Bushfire Management Plan

(Subdivision Application)

Lot 9000 Reen Road, Gidgegannup

City of Swan

Job Number:	190294
Assessment Date:	11 August 2020
Report Date:	14 August 2020

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The measures contained in this Bushfire Management Plan are considered to be minimum standards and they do not guarantee that a building will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the correct implementation of the required bushfire protection measures (and any associated response/evacuation plan if applicable) will depend, among other things, on the actions of the landowners or occupiers over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the project are made in good faith based on information available to Bushfire Prone Planning at the time.

All maps included herein are indicative in nature and are not to be used for accurate calculations.

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Document Control

Version	Version Details	Date Submitted
1.0	Proposed Subdivision BMP	14-Aug-20
1.1	Updated BMP – CoS Comment	8-Oct-20
1.2	Updates to mapping – Static Water Supply	23-Nov-20
1.3	Updates to mapping – Lot No's & Building Envelope	1-Sep-21

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Reviewed/Approved		
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Document Content Compliance Statement
This Bushfire Management Plan (the Plan) provides the required information to address State Planning Policy No. 3.7: Planning in Bushfire Prone Areas - December 2015 (SPP 3.7), the associated Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 (Guidelines), and any additional information as directed by the WA Planning Commission (WA Department of Planning, Lands and Heritage). It is fit for accompanying a planning application.
Subdivision BMP Template v7.3

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Executive Summary

Bushfire Prone Planning (BPP Group Pty Ltd) has been commissioned by the landowner to prepare a Bushfire Management Plan including an assessment against the Bushfire Protection Criteria for Lot 9000 Reen Road, Gidgegannup. The land consists of a 31.9890ha Special Rural zoned Lot, and it is proposed to subdivide the Lot into 5 Lots.

Contained within this report, contour mapping is utilised to visually show the potential radiant heat impacts (from bushfire prone vegetation), as separate Bushfire Attack Level contours across the site. The BAL's have been derived for the proposed Lots within the assessed area. The purpose is to inform future development planning by determining or indicating the Bushfire Attack Levels (BAL's) that future buildings, within each Lot, are potentially subject to.

Against the Bushfire Protection Criteria, the decision maker's assessment of a future Proposal will be on the basis of it being able to meet the Acceptable Solutions, once construction and landscaping is complete, as follows:

- For Element 1 'Location', the subdivision (Lot) is able to achieve the acceptable solution (by being located in an area that will on completion be subject to BAL-29 or less);
- For Element 2 'Siting and Design' the Proposal is able to meet the acceptable solutions by habitable buildings being able to achieve an Asset Protection Zone (APZ) of sufficient size to ensure the radiant heat impact does not exceed BAL-29. APZ's will be managed in a low-fuel state within each new Lot;
- For Element 3 'Vehicular Access', the location of the subdivision (Lot) is able to meet the current acceptable solution A3.1 and E3.1 (provision of two access routes to different destinations); and
- For Element 4 'Water', the Location of the Lot is able to achieve the acceptable solution (it is located in a non-reticulated water supply area) where a designated static water supply tank of 50,000ltr capacity for fire-fighting purposes will be provided for this subdivision portion of the Structure Plan area. City of Swan Static Water supply tanks for fire-fighting operations are also located on Reen Road. These tanks are accessible to fire appliances, to allow a 2.4 fire appliance to achieve a '20-minute' turn-around time at legal road speeds. Access to these static water supply tanks are via Reen Road without deviation, providing a direct access route.

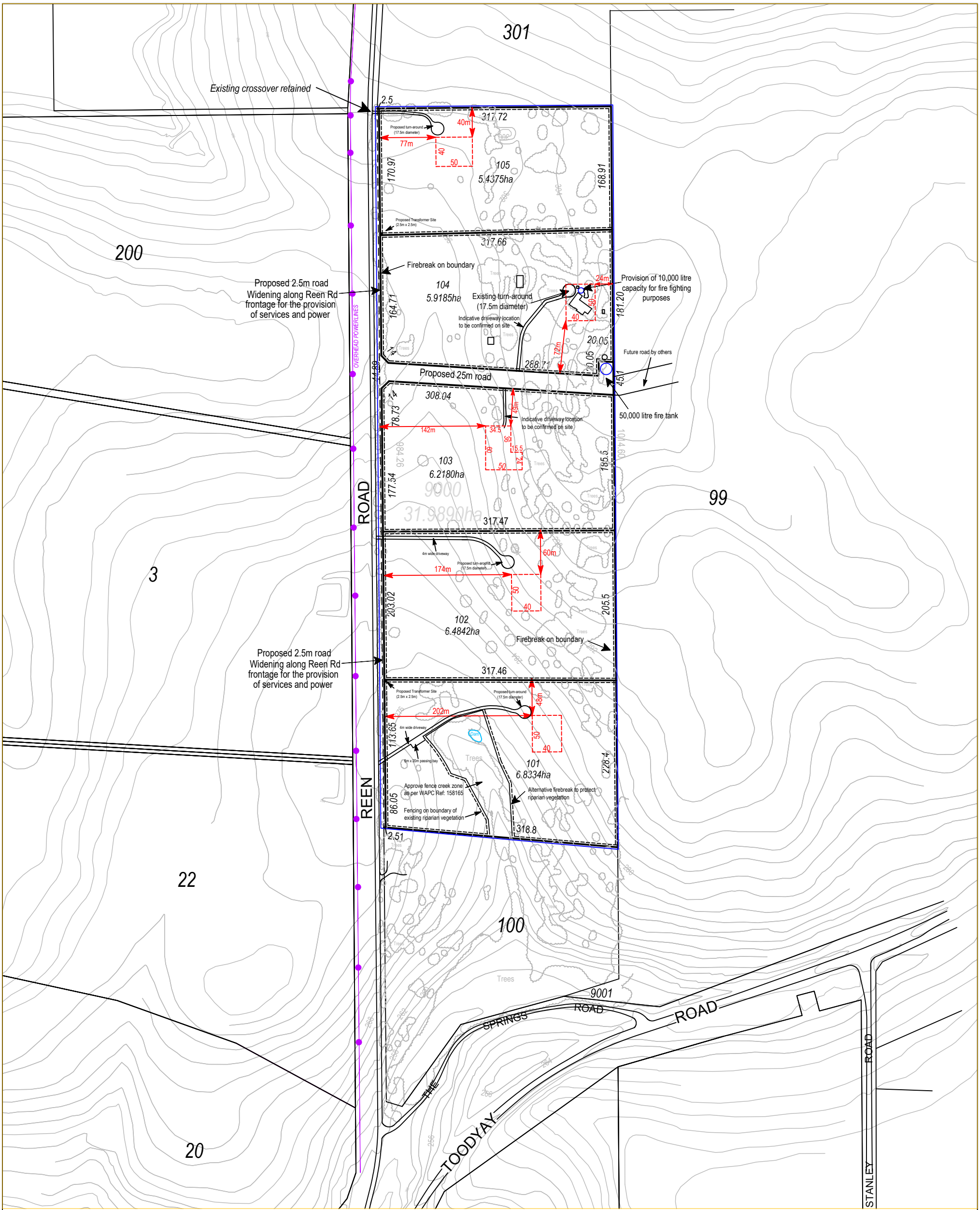
  The Structure Plan indicates 100,000ltr designated water supply for fire-fighting operations is to be provided for the Structure Plan area.

  An additional 50,000ltr static water supply tank is to be provided by future developers/proponents on the neighbouring site to the east, with the intention that this will service the remainder of the structure plan area in the future, on completion of that stage/s of subdivision.

1 The Proposal and Purpose of the Plan

1.1 Details

Landowner / Proponent:	Castleton Holdings Pty Ltd
Site Address:	Lot 9000 Reen Road, GIDGEGANNUP
Local Government:	City of Swan
Site Area:	31.9890ha
No. of Proposed Lots:	5 Lots
Planning Stage:	Subdivision
Subdivision Type:	Subdivision - small number of Lots
Overview of the Proposal:	Bushfire management planning assessment and report of Lot 9000 Reen Road, Gidgegannup.
Bushfire Prone Planning Commissioned to Produce the Plan by:	Landowner/Proponent
Purpose of the Plan:	To accompany a planning application
For Submission to:	WA Planning Commission (WAPC) & City of Swan



50 0 50 100 150 200

SCALE: 1:5000 @ A3
ALL DISTANCES ARE IN METRES

NORTH

SURVEYOR:	PI
DATE:	16/08/2021
FILE:	90053 Stage 2.see
HOR. DATUM:	N/A
VERT. DATUM:	AHD71
DRAWN: PI	CHECKED: PI

JUROVICH SURVEYING
ABN 60 146 230 944
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BUILDING ENVELOPE LOCATION
PROPOSED SUBDIVISION OF LOT 9000
REEN ROAD GIDGEGANNUP
CITY OF SWAN

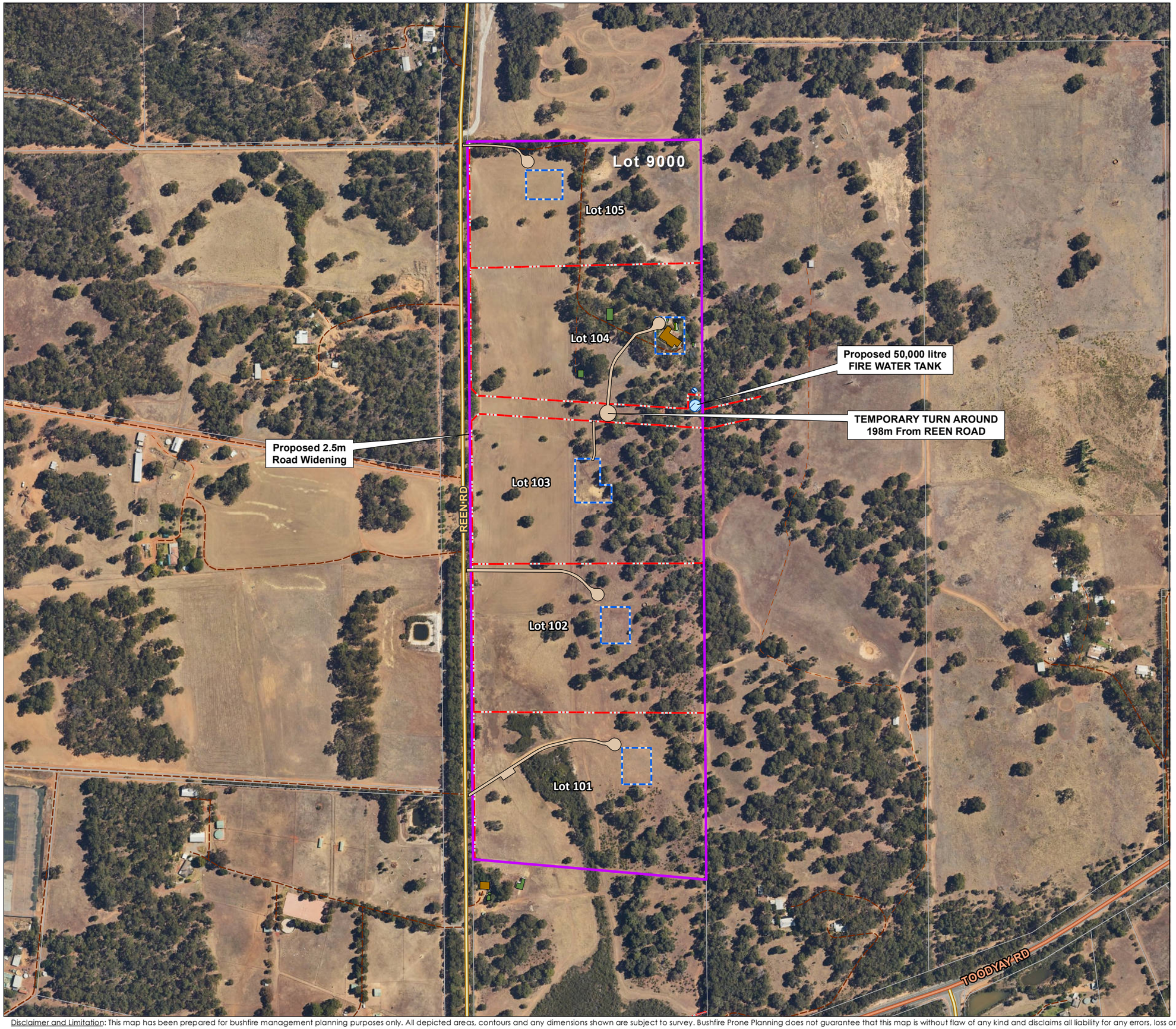
CLIENT : CASTLETON HOLDINGS PTY LTD

A3 SCALE :	JS JOB No :	DWG Name :	REV
1 :5000	90053	90053-02	F

Figure 1.2

Proposed Subdivision

Lot 90001 on Plan 415806
Reen Road
GIDGEGANNUP 6083
CITY OF SWAN



------ **LEGEND** ------

- Subject Site
- Other Lots
- Proposed Subdivision
- Proposed Building Envelope
- New Access & Turning Circles

Existing Building

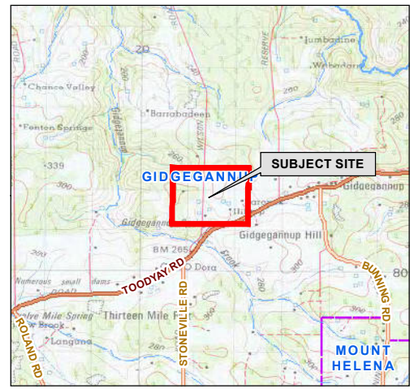
- Class 1a
- Class 10a
- Class 10b
- Water Tank

Proposed Building

- Water Tank

0 50 100 150 200 250
Metres

------ **LOCALITY** ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2021

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 7/09/2021
Map udated by: Ian Ross 7/09/2021

BUSHFIRE PRONE PLANNING

Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence arising from relying on any information depicted.
Map Document Path / Name: K:\Projects\Jobs 2019\190294 - Lot 81 Reen Road Gidgegannup (BMP SD)\Mapping\MXD\190294_Fig1-2_SUB_Lot 81 Reen Road Gidgegannup.mxd

Figure 1.3

Location Plan

Lot 9000 on Plan 415806
Reen Road
GIDGEGANNUP 6083
CITY OF SWAN

------ LEGEND ------

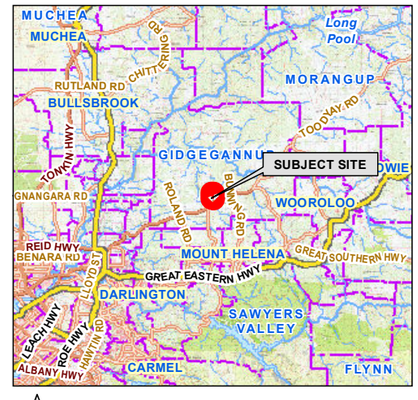
- Subject Site
- Local Government Authority
- Locality / Suburb
- Reserves
- Bush Fire Brigade

Legislated Lands and Waters

- Crown Freehold - DBCA Managed
- Nature Reserve
- Conservation Park
- National Park

0 1 2 3
Kilometers

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2021

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
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Map Document Path / Name: K:\Projects\Jobs 2019\190294 - Lot 81 Reen Road Gidgegannup (BMP SD)\Mapping\MXD\190294_Fig1-3_LOC_Lot 81 Reen Road Gidgegannup.mxd

Table 1.1.1: Details of Lots

CURRENT LOT			
Lot No.	Street No.	Lot Area	Zoning
9000	-	31.9890ha	Special Rural

PROPOSED LOTS		
Lot No.	Street No.	Lot Area
101	-	6.8334ha
102	-	6.4842ha
103	-	6.2180ha
104	-	5.9185ha
105	-	5.4375ha

Figure 1.4

Bushfire Prone Area

Lot 9000 on Plan 415806
Reen Road
GIDGEGANNUP 6083
CITY OF SWAN

Lot 9000
Lot 105
Lot 104
Lot 103
Lot 102
Lot 101
REEN RD
GIDGEGANNUP
TOODYAY RD
THE SPRINGS RD
STANLEY RD
CREST SIDE CL

------ LEGEND ------

- Subject Site
- Other Lots
- Locality / Suburb
- Proposed Subdivision
- Proposed Building Envelope

Existing Building

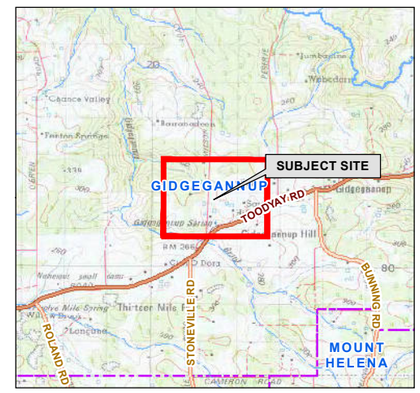
- Class 1a
- Class 10a
- Class 10b
- Water Tank

Proposed Building

- Water Tank
- Bushfire Prone Areas (2019)

0 50 100 150 200 250
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2021

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
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Map Document Path / Name: K:\Projects\Jobs 2019\190294 - Lot 81 Reen Road Gidgegannup (BMP SD)\Mapping\MXD\190294_Fig1-4_BPA_Lot 81 Reen Road Gidgegannup.mxd

1.2 Existing Documentation Relevant to the Construction of this Plan

This section acknowledges any known reports or plans that have been prepared for previous planning stages, that refer to the subject area and that may or will impact upon the assessment of bushfire risk and/or the implementation of bushfire protection measures and will be referenced in this Bushfire Management Plan.

RELEVANT DOCUMENTS		
Existing Document	Copy Provided by Client	Title
Structure Plan	Yes	Gidgegannup Structure Plan 17-10
Environmental Report	Yes	Spring Rare Flora Search Lots 81, 99, 52, & 50 North Side of Toodyay Road, Between Reen & Reserve Roads, Gidgegannup – Arthur S Weston (3 February 2010)
Landscaping (Revegetation) Plan	*N/A	-
Bushfire Risk Assessments	Yes	Fire Management Plan – Structure Plan, Lots 51 & 52 Toodyay Road, Lot 50 Reserve Road, Lot 81 Reen Road & Lot 99 The Springs Road, Gidgegannup (FirePlan WA - March 2014) Bushfire Management Plan – Lot 81 (No.102) Reen Road, Gidgegannup (Bushfire Prone Planning – 19 June 2019)

*Landscaping has been implemented for the creek area as part of previous subdivision works. No further re-vegetation proposed for this subdivision.

2 Environmental Considerations

2.1 Native Vegetation – Modification and Clearing

'Guidelines' s2.3: "Many bushfire prone areas also have high biodiversity values. SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values."

Existing conservation areas that are potentially affected by the development proposal are required to be identified. This may result in vegetation removal/modification prohibition or limitations. These areas include National Parks, Nature Reserves, Wetlands and Bush Forever sites.

Environmental Protection Act 1986: "Clearing of native vegetation in Western Australia requires a clearing permit under Part V, Division 2 of the Act unless clearing is for an exempt purpose. Exemptions from requiring a clearing permit are contained in Schedule 6 of the Act or are prescribed in the Environmental Protection Regulations" ('Guidelines' s2.3).

The Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act): This Act administered by the Australian Government Department of Environment, provides a national scheme of environment and heritage protection and biodiversity conservation. Nationally threatened species and ecological communities are a specific matter of significance. Areas of vegetation can be classified as a Threatened Ecological Community (TEC) under the EPBC Act and consequently have removal restrictions imposed.

VEGETATION MODIFICATION AND CLEARING ASSESSMENT	
Will on-site clearing of native vegetation be required?	Yes
Does this have the potential to trigger environmental impact/referral requirements under State and Federal environmental legislation?	No
Identified environmental legislation applicable to the Proposal site - No.1:	N/A
Identified environmental legislation applicable to the Proposal site - No.2:	N/A
For the proposed development site, have any areas of native vegetation been identified as species that might result in the classification of the area as a Threatened Ecological Community (TEC)?	*No
Potential TEC species identified:	N/A

The bushfire assessment and management strategies contained in this report, assume that environmental approval will be achieved or clearing permit exemptions will apply. Limited clearing applicable to this site, (predominantly for new fence-lines, firebreaks and asset protection zone maintenance), due to existing cleared pasture areas.

*Refer to the Spring Rare Flora Search Lots 81, 99, 52, & 50 North Side of Toodyay Road, Between Reen & Reserve Roads, Gidgegannup – Arthur S Weston (3 February 2010).

Development Design Options

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation Lots and/or Asset Protection Zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available design options to minimise the removal of native vegetation.

MINIMISING THE REMOVAL OF NATIVE VEGETATION		
Design Option	Identified	Adopted
Reduction of lot yield	N/A	N/A
Cluster development	N/A	N/A
Construct building to a standard corresponding to a higher BAL rating as per BCA (AS 3959-2018 and/or NASH Standard)	N/A	N/A
Modify the development location	N/A	N/A

The subject site comprises large areas of cleared pasture which reduces the need to clear native vegetation for development purposes. Lot design for the subdivision proposal has considered the location of existing infrastructure, with buildings on the proposed Lots being able to achieve the development of asset protection zones without clearing areas of significant vegetation.

Impact on Adjoining Land

Is this planning proposal able to implement the required bushfire measures within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes

The subdivision is not reliant upon bushfire measures being implemented external to the site to achieve compliance with bushfire protection criteria.

2.2 Re-vegetation / Retained Vegetation / Landscape Plans

Is re-vegetation of riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	Considered and implemented at previous subdivision stage
Is the requirement for ongoing maintenance of existing vegetation in riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	No

In assessing vegetation for bushfire threat, consideration must be given to possible future vegetation changes likely on the site that is being assessed and in particular those that would have the potential to increase the bushfire risk. This may be due to growth of existing vegetation or growth of planned landscape plantings. There must be careful consideration of the creation of vegetation corridors where they join offsite vegetation, and which may provide a route for fire to enter an area of future development.

Where an environmental report or landscaping (revegetation) is required as a condition of future development, the bushfire management planning may be required to address any bushfire impacts arising from these subsequent reports or plans.

Landscaping or re-vegetation of creek protection zones within the site requires consideration of the bushfire management planning requirements to ensure an increase in bushfire hazards does not occur, nor alter bushfire attack levels determined for the site.

Future garden landscape areas will be managed and lawn on site is able to be maintained below 100mm in height to the extent required and subsequently on-site vegetation will rate as low threat within asset protection zones.

Gidgegannup Springs is located with the southern portion of the adjoining Lot 100 Reen Road. This wetland extends into the central area of proposed Lot 5 within the new subdivision and may retain some environmental significance to flora and fauna communities. Firebreak alignments have considered minimum buffer requirements and avoided areas of low-lying wetland, rehabilitation areas (where applicable) or significant vegetation. An alternate firebreak has been implemented as part of previous subdivision and will remain as part of this proposal as indicated on the subdivision plan to minimise disturbance this wetland area.

Note: Areas of Class 'D' Scrub identified at the time of assessment and indicated in vegetation classification photographs, are required by the City of Swan, via the City's Community Fire Management Officer, to be classified as Class 'B' Woodland. This is resulting from the approved revegetation plan documentation indicating potential for future changes to the creek protection zone vegetation.

The Vegetation and Topography Map Figure 3.1 and the BAL Contour Map Figure 3.2, reflect this City of Swan vegetation classification requirement and as detailed in the following communique extracts.

"Based on the potential species to be used in the revegetation and management of the Creek Protection Zone I would suggest reclassifying Area 3 as B-Woodland rather than D-Scrub."

"species that could potentially be used from the revegetation plan, note the use of Eucalyptus patens (up to 30m high) & Corymbia (up to 60m high). If this revegetation plan is to be used at any time in the future within the "Creek Protection" plot then that will compromise the current classification."

3 Potential Bushfire Impact Assessment

3.1 Assessment Input

3.1.1 Fire Danger Index (FDI) Applied

AS 3959-2018 specifies the fire danger index values to apply for different regions as per Table 2.1. The values used in the model calculations are for the Forest Fire Danger Index (FFDI) and for which equivalent representative values of the Grassland Fire Danger Index (GFDI) are applied as per Appendix B. The values can be refined if appropriately justified.

Table 3.1.1: Applied FDI Value

FDI Value			
Vegetation Area	As per AS 3959 - 2018 Table 2.1	As per DFES for the Location	Value Applied
1 to 26	80	N/A	80

Existing Vegetation Identification, Classification and Effective Slope

Vegetation identification and classification has been conducted in accordance with AS 3959-2018 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

When more than one vegetation type is present, each type is identified separately with the worst-case scenario being applied as the classification. The predominant vegetation is not necessarily the worst-case scenario.

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959-2018 s2.2.3.2(f) and asset protection zone standards). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

Effective Slope: Is the ground slope under the classified vegetation and is determined for each area of classified vegetation. It is the measured or determined slope which will most significantly influence the bushfire behaviour in that vegetation as it approaches a building or site. Where there is a significant change in effective ground slope under an area of classified vegetation, that will cause a change in fire behaviour, separate vegetation areas will be identified, based on the change in effective slope, to enable the correct assessment.

Table 3.1.2: Vegetation identification and classification

ALL VEGETATION WITHIN 150 METRES OF THE LOT				
Vegetation Area	Identified Classification Types [1] or Description if 'Excluded'	Applied Classification[2]	Effective Slope Under Classified Vegetation	
			degrees	description
1	Sown Pasture G-26	Class G Grassland	4.9	Downslope
2	Sown Pasture G-26	Class G Grassland	0	Upslope
3	Sown Pasture G-26	Class G Grassland	0	Upslope
*4	*Woodland B-05	*Class B Woodland	0	Flat
5	Open Forest A-03	Class A Forest	4.4	Downslope
6	Open Forest A-03	Class A Forest	0	Upslope
7	Open Forest A-03	Class A Forest	0	Upslope
8	Open Forest A-03	Class A Forest	2.8	Downslope
9	Open Forest A-03	Class A Forest	0	Upslope
10	Open Forest A-03	Class A Forest	0	Upslope
11	Sown Pasture G-26	Class G Grassland	0	Upslope
12	Open Forest A-03	Class A Forest	0	Upslope
13	Open Forest A-03	Class A Forest	0	Upslope
14	Open Forest A-03	Class A Forest	0	Upslope
15	Sown Pasture G-26	Class G Grassland	0	Upslope
16	Open Forest A-03	Class A Forest	0	Upslope
17	Open Forest A-03	Class A Forest	0	Upslope
18	Open Forest A-03	Class A Forest	4.6	Downslope
19	Open Forest A-03	Class A Forest	4.1	Downslope
*20	*Woodland B-05	*Class B Woodland	2.7	Downslope
21	Sown Pasture G-26	Class G Grassland	0	Upslope
22	Open Forest A-03	Class A Forest	6.7	Downslope
23	Open Forest A-03	Class A Forest	0	Upslope
24	Sown Pasture G-26	Class G Grassland	0	Upslope
25	Open Forest A-03	Class A Forest	0	Upslope
26	Open Forest A-03	Class A Forest	0	Upslope

Representative photos of each vegetation area, descriptions and classification justification, are presented on the following pages. The areas of classified vegetation are defined, and the photo locations identified on the topography and classified vegetation map, Figure 3.1.

Note[1]: As per AS 3959-2018 Table 2.3 and Figures 2.4(A)and 2.4 A-G
Note[2]: As per AS 3959-2018 Table 2.3.

Vegetation within the assessment area has an effective slope under the classified vegetation of 'upslope and downslope' in relation to the existing buildings and proposed building envelopes due to site topography. Vegetation classes of the same type, in close proximity and within the same slope range have been grouped in the same area. It is assumed for the purposes of assessment that asset protection zones around existing buildings will be modified/maintained to low threat vegetation standards as part of subdivision works and ongoing management in a low threat state in perpetuity.

City of Swan required precautionary approach (possible future revegetation area) - Area 4 currently Class 'D' Scrub, to be classified as Class 'B' Woodland, for the purposes of vegetation mapping and BAL Contour Mapping. (Refer Figure 3.1)

Vegetation Area 1, 7 & 8	**Classification Applied or Exclusion Clause:** Class G Grassland ; Class A Forest
Vegetation Type Present: Sown pasture G-26; Open forest A-03	
Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas. Marri and Jarrah dominant canopy trees, tall shrubs and grassy understorey interface. Tree height ~20.2m, foliage cover ~50%.	

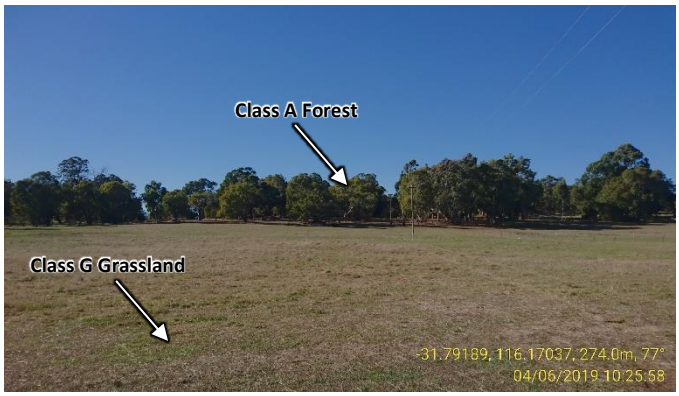

Photo ID: 1



Photo ID: 2

Vegetation Area 1, 2 & 4	**Classification Applied or Exclusion Clause:** Class G Grassland; *Class D Scrub
Vegetation Type Present: Sown pasture G-26; Closed scrub D-13	
Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas. Shrubs 2m in height within wetland/creek-line area. 60%-70% foliage cover.	



Photo ID: 3

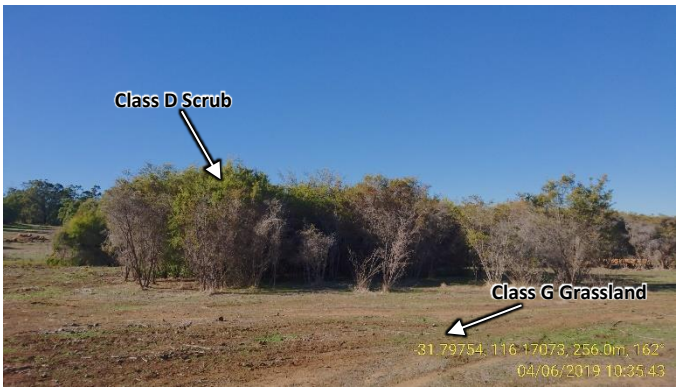

Photo ID: 4

Vegetation Area 1, 3, 4 & 5	**Classification Applied or Exclusion Clause:** Class G Grassland; *Class D Scrub; Class A Forest
Vegetation Type Present: Sown pasture G-26 ; Closed scrub D-13; Open forest A-03	
Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas. Shrubs 2m in height within wetland/creek-line area. 60%-70% foliage cover. Marri and Jarrah dominant canopy trees, tall shrubs and grassy understorey interface. Tree height ~20.2m, foliage cover ~50%.	

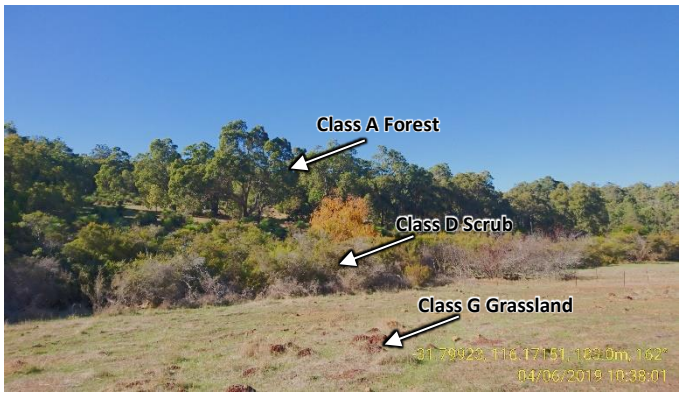

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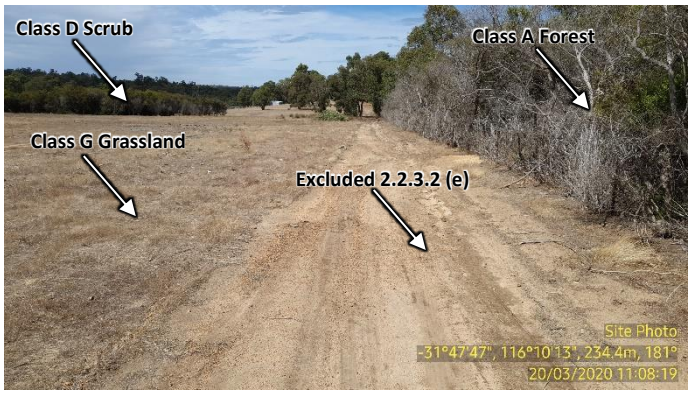
Photo ID: 6

Vegetation Area 1, 2, 4, 10 & 23	**Classification Applied or Exclusion Clause:** *Class D Scrub; Class G Grassland; Class A Forest; Excluded AS3959-2018 2.2.3.2 (e) Non Vegetated Areas
Vegetation Type Present: Closed scrub D-13 ; Sown pasture G-26 ; Open forest A-03	
Description / Classification Justification: *Class D Scrub - Shrubs 2m in height within wetland/creek-line area. 60%-70% foliage cover. Class G Grassland - Mixed pasture grasses, <10% foliage cover within paddock areas. Class A Forest - Marri dominant canopy trees along verge, low and tall shrubs up to 2.5m, grass trees and grassy understorey interface. Tree height ~20.0m, foliage cover ~50%. Excluded 2.2.3.2 (e) – Cleared firebreak, mineral earth – non vegetated area. ***City of Swan required precautionary approach (possible future revegetation area) – Area 4 Class 'D' Scrub to be classified as Class 'B' Woodland. (Refer Figure 3.1)***	



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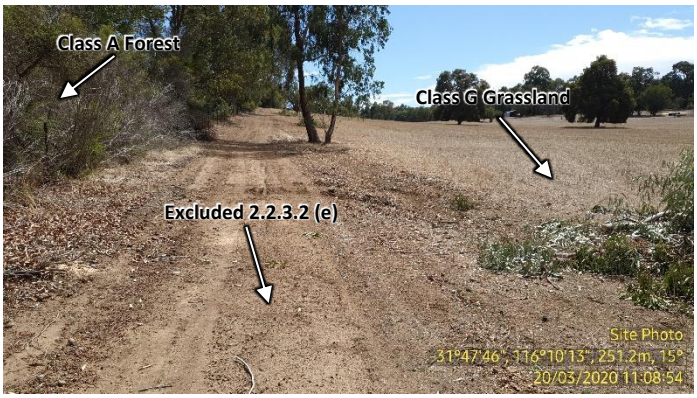

Photo ID: 8

Vegetation Area 7 & 11	**Classification Applied or Exclusion Clause:** Class A Forest; Class G Grassland
Vegetation Type Present: Open forest A-03; Sown pasture G-26	
Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas.	

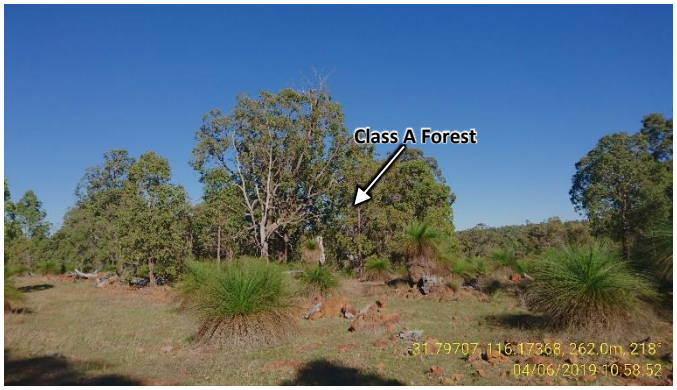

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Photo ID: 10

Vegetation Area 11, 12 & 13	**Classification Applied or Exclusion Clause:** Class G Grassland ; Class A Forest
Vegetation Type Present: Sown pasture G-26 ; Open forest A-03	
Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas. Marri and Jarrah dominant canopy trees, tall shrubs and grassy understorey interface. Tree height ~20.2m, foliage cover ~50%.	



Photo ID: 11



Photo ID: 12

Vegetation Area 14, 15 & 17	**Classification Applied or Exclusion Clause:** Class A Forest ; Class G Grassland

Vegetation Type Present: Open forest A-03 ; Sown pasture G-26

Description / Classification Justification: Marri dominant canopy trees, low shrubs, grass trees and grassy understorey interface. Tree height ~18.0m, foliage cover ~50%. Mixed pasture grasses, <10% foliage cover within paddock areas.



Photo ID: 13



Photo ID: 14

Vegetation Area 15, 16 & 17	**Classification Applied or Exclusion Clause:** Class G Grassland ; Class A Forest

Vegetation Type Present: Sown pasture G-26; Open forest A-03

Description / Classification Justification: Mixed pasture grasses, <10% foliage cover within paddock areas. Marri dominant canopy trees, low shrubs, grass trees and grassy understorey interface. Tree height ~20.0m, foliage cover ~50%.



Photo ID: 15

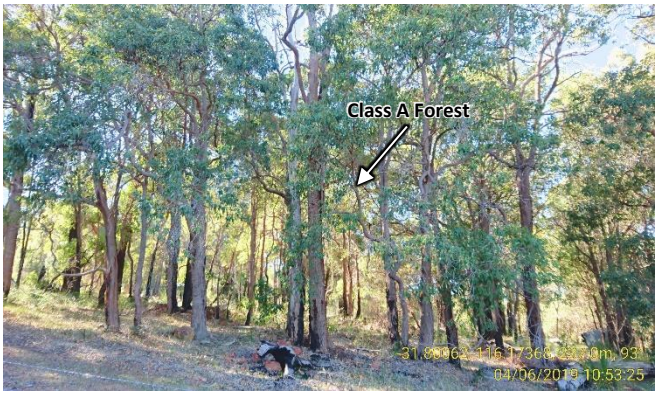

Photo ID: 16

Vegetation Area 18, 19 & 20	**Classification Applied or Exclusion Clause:** Class A Forest; Class G Grassland; *Class D Scrub
Vegetation Type Present: Open forest A-03 ; Sown pasture G-26; Closed scrub D-13	
Description / Classification Justification: Marri dominant canopy trees, tall /low shrubs and grass trees. Tree height ~20.0m, foliage cover ~50%. Mixed pasture grasses, <10% foliage cover within paddock areas. *Class D Scrub - Shrubs ~2m in height within wetland/creek-line area. 60%-70% foliage cover. ***City of Swan required precautionary approach (possible future revegetation area) – Area 20 Class 'D' Scrub to be classified as Class 'B' Woodland. (Refer Figure 3.1)***	



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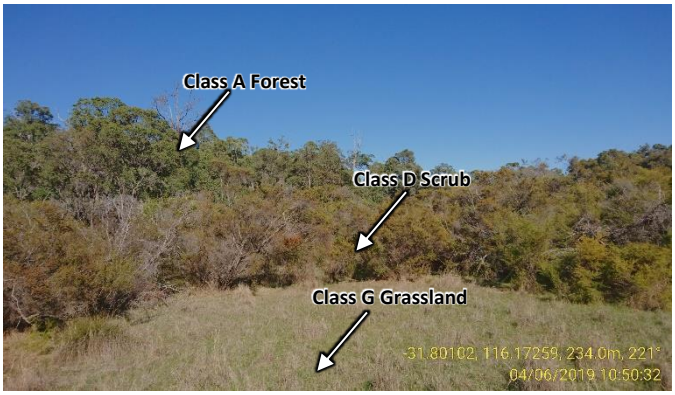


Photo ID: 18

Vegetation Area 21, 22 & 24	**Classification Applied or Exclusion Clause:** Class A Forest ; Class G Grassland
Vegetation Type Present: Open forest A-03 ; Sown pasture G-26	
Description / Classification Justification: Marri dominant canopy trees, tall /low shrubs and grass trees. Tree height ~20.0m, foliage cover ~50%. Mixed pasture grasses, <10% foliage cover within paddock areas.	



Photo ID: 19



Photo ID: 20

Vegetation Area 24 & 25	**Classification Applied or Exclusion Clause:** Class A Forest ; Class G Grassland

Vegetation Type Present: Open forest A-03 ; Sown pasture G-26

Description / Classification Justification: Marri dominant canopy trees, tall /low shrubs and grass trees. Tree height ~20.0m, foliage cover ~50%. Mixed pasture grasses, <10% foliage cover within paddock areas.

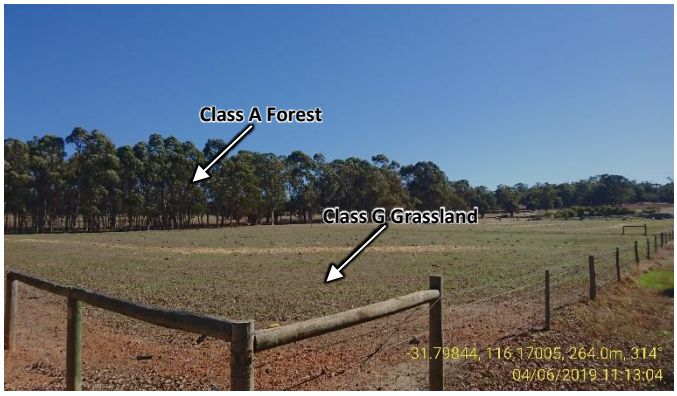


Photo ID: 21



Photo ID: 22

Vegetation Area 25 & 26	**Classification Applied or Exclusion Clause:** Class A Forest

Vegetation Type Present: Open forest A-03

Description / Classification Justification: Marri dominant canopy trees, tall /low shrubs and grass trees. Tree height ~20.0m, foliage cover ~50%.



Photo ID: 23

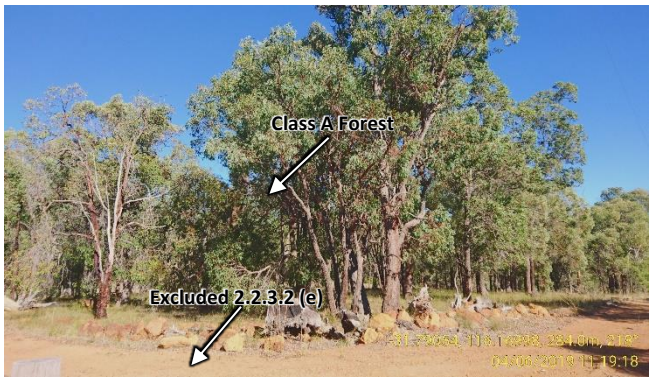


Photo ID: 24

Vegetation Area 26	**Classification Applied or Exclusion Clause:** Class A Forest
Vegetation Type Present: Open forest A-03	
Description / Classification Justification: Marri dominant canopy trees, tall /low shrubs and grass trees. Tree height ~20.0m, foliage cover ~50%.	



Photo ID: 25

Photo ID: -

Figure 3.1

Topography & Classified Vegetation

Lot 90001 on Plan 415806
Reen Road
GIDGEGANNUP 6083
CITY OF SWAN

------ LEGEND ------

- Subject Site
- Other Lots
- Photo & Direction
- Proposed Subdivision
- Proposed Building Envelope
- Firebreaks
- New Access & Turning Circles

Asset Protection

- APZ - Proposed (BAL 29)

Existing Building

- Class 1a
- Class 10a
- Class 10b
- Water Tank

Proposed Building

- Water Tank

Vegetation Assessment Area

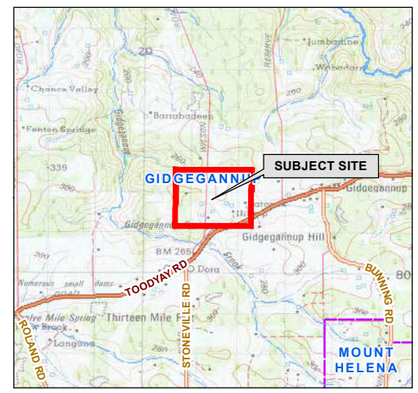
- 150m from Subject Site

Classied Vegetation

- Class (A) Forest
- Class (B) Woodland
- Class (G) Grassland
- Exclusion 2.2.3.2
- APZ Distance

0 50 100 150 200 250
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2021

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 8/09/2021
Map udated by: Ian Ross 8/09/2021

BUSHFIRE PRONE PLANNING

Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence arising from relying on any information depicted.
Map Document Path / Name: K:\Projects\Jobs 2019\190294 - Lot 81 Reen Road Gidgegannup (BMP SD)\Mapping\MXD\190294_Fig3-1_VEG_Lot 81 Reen Road Gidgegannup.mxd

3.2 Assessment Output

Understanding the Bushfire Assessment Results - Application of Bushfire Attack Levels (BAL)

The BAL rating has a different application in the building environment compared to the planning environment and the BAL assessment can result in a determined BAL or an indicative BAL which have different implications.

Building versus Planning Applications

In the building environment, a determined BAL rating is required (for the proposed construction) at the building application stage. This is to inform approval considerations and establish the construction standards that are to apply if approved. An indicative BAL rating is not acceptable for a building application.

In the planning environment, assessing the ability of a proposed development site to achieve BAL-29 or less is the objective (as one of the bushfire protection criteria being assessed). The 'development site' is defined by the LPS Amendment Regulations 2015 as "that part of a lot on which a building that is the subject of development stands or is to be constructed".

Therefore, being able to show that a BAL rating of BAL-29 or lower is achievable for a proposed development site (i.e. the building footprint) is an acceptable outcome for that criteria, as established by the bushfire provisions, SPP 3.7 and the associated Guidelines. For planning purposes, this BAL rating could be either indicative or determined.

Determined BAL Ratings

A determined BAL rating is to apply to an existing or proposed construction site (building) and not to a lot or envelope. Its purpose is to state the potential radiant heat flux to which the building will be exposed.

A determined BAL cannot be given for a future building whose location, elevation design and footprint (on a given lot) are unknown. It is not until these variables have been fixed that a BAL can be determined (typically at the development application or building application stage).

The one exception is when a building of ***any dimension*** can be ***positioned anywhere*** on a proposed lot or within defined limits within the lot (i.e. building setbacks or building envelope) and always remain subject to the same BAL rating. For this to be the case, there needs to be no classified vegetation either onsite or offsite that if retained could impact upon the determined BAL rating.

Indicative BAL Ratings

When this Plan presents a single indicative BAL rating for a proposed construction site (building), this will be because the construction is still subject to a location within the lot being confirmed and/or a vegetation separation distance being achieved. That is, it will be conditional upon some factor being confirmed at a later stage.

For planning applications associated with proposed lots, the building location, elevation design and footprint have typically not been established. Therefore, indicative rather than determined BAL rating/s will be presented for each lot (with the exception as noted above under 'Determined BAL Ratings').

When this Plan presents a single indicative BAL rating for a lot or building envelope (i.e. an 'area' that is not a located building footprint) it will represent the highest BAL rating affecting that 'area'. The BAL rating of a future building on that 'area' will be dependent on its eventual location.

Otherwise, this Plan will present all BAL ratings for each lot and for each BAL rating, the vegetation separation distances from each area of classified vegetation that are to apply. These distances will be presented as either figures in a table or as a BAL contour map.

From this indicative BAL information, it can be assessed if acceptable BAL ratings (≤ BAL-29) can be achieved for future buildings.

3.2.1 Bushfire Attack Level (BAL) Results Presented as a Table

Table 3.2.1: Determination of BAL ratings for proposed Lots (Indicative).

INDICATIVE ACHEIVABLE BUSHFIRE ATTACK LEVEL FOR BUILDINGS ON PROPOSED LOTS		
Relevant Fire Danger Index (AS 3959-2018 Table 2.1)		80
BAL Determination Method	Method 1 as per AS 3959-2018 s2.2.6 and Table 2.5	
Lot No.	Indicative Achievable BAL Rating within Lot	
101	(Building Envelope)	BAL-29
102	(Building Envelope)	BAL-29
103	(Building Envelope)	BAL-29
104	(Existing Dwelling)	BAL-29
105	(Building Envelope)	BAL-29

3.2.2 Bushfire Attack Level (BAL) Results Presented as a BAL Contour Map

Interpretation of the Bushfire Attack Level (BAL) Contour Map

The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels that exist at varying distances away from the classified vegetation. Each BAL represents a set range of radiant heat flux (as defined by AS 3959-2018) that can be generated by the bushfire in that vegetation at that location.

The width of each shaded contour (i.e. the distance interval) will vary and is determined by consideration of variables including vegetation type, fuel structure, ground slope, climatic conditions. They are unique to a site and can vary across a site. The width of each contour is a diagrammatic expression of the separation distances from the classified vegetation that apply for each BAL rating, for that site. A building (or 'area') located within any given BAL contour will be subject to that BAL rating and potentially multiple BAL ratings of which the highest rating will be applied.

Separation Distances Calculated to Construct the BAL Contours

Table 3.2.2: Vegetation separation distances applied to construct the BAL contours.

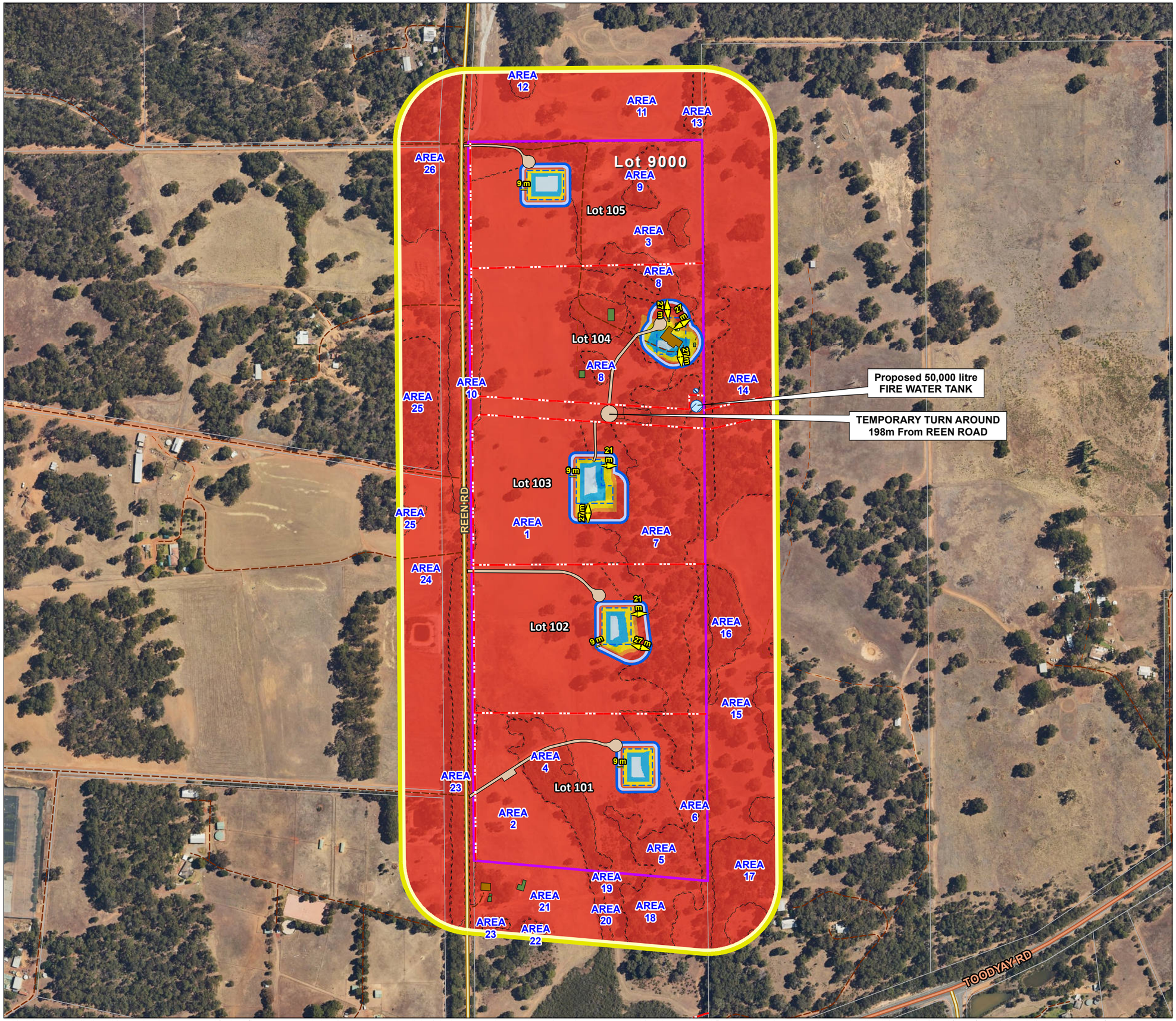
CALCULATED VEGETATION SEPARATION DISTANCES (BAL Assessment Method Applied – METHOD 1)								
Vegetation Classification	Effective Slopes (Under vegetation)	Slope Range (Degrees)	BAL Rating and Corresponding Separation Distance (metres)					
			BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW
Class G Grassland	0	All upslopes & Flat Land	<6	6-<8	8-<12	12-<17	17-<50	>50
Class G Grassland	4.4, 4.9	>0 to 5	<7	7-<9	9-<14	14-<20	20-<50	>50
Class A Forest	0	All upslopes & Flat Land	<16	16-<21	21-<31	31-<42	42-<100	>100
Class A Forest	2.8, 4.1, 4.6	>0 to 5	<20	20-<27	27-<37	37-<50	50-<100	>100
Class A Forest	6.7	>5 to 10	<26	26-<33	33-<46	46-<61	61-<100	>100
*Class B Woodland	0	All upslopes & Flat Land	<10	10-<14	14-<20	20-<29	29-<100	>100
*Class B Woodland	2.7	>0 to 5	<13	13-<17	17-<25	25-<35	35-<100	>100
Method 1 as per AS 3959-2018 Table 2.5.								

City of Swan required precautionary approach (possible future revegetation area) – Area 4 & Area 20 Class 'D' Scrub to be classified as Class 'B' Woodland. (Refer Figure 3.1)

Figure 3.2

BAL Contour Map

Lot 90001 on Plan 415806
Reen Road
GIDGEGANNUP 6083
CITY OF SWAN



------ LEGEND ------

- Subject Site
- Other Lots
- Proposed Subdivision
- Proposed Building Envelope
- New Access & Turning Circles

Asset Protection

- APZ - Proposed (BAL 29)

Existing Building

- Class 1a
- Class 10a
- Class 10b
- Water Tank

Proposed Building

- Water Tank

Vegetation Assessment Area

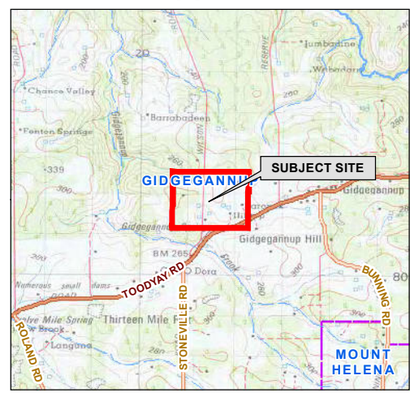
- 100m from Subject Site
- Classified Vegetation Boundary

Indicative Bushfire Attack Levels

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- APZ Distance

0 50 100 150 200 250
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2021

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 7/09/2021
Map udated by: Ian Ross 7/09/2021

BUSHFIRE PRONE PLANNING

Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence arising from relying on any information depicted.
Map Document Path / Name: K:\Projects\Jobs 2019\190294 - Lot 81 Reen Road Gidgegannup (BMP SD)\Mapping\MXD\190294_Fig3-2_BAL_Lot 81 Reen Road Gidgegannup.mxd

3.2.3 Bushfire Attack Levels (BAL) Derived from the Contour Map

Deriving a BAL Rating for a Future Construction Site (Building) from the BAL Contour Map Data

(Capacity to Issue a BAL Certificate)

Key Assumptions: The actual location of a building within a lot or envelope (an 'area') may not have been determined at this stage of planning; and the BAL ratings represent the BAL of an 'area' not a building.

The BAL Rating is Assessed as Indicative

If the assessed BAL for the 'area' is stated as being 'indicative', it is because that 'area' is impacted by more than one BAL contour interval and/or classifiable vegetation remains on the lot, or on adjacent lots, that can influence a future building's BAL rating (and this vegetation may have been omitted from being contoured for planning purposes e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified).

In this report the indicative BAL is presented as either the highest BAL impacting the site or as a range of achievable BAL's within the site – whichever is the most appropriate.

The BAL rating that will apply to any future building within that 'area' will be dependent on:

1. vegetation management onsite; and/or
2. vegetation remaining on adjacent lots; and/or
3. the actual location of the future building within that 'area'.

A BAL Certificate cannot be provided for future buildings, within a lot or envelope with an indicative BAL, until the building location and in some instances building design (elevation), have been established and any required and approved vegetation modification/removal has been confirmed. Once this has occurred a report confirming the building location and BAL rating will be required to submit with the BAL certificate.

The required confirmation of the BAL rating must be done by a bushfire practitioner with the same level of accreditation as has been required to compile this Bushfire Management Plan. This is dependent on the type of calculations utilised (e.g. if performance-based solutions have been used in the Plan BPAD Level 3 accreditation is required)

The BAL Rating is Assessed as Determined

If the assessed BAL for the lot or envelope is stated as being 'determined' it is because that lot or envelope is impacted by a single BAL contour interval. This BAL has been determined by the existence (or non-existence) of classified vegetation outside the lot or envelope, and no classifiable vegetation currently exists on the lot or envelope (i.e. it has been cleared to a minimal fuel, low bushfire threat state). In the situation where the BAL Contour Map has been constructed around multiple lots, there also needs to no classifiable vegetation on an adjacent lot if this vegetation has not already been incorporated into the creation of the BAL Contour Map.

As a result, a determined BAL can be provided in this limited situation because:

1. No classified vegetation is required to be removed or modified to achieve the determined BAL, either within the lot/envelope or on adjacent lots (or if vegetation is excluded from classification, it is reasonable to assume it will be maintained in this state into the future); and
2. A future building can be located anywhere within the 'site' and be subject to the determined BAL rating; and
3. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the BAL contours.

For a determined BAL rating for a lot/envelope, A BAL Certificate (referring to this BMP) can be provided for a future building, if the BMP remains current.

4 Identification of Bushfire Hazard Issues

This bushfire planning assessment is required to show that the Bushfire Protection Criteria can be complied with in the future. The intent is to ensure future development is located where the bushfire hazard level is (or will on completion be) moderate or low and subject to a maximum Bushfire Attack Level of BAL-29. This can be achieved for this site due to the separation distances required for the appropriate BAL rating that considers the following:

Onsite Vegetation: The key factor to facilitate the determining of Indicative Bushfire Attack Levels for the proposed Lots is that vegetation onsite is under the control of the landowner/s. Vegetation onsite therefore can potentially be removed or modified to lower the bushfire risk and therefore presents a lower bushfire threat to the existing buildings.

The predominant vegetation on the site is pasture grasses, which can be managed effectively by grazing of livestock. The primary bushfire hazard issue for this site is the areas of forest native vegetation, and the limited ability for this bushland to be managed in a low threat state.

Achieving a lower BAL rating: A lower Bushfire Attack Level rating than the 'Planning' requirement of BAL-29, may be achieved on those Lots predominantly impacted by grassland vegetation through implementation of the standard 20m asset protection zone distance on flat land as detailed within the City of Swan Fire Hazard Reduction Notice. Site specific assessment at building application time may enable a lower bushfire attack level rating to be determined and subsequently applied to the individual site.

Offsite Vegetation: Areas of vegetation offsite that form part of native vegetation road reserves and neighbouring private land, cannot be removed or modified and as a result the assessed BAL's impacted by the proximity of this vegetation are unable to be further reduced. These areas external to the site but not part of the future development have been factored for the BAL Contour mapping.

5 Assessment Against the Bushfire Protection Criteria (BPC)

5.1 Bushfire Protection Criteria - Assessment Summary

Summarised Outcome of the Assessment Against the Bushfire Protection Criteria (BPC)				
Element	Basis for the Assessment of Achieving the Intent of the Element			
	Achieves compliance with the Element through meeting Acceptable Solutions		Achieves compliance with the Element by application of a Performance Based Solution	Minor or Unavoidable Development
	Meets all relevant acceptable solutions	One or more relevant Acceptable Solutions are not fully met. A variation of the solution is provided and justified.	One or more applicable Acceptable Solutions are not met. A solution is developed with the summary presented in this Plan in Section 5.5. The supporting document presenting Bushfire Prone Planning's detailed methodology is submitted separately to the decision makers.	The required supporting statements are presented in this Plan.
Location	✓			N/A
Siting and Design of Development	✓			
Vehicular Access	✓			
Water	✓			

The subject site has been assessed against:

1. The requirements established in Appendix 4 of the Guidelines for Planning in Bushfire Prone Areas, WAPC 2017 v1.3 (the 'Guidelines'). The detail, including technical construction requirements, are found at https://www.dplh.wa.gov.au/8194.aspx. A summary of relevant information is provided in the appendices of this Plan; and

2. Any endorsed variations to the Guideline's acceptable solutions and associated technical requirements that have been established by the relevant local government. If known and applicable these have been stated in Section 5.2 of this Plan with the detail included as an appendix if required by the relevant local government.

5.2 Bushfire Protection Criteria – Acceptable Solutions Assessment Detail

5.2.1 Element 1: Location

Bushfire Protection Criteria Element 1: Location Assessment Statements and Bushfire Protection Measures to be Applied			
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.			
Acceptable Solution:	A1.1: Development Location	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is fully met.

The subject site can achieve compliance by:

- By ensuring future building work on each proposed Lot can be located on an area that will be subject to potential radiant heat from a bushfire not exceeding 29 kW/m^2 (i.e. a BAL rating of BAL-29 or less will apply – refer Figure 3.1: BAL Contour Map). This can be achieved by using positioning, design and appropriate on-site vegetation management; and
- Managing the remaining bushfire risk to an acceptable level by the existence/implementation and ongoing maintenance of all required bushfire protection measure. These measures include the requirements for vegetation management, vehicular access and fire-fighting water supply.

5.2.2 Element 2: Siting and Design of Development

Bushfire Protection Criteria Element 2: Siting and Design of Development Assessment Statements and Bushfire Protection Measures to be Applied			
Intent: To ensure that the siting and design of development (note: not building/construction design) minimises the level of bushfire impact.			
Acceptable Solution:	A2.1: Asset Protection Zone	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is fully met.

The subject site achieves compliance by:

- Ensuring future building work on each Lot can have established around it an APZ of the required dimensions - to ensure that the potential radiant heat from a bushfire to impact future building/s, does not exceed 29 kW/m^2 (i.e. a BAL rating of BAL-29 or less will apply to determine building construction standards);
- The APZ/s can be established within the Lot boundaries.
- The landowner/s having the responsibility of continuing to manage the required APZ as low threat vegetation in a minimal fuel state, by maintaining the APZ to the required dimensions and standard, including compliance with the local government's annual firebreak notice.

The required APZ dimensions are set out in Section 5.3.1. The APZ technical requirements (Standards) are detailed in Appendix 1.

5.2.3 Element 3: Vehicular Access

Bushfire Protection Criteria Element 3: Vehicular Access Assessment Statements and Bushfire Protection Measures to be Applied			
Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.			
Acceptable Solution:	A3.1: Two access routes	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is fully met.

The subject site (5 Lots created) will have frontage to Reen Road, which provide safe access and egress to two different destinations via the local road network. Reen road enables a connection to Toodyay Road directly to the south or via Reserve Road and Berry Road in the north east. As sealed public roads, they are available to all residents and the public at all times and under all weather conditions. Access to all Lots will be via existing or proposed public roads.

A new road connection for the future development of land to the east will provide driveway access to proposed Lot 103 and Lot 104. This road will be constructed by the developer, to ensure public road access is available to Lot 103 and Lot 104, to the satisfaction of the City of Swan. The proposed road intersects with Reen Road. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with.

Acceptable Solution:	A3.2 Public Road	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is fully met.

Reen Road is an existing constructed road that meet the City of Swan standards and specifications for public roads. The new internal road for future connection through to the east, will be constructed to the City of Swan standards and specification.

The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. (Refer Appendix 2 - part 2)

Acceptable Solution:	A3.3 Cul-de-sacs (including a dead-end road)	Method of achieving Element compliance and/or the Intent of the Element:	N/A

The new internal road for future connection through to the east, will be constructed to the City of Swan standards and specification. An interim turn-around area of minimum 17.5m diameter will be constructed within 200m of Reen Road, to enable safe turn-around of public and emergency service vehicles, until the future development of land to the east occurs and provides a through connection to Reserve Road.

The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. (Refer Appendix 2 – Part 1 & 2)

Acceptable Solution:	A3.4: Battle-axe	Method of achieving Element compliance and/or the Intent of the Element:	N/A

N/A

Bushfire Protection Criteria Element 3: Vehicular Access (continued) Assessment Statements and Bushfire Protection Measures to be Applied			
Acceptable Solution:	A3.5: Private Driveways	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution will be fully met in the future (building construction stage).
Future development on each Lot will require increased construction standards for driveways for any future buildings being greater than 50m from the public road, including provision for turn-around areas and passing bays where required, as specified in the Guidelines. Proposed Lot 5 is impacted by wetland areas and the site prior to the culvert is to most suitable for a passing bay, as it allows a suitable level site for vehicles to pass safely. (Refer site plan). The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. (Refer Appendix 2 – Part 1 & 2)			
Acceptable Solution:	A3.6 Emergency Access Way	Method of achieving Element compliance and/or the Intent of the Element:	N/A
N/A			
Acceptable Solution:	A3.7 Fire Service Access Routes	Method of achieving Element compliance and/or the Intent of the Element:	N/A
N/A			
Acceptable Solution:	A3.8 Firebreak Width	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution can be fully met in the future (at the subdivision construction stage).
The subject site will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954. Firebreaks and hazard reduction, as necessary, will be installed/maintained annually and in perpetuity. Each Lot will have firebreaks upgraded and/or constructed along new boundaries as part of the subdivision works by the developer and maintained by landowner/s. An existing alternative firebreak system is implemented on Lot 5 to limit removal of vegetation within the wetland area in the southern portion of the Lot. The firebreak alignment will follow the vegetation edge on a suitable gradient to ensure a traversable surface for fire appliances is maintained. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. (Refer Appendix 2 – Part 1)			

5.2.4 Element 4: Water

Bushfire Protection Criteria Element 4: Water Assessment Statements and Bushfire Protection Measures to be Applied			
Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.			
Acceptable Solution:	A4.1 Reticulated Areas	Method of achieving Element compliance and/or the Intent of the Element:	N/A
N/A			
Acceptable Solution:	A4.2 Non-Reticulated Areas	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is mostly met. A variation is justified.
Existing static water supply tanks designated for fire-fighting operations, owned and managed by the City of Swan, are located on Reen Road, approximately 2.2km (marginally exceeding the 2.0km limitation) from the further most building envelope site on Lot 101. These tanks are accessible to fire appliances, to allow a 2.4 fire appliance to achieve a '20-minute' turn-around time at legal road speeds. Access to the static water supply tanks are via Reen Road, providing a direct unimpeded access route. The Developer/Proponent is to install a non-combustible 50,000ltr capacity static water supply tank with associated fire appliance connection couplings, hardstand and turn-around area. (Refer Appendix 3) The Structure Plan shows a proposed fire tank (to be a minimum of 50,000ltrs capacity) on the neighbouring site to the east, with the intention that this will service the remainder of the structure plan area in the future on completion of that stage/s of subdivision. The total combined fire-fighting water supply being 100,000ltrs as per the Structure Plan detail. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with.			
Acceptable Solution:	A4.3 Non-reticulated Areas (Individual Lots)	Method of achieving Element compliance and/or the Intent of the Element:	The acceptable solution is fully met.
The subject site is located within a non-reticulated area. A dedicated non-combustible tank water supply for fire fighting on each Lot, will be provided by each landowner on their individual Lot at the building stage that has the effective capacity of 10,000ltrs. Tanks are to be fitted with City of Swan specified couplings for fire appliance connection. Turn-around areas are to be constructed/maintained at the tank sites. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. (Refer Appendix 3)			

5.3 Additional Information for Required Bushfire Protection Measures

The subject site will be required to be maintained in accordance with the City of Swan 'Fire Hazard Reduction Notice 'Firebreak Notice'. The Notice specifies hazard reduction requirements and Asset Protection Zone detail. Note: This Notice may be subject to change in the future.

5.3.1 Vegetation Management

Vegetation management outside of asset protection zones (to achieve the indicated BAL rating) other than that described in the City of Swan Fire Hazard Reduction Notice 'Firebreak Notice' is not required for the subject site. The minimum dimensions (vegetation separation distances) that are to apply to the asset protection zones for each Lot for this Proposal are presented in the table below.

Asset Protection Zone (APZ) Dimensions that are to Apply

The required dimensions of the APZ will vary dependent upon the purpose for which the APZ has been defined. There are effectively three APZ dimensions that can apply:

1. An application for planning approval will be required to show that an APZ can be created which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29); and
2. If the assessment has determined a BAL rating for an existing or future building is less than BAL-29, the APZ must be of sufficient size to ensure the potential radiant heat impact of a fire does not exceed the kW/m² corresponding to the lower assessed BAL rating; or
3. Complying with the relevant local government's annual firebreak notice may require an APZ of greater size than that defined by the two previous parameters.

The 'Planning (WAPC) BAL-29' APZ Minimum Required Dimensions for the Subject Site			
Requirement Set By	Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.3)		
Relevant Fire Danger Index (AS3959-2018 Table 2.1)			80
BAL Determination Method	Method 1 (as per AS 3959-2018 s2.2.6 and Table 2.5)		
Applied Vegetation Classification	Effective Slope Range (degrees)	Acceptable 'Planning' BAL	Required Separation Distance (metres)
Class G Grassland	0	**BAL-29**	8
Class G Grassland	>0 to 5		9
Class G Grassland	>5 to 10		10
Class A Forest	0		21
Class A Forest	>0 to 5		27
Class A Forest	>5 to 10		33
Class B Woodland	0		14
Class B Woodland	>0 to 5		17

This requirement has been established through the State bushfire provisions, SPP 3.7 and the associated Guidelines, as being a key compliance requirement for development proposals in WA.

'Local Government Firebreak Notice APZ' Required Minimum Requirements for the Subject Site	
Requirement Set By:	Local Government (City of Swan)
Minimum Standard:	**Asset (Building) Protection Zone Specification** Asset protection zones for habitable buildings and other assets must meet the following requirements: **1)** Asset protection zones for habitable buildings must extend a minimum of 20 metres out from any external walls of the building, attached structures, or adjacent structures within 6 metres of the habitable building, unless varied under an approved bushfire management plan. **2)** On sloping ground the asset protection zone distance shall increase with 1 metres for every degree in slope on the sides of the building/ structure that are exposed to down slope natural vegetation. **3)** Asset protection zone requirements only apply within the boundaries of the lot on which the asset is located and cannot be enforced across boundaries. **4)** Recommendation Only - Asset protection zones predominantly consist of non-flammable managed vegetation, reticulated lawns and gardens and other non-flammable features. **5)** All grass is maintained to or under 5cm. **6)** Fuel loads must be reduced and maintained at 2 tonnes per hectare or lower. **7)** The crowns of trees are to be separated where possible to create a clear separation distance between adjoining or nearby tree crowns. The separation distance between tree crowns is not required to exceed 10 metres. Clearing or thinning existing trees to create distances greater than 10 metres separation between tree crowns within an asset protection zone is not required or supported by this notice and requires approval from the Department of Water and Environmental Regulation and the City of Swan. **8)** A small group of trees within close proximity to one another may be treated as one crown provided the combined crowns do not exceed the area of a large or mature crown size for that species. **9)** Trees are to be low pruned (or under pruned) to at least a height of 2 metres from ground. **10)** No tree, or shrub over 2 metres high is planted within 2 metres of a building, especially adjacent to windows. **11)** There are no tree crowns or branches hanging over buildings. **12)** Clear and prune scrub to reduce to a sparse density (able to walk through vegetation with relative ease with minimal deviation around trees and shrubs). **13)** Install paths or clear flammable or dry vegetation, debris and materials immediately adjacent to the building. **14)** Wood piles and flammable materials stored a safe distance from buildings.

Other Conditions:	**All land with an area greater than 25,000m2 (2.5 Hectares or 6.2 Acres)** **1)** Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice. **2)** Install firebreaks immediately inside and adjacent to all external property boundaries. Firebreaks need to be 3 metres wide with a 4 metres vertical height clearance free from flammable materials and overhanging branches (see section 10 in this notice for further details). a) Properties over 100 hectares require additional firebreaks to divide the land into areas not exceeding 100 hectares. **3)** Slash or mow grass to a height no greater than 10cm immediately adjacent to firebreaks to a minimum width of 3 metres. a) If the land is stocked, this grass must be reduced and maintained to a height of no greater than 10cm by the 1st day of December. **4)** Natural vegetation within 100 metres of buildings including attached and adjacent structures and essential infrastructure shall be maintained at or below 8 tonnes per hectare, by passive methods of fuel reduction that does not permanently remove or reduce the quantity or occurrence of the native plants, shrubs and trees within the subject area. **5)** Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

This requirement has been established through the stated local government's annual fire break notice issued under the Bush Fires Act 1954 s33. The 'Notice' is subject to change annually.

6 Responsibilities for Implementation and Management of the Bushfire Protection Measures

Table 6.1: Implementation responsibilities prior to the issue of titles for the Developer.

DEVELOPER - PRIOR TO ISSUE OF CERTIFICATE OF TITLES FOR NEW LOTS			
No.	Implementation Actions	Local Government Clearance	Bushfire Consultant Clearance
1	Planning approval may be conditioned with the requirement to make appropriate notifications (on the certificates of title and the deposited plan), of the existence of this document. The WAPC may condition a subdivision application approval with a requirement for the landowner / proponent to place a notification onto the certificate(s) of title and a notice of the notification onto the diagram or plan of survey (deposited plan). This will be done pursuant to Section 165 of the Planning and Development Act 2005 ('Hazard etc. affecting land, notating titles as to:') and applies to lots with a determined BAL rating of BAL-12.5 or above. The notification will be required to state: *'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'*.	☐	
2	Implement Asset Protection Zones – as depicted in Figures 3.1 and 3.2, to the standards outlined in Appendix 1.	-	
3	Construct private driveways for Lots where proposed building sites are greater than 50m from the public road, in accordance with the deem-to-comply standards of the *Guidelines for Planning in Bushfire Prone Areas (Dec 2017)*, Element 3.5. (Refer Appendix 2)	-	
4	Construct the required portion of the new proposed road and interim turn-around area of minimum 17.5m diameter within 200m of the intersection with Reen Road, to enable safe turn-around of public and emergency service vehicles, until the future development of land to the east occurs and provides a through connection to Reserve Road. The proposed road will be constructed to the standards of the *'Guidelines'* and the satisfaction of the City of Swan. (Refer Appendix 2)	-	
5	The Developer is to construct each individual Lot firebreaks as part of the implementation works & maintain during the gazetted firebreak period, until the sale of the Lot, to the City of Swan Fire Hazard Reduction Notice (Firebreak Notice) requirements.	-	

6	The Developer/Proponent is to install a non-combustible 50,000ltr capacity static water supply tank with associated fire appliance connection couplings, hardstand and turn-around area. The tank is to be filled and tested prior to subdivision clearances. (Refer Appendix 3)	-	

Table 6.2: Implementation responsibilities prior to lot sale, occupancy or building for the Landowner/Developer.

LANDOWNER/DEVELOPER - PRIOR TO LOT SALE, OCCUPANCY OR BUILDING	
No.	Implementation Actions
1	The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title (it may also need to be included on the deposited plan). This will be done pursuant to Section 70A Transfer of Land Act 1893 as amended ('Factors affecting use and enjoyment of land, notification on title:'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost. This condition ensures that: 1. Landowners/proponents are aware their Lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and 2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.
2	Prior to sale and post planning approval, the entity responsible for having the Plan prepared should ensure that anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information and informed that it contains their responsibilities. This includes the landowners/proponents (including future landowners where the Plan was prepared as part of a subdivision approval), local government and any other authorities or referral agencies ('Guidelines' s4.6.3).
3	Prior to sale of the subject Lot/s, each individual Lot is to be compliant with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954. (Refer Section 5.3.1, Appendix 1 & Appendix 2 item 2.)
4	Prior to any building work, inform the builder of the existence of this Plan and the responsibilities it contains, regarding the required construction standards. This will be: • The standard corresponding to the determined BAL rating, as per the bushfire provisions of the Building Code of Australia (BCA); and/or • A higher standard as a result of the BMP establishing that construction is required at a standard corresponding to a higher BAL rating.

Table 6.3: Ongoing management responsibilities for the Landowner/Occupier.

LANDOWNER/OCCUPIER - ONGOING	
No.	Ongoing Management Actions
1	Maintain the Asset Protection Zone (APZ) to the dimensions and standard stated in the Plan. (Refer Appendix 1)
2	Comply with the City of Swan Fire Hazard Reduction Notice 'Firebreak Notice' issued under s33 of the Bush Fires Act 1954. (Refer Section 5.3.1, Appendix 1 & Appendix 2 item 2.)
3	A dedicated non-combustible tank water supply for fire fighting on each Lot, will be provided by each landowner on their individual Lot at the building stage that has the effective capacity of 10,000ltrs. Tanks are to be fitted with City of Swan specified couplings for fire appliance connection. Turn-around areas are to be constructed/maintained at the tank sites.
4	Ensure that any builders (of future structures on the Lot) are aware of the existence of this Plan and the responsibilities it contains regarding the application of construction standards corresponding to a determined BAL rating.
5	Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with: 1. the requirements of the WA Building Act 2011 and the bushfire provisions of the Building Code of Australia (BCA); and 2. with any identified additional requirements established by this BMP or the relevant local government.

Appendix 1 - Onsite Vegetation Management Technical Requirements

It is the responsibility of the landowner to maintain the established bushfire protection measures on their property. Not complying with these responsibilities can result in buildings being subject to a greater potential impact from bushfire than that determined by the assessed BAL rating presented in this Bushfire Management Plan.

For the management of vegetation within a lot (i.e. onsite) the following technical requirements exist:

1. **The APZ:** Installing and maintaining an asset protection zone (APZ) of the required dimensions to the standard established by the Guidelines for Planning in Bushfire Prone Areas (WA Planning Commission, as amended). When, due to the planning stage of the proposal to which this Bushfire Management Plan applies, defined APZ dimensions are known and are to be applied to existing or future buildings – then these dimensions are stated in Section 5.4.1 of this Plan.

2. **The Firebreak/Fuel Load Notice:** Complying with the requirements established by the relevant local government's annual firebreak notice issued under s33 of the Bushfires Act 1954. Note: If an APZ requirement is included in the Notice, the standards and dimensions may differ from the Guideline's APZ Standard – the larger dimension must be complied with.

3. **Changes to Vegetated/Non-Vegetated Areas:**

    a. If applicable to this Plan, the minimum separation distance from any classified vegetation, that corresponds to the determined BAL for a proposed building, must be maintained as either a non-vegetated area or as low threat vegetation managed to a minimal fuel condition as per AS 3959-2018 s2.2.3.2 (e) and (f). Refer to Part 4 of this Appendix 1.

    b. Must not alter the composition of onsite areas of classified vegetation (as assessed and presented in Section 3.1.2) to the extent that would require their classification to be changed to a higher bushfire threat classification (as per AS 3959-2018); and

    c. Must not allow areas within a lot (i.e. onsite) that have been:
        i. excluded from classification by being low threat vegetation or non-vegetated; and
        ii. form part of the assessed separation distance that is determining a BAL rating -

    …to become vegetated to the extent they no longer represent a low threat (refer to Part 4 of Appendix 1). Note: The vegetation classification exclusion specifications as established by AS 3959-2018 s2.2.3.2, are included at Appendix 4 below for reference.

1. Requirements Established by the Guidelines – the Asset Protection Zone (APZ) Standards

(Source: Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 Appendix 4, Element 2, Schedule 1 and Explanatory Note E2.1)

Defining the Asset Protection Zone (APZ)

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It will be site specific.

The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

For subdivision planning, design elements and excluded/low threat vegetation adjacent to the lot can be utilised to achieve the required vegetation separation distances and therefore reduce the required dimensions of the APZ within the lot.

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity.

Note: Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation that can be involved in a bushfire, is unsafe.

Schedule 1: Standards for APZ

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 mm in thickness reduced to and maintained at an average of two tonnes per hectare (example below).

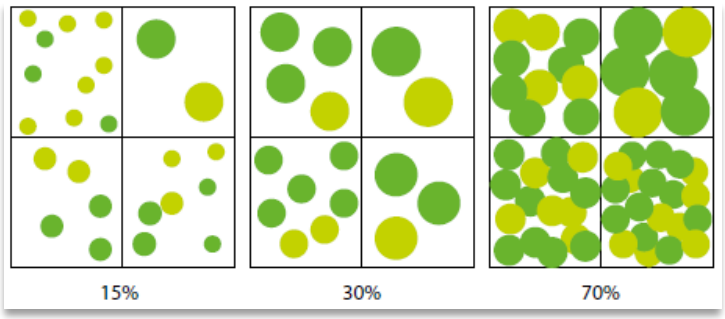
Example Fine Fuel Load of Two Tonnes per Hectare



(Image source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice)

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. Diagram below represents tree canopy cover at maturity.

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



(Source: Guidelines for Planning in Bushfire Prone Areas 2017, Appendix 4)

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 mm 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 mm or less.

The following example diagrams illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation.

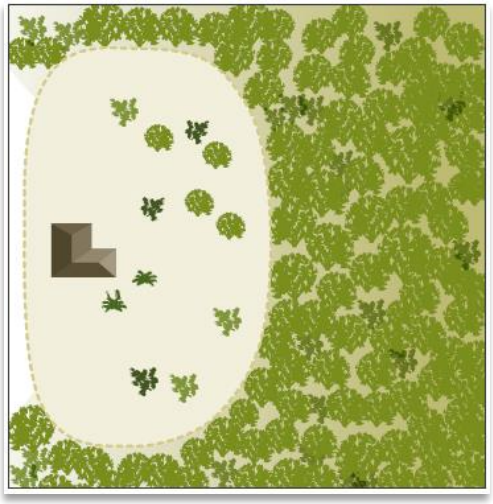
Hazard on one side

APZ



Hazard on three sides

APZ



2. Requirements Established by the Local Government – the Firebreak Notice

These requirements are established by the relevant local government's Firebreak Notice created under s33 of the Bushfires Act 1954 and issued annually (potentially with revisions). The Notice may include additional components directed at managing fuel loads, accessibility and general property management with respect to limiting potential bushfire impact.

The relevant local government's current Firebreak Notice is available on their website, at their offices and is distributed as ratepayer's information. It must be complied with.

If Asset Protection Zone technical requirements are defined in the Notice, the standards and dimensions may differ from the Guideline's APZ Standards, with the intent to better satisfy local conditions. When these are more stringent than those created by the Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with.

When, due to the planning stage of the proposal to which this Bushfire Management Plan applies, defined APZ dimensions are known and are to be applied to existing or future buildings – then these dimensions are stated in Section 5.3.1 of this Plan.

3. Requirements Recommended by DFES – Property Protection Checklists

Further guidance regarding ongoing/lasting property protection (from potential bushfire impact) is presented in the publication 'DFES – Fire Chat – Your Bushfire Protection Toolkit'. It is available from the Department of Fire and Emergency Services (DFES) website.

4. Requirements Established by AS 3959-2018 - Maintaining Areas within your Lot as 'Low Threat'

This information is provided for reference purposes. This knowledge will assist the landowner to comply with Management Requirement No. 3 set out in the Guidance Panel at the start of this Appendix. It identifies what is required for an area of land to be excluded from classification as a potential bushfire threat.

This information is taken from the Australian Standard AS 3959-2018 *Construction of buildings in bushfire prone areas*. This Standard presents the methods for calculating Bushfire Attack Levels that have been applied in this Report. The following specific section identifies what is required for an area of land to be excluded from classification as a potential bushfire threat.

"Australian Standard - AS 3959-2018 Section 2.2.3.2: Exclusions - Low threat vegetation and non-vegetated areas"

The following vegetation shall be excluded from a BAL assessment:

a) *Vegetation of any type that is more than 100m from the site.*
b) *Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified.*
c) *Multiple area of vegetation less than 0.25ha in area and not within 20m of the site or each other or of other areas of vegetation being classified vegetation.*
d) *Strips of vegetation less than 20m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified vegetation.*
e) *Non-vegetated areas that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.*
f) *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.*

Notes:

1 *Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of a bushfire attack (recognisable as short cropped grass to a nominal height of 100mm for example).*
2 *A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.*

Appendix 2 - Vehicular Access Technical Requirements

Each local government may have their own standard technical requirements for emergency vehicular access and they may vary from those stated in the Guidelines.

Contact the relevant local government for the requirements that are to apply in addition to the requirements set out as an acceptable solution in the Guidelines. If the relevant local government requires that these are included in the Bushfire Management Plan, they will be included in this appendix and referenced.

Requirements Established by the Guidelines – The Acceptable Solutions

(Source: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4)

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 1

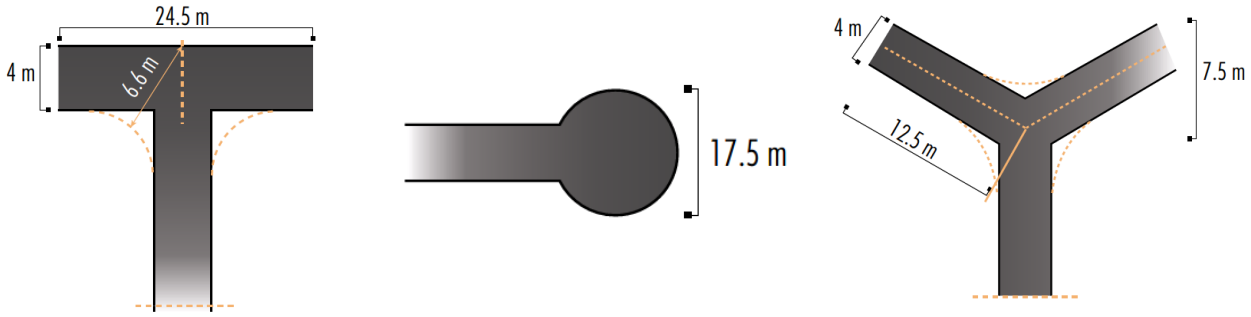
Acceptable Solution 3.5: Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the 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 (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



Acceptable Solution 3.8: Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 2					
Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	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	4.5	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 cross-fall	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

* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

Appendix 3 - Water Technical Requirements

Requirements Established by the Guidelines - Acceptable Solution A4.3: Non-Reticulated Areas

Each local government may have their own standard technical requirements for firefighting water supplies, and they may vary from those stated in the Guidelines.

Table A4.2: Non-reticulated areas – water supply technical requirements.

TECHNICAL REQUIREMENTS FOR STATIC WATER SUPPLY (EXAMPLE ONLY – CHECK WITH LOCAL GOVERNMENT)	
Application:	Where the intention is to actively defend property and infrastructure. To provide an adequate supply of water for firefighting purposes to reflect the intended response to a bushfire event, by emergency services and/or the owner/occupier.
Volume:	Provision of a minimum 50,000 litre static water supply (can be a combined capacity from multiple tanks) for firefighting purposes, to the satisfaction of the local government. (In addition to the capacity required to accommodate the sprinkler deluge system). The storage tank should not facilitate sharing the water for domestic potable use due to the potential of contamination from firefighting foam (incorporate a non-return valve).
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried at least 300mm below ground).
Vehicle Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate valve (not ball valve) and a 50mm or 100mm cam-lock coupling of metal/alloy construction (example below).
Signage:	Multiple buildings and/or firefighting water supplies may require directional signage to guide firefighters to the emergency water supplies.
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity always.
[Sources: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4, Element 4 with example construction / coupling requirements from various sources including FESA (DFES) Operational Circular 07/2011 and Planning for Bushfire Protection Guidelines WAPC 2010]	

