the City's annual firebreak notice (refer to Appendix 2).	Before 1 November and maintained up to and including 31 March, or as published in any subsequent annual firebreak notice.	Developer/ land manger
16	Prepare updated BMP or addendum to support future DA	At the discretion of the City in response to any changes in development design, or classified vegetation extent.	Developer

7. References

- Department of Fire and Emergency Services (DFES) 2017, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from:
<http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx>, [13/02/2018].
- Department of Planning (DoP) 2016, *Visual guide for bushfire risk assessment in Western Australia*, Department of Planning, Perth, WA.
- Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 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

Site photographs

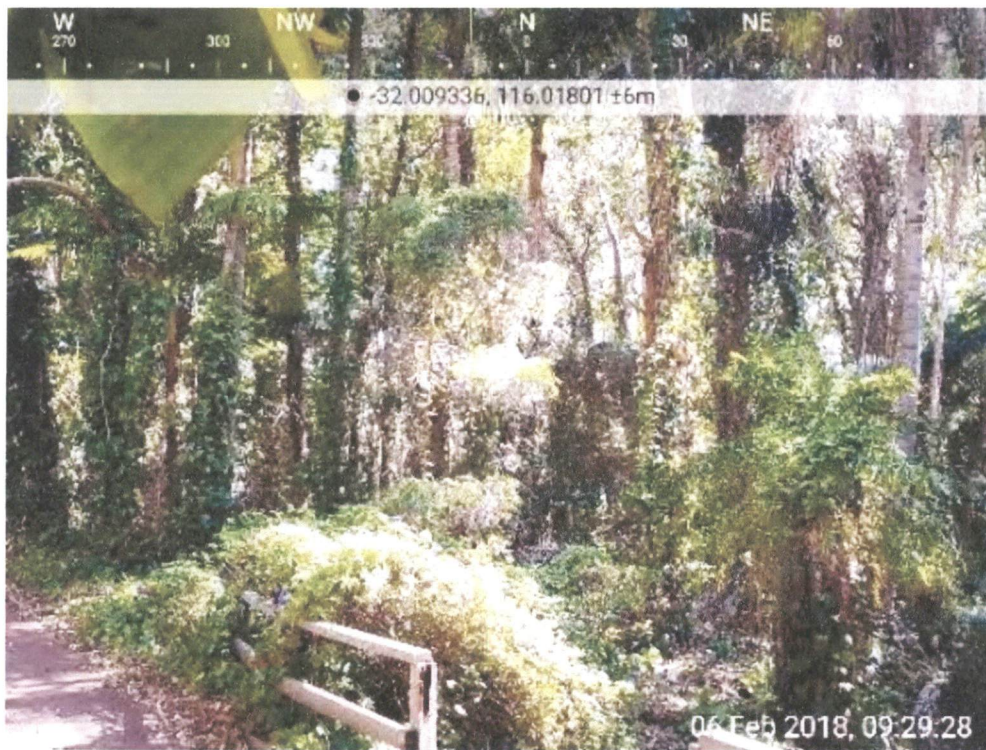


Photo 1: Class A forest adjacent to Crystal Brook (to be reconfigured to Class G grassland)

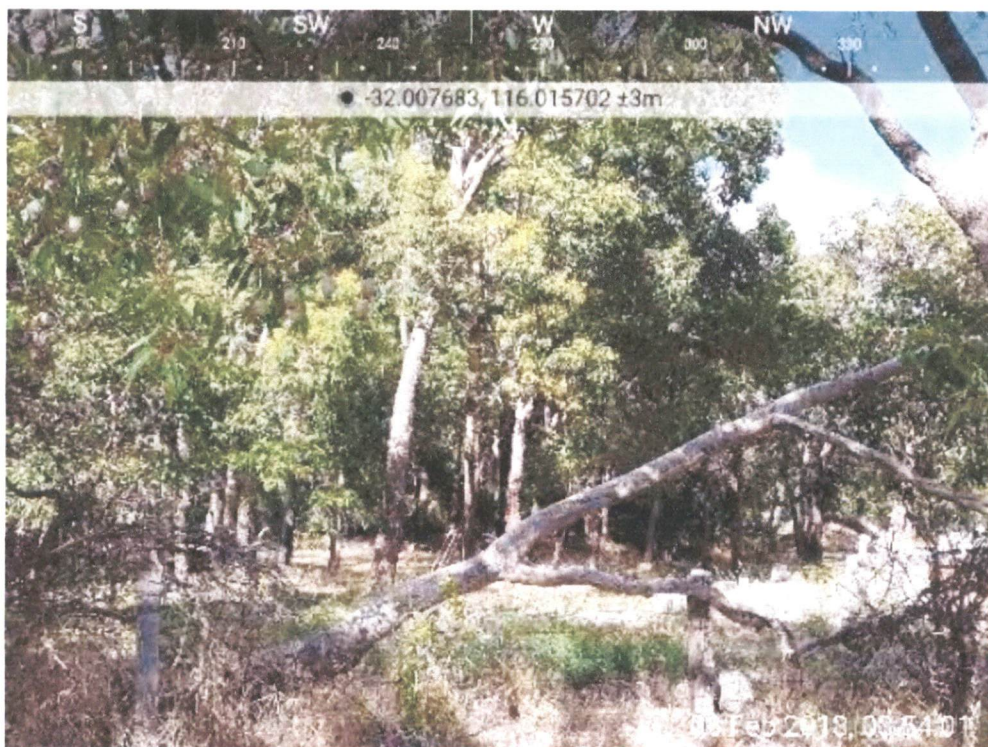


Photo 2: Class B woodland within Special Rural land to the south-west

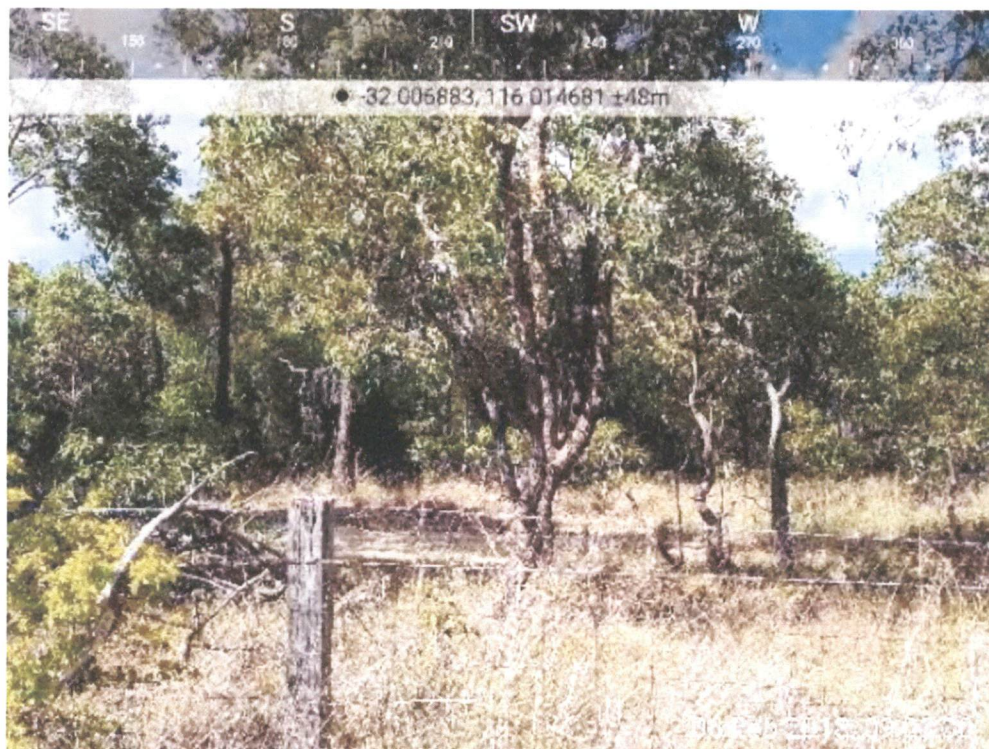


Photo 3: Class B woodland within Special Rural land to the south-west



Photo 4: Class B woodland within the project area

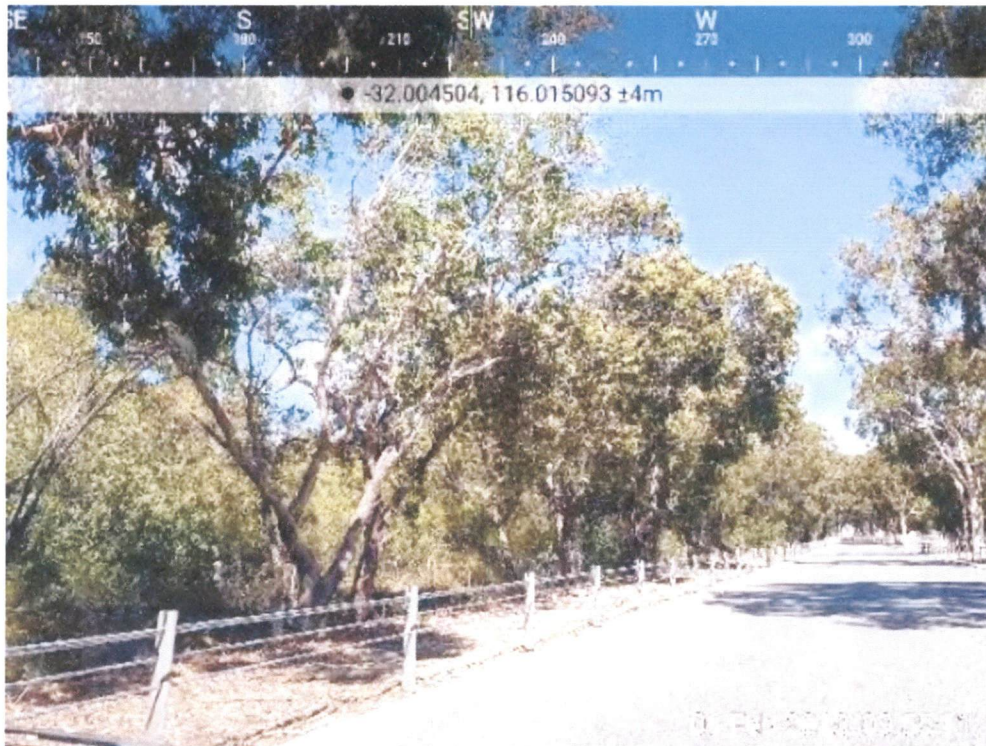


Photo 5: Class B woodland within Welshpool Road reserve, to be cleared and/ or landscaped to low threat



Photo 6: Class B woodland within Bush Forever site to the north



Photo 7: low threat managed land to the east

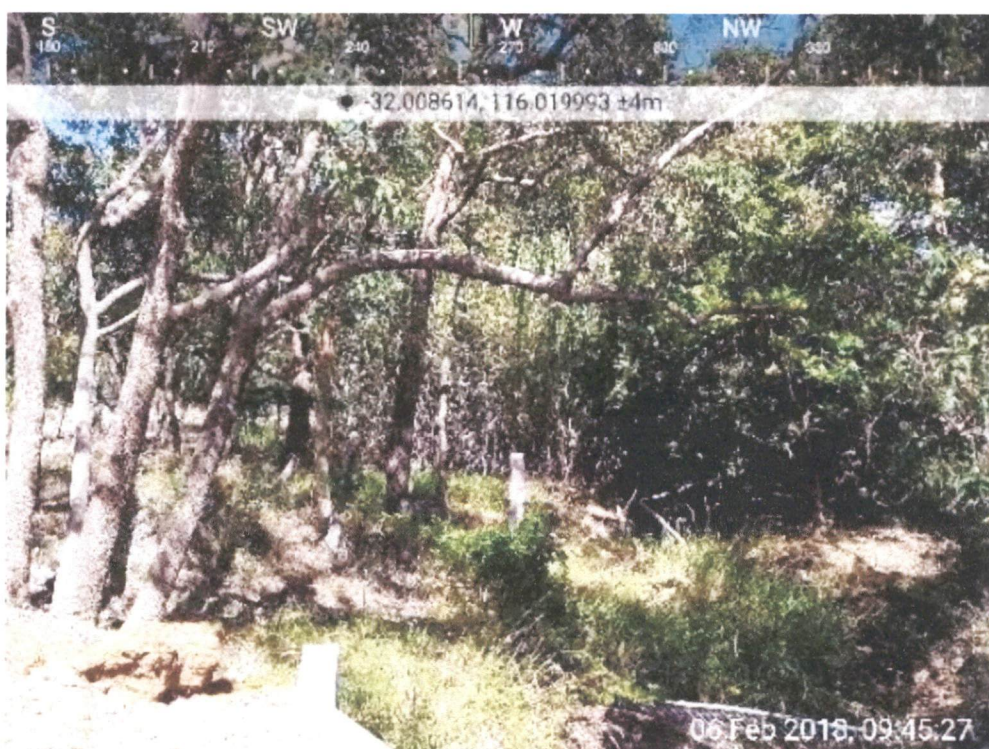


Photo 8: Class B woodland north of Gavour Road adjacent to Crystal Brook

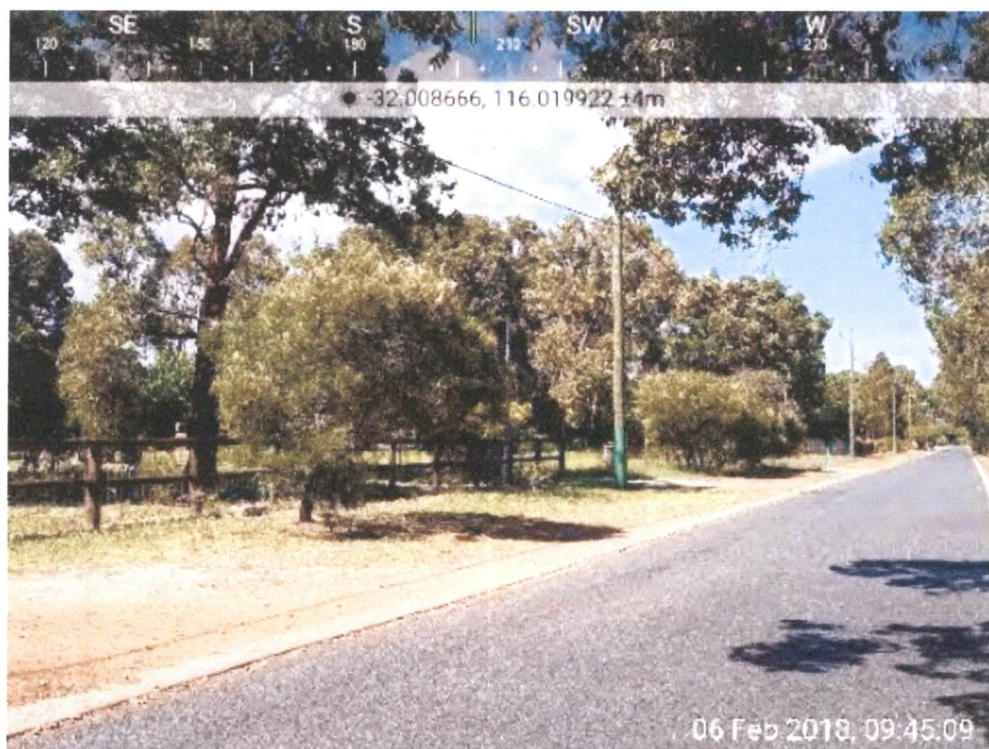


Photo 9: low threat managed areas of Gavour Road reserve

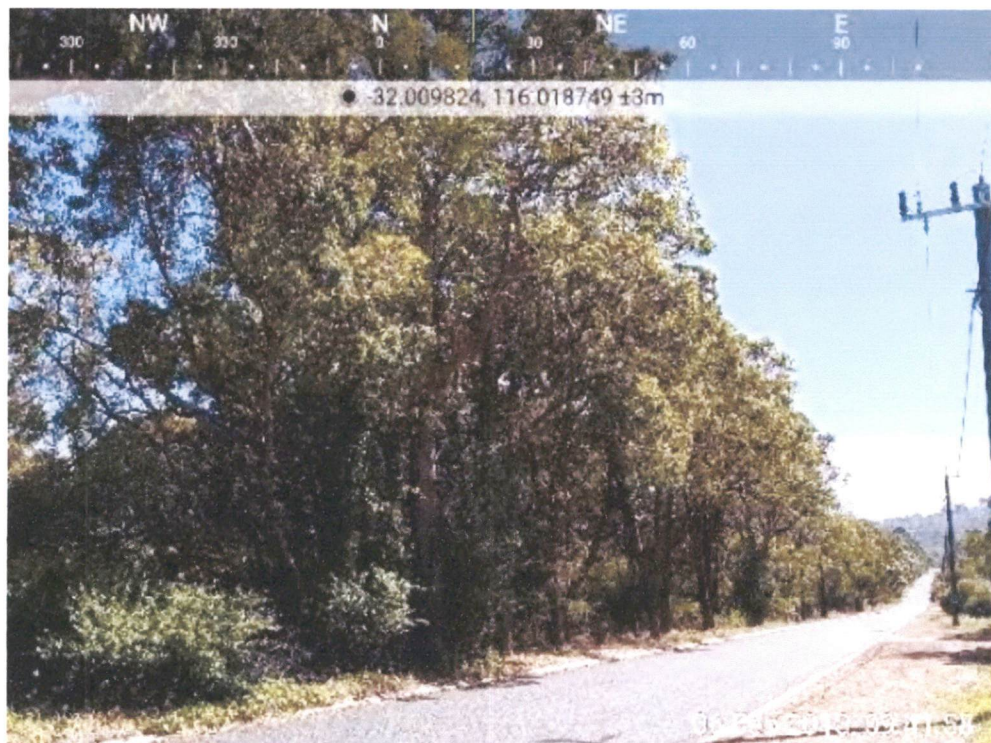


Photo 10: Class B woodland areas of Gavour Road reserve



Photo 11: low threat managed land south-east of Gavour Road

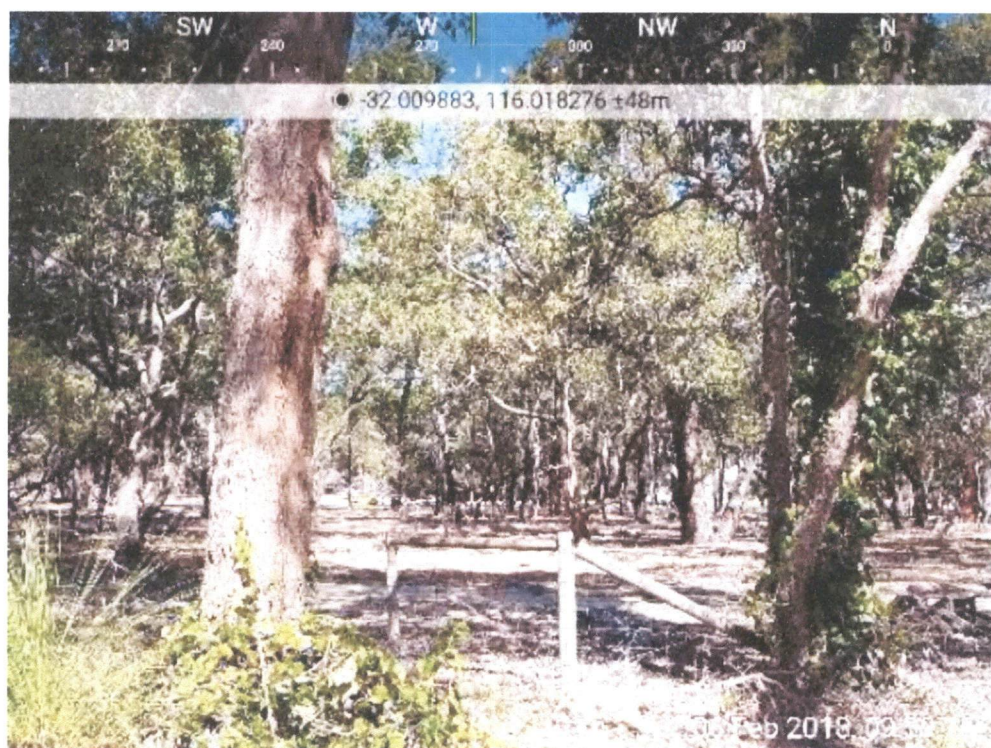


Photo 12: Class B woodland within Special Rural land to the west



Photo 13: low threat managed land within project area

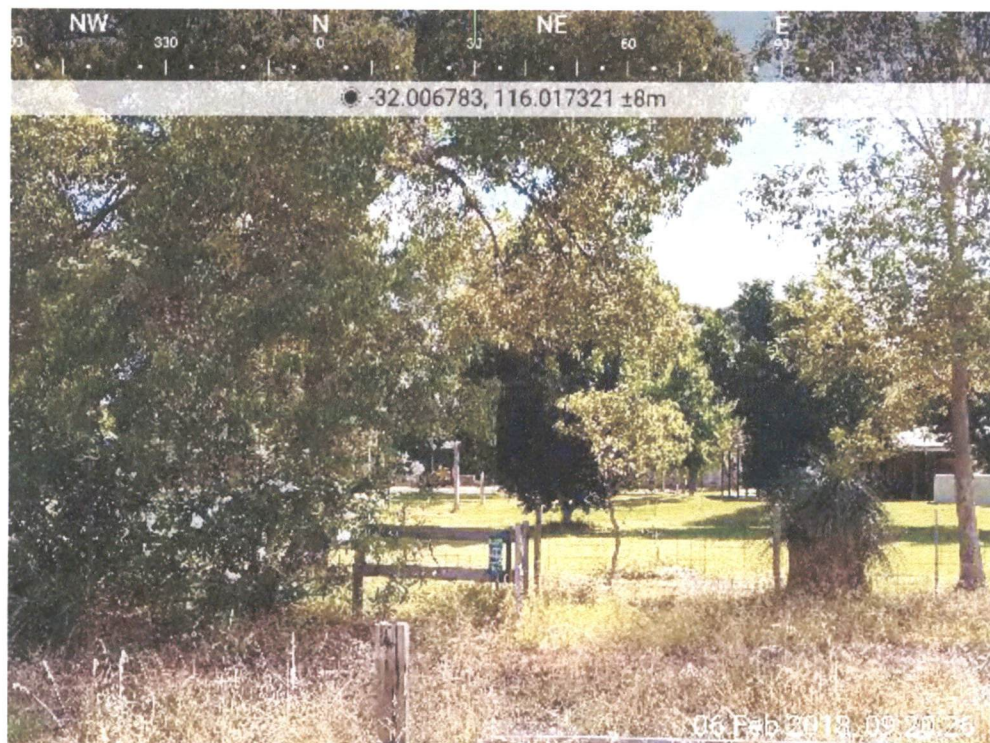


Photo 14: low threat managed land (background) within Special Rural property to the north-east

Appendix 2
City of Kalamunda annual firebreak
notice

City of Kalamunda 2017/2018

FIREBREAK AND FUEL LOAD NOTICE

Bush Fires Act 1954

Notice to Owners and/or Occupiers* of Land situated within the City of Kalamunda.

As a measure to assist in the control of bushfires and pursuant to the powers contained in section 33 of the *Bush Fires Act 1954* (as amended), as the property owner or occupier of land within the City of Kalamunda, you are hereby required before 1 November 2017, or within 14 days of becoming an owner or occupier of land if after this date, to comply with the requirements set out in this notice.

The applicable works outlined below must be completed before 1 November 2017 and maintained up to and including 31 March 2018.

Persons who fail to comply with the requirements of this notice may be issued with an infringement notice penalty (\$250) or prosecuted with an increased penalty (maximum penalty \$5,000). Additionally, the City of Kalamunda may carry out the required work at cost to the owner/occupier.

1. Land, with a building on it, with an area greater than 5,000m²

You are required to:

- ☐ Have all flammable matter slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property (living trees, shrubs, plants and lawn under cultivation are excepted).
- ☐ Install bare earth firebreaks three (3) metres wide immediately inside and along all boundaries of land in a continuous form, including on boundaries adjacent to roads, rail and drain reserves and all public

open space reserves, with all overhanging branches, trees, limbs etc. to be trimmed back from over the firebreak area from ground level to a minimum height of four (4) metres. Driveways must also be maintained to these conditions.

- ☐ Ensure the roofs, gutters and walls of all buildings on the land are free of flammable matter.
- ☐ Install and maintain an Asset Protection Zone in accordance with the requirements set out in Part 4 of this Notice.

2. Land, with a building on it, with an area less than 5,000 m²

You are required to:

- ☐ Have all flammable matter slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property (living trees, shrubs, plants and lawn under cultivation are excepted).
- ☐ Install a firebreak immediately inside all external boundaries of the property unless the property is maintained clear of flammable matter by slashing and mowing or maintaining living garden beds or lawn.
- ☐ Ensure the roofs, gutters, walls of all buildings on the land are free of flammable matter. Driveways must also be maintained to these conditions.
- ☐ Install and maintain an Asset Protection Zone in accordance with the requirements set out in Part 4 of this Notice.

** Please note that the Bush Fires Act 1954 (WA) requires the owner or occupier of land to attend to all requirements in this Notice. The City may take action against either the owner or occupier of land for a failure to comply with this Notice at its absolute discretion.*



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3. All Vacant Land

You are required to:

- ☐ Have all flammable matter slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property (living trees, shrubs, plants under and lawn under cultivation excepted).
- ☐ On vacant land larger than 1,000 m², install bare earth firebreaks three (3) metres wide immediately inside and along all boundaries of land in a continuous form, including on boundaries adjacent to roads, rail and drain reserves and all public open space reserves, with all overhanging branches, trees, limbs etc. to be trimmed back from over the firebreak area from ground level to a minimum height of four (4) metres. Driveways must also be maintained to these conditions. A Fire Control Officer may request firebreaks to be installed on vacant land under 1,000m² should they deem it necessary under Part 5 of this Notice to reduce risk of fire.

4. Asset Protection Zones

The area of land that extends out 20m from a habitable building or attached structure (for example verandas or gazebos) within the boundaries of a lot on which a habitable building is situated, is considered to be an Asset Protection Zone, also known as 'Building Protection Zone' (Asset Protection Zone).

In the Asset Protection Zone, unless an approved 'Alternative Bushfire Management Plan' is in place:

- ☐ Non-flammable managed vegetation, reticulated lawns and gardens and other non-flammable features are permitted only.
- ☐ All grass must be maintained to or under 50mm in height.
- ☐ Mature trees over five (5) metres in height must be under pruned to at least a height of two (2) metres from the ground (which means you must prune branches and leaves etc. from the ground up to the first 2 metres in height of the tree).

- ☐ Tree or shrubs over two (2) metres high must not be within 2 metres of a habitable building.

5. Additional Works

In addition to the requirements noted above, regardless of land size and location, the City of Kalamunda or its duly authorised officer(s) may require you to undertake additional works on your property to improve access and/ or undertake further hazard removal (Additional Works) where, in the opinion of an authorised officer, such Additional Works are necessary to prevent the outbreak and/or the spread of a bush fire.

6. Firebreak Variations

If you consider for any reason that it is impractical to clear firebreaks as required by this Notice, or if natural features render firebreaks unnecessary, you may apply in writing to the City of Kalamunda or its duly authorised officers, not later than 1 October 2017, for alternative positions, or other methods of fire prevention on your land.

If permission is not granted, you must comply with the requirements of this Notice. This applies to variations to the Asset Protection Zone as well. The Chief Bush Fire Control Officer reserves the right to review and revoke any variation granted.

Fuel Dumps and Depots

You are required to remove all flammable matter within ten (10) metres of where fuel drums, fuel ramps or fuel dumps are located, and where fuel drums, whether containing fuel or not, are stored.

By order of the City of Kalamunda.

Rhonda Hardy

CHIEF EXECUTIVE OFFICER



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Appendix 3
Standards for APZs

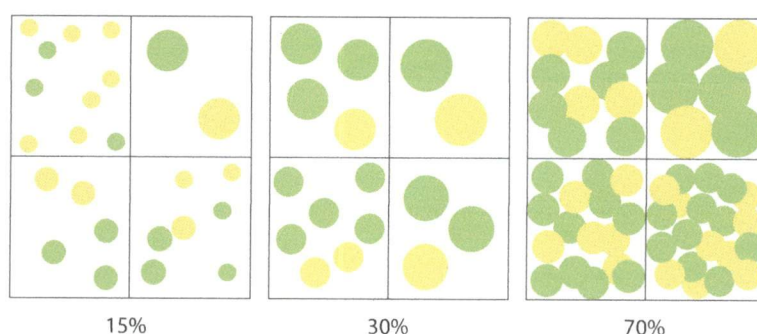
Contents	1	2	3	4	5	6	Appendices
	Introduction	Policy framework overview	Bushfire prone areas	Assessing bushfire risk in the planning context	Applying SPP 3.7	Roles and responsibilities	

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 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
Vehicle access technical requirements

A3.5 Private driveway longer than 50 metres

A private driveway is to meet all of the following requirements:

- Requirements in Table 6, Column 3;
- Required where a house site is more than 50 metres from a public road;
- Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house; and
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes.
- All-weather surface (i.e. compacted gravel, limestone or sealed).

E3.5 Private driveway longer than 50 metres

For a driveway shorter than 50 metres, fire appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turn-around areas should be available for both conventional two-wheel drive vehicles of residents and type 3.4 fire appliances.

Turn-around areas should be located within 50 metres of a house. Passing bays should be available where driveways are longer than 200 metres and turn-around areas in driveways that are longer than 500 metres. Circular and loop driveway designs may also be considered. These criteria should be addressed through subdivision design.

Passing bays should be provided at 200 metre intervals along private driveways to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres.

Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at the house sites and at 500 metre intervals along the driveway.

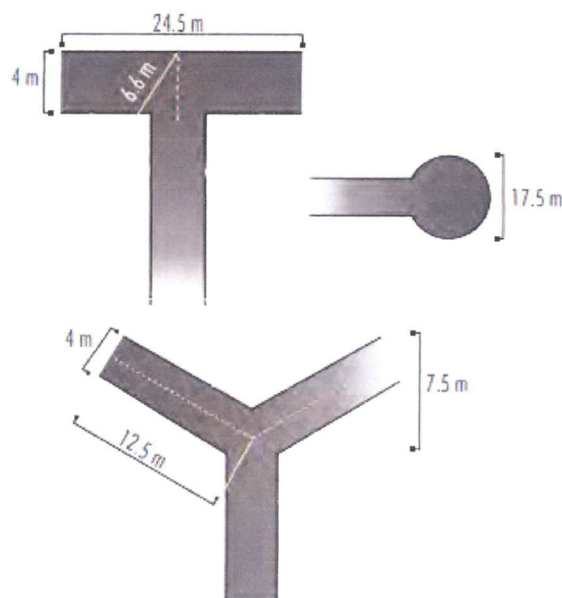


Figure 22: Design requirements for a private driveway longer than 50 metres

Turning areas should allow type 3.4 fire appliances to turn safely

A3.6 Emergency access way

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 6, 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; and
- Must be signposted.

E3.6 Emergency access way

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.

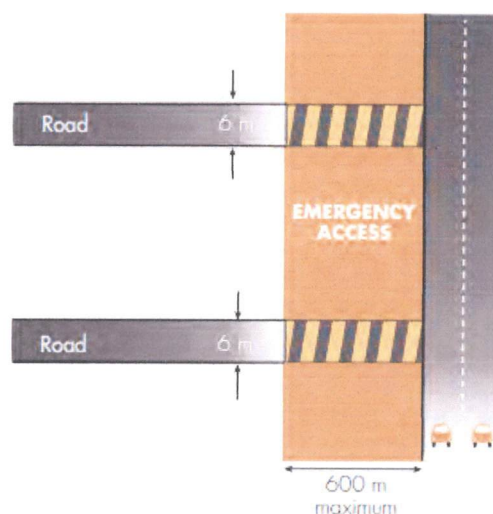


Figure 23: Minimum design requirements for an emergency access way

Two different vehicular access routes, both of which connect to the public road network, should be available to all residents at all times

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					