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# Bushfire Management Plan (Strategic Planning Proposal)

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Lot 6, 7 & 8 Drovers Place, Joondalup

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City of Wanneroo

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Project Number: 15502-1

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Assessment Date: 31 March 2017

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Report Date: 19 May 2018

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# Plan Details

BMP Template v5.7

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Plan Version	Submitted to	Submitted Date
v1.0	Landowner & Proponent	-

Plan Version	Amendment Record	Submitted Date
v1.1	Changed plan layout (mapping) RW & MS 19 May 2017	19-May-17
V1.2	Minor amendments	
V1.3	Amend to guidelines v1.3, additional- Method 2 fuel loads, Amended Plan to DFES requirements.	12-Feb-18
V1.4	Amended Map Figures	22 March 18
V1.5	Removed reference to fuel loads and added Method 2 slope	19 May 2018

## Compliance Statement

This Bushfire Management Plan (the Plan) meets the requirements of both the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) and the supporting *Guidelines for Planning in Bushfire Prone Areas* (WAPC v1.1 2017; the 'Guidelines').

Author	Bushfire Planning and Design (BPAD) Accreditation	Signature
Mike Scott	Level 2 Bushfire Planning Practitioner BPAD27795	

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Reviewed/Approved	Bushfire Planning and Design (BPAD) Accreditation	Signature

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### **Disclaimer**

*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. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the achievement of and level of implementation of bushfire management measures 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 on the basis of 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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# 1 Executive Summary

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This Bushfire Management Plan (the Plan) has been prepared to support a proposed Local Structure Plan over Lots 6, 7 & 8 Drovers Place, Joondalup within the City of Wanneroo.

The development site is within a designated bushfire prone area and the Proposal requires the application of *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)*. The assessed bushfire risk is considered to be manageable and will be achieved by the identified stakeholders implementing and maintaining the bushfire risk management measures that are presented in this Plan.

Assessment of the planned location, vegetation and consideration of planned infrastructure indicates that compliance is able to be achieved against all applicable bushfire related legislation, policy, standards and guidelines, including the Bushfire Protection Criteria.

Against the Bushfire Protection Criteria, the decision maker's assessment of this Proposal is to be on the basis of it being able to meet the acceptable solutions for all four elements to be demonstrated in future planning stages and once construction and landscaping is complete. **Achievable BAL compliance will be demonstrated to achieved BAL-29 or less after the Structure Plan is modified. Actual slope has been used in the Method 2 modelling to determine vegetation separation distances (Refer 10 - Appendix).**

**In terms of the separation distances from the vegetation and proposed lots required to achieve BAL-29 are:**

- **Western boundary 24.1m**
- **Southern boundary 26.7m**

Future buildings within 100 metres of classified vegetation will be constructed to standards which correspond to a determined BAL, as required by *AS 3959-2009 Construction of buildings in bushfire prone areas*. As this proposal does not identify the actual location of building works within the development, there may be a requirement to determine the BAL for individual building works once the actual building site has been identified.

The development site is adjacent to the Yellagonga Regional Reserve and Lake Joondalup Nature Reserve that may require additional environmental conditions in future planning stages to be complied with. No native vegetation is proposed to be cleared as part of this Local Structure plan as the onsite vegetation is introduced species and previously managed/cleared open woodlands within an old market garden/orchard.

## 2 Application of SPP 3.7

The *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) provides the foundation for land use planning to address bushfire risk in Western Australia.

This Proposal must consider SPP 3.7 and, if required, comply with its policy measures. The determination of this requirement is presented below.

### Application of SPP 3.7 Policy Measures – Primary Triggers

The subject Proposal is a higher order strategic planning document, a strategic planning proposal or a subdivision or development application: ✓

The project site is in a designated bushfire prone area on the WA Map of Bushfire Prone Areas: ✓

The project site is not located in a designated bushfire prone area on the WA Map of Bushfire Prone Areas but the existing vegetation type and condition dictate that it should be:

The project site is in an area not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 s3.2.2*):

### Application of SPP 3.7 Policy Measures – Secondary Trigger/s

The Proposal is a strategic planning proposal, subdivision or development application relating to land that has or will have a Bushfire Hazard Level above low and/or where a Bushfire Attack Level rating above BAL-LOW applies (SPP 3.7 s6.2): ✓

The subject Proposal is a development application for the construction or/and use of a single house or ancillary dwelling on a lot or lots greater than 1100m<sup>2</sup> and subject to BAL-40 or BAL-FZ (LPS Amendment Regulations 2015):

The subject Proposal is a development application for the construction or/and use of a habitable building (other than a single house or ancillary dwelling), or a specified building on any lot size and subject to a BAL rating above BAL-LOW (LPS Amendment Regulations 2015):

### 3 Commissioning and the Land Use Proposal

Bushfire Prone Planning (BPP Group Pty Ltd) has been commissioned to carry out the assessments and prepare the required bushfire planning documentation to accompany the proponent’s planning submission associated with their proposed land use project.

#### Commissioning Record

Landowner / Proponent: Roman Catholic Archbishop of Perth

BPP Commissioned by: Catholic Education WA (CEWA)- Shaun Mayne

Purpose: To support a proposed local structure plan

#### Project Location

Subject Site and Address: Lot No. 6, 7 & 8 Drovers Place, Joondalup

Local Government: City of Wanneroo

Zoning and R-Code: -

#### Project Description

Description:

Building Class: -

Lot Areas: Refer to Table 3.1

**Table 3.1:** Proposed subdivision lot areas for Lot 6, 7 & 8 Drovers Place, Joondalup

Current Lot (ha)		
Lot 6	Lot 7	Lot 8
2.9253	3.2947	3.0727





**Figure 3.1:** Proposed Local Structure Plan for Lot 6, 7, & 8 Drovers Place, Joondalup (Source:Roberts Day). The proposed structure plan will be modified to achieve BAL requirements set out in Section 5.3 of this Bushfire Management Plan.








Figure 3.2  
Proposed Development

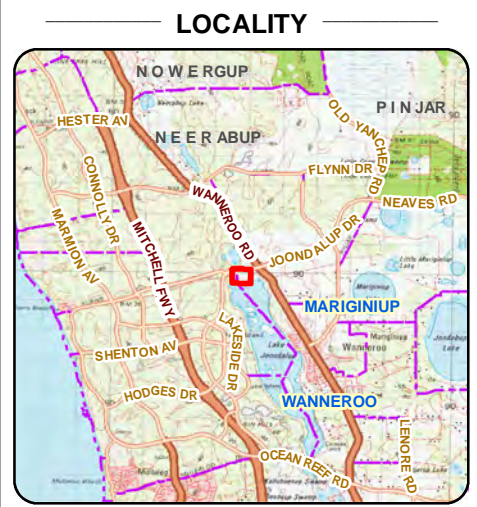
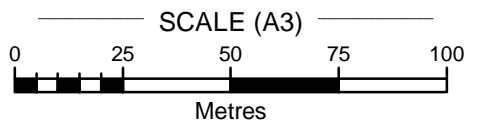
Lots 6, 7 & 8 on Plan 7782  
Drovers Place  
WANNEROO

**LEGEND**

-  Subject Area: Lots 6, 7 & 8
-  Other Lots

**Proposed Residential Development**


-  R30
-  R40
-  R60
-  Hydrant / Standpipe
-  Public Open Space / Drainage



Aerial Imagery : Landgate/SLIP  
Image Date : Aug 2017

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Universal Transverse Mercator Units: Metre

Map compiled by: Russell Womes  
Date map compiled/updated: 15/02/2018




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Document Path: G:\BushfireProne\Mapping\MXD\s\15502-2\_Lots 6, 7 & 8 on Plan 7782, Drovers Place, Wanneroo BMP (A3L)18-2.mxd



## 4 The Planning Submission and the Documents Required

Policy measures in *SPP 3.7* (and further instruction in the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*) set out the bushfire planning information (including bushfire risk assessments) that are to accompany a planning submission. It is dependent on the type of proposal and stage of the development process. In most circumstances this information is to be presented in the form of a Bushfire Management Plan (BMP).

The Planning Submission – Stage and Specific Land Use or Development	
Planning Stage:	Strategic - local structure/master plan
For Submission to:	WA Planning Commission (WAPC)
Project Type:	Subdivision - one lot into a large number of lots
‘Vulnerable’ Land Use:	No
‘High Risk’ Land Use:	No
‘Minor’ Development:	No
‘Unavoidable’ Development:	No

This Bushfire Management Plan will include the information indicated by the check mark. If an item is checked it is required by either: *SPP 3.7* or by a local government variation. It may also have been prepared at an earlier planning stage and therefore re-included or included by the assessor as it improves the information presented in this Bushfire Management Plan.

Bushfire Hazard Level Assessment	Bushfire Attack Level Contour Map	Bushfire Attack Level Assessment	Identify any issues arising from the BAL contour map or BAL assessment	Identify and specifically address the list of issues related to strategic level planning and defined in the <i>Guidelines</i> s5.2	Demonstrate compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages	Demonstrate compliance with the Bushfire Protection Criteria
✓	✓		✓	✓	✓	

## 5 Assessment of Bushfire Risk

### 5.1 Vegetation Assessment/Classification and Ground Slope

#### 5.1.1 Existing Vegetation

All vegetation within 100 metres of the subject site has been identified and classified or excluded and presented in Table 5.1.1. This has been done with accordance with *AS 3959-2009* and reference to the *Visual Guide for Bushfire Risk Assessment in WA* (WAPC February 2016).

The vegetation has been assessed as it will be in its mature state and where deemed appropriate, in its unmanaged state. The areas of classified vegetation that will determine bushfire risk are defined on the topography and vegetation map Figure 5.1. Representative photos of each vegetation area is presented after the table.

**Table 5.1.1:** Vegetation types identified, the applied classification and effective slope

All Vegetation Within 100 metres of Subject Site			
Vegetation Area	Identified Types (AS3959) or Description if 'Excluded'	Applied Classification	Effective Slope Under Classified Vegetation (degrees)
1	Open Woodland B-06	Class B Woodland	0.6
2	Open Forest A-03	Class A Forest	0.5
3	Open Forest A-03	Class A Forest	2.4
4	Open Woodland B-05	Class G Grassland	0

Note: When more than one vegetation type is present each type is classified separately with the worst case scenario being applied. The predominant vegetation is not necessarily the worst case scenario.

**Vegetation Area 1**

**Classification Applied:** Class B Woodland

**Assessment Comment:** offsite banksia woodland, eucalypt, grass trees, shrub understorey, tree height ~9m, less than 30 percent canopy cover



**Photo ID: 1a**



**Photo ID: 1b**

**Vegetation Area 2**

**Classification Applied:** Class A Forest

**Assessment Comment:** offsite forest, tuart, banksia, grass trees, moderate shrub understorey with grass patches, tree height ~18m, 30 percent canopy cover.



**Photo ID: 2a**



**Photo ID: 2b**

**Vegetation Area 2**

**Classification Applied:** Class A Forest

**Assessment Comment:** offsite forest, road reserve with multi use path, thick acacia understorey, established fire break on boundary (see photo 2d)



**Photo ID: 2c**



**Photo ID: 2d**



### Vegetation Area 3

**Classification Applied:** Class A Forest

**Assessment Comment:** offsite forest, eucalypt, closed scrub understorey, acacia, melaleuca, tree height ~18m,



**Photo ID: 3a**



**Photo ID: 3b**

### Vegetation Area 4

**Classification Applied:** Class G Grassland

**Assessment Comment:** onsite grassland, open woodland structure with varying degrees of canopy cover including exotic species such as fruit and palm trees



**Photo ID: 4a**



**Photo ID: 4b**

## 5.1.2 Vegetation Excluded from Classification

Certain areas and vegetation within 100m of the subject site may be assessed as 'low threat or non-vegetated'. These are to be excluded from classification and are therefore rated BAL-LOW. They must be managed to maintain the specifications set out in AS3959-2009 s2.2.3.2 in perpetuity (refer to Appendix 3 'Vegetation Classification Exclusions').

Managed gardens surrounding the development to the east of the subject site has been excluded from classification as presenting a low bushfire threat as per AS 3959-2009s2.2.3.2 (f).

### 5.1.3 Expected On-site Vegetation Changes Due to Proposed Subdivision or Development

In assessing vegetation for bushfire threat, consideration must be given to possible future vegetation changes likely on the site that is being assessed, particularly 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, including future roadside or water course re-vegetation. There must be careful consideration of the creation of vegetation corridors where they join offsite vegetation and may provide a route for fire to enter an area of future development.

For this Proposal the future onsite vegetation has been considered and is expected to be maintained as “low threat” with a BAL rating of BAL-Low. It will meet AS 3959-2009 s2.2.3.2 requirements (refer Appendix 3 ‘Vegetation Classification Exclusions’).



Figure 3.1  
Topography & Classified Vegetation

Lots 6, 7 & 8 on Plan 7782  
Drovers Place  
WANNEROO

**LEGEND**

- Subject Area: Lots 6, 7 & 8
- Other Lots
- Elevation contour (m)

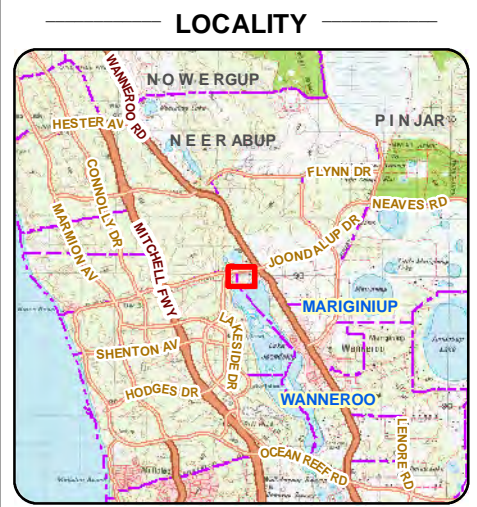
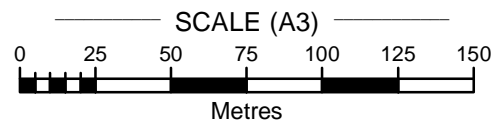
**Assessment Area**

- Vegetation - 150m

**Classified Vegetation**

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

Photo no., location & direction



Aerial Imagery : Landgate/SLIP  
Image Date : Aug 2017

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Universal Transverse Mercator Units: Metre

Map compiled by: Russell Wormes  
Date map compiled/updated: 18/05/2018



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Document Path: G:\BushfireProne\Mapping\MXD\s\15502-2\_Lots 6,7 & 8 on Plan 7782, Drovers Place, Wanneroo BMP (A3L)18-2.mxd



## 5.2 Bushfire Hazard Level (BHL) Assessment

“A Bushfire Hazard Level assessment provides a ‘broad-brush’ means of determining the potential intensity of a bushfire for a particular area. The Bushfire Hazard Level assessment assists in informing the suitability of land contained within strategic planning proposals for future subdivision and development. It is a pre-development tool used to inform decision making to ensure a holistic understanding of the bushfire risk (‘Guidelines’ Appendix 2)”.

SPP 3.7 and the ‘Guidelines’ indicate that BHL assessments are required to accompany all strategic planning proposals (planning schemes and structure plans) unless the future lot layout of the Proposal is known in which case a Bushfire Attack Level assessment incorporating a BAL Contour Map provides more detailed information and is more appropriate.

### Assessment Results

The results of the Bushfire Hazard Level assessment detailing the vegetation type, class and the hazard levels assigned, are presented in Table 5.2.1 and visually in Figure 5.2 as a Bushfire Hazard Level Map. If additional assessment inclusions are required in this Plan, they are identified in Table: 5.2.2

**Table 5.2.1:** BHL assessment

<b>Bushfire Hazard Level Assessment</b>	
Data Used (methodology as per the ‘Guidelines’ Appendix 2):	<b>site inspection + aerial map data</b>
<b>Assessed Area</b>	<b>Bushfire Hazard Level</b>
Land inside the external boundary of the subject site:	<b>Moderate</b>
Land within 100 metres of external boundary of the subject site:	<b>Moderate + Extreme</b>

The Bushfire Hazard Level mapping demonstrates that the Bushfire Hazard Level to which future and existing residences will be exposed, will be reduced after development.



**Table 5.2.2:** Required additional assessment.

<b>Rationale for the Inclusion/Exclusion of a Bushfire Hazard Level Assessment in this BMP</b>	
A BHL assessment has been included in this BMP as the Proposal is at a strategic planning stage with the location of future lots unknown.	Yes
A BHL assessment has been requested by the relevant decision maker (WAPC, DFES or LGA).	-
A BHL assessment has not been conducted for this BMP as the lot layout is known and/or the Proposal is for a subdivision or development application. A Bushfire Attack Level assessment can provide more appropriate and detailed information.	-

### 5.2.1 Identification of Specific Issues Arising from BHL Assessment

The bushfire hazard assessment undertaken for the Proposal indicates a Moderate to Low rating on the site, which is deemed as ‘manageable’ enabling the implementation of appropriate low fuel zones to be developed.

The design of the development plans have taken into account the offsite bushfire risk and provided buffers to any future buildings that may be constructed within the development.



Figure 5.2

### Bushfire Hazard Level

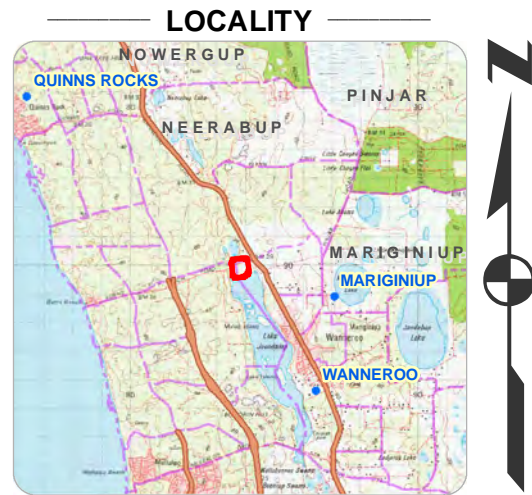
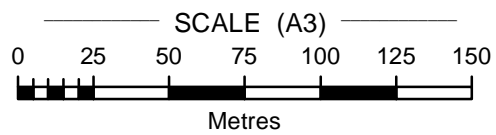
Lots 6, 7, & 8 on Plan 7782  
Drovers Place  
Joondalup

**LEGEND**

- Lots 6, 7 & 8
- Other Lots
- Development
- Area of Interest - 150m extent

**Bushfire Hazard Mapping**

- Extreme Bushfire Hazard
- Moderate Bushfire Hazard
- Low Bushfire Hazard



Aerial Image: Landgate Aug 2016

BUSHFIRE PRONE PLANNING  
Coordinate System: GDA 1994 MGA Zone 50  
Projection: Universal Transverse Mercator  
Map created on: 19/05/2017  
Map compiled by: Bruce Greentree



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## 5.3 Bushfire Attack Level (BAL) Assessment – BAL Contour Map

### Bushfire Prone Planning's BAL Contour Map Guide

#### Description and Purpose of the BAL Contour Map ('Guidelines')

A Bushfire Attack Level (BAL) Contour Map identifies land suitable and unsuitable for development and guides the location of building envelopes within a development site. The BAL Contour Map is a scale map of a development site (which can include proposed or an existing lot layout), which identifies indicative BAL ratings across the development site and within the immediate surrounding area. The map illustrates potential bushfire attack levels and radiant heat impacts in relation to any classified vegetation that will remain within 100 metres of the assessment area once development is constructed i.e. when the land has been cleared and all the subdivision works have been undertaken. It needs to take into account any vegetation that will remain or will be introduced when the works are complete (source: *WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*).

#### BAL Contour Map Interpretation

The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels (BAL's) that exist as the distance increases away from the classified vegetation. Each BAL represents a set range of radiant heat flux (refer to Appendix 2) that can be generated by the bushfire in that vegetation. The width of each shaded contour interval (i.e. the applicable vegetation separation distances corresponding to a BAL rating) will vary and is determined by calculations involving vegetation type, fuel structure, ground slope, and climatic conditions (i.e. the expected fire behaviour). They are unique to a site and can vary across a site.

#### The Primary Use of BAL Contour Mapping - Planning

BAL contour mapping is primarily a planning tool that can give an overview as to the suitability of a site for development with respect to the extent to which bushfire is a potential threat to future buildings and persons on the subject land.

The mapping considers the development site (i.e. all existing or proposed lots) and does not consider the bushfire risk at an individual lot level or over different development time frames. Rather it is assessing the situation that will exist when the entire development has been completed, including any vegetation management that would reasonably be expected to take place as part of establishing buildings on the lots. On this basis, it helps decision makers determine the suitability of the proposed development for planning approval.

As a result, there will be situations where, for the purposes of planning, classifiable vegetation is not contoured (e.g. e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). However, at a specific point in time (prior to full completion of a development) this vegetation may impact on a proposed buildings BAL rating.

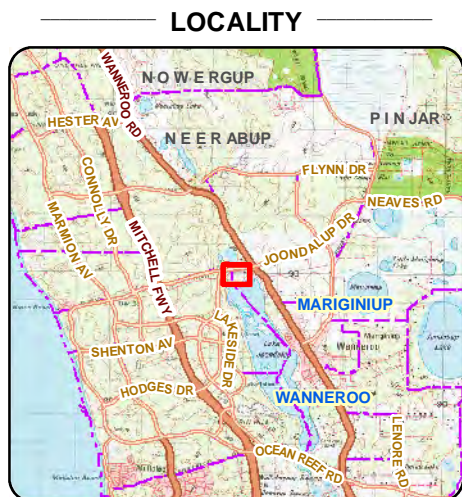
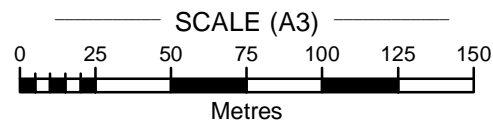


Figure 3.2  
BAL Contour Map

Lots 6,7 & 8 on Plan 7782  
Drovers Place  
WANNEROO

**LEGEND**

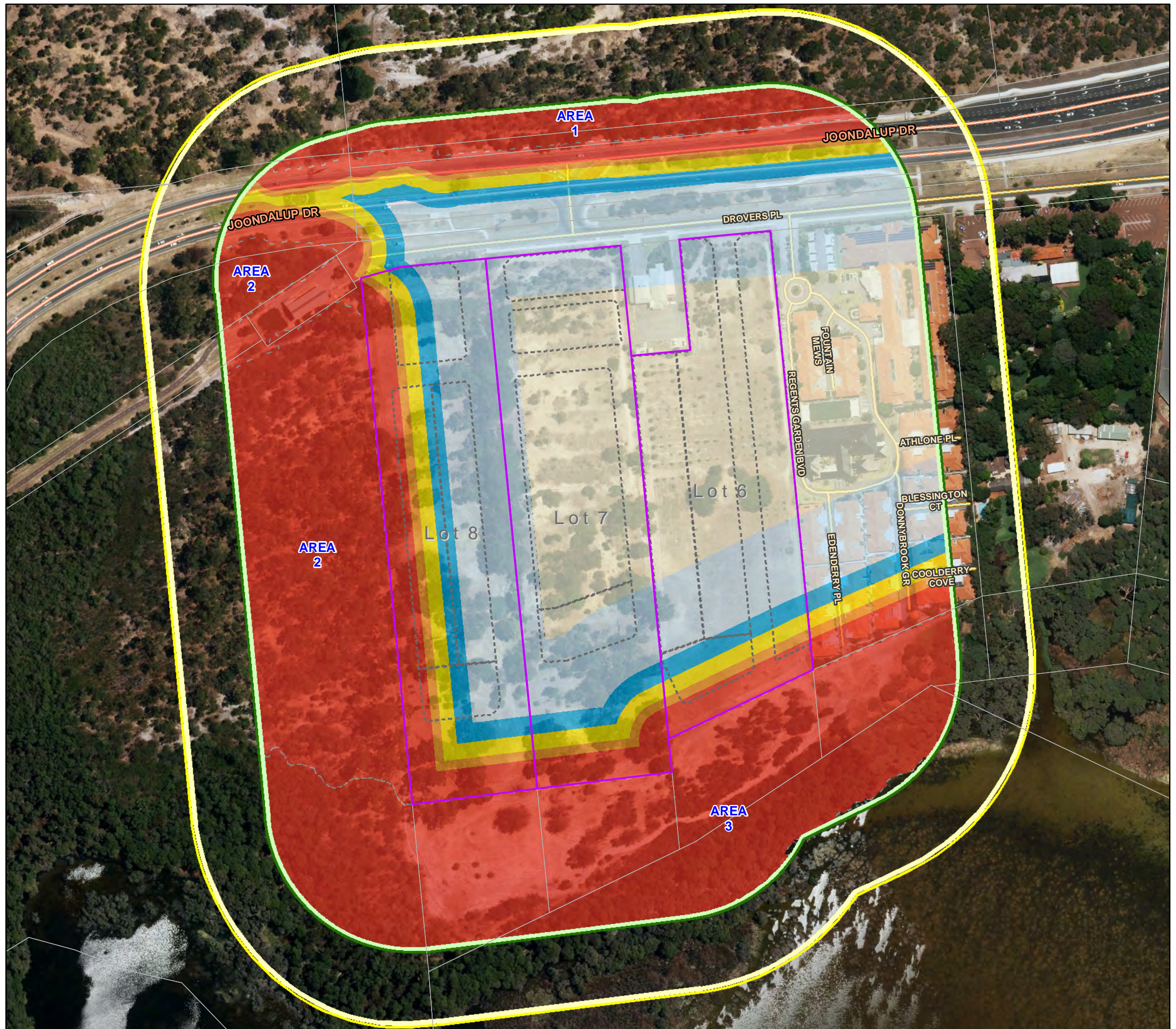
- Subject Area: Lots 6, 7 & 8
- Other Lots
- Assessment Area**
- Vegetation - 150m
- BAL Contour - 100m
- Bushfire Attack Levels (Method 1 & 2)**
- Vegetation edge (Indicative only)
- BAL FZ (Indicative only)
- BAL 40 (Indicative only)
- BAL 29 (Indicative only)
- BAL 19 (Indicative only)
- BAL 12.5 (Indicative only)
- BAL LOW (Indicative only)



Aerial Imagery : Landgate/SLIP  
Image Date : Aug 2017

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Universal Transverse Mercator Units: Metre

Map compiled by: Russell Wornes  
Date map compiled/updated: 22/05/2018





### 5.3.1 Construction of the BAL Contours - Statement of Site Data and 'Separation Distance Range' Applied

For the subject site, the vegetation separation distance range that corresponds to each Bushfire Attack Level (and represented by Figure 5.3, the BAL Contour Map), has been derived from:

1. An AS3959-2009 Method 1 assessment and sourced from AS3959-2009 Table 2.4.3; and/or
2. An AS3959-2009 Method 2 assessment as per AS3959-2009 Appendix B.

**Table 5.3.1:** Construction of the BAL contours

Effective Slope and Site Slope Assessed Values			
Values to Apply Using Method 1 (AS 3959-2009)			
Vegetation Area	Vegetation Classification	Assessed Effective Slope (degrees)	Effective Slope Range to Apply (degrees)
1	Class B Woodland	0.6	downslope >0-5
4	Class G Grassland	2.4	downslope >0-5
Values to Apply Using Method 2 (AS 3959-2009)			
Vegetation Area	Vegetation Classification	Effective Slope (degrees)	Site Slope (degrees)
2	Class A Forest	2.3 DS	0
3	Class A Forest	3.8 DS	0

## 5.3.2 Additional Inputs Applied for Method 2 (AS 3959-2009) Calculations

### Summary of Applied Values

Table 5.3.2: Vegetation Area 1 and 2 - Summary of Method 2 calculation input values applied.

Vegetation Area 2 and 3 Summary of Method 2 (AS 3959-2009) Input Values Applied		
Input Variables	Input Values Applied	
	AS 3959 M2 Default Value (Table 2.4.1 & Appendix B)	Required / Assessed / Modified Value
Variables with Default Value		
Fire Danger Index		80
Vegetation Classification		Class A Forest
Vegetation Fuel Load – Surface (t/ha)	✓	
Vegetation Fuel Load – Overall (t/ha)	✓	
Vegetation Height – Shrub & Heath (m)	✓	
Wind Speed – Shrub & Heath (km/hr)	✓	
Effective Slope (°)		Area 2 – 2.3 & Area 3 – 3.8
Site Slope (°)		Area 2 - 0 & Area 3 - 0
Vegetation Separation Distance (m)		This value is an output
Heat of Combustion (kJ/kg)	✓	
Flame Temperature (°K)	✓	
Ambient Temperature (°C)	✓	
Relative Humidity (%)	✓	
Flame Width (m)	✓	
Variables with Calculated Value	AS 3959 M2 Calculated Value	Modified Value
Rate of Spread (km/hr)	✓	
Elevation of Receiver (m)	✓	
Flame Length (m)	✓	
Flame Angle (°)	✓	
View Factor	✓	



Calculated May 8, 2018, 1:03 pm (MDC v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.81 km/h
Vegetation classification	Forest	Flame length	22.48 m
Surface fuel load	25 t/ha	Flame angle	51 °, 61 °, 67 °, 72 °, 73 ° & 80 °
Overall fuel load	35 t/ha	Elevation of receiver	8.73 m, 9.83 m, 10.34 m, 10.69 m, 10.75 m & 11.07 m
Vegetation height	n/a	Fire intensity	50,864 kW/m
Effective slope	2.3 °	Transmissivity	0.859, 0.835, 0.806, 0.779, 0.767 & 0.712
Site slope	0 °	Viewfactor	0.6106, 0.4565, 0.3098, 0.2103, 0.1709 & 0.0461
Flame width	100 m	Minimum distance to < 40 kW/m <sup>2</sup>	18.3 m
Windspeed	n/a	Minimum distance to < 29 kW/m <sup>2</sup>	24.1 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m <sup>2</sup>	33.9 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m <sup>2</sup>	46 m
		Minimum distance to < 10 kW/m <sup>2</sup>	53.4 m
		Minimum distance to < 2.5 kW/m <sup>2</sup>	118.5 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Area 2 - Western boundary – Method 2 required BAL-29 separation distance 24.1m



Calculated May 8, 2018, 1:34 pm (MDC v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	3.22 km/h
Vegetation classification	Forest	Flame length	25.18 m
Surface fuel load	25 t/ha	Flame angle	51 °, 60 °, 66 °, 70 °, 72 ° & 80 °
Overall fuel load	35 t/ha	Elevation of receiver	9.78 m, 10.9 m, 11.5 m, 11.83 m, 11.97 m & 12.4 m
Vegetation height	n/a	Fire intensity	58,390 kW/m
Effective slope	-4.3 °	Transmissivity	0.855, 0.829, 0.8, 0.774, 0.762 & 0.707
Site slope	0 °	Viewfactor	0.6125, 0.4588, 0.3115, 0.2118, 0.1723 & 0.0464
Flame width	100 m	Minimum distance to < 40 kW/m <sup>2</sup>	20.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m <sup>2</sup>	26.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m <sup>2</sup>	37.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m <sup>2</sup>	49.9 m
		Minimum distance to < 10 kW/m <sup>2</sup>	57.6 m
		Minimum distance to < 2.5 kW/m <sup>2</sup>	125.8 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Area 3 - Southern boundary - Method 2 required BAL-29 separation distance 26.7m



### 5.3.3 Indicative BAL Results Presented as a Table and used for construction of the Contour Map

Table 5.3.7: Vegetation separation distances required to achieve the stated BAL rating.

Indicative (Achievable) Bushfire Attack Levels for the Proposed Lots (a BAL rating is achievable if a separation distance range is shown)								
Lot No.	Veg. Area	Applied Vegetation Classification	Effective Slope (degrees)	BAL Method	Indicative BAL's - Separation Distance (m) or Status			
					BAL-29	BAL-19	BAL-12.5	BAL-LOW
(refer to following page for further explanation).								
6	1	Class B Woodland	0.6	Method 1	17-<25	25-<35	35-<100	>100
	2	Class A Forest	2.3	Method 2	24.1	33.9	46	>100
	3	Class A Forest	4.3	Method 2	26.7	37.2	49.9	>100
	4	Class G Grassland	2.4	Method 1	9-<14	14-<20	20-<50	>50
7	1	Class B Woodland	0.6	Method 1	17-<25	25-<35	35-<100	>100
	2	Class A Forest	2.3	Method 2	24.1	33.9	46	>100
	3	Class A Forest	4.3	Method 2	26.7	37.2	49.9	>100
	4	Class G Grassland	2.4	Method 1	9-<14	14-<20	20-<50	>50
8	1	Class B Woodland	0.6	Method 1	17-<25	25-<35	35-<100	>100
	2	Class A Forest	2.3	Method 2	24.1	33.9	46	>100
	3	Class A Forest	4.3	Method 2	26.7	37.2	49.9	>100
	4	Class G Grassland	2.4	Method 1	9-<14	14-<20	20-<50	>50

### 5.3.4 BAL's as Indicated / Determined by the Contour Map

#### Bushfire Prone Planning's Interpretation of Deriving BAL Ratings from the BAL Contour Map

##### Indicative BAL Ratings

If the assessed BAL for a lot or building envelope (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 'area' or as a range of achievable BAL's within the 'area' – 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 an 'area' with an indicative BAL until the location of any future building has been determined. It usually requires an onsite visit and a BAL assessment report to be produced before the certificate can be issued.

##### Determined BAL Ratings

If the assessed BAL for a Lot or building envelope (the 'area') or existing building, is stated as being 'determined' it is because that 'area' or building is impacted by a single BAL contour interval. This has been determined by offsite classified vegetation, and no classifiable vegetation currently exists on the lot or on adjacent lots (i.e. it has been cleared to a minimal fuel, low bushfire threat state).

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 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 'area' 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.

A BAL Certificate (referring to the BAL Contour Map assessment) can be provided for a future building on those 'areas' assessed as having a determined BAL as long as the assessment is still valid and there is no requirement reassess the vegetation and update the contour map (this is a dependant on the time that has passed since the original assessment). Note also that a BAL Certificate will only remain valid for one year).

Once actual building locations are determined at a later planning stage, the BAL ratings for specific buildings or building envelopes may need to be determined by an onsite visit with the actual vegetation separation distances being measured.

As this proposal is for a local structure plan the BAL Contour map has been included to present that the proposed development can achieve an acceptable BAL-29 rating for any future buildings to be constructed within the development site to assist in future planning decisions.

### 5.3.5 Identification of Specific Issues Arising from BAL Contour Map

#### **Onsite Vegetation**

Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

The existing vegetation onsite of the subject site is comprised of historical orchards, introduced trees, open woodland and grassland. The entire site will be cleared and managed as part of the proposed development with minor areas of public open space to be developed and managed as low threat vegetation.

#### **Offsite Vegetation**

Vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced. The degraded area adjacent to the southern boundary of the subject site will be revegetated and as a precautionary approach, Areas 2 and 3 have been classified as forest.

## 6 Environmental Considerations

“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” (‘Guidelines’ s2.3).

“Clearing of native vegetation in Western Australia requires a clearing permit under Part V, Division 2 of the Environmental Protection Act 1986 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).

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; and
- Bush Forever sites.

Further, the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), administered by the Australian Government Department of Environment, provides a national scheme of environment and heritage protection and biodiversity conservation. The objectives of the of the EPBC Act include the protection of the environment with respect to matters of national environmental significance and conservation of Australian biodiversity.

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.

### 6.1 Native Vegetation and Re-vegetation

#### Protection of Native Vegetation

For the proposed development site, have any existing conservation areas been identified?	Yes
Type of existing conservation classification:	Conservation Category Wetland
Other identified conservation issue to be considered:	Threatened Flora
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)?	Yes

Potential TEC species identified:	Banksia Woodlands of the Swan Coastal Plain
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**Comment:**

The proposed development is adjacent to the Lake Joondalup Nature Reserve. The development is not clearing any native vegetation but is adjacent to the Banksia Woodlands within the Yellagonga Regional Park.

**Minimising Removal of Native Vegetation**

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

Options to Minimise Removal of Native Vegetation	Considered and Implemented in this Proposal
Reduce lot yield	N/A
Cluster development	N/A
Construct building to a higher standard as per BCA and AS 3959-2009	Yes
Modify the development location	No

**Comment:** All future Class 1,2 or 3 buildings to be constructed within the development will comply with AS3959-2009.

**Riparian Vegetation Maintenance and Re-vegetation**

Where, as part of the Proposal, revegetation of waterway foreshore, wetland or coastal buffers is necessary for their protection or management, this bushfire management plan assesses the ability and practicality of maintaining vegetation separation distances corresponding to determined BAL's.

Maintenance and/or re-vegetation of riparian and/or coastal areas is part of this Proposal?	Yes
Can the required BAL separation distance be maintained into the future?	Yes

**Comment:** Due to the nearby Lake Joondalup Nature Reserve there may be some environmental conditions that may be subjected by DPAW in future planning stages.

## Impact on Adjoining Land

Does this planning proposal satisfy bushfire protection requirements 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

**Comment:** clearing and management of the onsite vegetation will reduce the bushfire risk to the adjacent developments.

## 7 Bushfire Risk Management Measures

### 7.1 The Bushfire Protection Criteria – Assessment of Compliance

State Planning Policy 3.7 Planning in Bushfire Prone Areas (DoP 2015) requires an assessment against the bushfire protection criteria requirements contained in the Guidelines for Planning in Bushfire Prone Areas (DoP/DFES v1.1 2017) Section 4.5 and Appendix 4.

This assessment is to accompany any strategic planning proposal, subdivision application or development application.

Strategic planning proposals need to demonstrate that compliance can be achieved in subsequent planning stages. Subdivision and development applications must demonstrate compliance within the boundary of the subject site or provide justification for those criteria that are not able to be fully met.

The bushfire protection criteria are divided into four elements location, siting and design, vehicular access and water.

For each element, there is:

1. An intent stating the required outcome (overall aim);
2. A performance principle that is a general statement of how best to achieve the intent; and
3. One or more specific criteria to be addressed and for which an acceptable solution is provided as an example of one way of meeting the criteria (and therefore the elements intent).

A proposals compliance with each element is determined by either one or a combination of the following:

1. For each relevant criterion, fully meeting the requirements of the acceptable solution (which automatically achieves the intent for that criteria); and/or
2. For one or more relevant criteria, not fully meeting the requirements of the acceptable solution but achieving the requirements of the performance principle by employing a relatively minor variation on the acceptable solution; and/or
3. For one or more relevant criteria, developing an alternative solution that will achieve the performance principle.

Bushfire Prone Planning presents the required assessment against all the bushfire protection criteria as a separate table for each element and includes the intent, the performance principle and acceptable solution examples, for convenient reference.

## Summarised Outcome of the Assessment Against the Bushfire Protection Criteria

Element  <i>each element consists of one or more applicable 'acceptable solutions'</i>	Complies With All Applicable 'Acceptable Solutions'  <i>or will comply</i>	Achieves the Intent of the Element for All Applicable 'Acceptable Solutions'  <i>or will achieve</i>	Required Basis of the Planning Assessment			Notes
			Acceptable Solutions		Performance Principle	
			Complies With All Applicable 'Acceptable Solutions'  <i>or will comply</i>	Achieves the Intent of the Element <i>(or will achieve)</i>		
				<i>For one or more applicable 'acceptable solutions' the solution is not fully met. A <u>variation</u> of the solution is provided and justified.</i>	<i>An Alternative Solution is Developed and Presented</i>	
Location	Will in the Future	Yes	✓			N/A
Siting and Design of Development	Will in the Future	Yes	✓			
Vehicular Access	Will in the Future	Yes	✓			
Water	Yes	Yes	✓			



## Bushfire Protection Criteria - Element 1- Location

**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.

**Performance Principle P1 (to be complied with to meet the intent and used to develop alternative solutions):** The intent may be achieved where the strategic planning proposal, subdivision or development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low **OR** a BAL-29 or below applies **AND** the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of DFES and the decision-maker.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
<p><b>A1.1 Development Location</b></p> <p>The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low;</p> <p><b>OR</b></p> <p>Be subject to BAL-29 or below;</p> <p><b>AND</b></p> <p>the risk can be managed.</p>	<p>Land is most suitable for land use intensification where hazard levels are low. Where there is an extreme bushfire hazard level or requirements for use of BAL-40 or BAL-FZ construction standards, the land is not considered suitable for development unless it meets the definition of minor or unavoidable development.</p> <p>Minor development requires local government planning approval. Unavoidable development requires demonstrating that risk can be managed to the satisfaction of DFES, WAPC and local government.</p>	<p>Will Fully Comply with the Acceptable Solution</p>	<p>The proposed development is located within a designated bushfire prone area.</p> <p>By implementing the positioning and vegetation management measures identified in this Plan the proposed development can meet the acceptable solution of being subject to BAL-29 or below and result in the bushfire risk being able to be managed. It does not require the use of BAL-40 or BAL-FZ construction standards.</p>

## Bushfire Protection Criteria - Element 2 - Siting and Design of Development

**Intent:** To ensure that the siting and design of development minimises the level of bushfire impact (*note: not related to construction standards to apply*).

**Performance Principle P2 (to be complied with to meet the intent and used to develop alternative solutions):** The intent may be achieved where the siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire risk that applies to the site. That it incorporates a defensible space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS3959 if appropriate.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
<p><b>A2.1 Asset Protection Zone (APZ)</b></p> <p>Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:</p> <p><b>Width:</b> Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m<sup>2</sup> (BAL-29) in all circumstances.</p> <p><b>Location:</b> 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/s will be managed in a low-fuel state on an ongoing basis, in perpetuity.</p> <p><b>Management:</b> The APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' ('Guidelines' Appendix 4, Element 2 Schedule 1). Also, refer to Appendix 3 and 4 of this Plan/Report.</p>	<p>The APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level by reducing fuel loads (predominantly combustible vegetation).</p> <p>The required width of the APZ varies with the vegetation impacting the site and ground slopes.</p> <p>The APZ is to include a defensible space (minimum 3m width) – an area adjoining the asset in which vegetation is kept to an absolute minimum and free from combustible items and obstructions – to facilitate fire fighting operations.</p> <p>Where the loss of vegetation is not acceptable or causes conflict with landscape and environmental objectives, then the development may need to be modified.</p>	<p>Will Fully Comply with the Acceptable Solution</p>	<p>The proposed development will meet the acceptable solution by:</p> <ul style="list-style-type: none"> <li>• Being able to partially establish an APZ of the required dimensions (as determined by the classified vegetation impacting the Site and the relevant ground slopes) within the boundary of development after the design has been updated. APZ's will be achieved as set out in Section 5.3 of this Bushfire Management Plan;</li> <li>• The balance of the required APZ dimensions being contributed by an area on adjoining land that is assessed as being managed in a low-fuel state and which can most reasonably be expected to be managed this way in perpetuity.</li> <li>• Part of/The balance of the required APZ dimensions are made up of an area consisting of public roads, footpaths and verges; and</li> <li>• The landowner/s having the responsibility of implementing the requirements of the 'Standards for APZ's' and continuing to manage the APZ to maintain it in a low fuel state.</li> </ul>

## Bushfire Protection Criteria - Element 3 - Vehicular Access

**Intent:** To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

**Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions):** The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
<p><b>A3.1 Two access routes</b> Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents and the public at all times and under all weather conditions.</p>	<p>This is to apply to access routes leading into a subdivision as well as those within a subdivision. All access should accommodate type 3.4 fire appliances (4WD 7t chassis). Two-way access should be provided as a public road, however, where a public road cannot be provided (and this will need to be demonstrated by the proponent providing justification), an emergency access way may be considered.</p>	<p>Will Fully Comply with the Acceptable Solution</p>	<p>Joondalup Drive provides safe access and egress to two different destinations. As a sealed public road, it is available to all residents and the public at all times and under all weather conditions.</p>

## Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)

**Intent:** To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

**Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions):** The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
<p><b>A3.2 Public Road</b> Minimum trafficable surface of 6m. Constructed to meet the technical requirements stated in Appendix 5.</p>	<p>In special circumstances, where <math>\leq 8</math> lots serviced, a minimum 4m trafficable surface for a maximum of 90 might be approved.</p>	<p>Will Fully Comply with the Acceptable Solution</p>	<p>All public roads will be designed and constructed to comply with the Local governments and Guidelines requirements. See Appendix 5 for details.</p>
<p><b>A3.3 Cul-de-sacs</b> - (includes dead-end roads). A maximum length of 200m with a 17.5m turnaround. 600m length if cul-de-sacs services <math>\leq 8</math> lots and is joined to another cul-de-sac by an emergency access way of <math>&lt; 600</math>m). Constructed to meet the technical requirements stated in Appendix 5.</p>	<p>Should be avoided in bushfire prone areas as they do not provide access/egress in different directions. Where no alternative exists this will need to be demonstrated by the proponent including if the lot layout already exists. Cul-de-sac is to connect to a public road.</p>	<p>N/A</p>	
<p><b>A3.4 Battle-axe</b> Maximum length 600m, minimum width 6m, passing bays @ 200m, turnaround area @ 500m and at house site. Constructed to a minimum of private driveway standards. Constructed to meet the technical requirements stated in Appendix 5.</p>	<p>Should be avoided in bushfire prone areas If no alternative exists this will need to be demonstrated by the proponent.</p>	<p>N/A</p>	

### Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)

Acceptable Solutions	Further Explanation	Compliance	Assessment Statements
<p><b>A3.5 Private Driveways</b> Are required where a house is &gt;50m from a public road. Passing bays @ 200m, turnaround area @ 500m and within 50m of house. Bridges/culverts to support 15t. All weather surface. Constructed to meet the technical requirements stated in Appendix 5.</p>		Will Fully Comply with the Acceptable Solution	
<p><b>A3.6 Emergency Access Way</b> Provided as a right of way or public access easement in gross (maximum length of 600m) to ensure accessibility to the public and fire services in emergencies. It should comply with minimum standards for a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.</p>	An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists this will need to be demonstrated by the proponent. It is to be provided as an alternative link to a public road during emergencies.	N/A	
<p><b>A3.7 Fire Service Access Routes - (perimeter roads)</b> Provided as rights of way or public access easements in gross; all weather surface and allow for two-way traffic; dead-end roads not permitted; turnarounds every 500m; less than 600m to a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.</p>	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 the subdivisions and related development. To be used during bushfire suppression operations and prevention work.	N/A	
<p><b>A3.8 Firebreak Width</b> Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level prescribed in the local firebreak notice issued by the local government.</p>		Will Fully Comply with the Acceptable Solution	The proposed development will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.

## Bushfire Protection Criteria - Element 4 – Water

**Intent:** To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

**Performance Principal P4 (to be complied with to meet the intent and used to develop alternative solutions):** The intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
<p><b>A4.1 Reticulated Areas</b> The subdivision, development or land use is provided with a reticulated water supply, in accordance with the specifications of the relevant water supply authority and DFES. Constructed to meet the technical requirements stated in Appendix 6.</p>	<p>The Water Corporations ‘No 63 Water Reticulation Standard’ is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities’ conditions apply. Additionally, any local government variation must be met (s8.4).</p>	<p>Fully Complies with the Acceptable Solution</p>	<p>A reticulated water supply is available in the area of the subject site. Installation of several hydrants will be required within the proposed development to meet Water Corp DS63 standards.</p>
<p><b>A4.2 Non-Reticulated Areas</b> Water tanks for firefighting purposes with a hydrant or standpipe are provided. Minimum of 50,000l/tank; minimum 1 tank/25 lots (or part thereof); house ≤2km from a tank; 20min turnaround time for 2.4 appliance; hardstand area suitable for 3.4 appliance within 3m of tank Must meet the technical requirements stated in Appendix 6. Any local government variation must also be met (s8.4).</p>	<p>The specification of the requirements for the proposal being assessed will be set by the water supply authority and DFES. A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity at all times, including home tanks on single lots. This could be in the form of an agreement with the local government and the fire service. Water tanks and associated facilities are vested in the relevant local government</p>	<p>N/A</p>	
<p><b>A4.3 Non-reticulated Areas (Individual Lots)</b> Single lots above 500 m<sup>2</sup> need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres. Must meet the technical requirements stated in Appendix 6.</p>	<p>A4.3 is only for use if creating one additional lot and cannot be applied cumulatively.</p>	<p>N/A</p>	

## 7.2 Location of Buildings and Applicable BAL's

Future buildings on the proposed lots are to be located in areas where an appropriate Bushfire Attack Level rating can be achieved and where minimal removal of valuable existing native vegetation is required to achieve this rating. The intent is to have the subject land of this Proposal located in an area where the bushfire hazard level is, or will on completion, be moderate or low or be subject to a maximum Bushfire Attack Level of BAL-29.

The proposed subdivision is unlikely to be approved if the indicative BAL rating for future buildings on any proposed lots is either BAL-40 or BAL-FZ as it is unacceptable on planning grounds. The exception will be if it meets the definition of unavoidable development ('Guidelines' s5.4 and s5.7). If this applies the appropriate additional assessment and input from the relevant authorities, if required, is included in this Plan.

The proposed location of the development will result in it being subject to BAL-29 or lower. As such it is located appropriately but the required separation distances from the classified vegetation will need to be maintained. These distances are stated in the next section of this Plan, Section 7.3 'Vegetation Management'.

## 7.3 Vegetation Management

### Ongoing Maintenance of Assessed Vegetation

1. Where any existing or planned, re-vegetation has been assessed as “low threat” (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements (refer to Appendix 3) and enable the buildings to retain their determined BAL ratings;
2. Any classified vegetation onsite (i.e. within a subject lot) that has directly contributed to the determined BAL rating for a given building, will be managed such as to not change that vegetation to a higher risk classification; and
3. Where a local government issues an annual firebreak notice under s33 of the Bush Fires Act 1954, this will be complied with.

### Bushfire Protection Zones

The *Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* set out the requirements to create an Asset Protection Zone (APZ). The aim of these bushfire protection zones is to have a fire of diminishing intensity and flame length as it approaches development. These reduced fuel loads will reduce the intensity of radiant heat onto the buildings, thereby increasing their survivability. This will also be important for firefighter and occupant’s safety during fire suppression activities.

**Asset Protection Zone (APZ)** – This is to be established, within a subject lot’s boundary such that a building will not be subject to a BAL rating greater than BAL-29. On a lot size where it is possible to achieve, it is to be a minimum width of 20 metres and increased when directed to the width required such that such that a building will not be subject to a BAL rating greater than BAL-29.

The APZ must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning “there is insufficient fuel available to significantly increase the severity of the bushfire attack” and being “recognisable as short cropped grass for example to a nominal height of 100mm.”

### Establishing the APZ

An Asset Protection Zone (APZ) creating a low fuel area will be required to be incorporated surrounding any future buildings within the proposed development (Refer Figure 3.1) or BAL separation distance (Refer Figure 5.3).

### Minimum Vegetation Separation Distances

The minimum separation distance from any classified vegetation, that corresponds to the proposed indicative BAL indicated on the BAL contour map will be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f).



A minimal fuel condition is stated in the standard as meaning “there is insufficient fuel available to significantly increase the severity of the bushfire attack” and being “recognisable as short cropped grass for example to a nominal height of 100mm.” Refer to Appendix 3 of this Plan for further detail.

It is also recognised that the local government issues an annual firebreak notice under s33 of the Bush Fires Act 1954 and this will be complied with.

## 7.4 Vehicular Access – Element 3 of the Bushfire Protection Criteria

The intent of the ‘Vehicular Access’ element of the bushfire protection criteria is “to ensure that the vehicular access/egress servicing a subdivision/development is available and safe during a bushfire event”. The performance principle to be met is that “The internal layout, design and construction of public and private roads must allow emergency and other vehicles to move through the subdivision/development easily and safely at all times”.

***The required outcome is that in the event of a bushfire, personal safety must be able to be maintained when travelling on the access/egress route.***

How this Proposal complies with the acceptable solutions for the vehicular access criterion and is stated in Section 7.1 ‘The Bushfire Protection Criteria – Assess and Demonstrate Compliance’. If additional information is required to further demonstrate compliance and/or present alternative solutions, this is presented below in this Section 7.4 ‘Vehicular Access’.

All relevant vehicle access requirements will be designed and constructed to the relevant technical requirement in future planning stages. The existing design shown in Figure 3.1 and 3.2 indicate that all vehicle access provisions of the guidelines can be complied with.

## 7.5 Firefighting Water Supply

The intent is to ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire. This intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

A reticulated water supply exists in the vicinity of the development site. The required hydrants and access will be installed as per the technical requirements detailed in Appendix 6 that are applicable to Water Corp DS63 and DFES requirements.

## 7.6 Building Construction Standards

### 7.6.1 Future Habitable Buildings on the Subject Site

#### Building Classes 1, 2, 3 and 10a

The Building Code of Australia (BCA) contains bushfire construction requirements that are applied to residential buildings of Class 1, 2 or 3 and associated Class 10a buildings and decks. These are required by the BCA to be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the BAL rating for the development site.

The BCA references *AS3959-2009 Construction of buildings in bushfire prone areas* or the *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas* (for Class 1a and 1b buildings only) as deemed to satisfy solutions that provide one way of complying with the Building Code's bushfire performance requirements.

**Note:** Higher construction standards can be either applied by a planning authority or presented as a part of an alternative solution in this Plan to enable compliance with the intent of the Bushfire Protection Criteria.

#### Buildings Classes 4 to 9

The BCA does not require Class 4-9 buildings to meet bushfire performance requirements. However, the responsible planning authority may condition planning approval with the requirement for the building works to be designed and constructed to reduce the risk of ignition from a bushfire - or a proponent might voluntarily adopt this approach.

The required bushfire performance measures will be those necessary to reduce the potential risk of ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the assessed BAL rating for the development site.

These measures would need to be determined by a Fire Engineer (with reference to AS3959-2009), certified in working drawings and approved by the responsible authority.

*Bushfire Prone Planning Recommendation - When the subject site is in a designated bushfire prone area and the determined BAL is BAL-LOW, AS3959-2009 does not provide any specific construction requirements. However, Bushfire Prone Planning considers a building in this situation to still be at some risk of an ember attack. To improve the protection for occupants as well as the building itself, we recommend that consideration be given to constructing the proposed building works to the standard corresponding to BAL-12.5.*

*Bushfire Prone Planning Recommendation – in line with the intent of State Planning Policy 3.7 of preserving life and reducing the impact of bushfire on property and infrastructure, we recommend that the construction of a Class 4-9 building should apply bushfire performance measures appropriate to the assessed BAL rating. The appropriate bushfire performance measures will need to be determined by a Fire Engineer and approved by the responsible planning authority.*

This Plan has provided achievable (or indicative) BAL's rather than determined BAL's because any future building works actual location is unknown. Once actual building locations have been determined confirmation or reassessment of the BAL may be required prior to the construction of any buildings.

## 8 Compliance Statements - of the Proposal and this Plan

This section of the Plan makes statements with respect to the Proposal’s compliance against the components of the WA framework for bushfire risk management. It also states how the content of this BMP satisfies the requirements of SPP 3.7.

The key components of the WA framework for bushfire risk management are summarised in Appendix 1.

### 8.1 State Planning Policy No. 3.7: Planning in Bushfire Prone Areas

SPP 3.7 Policy Objectives - Proposal Compliance Statement		The Proposal Meets Objectives
s5.1	Avoid any increase in the threat of bushfire to people property and infrastructure	Yes
Implementation of the bushfire risk management measures as set out in this Plan, including meeting the requirements of the bushfire protection criteria; will avoid any increase in the threat of bushfire.		
s5.2	Identify and consider bushfire risks in decision-making at all stages of the planning and development process (to reduce vulnerability to bushfire).	Yes
The bushfire risks have been identified and assessed, as relevant for the stage of this planning submission, using the tools prescribed in <i>SPP 3.7</i> (and the associated document <i>Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017</i> ). Refer to Section 5 ‘Assessment of Bushfire Risk’.		
s5.3	Ensure that all stages of planning submissions take into account bushfire protection requirements and include specified bushfire protection methods.	Yes
The bushfire protection requirements and any specified protection methods, relevant for the stage of this planning submission, have been taken into account and presented in Section 7 ‘Bushfire Risk Management Measures’.		
s5.4	Achieve an appropriate balance between bushfire risk management measures; biodiversity conservation values; environmental protection and biodiversity management; and landscape amenity, with consideration of climate change.	Yes
The components of this objective have been considered along with the requirements set out in the ‘Guidelines’ s2.3. Identifying and addressing issues relevant for the stage of this planning submission is presented in this Plan in Section 6 ‘Environmental Considerations’.		

<b>SPP 3.7 Policy Measures – BMP Compliance Statement</b>		<b>This BMP is Compliant</b>
s6.1	Higher order strategic planning documents in bushfire prone areas	<b>Yes</b>
<p>The requirements stated in SPP 3.7 s6.3 include provision of high level consideration of relevant bushfire hazards when identifying or investigating land for future development.</p>		
s6.2	Strategic planning proposals, subdivision and development applications	<b>Yes</b>
<p>Plans relating to land that has or will have a BHL above low and/or where a BAL rating above BAL-Low apply, are to comply with these policy measures. If the proposal has or will on completion have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, it may be considered for approval when the required information is provided and it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.</p>		
s6.3	Information to accompany strategic planning proposals	<b>Yes</b>
<p>The requirements stated in SPP 3.7 s6.3 include provision of a Bushfire Hazard Level assessment (or a BAL contour map if lots are known), identify issues arising from the relevant assessment and demonstrate that compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages. Refer to Section 5 of this Plan.</p>		
s6.4	Information to accompany subdivision applications	<b>N/A</b>
<p></p>		
s6.5	Information to accompany development applications	<b>N/A</b>
<p></p>		
s6.6	Vulnerable or high risk land uses (subdivision and development applications).	<b>N/A</b>
<p></p>		

<b>SPP 3.7 Policy Measures – BMP Compliance Statement</b>		<b>This BMP is Compliant</b>
s6.7	Strategic planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL-FZ applies	<b>N/A</b>
s6.8	Advice of State/relevant authority/s for emergency services to be sought	<b>N/A</b>
s6.9	Advice of State/relevant agencies/authorities for environmental protection to be sought	<b>Yes</b>
<p>For all stages of planning proposals, advice from relevant authorities has been sought, considered and is referenced in Section 7 of this Plan where:</p> <ul style="list-style-type: none"> <li>• The clearing of vegetation within protected environmentally sensitive areas is proposed</li> <li>• Substantial clearing of native vegetation is proposed</li> <li>• Development abuts land managed by a State or Federal authority</li> </ul>		
s6.10	Bushfire conditions may be imposed by the decision maker (detailed requirements including modifications and/or conditions)	<b>Yes</b>
<p>WAPC and/or the local government may, as a condition of approval, require that a notification be placed on certificates of title and notice of the notification on the deposited plan advising that the lots are in a designated bushfire prone area and subject to a Bushfire Management Plan. This is noted in Section 9 ‘Responsibilities for Implementation and Maintenance’.</p>		

## 8.2 Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)

The 'Guidelines' are designed to assist in the interpretation of SPP3.7's objectives and policy measures. As such they have been referenced and complied with in compiling this Bushfire Management Plan which is to accompany the planning submission. This Plan contains, as a minimum, the information required as per the 'Guidelines' checklist.

## 8.3 Bushfire Protection Criteria (WAPC v1.1 2017 'Guidelines')

The proposed land use has been assessed against the bushfire protection criteria. The assessment of the bushfire risk management measures (i.e. those relevant to each element) and the demonstration of how the proposal meets the criteria are presented in Section 7.1 of this Plan - 'Bushfire Protection Criteria - Assess and Demonstrate Compliance'.

Where the proposal has not been able to fully meet an acceptable solution for a given element or an alternative solution is proposed, then the appropriate sub section of Section 7 'Bushfire Risk Management Measures', demonstrates how the Proposal will comply with the performance principle and the intent of that element. Any required advice and recommendations from DFES and other referral authorities will be included.

## 8.4 Local Variations to Bushfire Protection Criteria

Are there any endorsed local variations to the bushfire protection criteria (e.g. through a local planning policy) that are to apply to the proposed land use and therefore addressed in Section 7 'Bushfire Risk Management Measures' of this Plan?	No
Does the proposal satisfy the local variations to the bushfire protection criteria?	N/A

## 8.5 WA Building Act 2011

Relevant regulations associated with the Act are the *Building Regulations 2012* and the *Building Amendment Regulations (No 3) 2015*. The legislation adopts the Building Code of Australia as the minimum technical requirement for the design and construction of buildings and certain other structures in WA and prescribes applicable building standards for certain classes of buildings located in areas designated by the Fire and Emergency Services Commissioner as bushfire prone areas (identified on the Map of Bushfire Prone Areas).

Is this land use proposal at a planning stage at which lot layout is known and construction of buildings (any class) is being proposed?	No
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If the response is ‘No’, then this Proposal is at a planning stage where specific compliance with the Building Act 2011 is not required – rather it will apply at future planning stages. However, if a BAL Contour Map and/or BAL assessment has been provided as part of this Plan, they can apply and may be able to be used for any future planning application (at the applicable planning stage involving construction of buildings).

If the response is ‘Yes’, then one of the situations below will apply to this proposal.

The Nature of this Land Use Proposal	Applicable
A proposal for a single house or ancillary dwelling (Class 1); or a specified building located in a bushfire prone area on a lot less than 1100m <sup>2</sup> or on a lot equal to or greater than 1100m <sup>2</sup> but subject to a BAL of BAL-29 or less, does not need to lodge a development application (but will require a building permit application). However, the relevant local government can additionally require that a development application is submitted for planning approval. Bushfire construction requirements will apply in both cases.	-
A proposal for a single house or ancillary dwelling (i.e. Class 1); or a specified building located in a bushfire prone area on a lot equal to or greater than 1100m <sup>2</sup> but subject to BAL-40 or BAL-FZ must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for a habitable building other than a single house or ancillary dwelling (i.e. Class 2 or 3 residential or accommodation buildings); or a specified building, located in a bushfire prone area, must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for mixed use, commercial, industrial buildings or public facilities (i.e. Class 4-9 buildings), located in a bushfire prone area, and must lodge a development application. Bushfire construction requirements will not apply (unless the local government additionally requires them to apply).	-

This Proposal is for a planning stage that does not yet require compliance with the *WA Building Act 2011*. However, the obligation for future buildings to be constructed to the standard corresponding to the determined bushfire attack levels is noted in Section 9 of this Plan ‘Responsibilities for Implementation and Maintenance’.

## 8.6 AS 3959 Construction of Buildings in Bushfire Prone Areas (2009 as amended)

This Proposal complies with the methodology set out in AS 3959 to classify vegetation that is a bushfire threat and to calculate the bushfire attack levels presented as a BAL Contour Map and/or a BAL assessment in Section 5 of this Plan ‘Assessment of Bushfire Risk’.



For the construction of any Class 1, 2, 3 buildings and associated Class 10a buildings and decks, this land use proposal will comply with the construction requirements, set out in AS 3959, that correspond to the determined bushfire attack level/s for the subject site. This obligation is stated in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance'.

## 8.7 Local Government Firebreak Notice

This Proposal complies with the requirements of the relevant local government notice by stating the landowner's obligations in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance.' Additionally, the obligation is noted in Section 7.3 'Vegetation Management'.

## 9 Responsibilities for Implementation & Maintenance

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This section sets out the responsibilities of landowners/proponents (including future landowners), builders and local government in relation to the implementation and maintenance of the requirements of SPP 3.7 and the 'Guidelines'.

### 9.1 Landowner / Proponent Responsibilities (and those acting on their behalf)

#### Implementation

- Ensure anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information. This includes the landowners/proponents, local government and any other authorities or referral agencies ('Guidelines' s4.6.3).
- Construction of public roads must comply with the standards (Appendix 5 'Vehicular Access').
- Construction of private driveways must comply with the standards (Appendix 5 'Vehicular Access').
- Installation of a reticulated water supply must comply with the standards (Appendix 6 'Water') or the requirements set out by the relevant local government.
- Implement the low fuel Asset Protection Zone (APZ) as per s7.3 'Vegetation Management' and Appendix 4 'APZ'.
- Before any of the subject lots are sold, each individual lot is to be compliant with the local government's annual firebreak notice (referenced in this Plan s7.3 'Vegetation Management' and Appendix 4 'APZ').
- Ensure all future buildings the landowner/proponent has responsibility for, are designed and constructed in full compliance with the requirements of the WA Building Act 2011 and the referenced Building Code of Australia (BCA), and with any identified additional requirements of the relevant local government. This should include due consideration of constructing any Class 4-9 buildings to the standard corresponding to their determined BAL even though not required by the BCA.

For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks this will include compliance with AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* (2009 as amended) and/or the National Association of Steel Housing – (NASH) *Standard – Steel Framed Construction in Bushfire Prone Areas*, whereby construction standards corresponding to the assessed BAL will be applied (Appendix 2 'Bushfire Risk Assessment – Methodology Explained').

### Deposited Plan and Certificate of Title – Potential Obligation

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'.

### Maintaining Compliance

- Current and future landowners/proponents must continue to apply the bushfire management measures set out in this Plan. They must inform any builders (of future structures on a Lot) of the existence of the Plan and the responsibilities it contains.
- The landowner/proponent is responsible for the ongoing review and implementation of the Bushfire Management Plan to ensure that the bushfire risk management measures remain effective. Bushfire plans do not expire and should be seen as a 'living document'. They may require updating in certain circumstances, including (but not limited to) if site conditions change, if further details are required at subsequent stages of the planning process or to reflect new technologies or methodologies in best practice bushfire risk management ('Guidelines' s4.6.4 and s4.6.5).
- Maintain the low fuel Asset Protection Zone (APZ) within the Lot boundary as per s7.2 'Vegetation Management' and Appendix 4 'APZ'.
- Where any existing or planned re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements and enable the buildings to retain their indicative BAL ratings.
- Any classified vegetation that has directly contributed to the determined BAL rating for a given Lot or building, must be managed such as to not change that vegetation to a higher risk classification.

## 9.2 Builder Responsibilities

The builder (generally named on the building permit) is responsible for ensuring that the building or incidental structure to which a building permit applies is, on completion, compliant with the Building Code of Australia (BCA).

For Classes 1a, 1b, 2, 3 and associated 10a buildings or decks located in a designated bushfire prone area, compliance with the BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

The construction standards for Class 1a and 1b buildings are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas; or*
- *National Association of Steel Housing – (NASH) Standard – Steel Framed Construction in Bushfire Prone Areas.*

The construction standards for Classes 2, 3 and associated 10a buildings or decks are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas.*

The building/s must also comply with any additional local government requirements.

For any Class 4-9 buildings the builder must comply with any construction requirements that are additional to those contained in the BCA. Of particular issue is any requirement, made by the relevant local government or the owner, to construct to the standard corresponding to the determined BAL for proposed buildings.

## 10 Appendix

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**From:** DFES Advisory Services [<mailto:advice@dfes.wa.gov.au>]  
**Sent:** Wednesday, 16 May 2018 12:09 PM  
**To:** Dawson, Tim <[tim.dawson@wanneroo.wa.gov.au](mailto:tim.dawson@wanneroo.wa.gov.au)>  
**Cc:** [mike@bushfireprone.com.au](mailto:mike@bushfireprone.com.au); Shaun Mayne <[Shaun.Mayne@cewa.edu.au](mailto:Shaun.Mayne@cewa.edu.au)>; Dan Pearce <[Dan.Pearce@robertsday.com.au](mailto:Dan.Pearce@robertsday.com.au)>  
**Subject:** Lots 6 7 8 Drovers Place Wanneroo - Amendment No. 6 to City of Wanneroo Drovers Place Precinct - Structure Plan No. 80 - Revised BAL Assessment - DFES Response

Our Ref: D02709

Good afternoon Timothy

The preliminary method 2 calculations submitted in an email from Mike Scott of Bushfire Prone Planning dated 8 May 2018 have been verified internally by DFES and have been accepted.

DFES recommend that the separation distances and BAL rating outputs generated from this assessment are used to update the BAL Contour Assessment for the structure plan, to understand which areas of the structure plan zoned for residential are affected by BAL-40 and BAL-FZ.

Regards

**Sandeep Shankar**

Land Use Planning Officer | Advisory Services  
Rural Fire Division | Department of Fire and Emergency Services  
20 Southport Street, West Leederville 6007  
E: [advice@dfes.wa.gov.au](mailto:advice@dfes.wa.gov.au) P: 94821761 | W: [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)



Government of Western Australia  
Department of Fire & Emergency Services



*Please note, I only check my emails twice a day. If your email is of an urgent nature, please contact me via the above telephone number. Thank you*

**From:** Dan Pearce [<mailto:Dan.Pearce@robertsday.com.au>]  
**Sent:** Tuesday, 8 May 2018 1:31 PM  
**To:** DFES Advisory Services <[advice@dfes.wa.gov.au](mailto:advice@dfes.wa.gov.au)>  
**Cc:** Dawson, Tim <[tim.dawson@wanneroo.wa.gov.au](mailto:tim.dawson@wanneroo.wa.gov.au)>; [mike@bushfireprone.com.au](mailto:mike@bushfireprone.com.au); Shaun Mayne <[Shaun.Mayne@cewa.edu.au](mailto:Shaun.Mayne@cewa.edu.au)>  
**Subject:** Lots 6 7 8 Drovers Place Wanneroo - Amendment No. 6 to City of Wanneroo Drovers Place Precinct - Structure Plan No. 80 - Revised BAL Assessment - please track in D02709 and assign high priority with 20 days and to Sandeep.

**From:** Mike Scott [<mailto:mike@bushfireprone.com.au>]

**Sent:** Tuesday, 8 May 2018 11:54 AM

**To:** Dan Pearce <[Dan.Pearce@robertsday.com.au](mailto:Dan.Pearce@robertsday.com.au)>

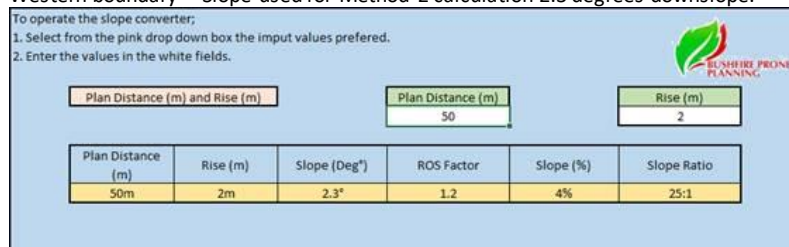
**Subject:** RE: Lots 6 7 8 Drovers Place Wanneroo - Amendment No. 6 to City of Wanneroo Drovers Place Precinct - Structure Plan No. 80 - Fuel load modifications - DFES clarification response

Hi Dan

Attached is a copy of a topography and classified vegetation map from the BMP. I have shown the location of measured contours and have used the worst case scenario (steepest slope). The areas measured are the western boundary and the southern boundary. The following are copies of inputs and results.

**Western boundary – Slope used for Method 2 calculation 2.3 degrees downslope.**

To operate the slope converter;  
1. Select from the pink drop down box the input values preferred.  
2. Enter the values in the white fields.

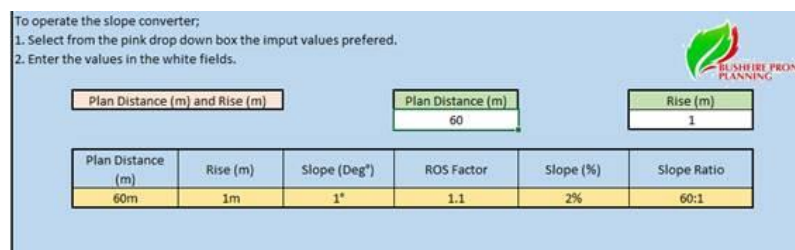


Plan Distance (m) and Rise (m)      Plan Distance (m)      Rise (m)

50      2

Plan Distance (m)	Rise (m)	Slope (Deg°)	ROS Factor	Slope (%)	Slope Ratio
50m	2m	2.3°	1.2	4%	25:1

To operate the slope converter;  
1. Select from the pink drop down box the input values preferred.  
2. Enter the values in the white fields.



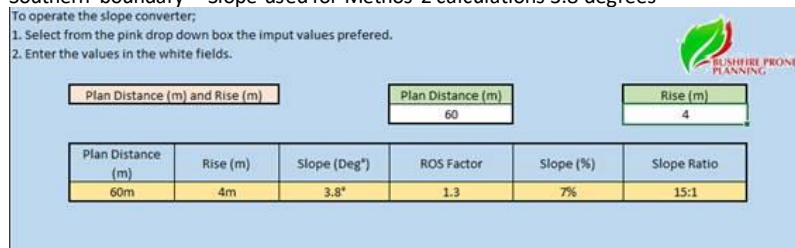
Plan Distance (m) and Rise (m)      Plan Distance (m)      Rise (m)

60      1

Plan Distance (m)	Rise (m)	Slope (Deg°)	ROS Factor	Slope (%)	Slope Ratio
60m	1m	1°	1.1	2%	60:1

**Southern boundary – Slope used for Method 2 calculations 3.8 degrees**

To operate the slope converter;  
1. Select from the pink drop down box the input values preferred.  
2. Enter the values in the white fields.



Plan Distance (m) and Rise (m)      Plan Distance (m)      Rise (m)

60      4

Plan Distance (m)	Rise (m)	Slope (Deg°)	ROS Factor	Slope (%)	Slope Ratio
60m	4m	3.8°	1.3	7%	15:1

Western boundary – Method 2 required BAL-29 separation distance 24.1m



Calculated May 8, 2018, 1:03 pm (MDC v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.81 km/h
Vegetation classification	Forest	Flame length	22.48 m
Surface fuel load	25 t/ha	Flame angle	51 °, 61 °, 67 °, 72 °, 73 ° & 80 °
Overall fuel load	35 t/ha	Elevation of receiver	8.73 m, 9.83 m, 10.34 m, 10.69 m, 10.75 m & 11.07 m
Vegetation height	n/a	Fire intensity	50,864 kW/m
Effective slope	2.3 °	Transmissivity	0.859, 0.835, 0.806, 0.779, 0.767 & 0.712
Site slope	0 °	Viewfactor	0.6106, 0.4565, 0.3098, 0.2103, 0.1709 & 0.0461
Flame width	100 m	Minimum distance to < 40 kW/m²	18.3 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	24.1 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	33.9 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	46 m
		Minimum distance to < 10 kW/m²	53.4 m
		Minimum distance to < 2.5 kW/m²	118.5 m

Rate of Spread - McArthur, 1973 & Noble et al., 1980  
 Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980  
 Elevation of receiver - Douglas & Tan, 2005  
 Flame angle - Douglas & Tan, 2005  
 Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Southern boundary - Method 2 required BAL-29 separation distance 26.7m

Southern boundary - Method 2 required BAL-29 separation distance 26.7m



Calculated May 8, 2018, 1:34 pm (MDC v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	3.22 km/h
Vegetation classification	Forest	Flame length	25.18 m
Surface fuel load	25 t/ha	Flame angle	51 °, 60 °, 66 °, 70 °, 72 ° & 80 °
Overall fuel load	35 t/ha	Elevation of receiver	9.78 m, 10.9 m, 11.5 m, 11.83 m, 11.97 m & 12.4 m
Vegetation height	n/a	Fire intensity	58,390 kW/m
Effective slope	4.3 °	Transmissivity	0.855, 0.829, 0.8, 0.774, 0.762 & 0.707
Site slope	0 °	Viewfactor	0.6125, 0.4588, 0.3115, 0.2118, 0.1723 & 0.0464
Flame width	100 m	Minimum distance to < 40 kW/m²	20.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	26.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	37.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	49.9 m
		Minimum distance to < 10 kW/m²	57.6 m
		Minimum distance to < 2.5 kW/m²	125.8 m

Rate of Spread - McArthur, 1973 & Noble et al., 1980  
 Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980  
 Elevation of receiver - Douglas & Tan, 2005  
 Flame angle - Douglas & Tan, 2005  
 Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Using the AS 3959-2009 default BAL separation distances for the western and southern boundary's to achieve BAL-29 are;

- Western boundary 27m
- Southern boundary 27m

Utilising the Method 2 methodology with Method 1 default inputs, with exception of slope, the distances required to achieve BAL-29 are;

- Western boundary 24.1m
- Southern boundary 26.7m

Kind Regards

**Mike Scott** | GradCert Business, Grad Dip Bushfire Protection  
 Director  
 (Accredited BPAD Level 3)