

SMITH BUSHFIRE CONSULTANTS Pty Ltd

BUSHFIRE MANAGEMENT PLAN

**Lot 9008 on DP54938 Lakeview and Carnegie Close,
Bridgetown**

Shire of Bridgetown-Greenbushes



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Site visited 14 October 2019; Report completed 16 April 2020

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address:

Site visit: Yes No

Date of site visit (if applicable): Day Month Year

Report author:

WA BPAD accreditation level (please circle):

Not accredited Level 1 BAL assessor Level 2 practitioner Level 3 practitioner

If accredited please provide the following.

BPAD accreditation number: Accreditation expiry: Month Year

Bushfire management plan version number:

Bushfire management plan date: Day Month Year

Client/business name:

	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 bushfire protection criteria elements)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Is the proposal any of the following (see [SPP 3.7 for definitions](#))?

	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strategic planning proposal (including rezoning applications)	<input type="checkbox"/>	<input checked="" 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"/>

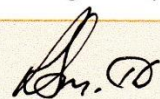
None of the above

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author



Date

NOTE

This Bushfire Management Plan has been developed by Smith Bushfire Consultants Pty Ltd for the exclusive use of the client, Mark Bombara and his agents.

The plan has been compiled using the standard methodologies required by Western Australian government departments and agencies. It is based on the following:

- *State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7)*, December 2015
- *Guidelines for Planning in Bushfire Prone Areas*, December 2017
- *Australian Standard 3959 – Construction of buildings in bushfire-prone areas*, November 2018

The techniques described in the above publications have been applied in the appropriate areas and circumstances for the development of this document.

Where there was no public access the interpretation is based on photographic and satellite imagery, and a laser distance meter was used to measure distances and effective slope.

It is recommended that this Bushfire Management Plan be revised every five years to ensure that it remains relevant and in-line with current requirements. This will optimise protection. It is proposed that the property owners undertake the review.

DISCLAIMER

This Bushfire Management Plan has been prepared in good faith. It is derived from sources believed to be reliable and accurate at the time of publication. Nevertheless, this plan is distributed on the terms and understanding that the author is not responsible for results of any actions taken based on information in this publication or for any error or omission from this publication.

Smith Bushfire Consultants Pty Ltd has exercised due and customary care in the preparation of this Bushfire Management Plan and has not, unless specifically stated, independently verified information provided by others.

Any recommendations, opinions or findings stated in this report are based on circumstances and facts as they existed at the time Smith Bushfire Consultants Pty Ltd performed the work. Any changes in such circumstances and facts upon which this document is based may adversely affect any recommendations, opinions or findings contained in this plan.

Document control

Report Version	Purpose	Author/reviewer and accreditation details	Date Submitted
1	Original Fire Management Plan	FirePlan WA	February 2007
2	Revised to current BMP requirements	R Smith	4/1/2019
2.1	Minor text changes	R Smith	4/1/2019
3	Revised BAL contour map and text	R Smith	8/4/2019
4	Revised text as requested by DPLH	R Smith	2/12/2019
4.1	Revised text following DPLH & Shire comments	R Smith	11/02/2020
4.2	Minor text modification	R Smith	2/03/2020
4.3	Minor text modification and revised maps	R Smith	2/04/2020
5	Text changes and revised maps	R Smith	16/04/2020

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Section 1: Proposal Details

The Shire of Bridgetown-Greenbushes requires as part of Town Planning Scheme 4 Amendment 40 the preparation of a 'Bushfire Management Plan' for the proposed development as part of the Condition of Subdivision. The WAPC also requires a BMP to address SPP 3.7 and the Guidelines for Planning in Bushfire Prone Areas (the 'Guidelines'). This document has been prepared to satisfy these requirements.

The purpose of this Bushfire Management Plan (BMP) is to detail the fire management methods and requirements that will be implemented within the proposed subdivision, being Lots 397–405. The aim of the BMP is to reduce the threat to residents and fire fighters in the event of a bushfire within or near the subdivision.

The site is characterised by an extensive, grassland vegetation which is basically a flat gully with limited raised land to the east and west of the gully. To the south the low gully extends almost to the southern boundary to form plateaus from which the land falls more steeply into a forest vegetation.

A Department of Biodiversity, Conservation and Attractions nature reserve is located along the western and a small portion of the northern boundary of the site and has been classified as forest vegetation.

This BMP differs considerably from the Fire Management Plan developed by FirePlan WA in 2007 as there have been numerous changes to the State's Guidelines. There has been the 'Planning for Bush Fire Protection' edition 2 (2010), the three editions in 2017 of the 'Guidelines for Planning in Bushfire Prone Areas', and the publication of State Planning Policy 3.7. This means that the following are contained within this BMP, but are not supported by the current State's Guidelines. They were addressed in the original FMP as required by the TPS 4:

- Strategic firebreaks are no longer applicable
- Building protection zone (BPZ) is now the asset protection zone (APZ). The BPZ had a 30 metre separation and the APZ only specifies a separation to achieve BAL–29.
- The hazard separation zone is no longer applicable

It is acknowledged that the Shire of Bridgetown-Greenbushes TPS 4, which is still current, requires a fire management plan to contain the following:

- I. strategic firebreak
- II. fuel reduction area
- III. means by which no buildings, outbuildings or any other structure shall be permitted within the 'Fuel Reduced Area'
- IV. the disposal of vegetation which has been cleared for fire fighting purposes
- V. water supply for fire fighting purposes (domestic/strategic)
- VI. emergency fire access to a two wheel drive standard
- VII. fire fighting equipment required to service the subdivision.

This BMP addresses TPS4, SPP 3.7, the Guidelines and the Shire's firebreak and fuel load notice.

The FSAR on the perimeter of the proposed residential lots being Lots 397–405 will be implemented/constructed on the perimeter of the combined lots. There is also a requirement to upgrade the FSAR between Lot 397 and Lot 501.

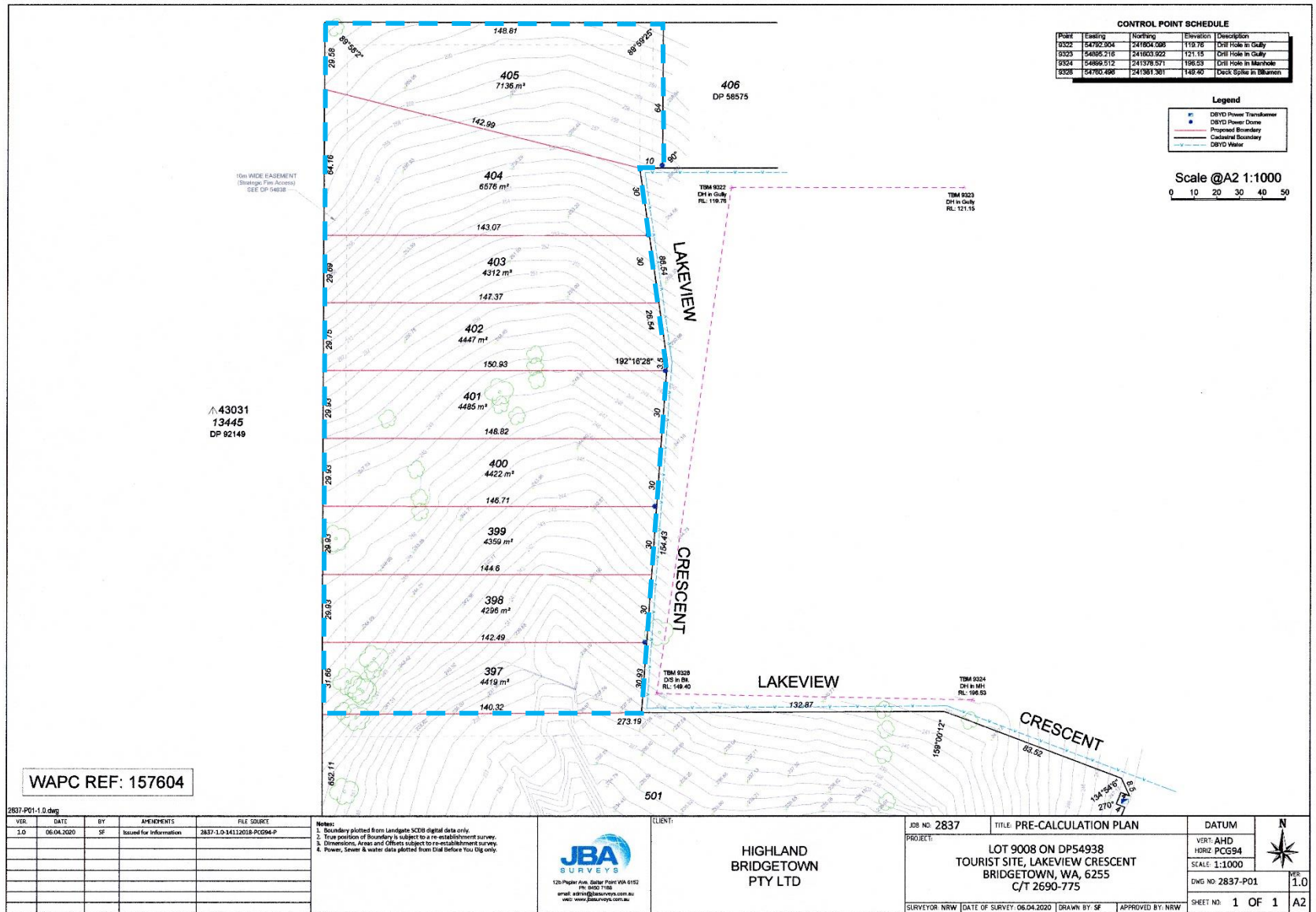


Figure 1. A copy of the site plan as provided with the subdivision application.



Figure 2. Aerial photo of the bushfire prone area for the subject site (shown in white).

Section 2: Environmental Considerations

Subsection 2.1: Native Vegetation – modification and clearing

This BMP covers Lots 397-405 within the proposed subdivision. These lots are effectively cleared of overstorey and contain tussock grassland surface vegetation.

The northern portion of the site is land basically cleared of native vegetation and now contains a grass surface vegetation which is maintained in a 'low threat vegetation' status during the summer months with very sparse overstorey cover. The grassland is mown and the grass is managed and retains a maximum height of 50 mm, which complies with the Shire's firebreak order.

Subsection 2.2: Re-vegetation/Landscape Plans

It is proposed to undertake revegetation in accordance with a Landscape Master Plan which will include vegetation corridors and buffer plantings in accordance with the TPS4 schedule 6. The Landscape Master Plan shows a northern landscape buffer, adjacent to Lot 405, which is 15 metres wide. It is proposed that the Landscape Master Plan will be developed and applied sympathetically to the bushfire risk and not increase the BAL ratings for future dwellings on the lots.

Section 3: Bushfire assessment results

Subsection 3.1: Assessment Inputs

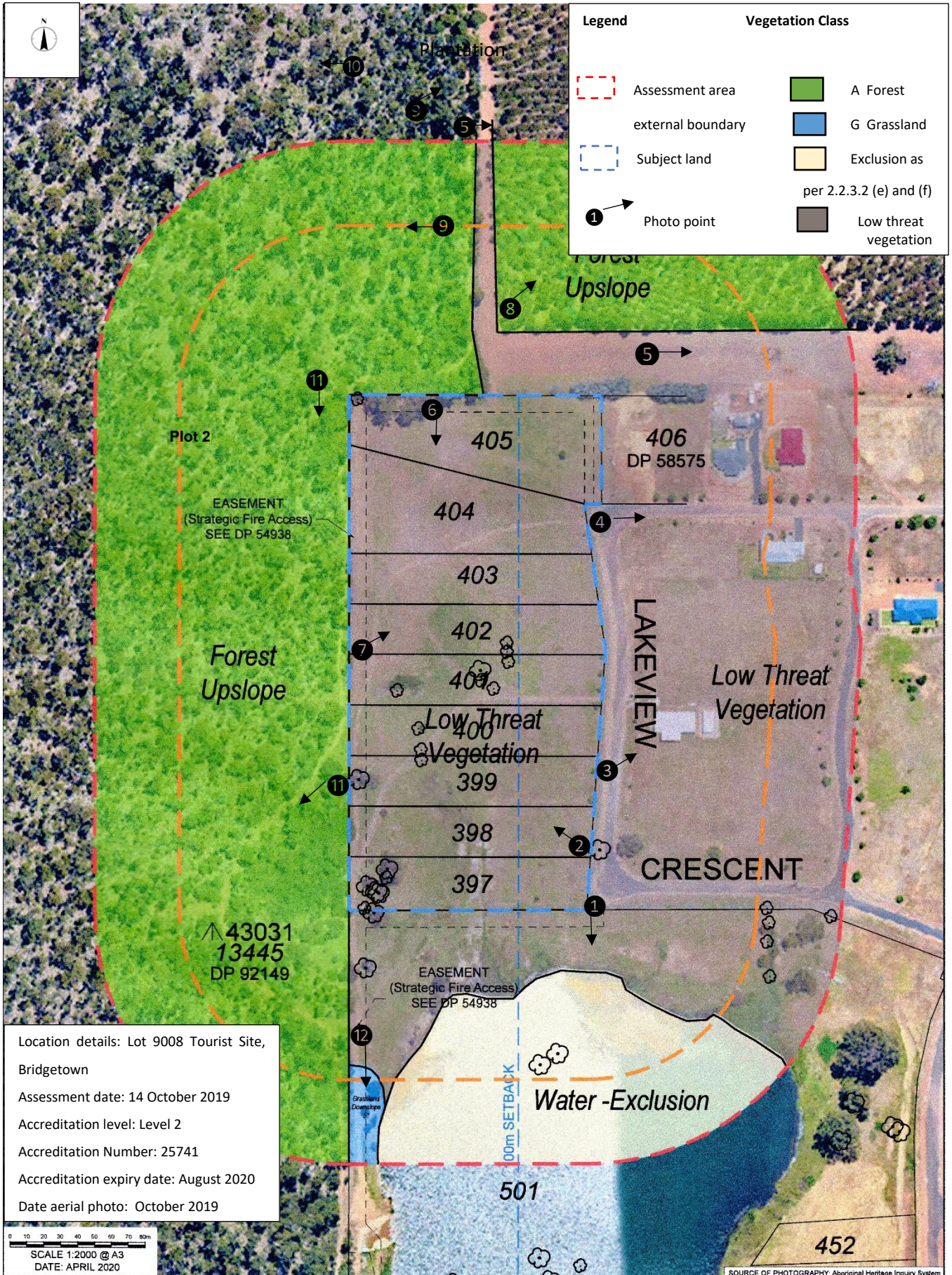


Figure 3. Vegetation classification map.

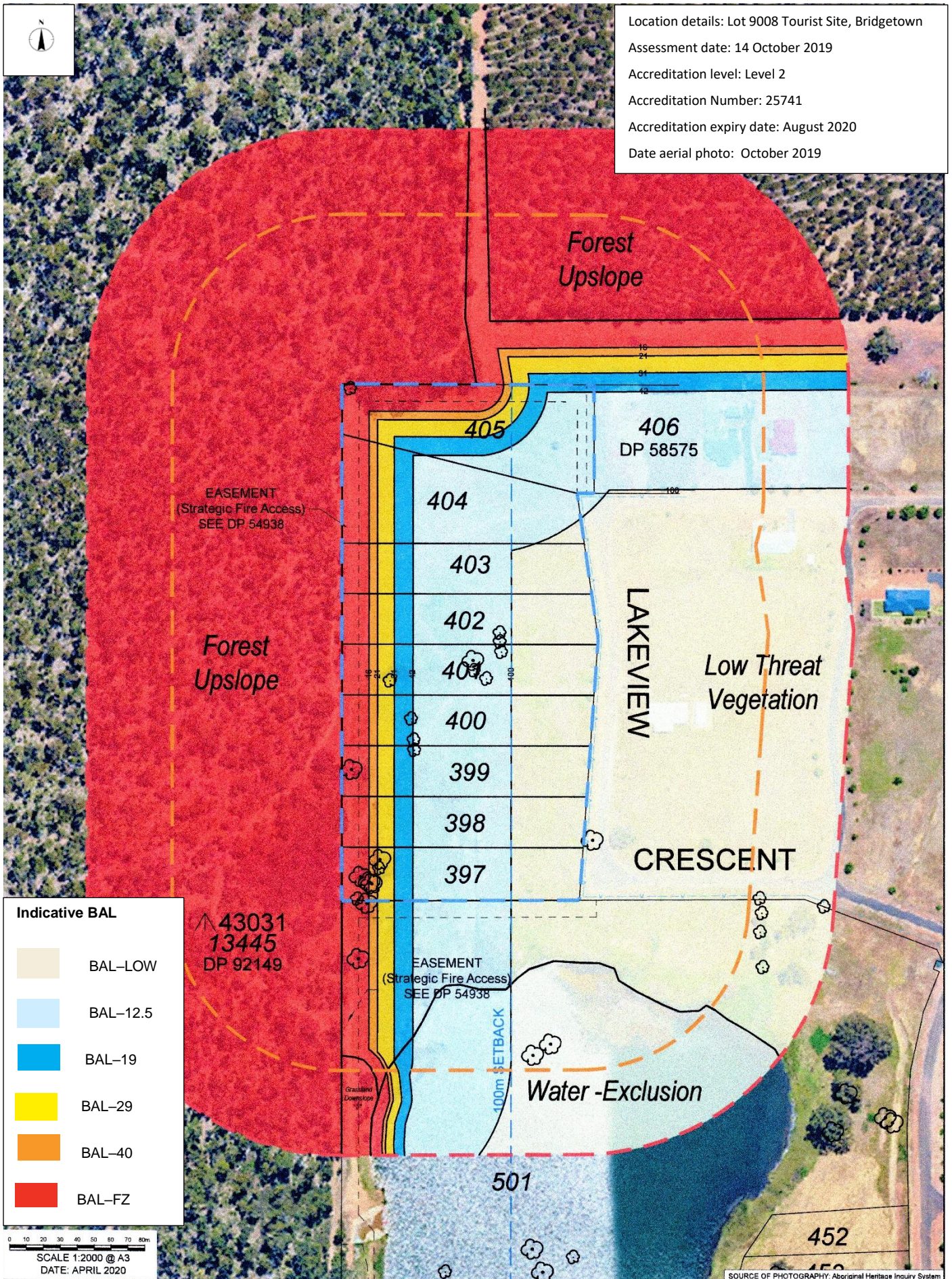


Figure 4. BAL contour map.

Plot 1

Exclusion

Clause 2.2.3.3 (e) and (f) and includes compliance with the Shire's Firebreak Notice.



14/10/2019 11:50:51 AM (+8.0 hrs) Dir=S Lat=-33.95348 Lon=116.09308 Alt=195m MSL WGS 1984
Photo ID: Photo 1 Looking at the road reserve and dam.



14/10/2019 11:51:01 AM (+8.0 hrs) Dir=NW Lat=-33.95348 Lon=116.09308 Alt=193m MSL WGS 1984
Photo ID: Photo 2 Looking north-west across the lots and mown grass to 'low threat' status.



14/10/2019 11:53:28 AM (+8.0 hrs) Dir=E Lat=-33.95309 Lon=116.09309 Alt=197m MSL WGS 1984
Photo ID: Photo 3 Looking at the neighbouring house and low threat vegetation.



14/10/2019 11:56:08 AM (+8.0 hrs) Dir=ESE Lat=-33.95175 Lon=116.09352 Alt=214m MSL WGS 1984
Photo ID: Photo 4 Looking east at the road reserve and the neighbouring properties to the east.



14/10/2019 11:57:28 AM (+8.0 hrs) Dir=E Lat=-33.95114 Lon=116.09336 Alt=214m MSL WGS 1984
Photo ID: Photo 5 The firebreak between the plantation and neighbouring land east of the subdivision site.



14/10/2019 11:59:01 AM (+8.0 hrs) Dir=SSW Lat=-33.95082 Lon=116.09263 Alt=213m MSL WGS 1984
Photo ID: Photo 6 Looking south across the subdivision site.



Photo ID: Photo 7 Looking north-east across the subdivision site and mown grass to 'low threat' status.

Plot 2

Class A – Forest (AS 3959 vegetation classification A – 03)



Photo ID: Photo 8 The plantation north-east of the subdivision site.



Photo ID: Photo 9 The forest vegetation to the north of the subdivision site.



Photo ID: Photo 10 The forest vegetation to the west of the subdivision site.



Photo ID: Photo 11 The forest vegetation to the west of the subdivision site.

Plot 3

Class G – Grassland (AS 3959 vegetation classification G – 21) includes open woodland with a grass surface vegetation.



14/10/2019 12:18:23 PM (+8.0 hrs) Dir=S Lat=-33.95673 Lon=116.0919 Alt=167m MSL WGS 1984
Photo ID: Photo 12 The grass on the dam wall and forest to the right.

Notes to Accompany Vegetation Classification

1. Plot 1

Exclusion – Low threat vegetation and non-vegetated areas (including the areas required to be maintained as ‘Low threat vegetation’ in compliance with the Shires Firebreak Order.

Clause 2.2.3.2 (e) & (f)

This plot comprises the houses, cultivated and reticulated gardens, and infrastructure adjacent to and within the the subdivision site. It includes the road infrastructure and developed land to the east of the subdivision site. This plot also includes the areas required to be maintained as ‘low threat vegetation’ during the bushfire season as required in the Shire’s Firebreak Order where grass must be maintained at less than 50 mm in height.

2. Plot 2

Class A – Forest (AS 3959 vegetation classification A – 03)

This plot is the forest to the north and west of the development site. This forest land is vested in the Department of Biodiversity, Conservation and Attractions (DBCA). This plot is upslope from the development site.

This plot also includes the *Eucalyptus globulus* (Bluegum) plantation east of the forest and to the north-east of the subdivision site.

3. Plot 3

Class G – Grassland (AS 3959 vegetation classification G–21).

This plot has been assessed as a grassland containing, in part, a woodland vegetation classification with a grassland surface vegetation on the basis that the tree overstorey coverage is less than 10%.

The native vegetation recolonisation of the grassland sites are known to be slow to non-existent. The recovery to a scrub understorey is limited by the seed availability and recruitment failure. Seed dispersal is limited by the seed bank and the distance from the potential seed source. There is no native scrub seed available in the area to facilitate recolonisation. The grass species are very competitive and restrict the opportunity for recolonisation by scrub seed, if there were scrub parent species present on or near the site, which there is not. In most cases to effectively regenerate the site to a scrub surface vegetation would require

direct seeding and control on non-native species as a minimum. These activities have not been undertaken and the grass surface vegetation remains.¹

Research by Alcoa has found that for effective rehabilitation of post mining areas to achieve a mixed species scrub understorey in the jarrah forest has significant similarities to the situation associated with the sparsely treed area. Alcoa has found that “for effective rehabilitation of post mined areas involves respreading overburden and top soil, contour ripping to approximately two metres depth and broadcasting fertilizer and pretreated understorey within the same year.

Poor seedling emergence was observed, however, when pretreated seed and fertilizer was simply broadcast onto old rehabilitated sites. With time, soil surfaces become compacted by settling and raindrop impact.”²

This means that without active intervention by the property owner it is highly improbable that the site will ever have a significant scrub understorey and will therefore remain as a grass and leaf litter surface vegetation.

Potential bushfire behaviour and impact on the development

The potential bushfire behaviour will be consistent with a grass surface vegetation. During a bushfire grass produces 16,890 kJ/kg of heat yield. By comparison forest and woodlands with a multi-tiered scrub understorey produces 18,600 kJ/kg. Grass has default maximum fuel load of between 4.5 and 5 t/ha. Forests with a mixed multi-tiered scrub have a maximum fuel load of 25 t/ha. Woodlands with a mixed multi-tiered scrub have a maximum fuel load of 15 t/ha.³

As the vegetation is grassland either in an open paddock or under a tree canopy the most appropriate vegetation classification to be applied under AS 3959 is that of grassland.

Slope

The orange lines on the slope aerials show the surface slope and the blue line the vegetation and buildings above the surface. The Nearmap slope diagrams were assessed during the field and deemed to be sufficiently accurate to show the applicable slope. Figure 1 also shows the slope across the lots through the contours.

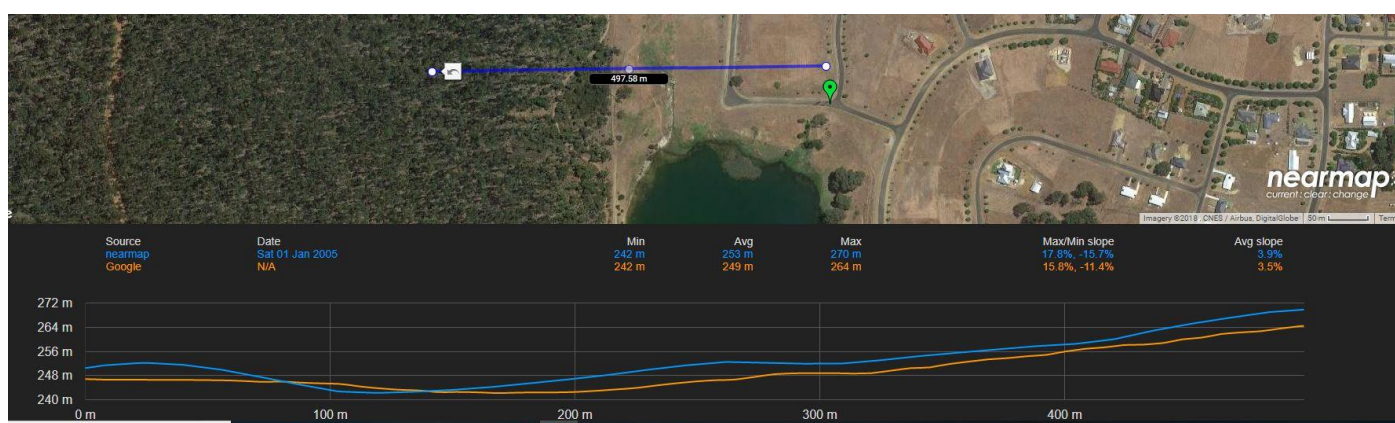


Figure 5. Aerial photo with slope from west to east across the development site (2.00°).

¹ R. J. Standish, V. A. Cramer, S. L. Wild & R. J. Hobbs (2007), *Seed dispersal and recruitment limitations are barriers to native recolonization of old-fields in Western Australia*, Journal of Applied Ecology 44, 435-445.

² B L Glossop (1982), *Cultivation Techniques for Understorey Establishment on Old Rehabilitated Bauxite Mine Sites*, Alcoa of Australia Environmental Research Note No 7.

³ Ralph Smith, 2010, *Fire behaviour formulas. A Guide for Bush Fire Managers*, Bush Fire and Environmental Protection Branch, FESA, Perth.

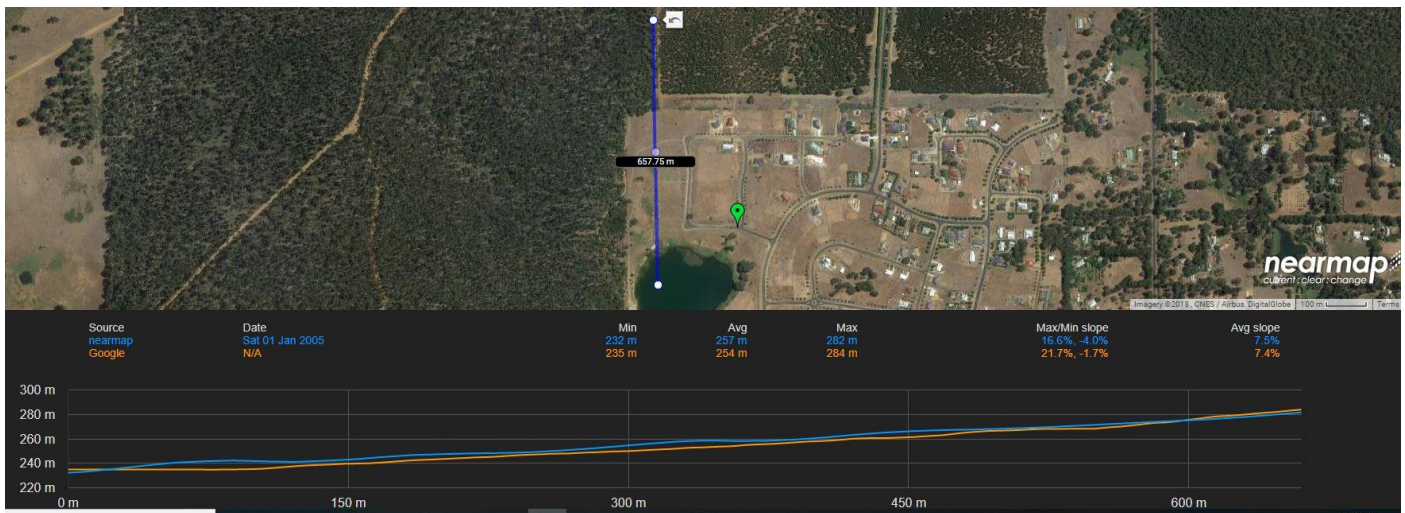


Figure 6. Aerial photo from the dam to the north across the development site (4.23°).

Fire Service Access Routes (FSAR)

The FSAR on the perimeter of the proposed residential lots being Lots 397–405 will be implemented/constructed on the perimeter of the combined lots. The FSAR between Lot 397 and 501 will be developed and maintained during the bushfire season.

Subsection 3.2: Assessment outputs

Method 1 BAL Determination				
Vegetation Area/Plot	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level
1	Exclusion	Not applicable	Not applicable	LOW
2	Forest & Plantation	Upslope	80 ^{1 & 2}	12.5
3	Grass & Grass under an Open Woodland (managed to a 'low threat state' for Lots 397 to 405 and northern portion of Lot 501)	Downslope 5°	200 metres to the unmanaged grassland	LOW
Determined Bushfire Attack Level				LOW

1. Only Lots 404 and 405 will be required to construct to a minimum BAL–12.5 rating. All other lots can locate a dwelling in the BAL–Low section on the lots.
2. It is assumed that there is no construction in the 100 metre setback from the forest vegetation which is to the west of the lots as required in the TPS 4.
3. The Lots 397–405 and the grassland north and east of the water body (norther portion of Lot 501) are all maintained as 'low threat vegetation' as required by the Shire during the bushfire season.

Section 4: Identification of bushfire hazard issues

The most significant bushfire threat to this development is the land to the north and west, both of which are not under the control or management of the property owner. The vegetation on these sites are forest or plantation. Of significance is that these vegetation types are generally upslope from the development site so any bushfire that was to attack the site would be under reduced fire behaviour as it will be running down the slope.

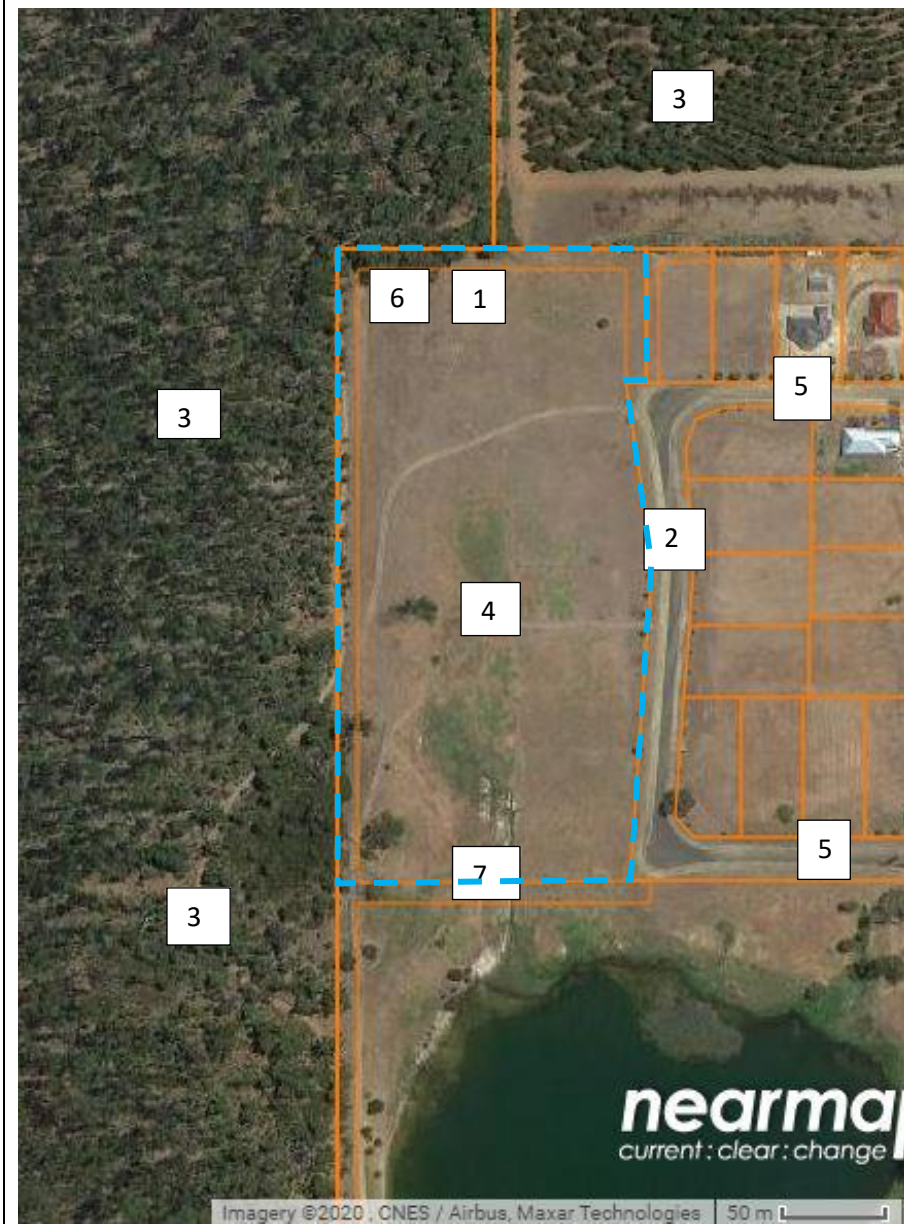
Not all of the lots are covered entirely by the declaration of bushfire prone. In most instances only the western portion of the lots are declared as bushfire prone. Any dwellings in the declared bushfire prone portion of the lots will need to be constructed to the appropriate BAL rating, but first be endorsed by the Shire as they will be within the separation zone required in TPS4. Whilst there is no formal requirement to construct to AS 3959 standards in the areas not declared as bushfire prone, or where the dwelling is greater than 100 metres from the threat vegetation, it is recommended that they consider constructing to BAL-12.5 to improve the protection from embers because it is known that a separation of 100 metres from the forest is not sufficient to eliminate all embers.

Section 5: Assessment against the Bushfire Protection Criteria

Subsection 5.1: Compliance

Bushfire protection criteria	Method of Compliance	Proposed bushfire management strategies
	Acceptable solutions	
Element 1: Location	A1.1 Development location	This development is developed in such a manner that on completion lots will enable dwellings to be able to construct to BAL-29 or lower standard. All lots will need to manage the grass to remain less than 50 mm high between 15 November and 26 April (or as amended by the Shire's firebreak order).
Element 2: Siting and design	A2.1 Asset Protection Zone (APZ)	
Element 3: Vehicular access	A3.1 Two access routes	There are multiple access options that facilitate movement to a range of alternative locations and directions of travel.
	A3.2 Public road	All public roads have been constructed to the appropriate standards as required in the Guidelines.
	A3.3 Cul-de-sac (including a dead-end-road)	Not applicable.
	A3.4 Battle-axe	Not applicable.
	A3.5 Private driveway longer than 50m	Not applicable.
	A3.6 Emergency access way	Not applicable.
	A3.7 Fire service access routes (perimeter roads)	Strategic fire access has been designed and will be implemented for Lots 397-405. The FSAR between Lot 501 and 397 will be established and maintained during the bushfire season.
	A3.8 Firebreak width	Firebreaks (including fuel load management) will be established and maintained in accordance with the Shire's firebreak and fuel load notice.
Element 4: Water	A4.1 Reticulated areas	The site is serviced with reticulated mains water in accordance with the State Government requirements. Fire hydrants are in place and their location is shown in Appendix 4.
	A4.2 Non-reticulated areas	Not applicable.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	Not applicable.

Subsection 5.2: Additional management strategies



Legend

- 1. Subject land (indicative only) - - -
- 2. Bitumen roads

Notes

1. AS 3959 construction standards only apply to the areas within the declared bushfire prone areas and where a lot is BAL rated at BAL-12.5 or above. Only Lots 404 and 405 require increased construction standards.
2. The site is serviced by the reticulated mains water supply.
3. Forest to the west and north, and the plantation to the north-east are the primary vegetation plots that provide an ongoing bushfire threat.
4. The grassland on the development site is mown, and on western, northern and eastern side of the water body are maintained at 50 mm high grass or less.
5. Evacuation road options.
6. The Landscape Master Plan shows a northern landscape buffer, adjacent to Lot 405, which is 15 metres wide and will be managed sympathetically to the potential bushfire risk.
7. FSAR to be constructed in this area (southern boundary of Lot 397 and northern side of Lot 501).

Location details: Lot 9008 on DP54938 Lakeview and Carnegie Close, Bridgetown
 Local government area: Shire of Bridgetown-Greenbushes
 Assessment date: 15 April 2020
 Prepared by: Ralph Smith
 Accreditation level: 2 Accreditation number: 27541
 Accreditation expiry date: August 2020
 Date of aerial photo: Jan 2015

Figure 7. Spatial representation of the bushfire management strategies.

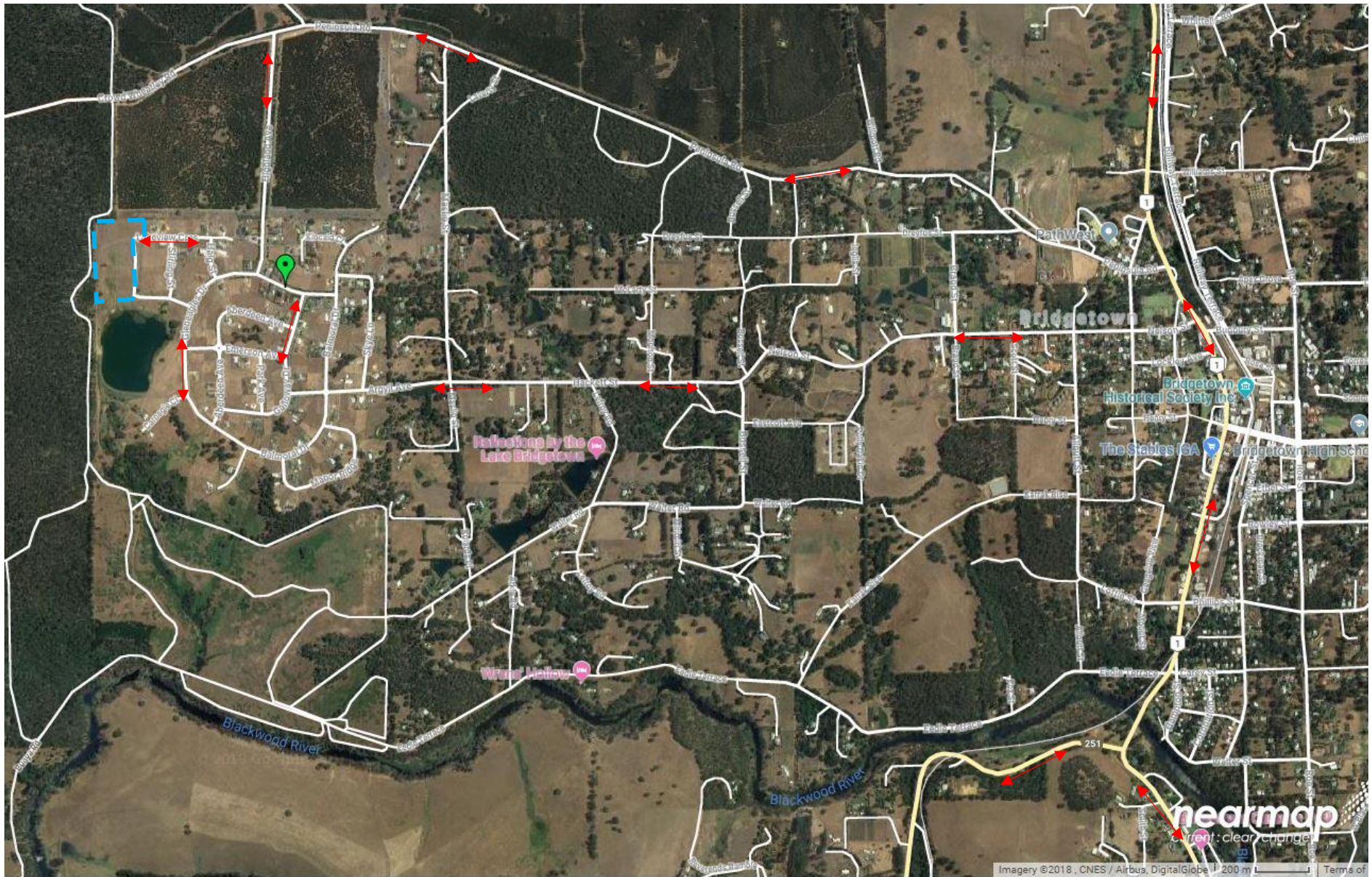
Section 6: Responsibilities for Implementation and Management of the Bushfire Measures

DEVELOPER/LANDOWNER – PRIOR TO ISSUE OF CERTIFICATE OF TITLES FOR NEW LOTS			
No.	Implementation Action	Local government clearance	Bushfire consultant clearance
1	Install the public roads to the standards stated in the BMP.		Completed
2	Install the required water supply that meets State Government's specifications.		Completed
3	Establish and maintain the grassland in a 'low threat state' in accordance with the Shire's annual firebreak notice issued under s33 of the Bush Fires Act 1954 and as stated in the BMP.		Completed and ongoing
4	<p>A notification, pursuant to Section 165 of the <i>Planning and Development Act 2005</i> is to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:</p> <p><i>"This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and may be subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land."</i></p> <p>(Western Australian Planning Commission)</p>		Required post approval of the subdivision
5	Upgrade/construct the FSAR and install gates as required with the subdivision and on the southern boundary of Lot 397.		

LANDOWNER/OCCUPIER – ONGOING MANAGEMENT			
No.	Management Action		
1	Comply with the relevant local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.		Completed and ongoing

Appendix 1

Map showing the access options to and from the development site.



Appendix 2

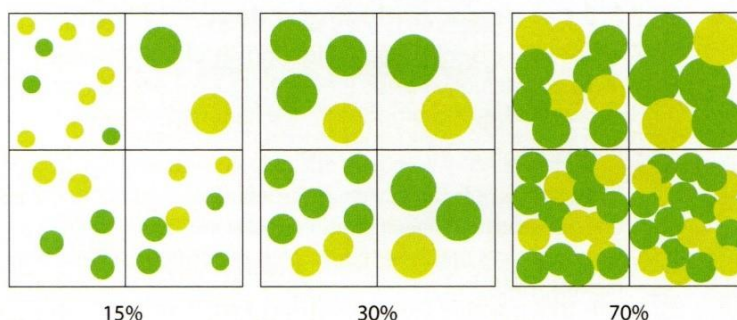
APZ criteria extracted from the Guidelines (page 65).

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 16: 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 3

Public roads, cul-de-sac, emergency access ways and fire service access routes standards as per the Guidelines.

Table 6: Vehicular access technical requirements

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

*Refer to E3.2 Public roads: Trafficable surface

E3.3 Cul-de-sac

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.

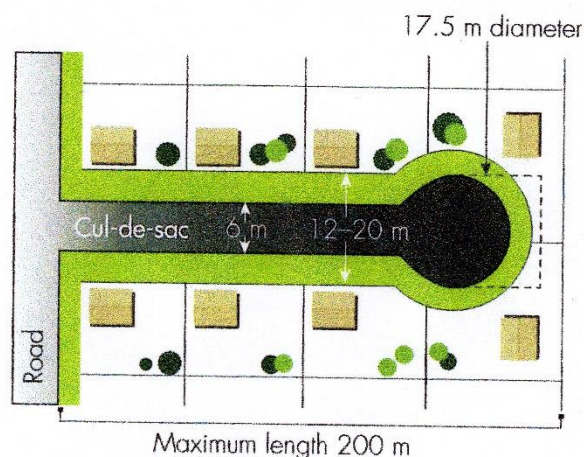


Figure 20: Minimum design requirements for a cul-de-sac

EXPLANATORY NOTES

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.

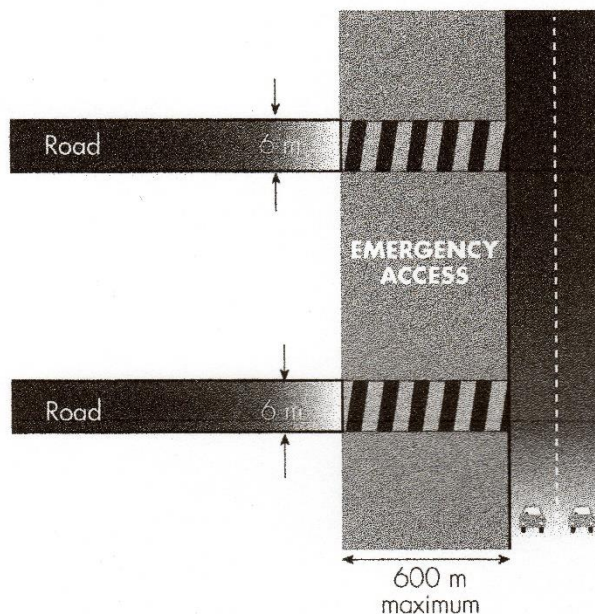


Figure 23: Minimum design requirements for an emergency access way

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

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ELEMENT 3: VEHICULAR ACCESS

EXPLANATORY NOTES

E3.7 Fire service access routes (perimeter roads)

Fire service access routes should be established to separate bushfire prone areas from developed areas, and to provide access within and around the edge of subdivisions and related development. Fire service access is used during bushfire suppression operations but can also be used for fire prevention work.

Fire service access routes should:

- Link up with the road network at regular intervals – the development and road network forms part of the fire service access system;
- Be adequately signposted;
- Allow for two-way traffic – that is, two fire appliances must be able to safely pass each other;
- Have an all-weather surface (i.e. compacted gravel, limestone or sealed); and
- Have erosion control measures in place.

Driveways may be used as part of the designated fire service access system, provided they meet the minimum standard for fire service access routes. It is beneficial to link the fire service access routes with individual driveways to allow quick access to properties and houses during fire emergencies.

Where gates are used, these should be wide enough to accommodate type 3.4 fire appliances (minimum width of 3.6m) with the design and construction to be approved by the relevant local government. Gates on fire service access routes may be locked to restrict access provided that a common key system is used and such keys are made available for fire appliances and designated fire officers within the local government area and/or surrounding district. Gates should be installed where fences cross fire service access routes.

Management and access arrangements should be in place to ensure that the maintenance of fire service access routes will occur in the long term after an area has been subdivided. A number of options can be used to achieve this, including but not limited to:

- Individual property owners being responsible for maintaining fire service access routes where these fall on their property;
- Providing such access as a right-of-way or easement in gross to ensure accessibility to fire services during an emergency; and/or
- A levy system administered by local government to cover the cost of maintaining fire service access routes.

Such arrangements should be documented in the relevant planning application (such as a structure plan, subdivision plan or development plan) and should be agreed to by local government.

Appendix 4

Hydrant locations. These hydrants are located in the field and comply with the State's criteria.

