



# Bushfire hazard and BAL assessment

Breakwater drive, Two Rocks

Prepared for  
Acumen development solutions  
by Strategen

January 2016



# **Bushfire hazard and BAL assessment**

**Breakwater drive, Two Rocks**

Strategen is a trading name of  
Strategen Environmental Consultants Pty Ltd  
Level 2, 322 Hay Street Subiaco WA  
ACN: 056 190 419

January 2016

## ***Limitations***

### **Scope of services**

This report ("the report") has been prepared by Strategen Environmental Consulting Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

### **Reliance on data**

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

### **Environmental conclusions**

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

## **Client: Acumen development solutions**

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For review by Client	P Molinari / D Panickar / R Banks	Electronic	11 Jun 2015
<b>Final Report</b>	<b>Rev 0</b>	<b>For submission to CoW</b>	<b>P Molinari / D Panickar</b>	<b>Electronic</b>	<b>21 Jul 2015</b>
<b>Final Report</b>	<b>Rev 1</b>	<b>For submission to CoW</b>	<b>D Panickar</b>	<b>Electronic</b>	<b>28 Jan 2016</b>

Filename: ADS15158\_01 R001 Rev 1 - 28 January 2016

## Table of contents

<b>1. Introduction</b>	<b>1</b>
1.1 Background	1
1.2 Purpose of this report	1
1.3 Key objectives	2
<b>2. Bushfire hazard assessment</b>	<b>6</b>
2.1 Site overview	6
2.1.1 Location	6
2.1.2 Site topography	7
2.1.3 Vegetation	7
2.1.4 Proposed site assets	7
2.2 Fuel hazard assessment	10
2.2.1 Predominant fuel type	10
2.3 Classified vegetation types	12
2.4 Location and levels of bushfire hazards	12
2.5 Bushfire Attack Level assessment	12
2.5.1 Fire danger index	12
2.5.2 Vegetation class	13
2.5.3 Distance from classified vegetation	13
2.5.4 Effective slope under classified vegetation	13
2.5.5 Determination of Bushfire Attack Level	15
<b>3. Bushfire mitigation and compliance</b>	<b>16</b>
3.1 Bushfire hazard performance criteria	16
3.2 Bushfire mitigation	16
3.2.1 Development location	16
3.2.2 Vehicular access	17
3.2.3 Water supply	17
3.2.4 Siting and design of development	17
3.2.5 Additional bushfire mitigation strategies	17
<b>4. Conclusion and compliance with PFBFP Guidelines</b>	<b>20</b>
<b>5. References</b>	<b>21</b>

## List of tables

Table 1: Predominant vegetation class and type	12
Table 2: Determination of Bushfire Attack Level	15
Table 3: Construction standards	15
Table 4: Bushfire hazard levels and performance criteria	16

## List of figures

Figure 1: Regional Location	3
Figure 2a: Concept Plan	4
Figure 3: Topography of the project area	8
Figure 4: Vegetation complexes of the project area	9
Figure 5: Vegetation class and bushfire hazard assessment map	14
Figure 6: Indicative Building Protection Zones and BALs	18

## List of appendices

Appendix 1 Compliance checklist

Appendix 2 City of Wanneroo 2014-2015 firebreak notice

Appendix 3 Construction standards for BAL 29, BAL 19 and BAL 12.5 as per AS 3959-2009

# 1. Introduction

## 1.1 Background

Acumen development solutions (ADS) is proposing to develop the Breakwater Precinct (the project area) as part of the larger Atlantis Beach residential development. The project area is located in the City of Wanneroo (CoW), approximately 57 km north-northwest of the Perth Central Business District and 34 km of the Wanneroo city centre.

A subdivision application is currently being prepared for the project area (Figure 2a, Figure 2b) for submission to the City of Wanneroo (CoW) and the Department of Planning (DoP). As the subdivision application area is located adjacent to coastal vegetation which will pose an inherent bushfire risk to proposed life and property assets of the subdivision, the application will require a Bushfire Hazard Assessment (BHA) as a supporting document to identify the level of risk associated with vegetation in and around the subject land.

ADS has commissioned Strategen to undertake a bush fire hazard assessment (BHA) and a bush fire attack level assessment (BAL) of the proposed project area and surrounding vegetation (within 100 m) of the project area to confirm the location and level of existing bush fire hazards. Strategen will submit the report of the findings and liaise with CoW for subdivision application purposes.

## 1.2 Purpose of this report

The purpose of this report is to:

- document the findings of a Bushfire Hazard Assessment and BAL assessment
- provide guidance on bushfire management considerations for the project area
- provide bushfire fuel hazard assessment for the future Fire Management Plan or any additional fire mitigation works to address current bushfire issues at the project area
- document measures to achieve an acceptable and compliant fire management outcome for the project area.

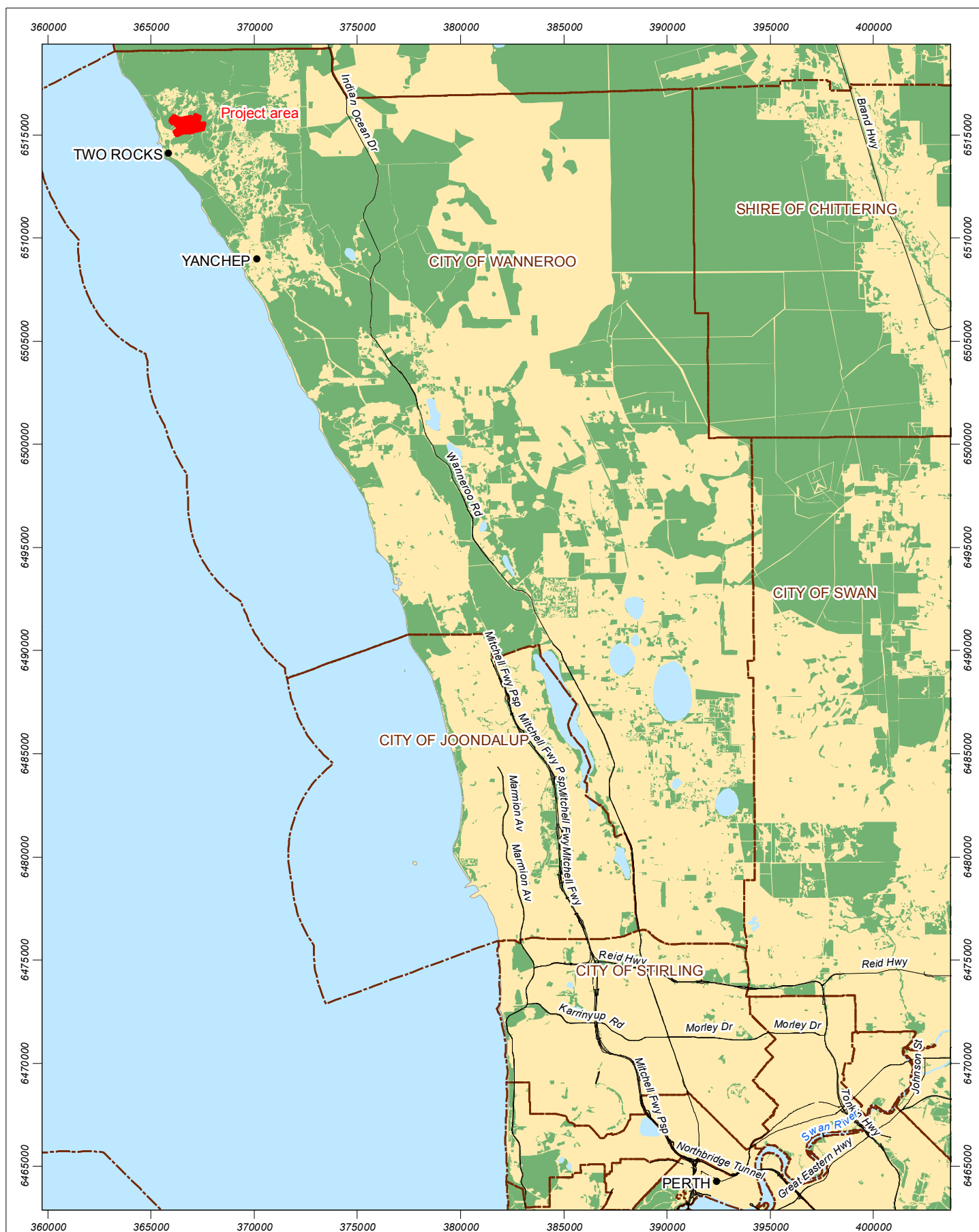
The need for a Fire Management Plan, or otherwise, will be based on the level of compliance of the proposed development with performance criteria outlined in *Planning for Bush Fire Protection Guidelines (Edition 2)* (PFBFP Guidelines; WAPC et al. 2010), Draft State Planning Policy 3.7 Planning for Bushfire Risk Management (DoP & WAPC 2014a) and accompanying Draft Planning for Bushfire Risk Management Guidelines (DoP & WAPC 2014b). Of particular importance will be the application of suitable building protection and hazard separation zones (defendable space) around the proposed development and specified level of construction standard in accordance with *AS 3959–2009 Construction of Buildings in Bushfire Prone Areas* (SA 2009).

### 1.3 Key objectives

Key objectives of the project include:

1. Undertake a detailed Bushfire Hazard Assessment of the project area and surrounds.
2. Undertake a BAL assessment of the project area in accordance with AS 3959–2009.
3. Document key findings of the Bushfire Hazard and BAL assessments, including mapping of bushfire hazard areas and hazard levels in accordance with methodology outlined in the Guidelines.
4. Verify compliance of the proposed development with Guideline performance criteria in light of the assessed bushfire hazard levels and BAL.





**Figure 1 Regional Location**

Scale 1:250,000 at A4

0 1 2 3 km

Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 21/01/2016

Author: JCrute

Source: Topography: Geoscience Australia 2011.



**Legend**

● Town

— Major road

Local government boundary

Major river

Lakes

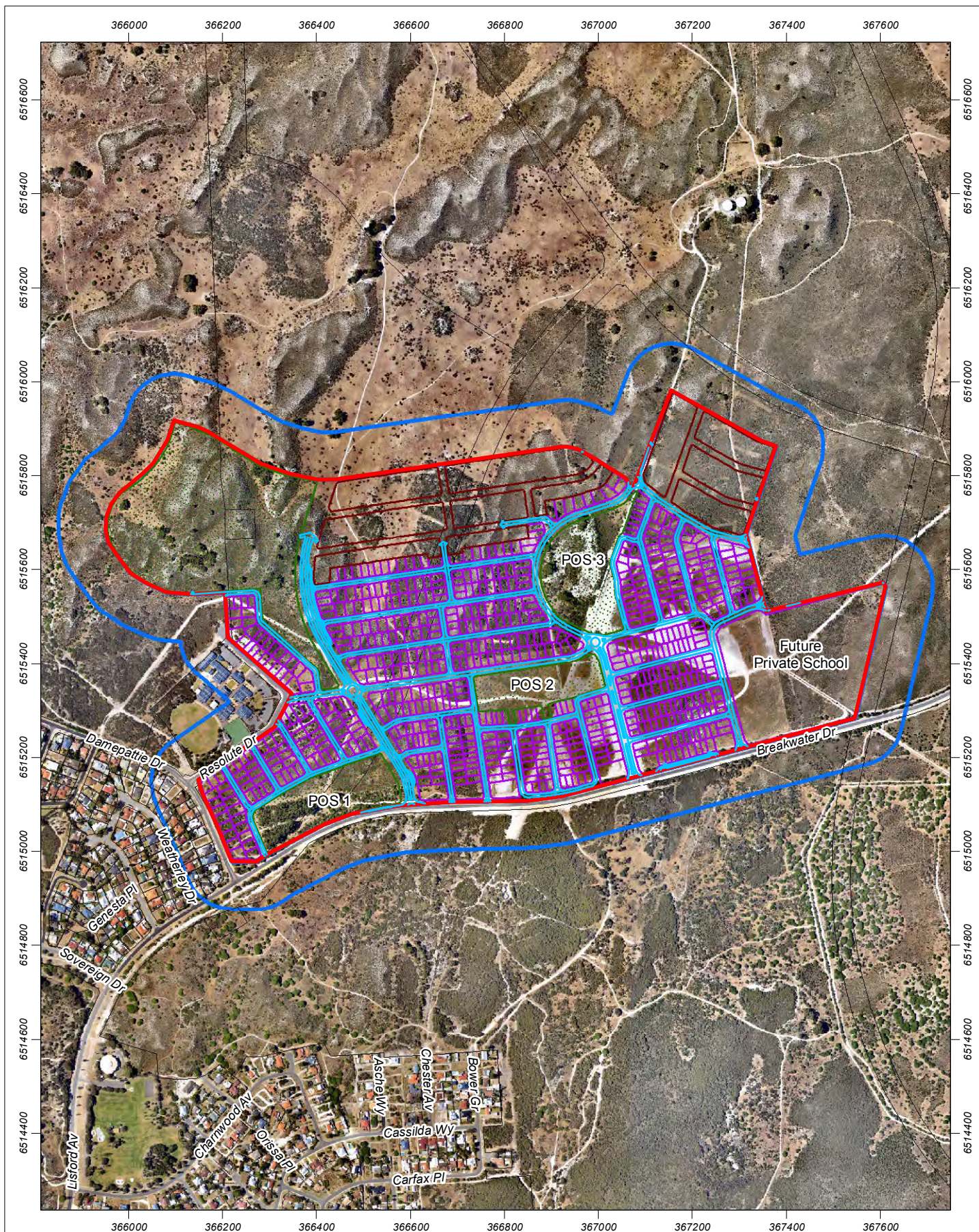
Native vegetation

Project area

**strategen**  
ENVIRONMENTAL

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





**Figure 2a: Concept Plan**

Scale 1:11,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 21/01/2016  
 Author: JCrute  
 Source: Client 2015 and 01/2016.

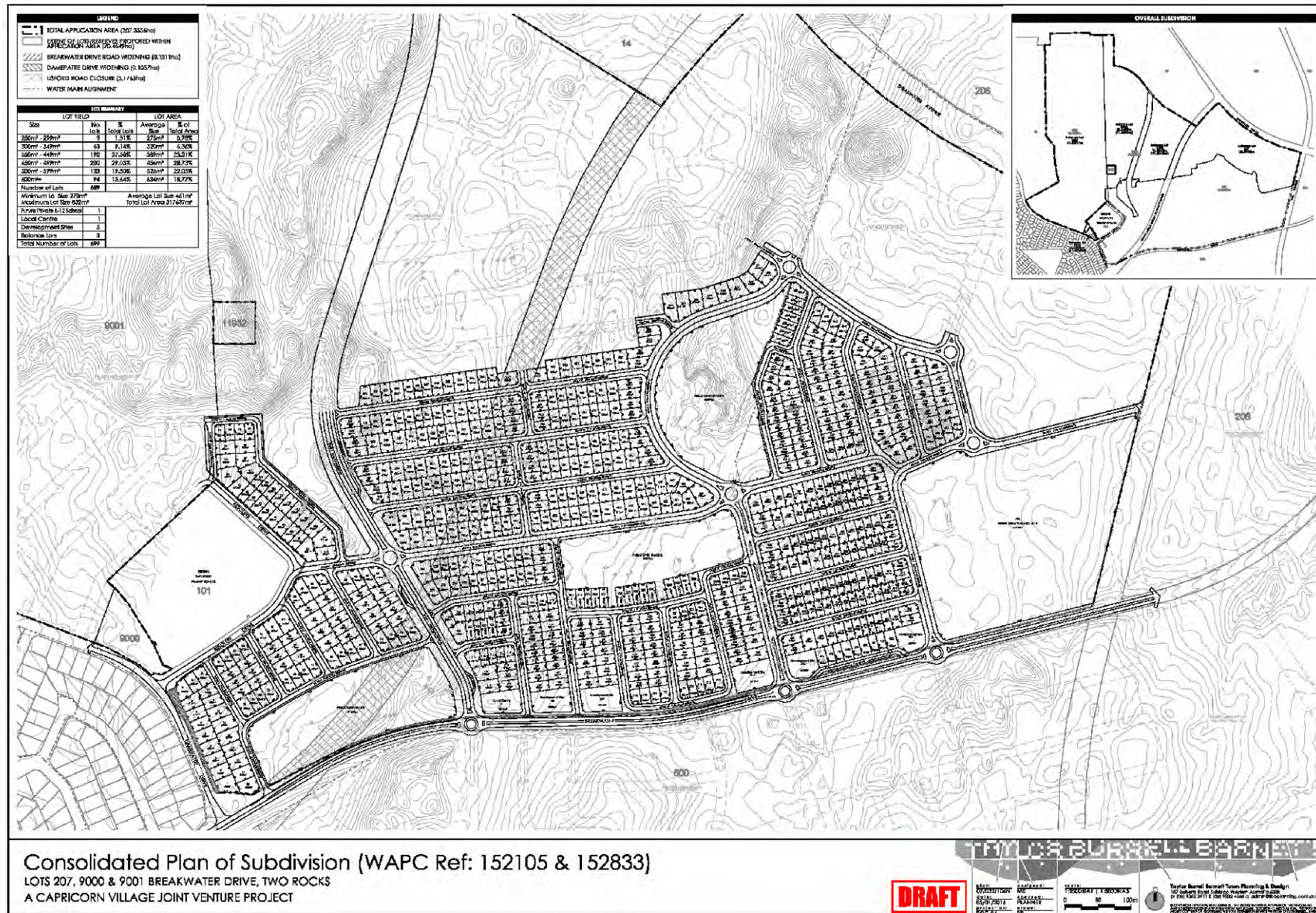
**Legend**

- Carriageways
- POS
- Proposed lots
- Road reserve
- Project area boundary
- Existing cadastre
- 100m wide assessment area

**strategen**  
 ENVIRONMENTAL

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







## 2. Bushfire hazard assessment

### 2.1 Site overview

#### 2.1.1 Location

The project area is situated adjacent to bushland on the north, east, north-west and south which will pose an inherent bush fire risk to proposed life and property assets of the subdivision (Figure 2a).

Vegetation within the project area is predominantly comprised of a mixture of Tuart woodland, coastal shrubland/heath, exotic Japanese Pepper woodland and exotic grasslands with scattered shrubs (Plate 1). Adjacent vegetation is contiguous with the vegetation types within the project area and will pose an inherent risk to future life and property assets of the development.



Plate 1: Site overview

### 2.1.2 Site topography

The project area has an undulating topography containing an overall rise in elevation in a north-easterly direction. It ranges from 20 metres Australian Height Datum (mAHD) in the south-west corner of the project area to 35 mAHD along the northern boundary, 40 mAHD in the south-eastern corner and is at its maximum with a rise on the eastern margin at 60 mAHD (Figure 3).

### 2.1.3 Vegetation

#### *Vegetation complexes*

Remnant native vegetation on the site is representative of the Quindalup vegetation complex (Hedde *et al.* 1980) as illustrated in Figure 4. This complex can be described as:

- a coastal dune complex consisting mainly of two alliances - the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include low closed forest of *Melaleuca lanceolata* - *Callitris preissii* and closed scrub of *Acacia rostellifera*.

#### *On-site and surrounding vegetation extent*

Native vegetation within and surrounding the project area is spread throughout the project area and consists predominantly of shrubland/heath vegetation with pockets of Japanese Pepper woodland and exotic grasslands.

Majority of vegetation within the project area will be cleared for development with the exception of two conservation POS areas which will contain shrub vegetation in its natural state.

### 2.1.4 Proposed site assets

Development of the project area will intensify life and property assets within the area due to construction of additional residences, recreational facilities, infrastructure and attraction of visitors.





**Figure 3: Topography of the project area**

Scale 1:11,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 21/01/2016  
 Author: JCrute  
 Source: Client 2015 and 01/2016.

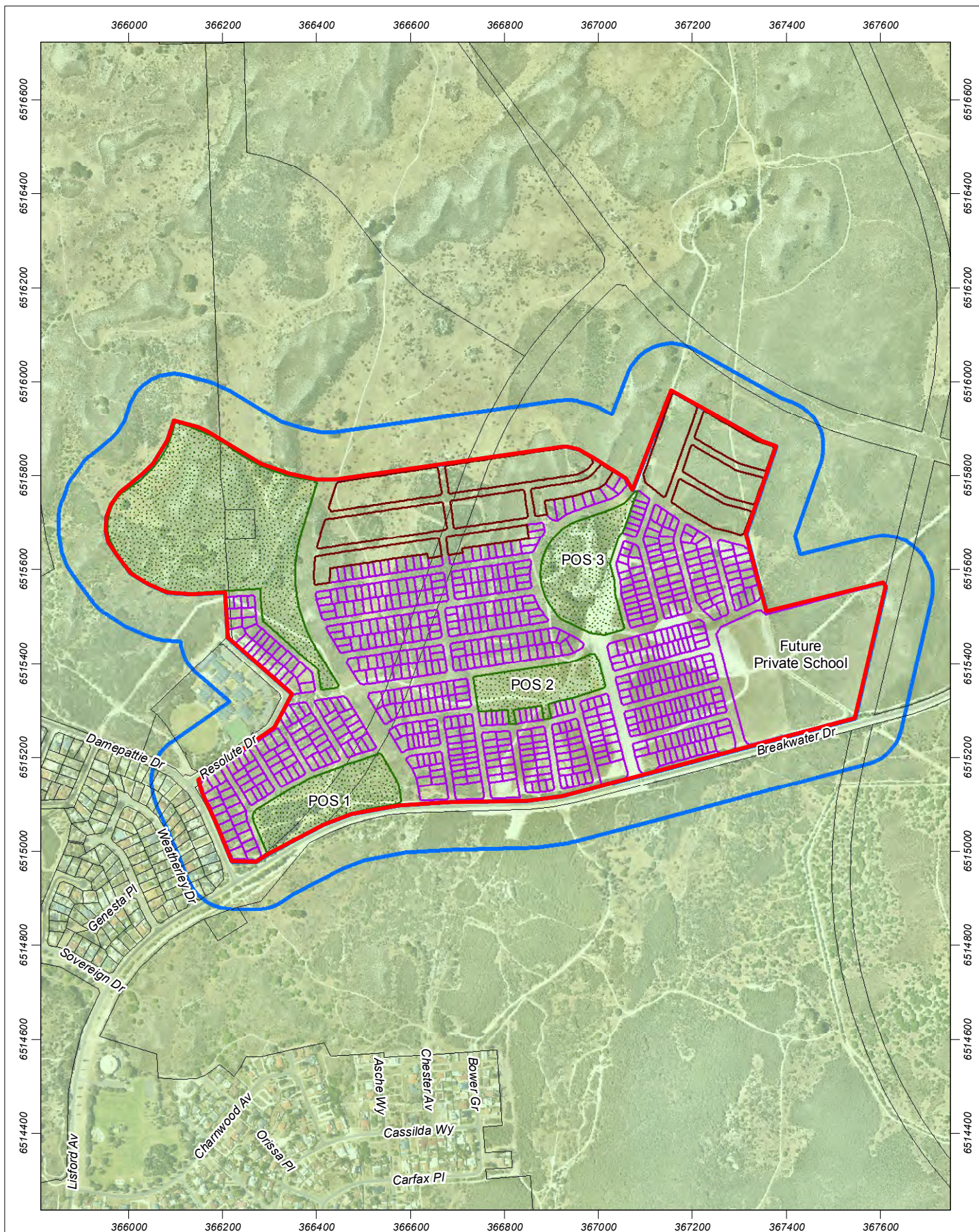
**Legend**

- Project area boundary
- POS
- Surface elevation (mAHD)
- Downslope 5-10 degrees
- Upslope or flat land

**strategen**  
 ENVIRONMENTAL

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





**Figure 4: Vegetation complexes of the project area**

Scale 1:11,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
Note that positional errors may occur in some areas  
Date: 21/01/2016  
Author: JCrute

Source: Aerial image and concept plan: Client 2015 and 01/2016. Vegetation: Heddle et al, DEC 2012.

#### Legend

- |               |                           |
|---------------|---------------------------|
| POS           | Project area boundary     |
| Proposed lots | Existing cadastre         |
| Road reserve  | 100m wide assessment area |

#### Vegetation complexes

- |                   |
|-------------------|
| Quindalup complex |
|-------------------|



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



## 2.2 Fuel hazard assessment

Strategen staff undertook a fuel hazard assessment of the project area and surrounding vegetation on 27 May 2015. The assessment was undertaken on the basis of a visual inspection of the following factors, cross-referenced with the Swan Coastal Plain Visual Fuel Load Guide (FESA 2012):

- vegetation type and structure
- vegetation condition and density
- fuel age
- scrub extent.

### 2.2.1 Predominant fuel type

#### *Project area*

Vegetation proposed to be retained within the project area is composed of:

- coastal shrubland/heath with available fuel loads ranging from 15-25 t/ha (tonnes per hectare) (Plate 2)
- grassland with available fuel loads between 2-3 t/ha (Plate 3).

Fuel age throughout the project area was estimated at approximately 10-15 years.

The majority of vegetation within the project area is proposed to be cleared for development and thus will not pose a bushfire hazard once development commences. The development will contain two conservation areas within the development (POS 3 and POS 4). Current plans indicate they will contain coastal shrubland/heath which will pose a risk to the surrounding development.

#### *Assessment area*

Vegetation adjacent to the project area represents a continuation of that within the project area (i.e. coastal shrubland/heath and unmanaged grassland). Majority of this vegetation will be cleared in the future as part of the wider Atlantis Beach development.





Plate 2: Coastal shrubland/heath

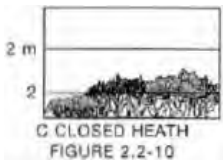



Plate 3: Unmanaged grassland (foreground)

## 2.3 Classified vegetation types

An assessment of vegetation class and type within and adjacent to the project area was undertaken in accordance with procedures outlined in the PFBFP Guidelines (Table 1). The classified vegetation type aligns with the predominant fuel type identified in Section 2.2.1.

Table 1: Predominant vegetation class and type

Predominant fuel type and available fuel load	Vegetation class	Vegetation type	Figure (taken from the Guidelines)	Description
Coastal shrubland/ heath (15-25 t/ha)	(C) Shrubland	Closed heath	 C CLOSED HEATH FIGURE 2.2-10	Found in wet areas and/or areas affected by poor soil fertility or shallow soils. Shrubs 1-2 metres high often comprising Banksia, Acacia, Hakea and Grevillea. Wet heaths occur in sands adjoining dunes of the littoral (shore) zone. Montane heaths occur on shallow or water-logged soils.
Unmanaged grassland (2-3 t/ha)	(G) Grassland	Tussock grassland	 G TUSsock GRASSLAND FIGURE 2.2-22	All forms, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%.

Previously cleared vegetation has not been classified.

## 2.4 Location and levels of bushfire hazards

The location and levels of existing bushfire hazard areas both within and adjacent to the project area are outlined in the vegetation class and bushfire hazard assessment maps (Figure 5). This map has been created using the abovementioned vegetation class and type description and assessed available fuel loads. Figure 5 displays the bushfire hazards within and adjacent to the project area according to the planned development scenario (i.e. majority of vegetation within 100 m of the project area is cleared in accordance with the Atlantis Beach master plan prior to development of the project area).

Bushfire hazard levels within the project area will be low within residential lots and POS areas 1 and 2 during and after development. Bushfire hazard levels within conservation POS areas 3 and 4 and areas within 100 m of the project area range from low to extreme. Classifying the bushfire hazard by assessing the predominant vegetation is a key to the initial determination of site suitability for development. This also leads to determination of the potential level of construction standard by the application of AS 3959–2009 for any proposed development.

## 2.5 Bushfire Attack Level assessment

This procedure, as outlined in the PFBFP Guidelines and AS 3959–2009, specifies the Bushfire Attack Level (BAL) by using a combination of the relevant fire danger index (FDI), vegetation class, slope and the distance maintained between the proposed development area and predominant vegetation. Based on the specified BAL, construction requirements for proposed buildings can then be assigned.

### 2.5.1 Fire danger index

A blanket FDI rating of 80 is adopted for Western Australian environments, as outlined in AS 3959–2009 and provided by Australasian Fire and Emergency Service Authorities Council (AFAC).

### **2.5.2 Vegetation class**

Two predominant vegetation classes (Shrubland and Grassland) were identified as occurring in proximity to the project area.

### **2.5.3 Distance from classified vegetation**

The project area is currently located within 100 m of classified vegetation. Due to the proximity of potential built assets to classified vegetation, relevant BALs will be applied to the project area in accordance with AS 3959-2009 (Figure 6). Vegetation within 100 m to the north, east and west of the project area will be cleared for neighbouring developments in the near future. This clearing will occur prior to dwellings being constructed within the project area and therefore BALs associated with this vegetation are not applicable.

No landscaping plans have been developed for the two conservation areas within the project area. As such, a precautionary approach has been taken and both areas have been assigned 'Extreme' bushfire hazard ratings. The only exception to this is the southern portion of POS 4. This area will consist of a maintained lawn area. This is subject to change on the release of the landscape plans by the developer.

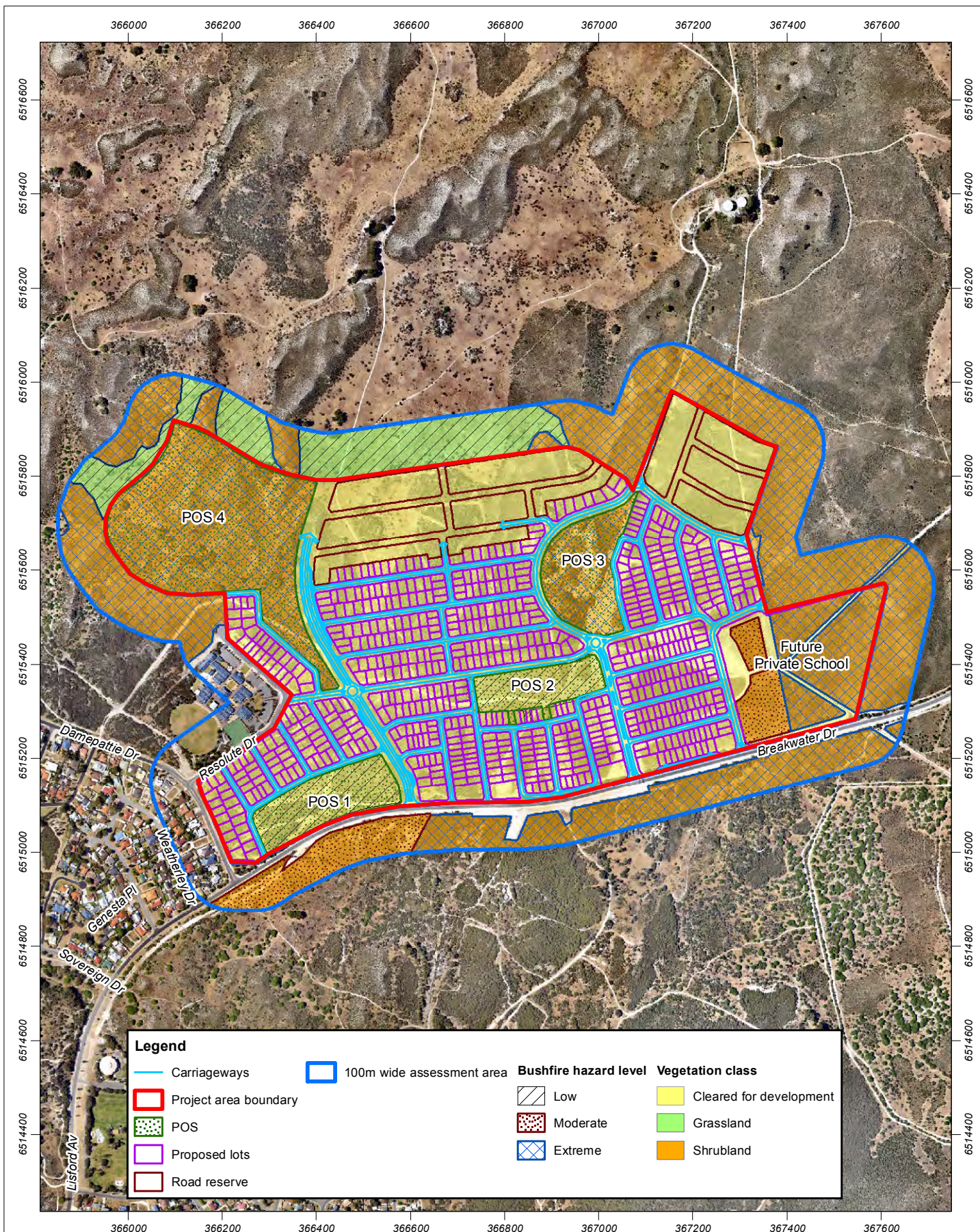
The sale of lots containing the BPZ as indicated in Figure 6 must not proceed until vegetation within 100 m of the project area is cleared.

### **2.5.4 Effective slope under classified vegetation**

Vegetation to the south-east and east of the project area is located upslope from proposed lots (Figure 3).

Given the undulating topography associated with the site, a precautionary approach has been taken and as such, vegetation on the western and northern boundaries of the project area has been assumed to occur downslope from proposed lots at an angle of 5-10 degrees (Figure 3).





**Figure 5: Vegetation class and bushfire hazard assessment map**

Scale 1:11,000 at A4

0 100 200 300 m

Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 21/01/2016

Author: JCrute

Source: Client 2015 and 01/2016.

Path: Q:\Consult\2015\ADS\ADS15158\ArcMap documents\R001\Rev1\ADS15158\_01\_R001\_Rev1\_F005.mxd

**strategen**  
ENVIRONMENTAL

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



### 2.5.5 Determination of Bushfire Attack Level

Based on the above parameters, the specified BALs for the proposed subdivision range from BAL 29 to BAL 12.5 as indicated in Table 2 (i.e. all lots located greater than 11 m from classified vegetation). This separation distance from classified vegetation will create a suitable low fuel buffer and defensible space between vegetation and proposed buildings. The separation distance will be achieved by a combination of the following:

- roads
- firebreaks
- footpaths
- low fuel areas
- building setbacks.

Table 2: Determination of Bushfire Attack Level

Vegetation class	Bushfire attack level (BAL)				
	BAL FZ	BAL 40	BAL 29	BAL 19	BAL 12.5
	Distance (m) of the site from the predominant vegetation class				
	Vegetation is upslope and flat land (0 degrees)				
(C) Shrubland	<7	7-<9	9-<13	13-<19	19-<100
(C) Shrubland	Vegetation is downslope (>5 to 10 degrees)				
	<8	8-<11	11-<17	17-<25	25-<100

Source: WAPC et al. (2010)

A brief description of the various BALs and associated heat flux exposure threshold, bushfire attack and level of exposure, and relevant section of AS 3959-2009 is provided in Table 3. Construction standards for BAL 29, BAL 19 and BAL 12.5 are fully explained in Appendix 3.

Table 3: Construction standards

Bush fire attack level (BAL)	Classified vegetation within 100m of the site and heat flux exposure thresholds	Description of predicted bush fire attack and levels of exposure	Construction Section as per AS 3959
BAL – Low	-	There is insufficient risk to warrant specific construction requirements. Despite this, FESA strongly recommends that ember protection features be incorporated in design where practicable.	4
BAL – 12.5	≤12.5 kW/m <sup>2</sup>	Ember attack	3 and 5
BAL – 19	>12.5 kW/m <sup>2</sup> ≤19 kW/m <sup>2</sup>	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux.	3 and 6
BAL – 29	>19 kW/m <sup>2</sup> ≤29 kW/m <sup>2</sup>	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux.	3 and 7

Source: SA (2009)

### 3. Bushfire mitigation and compliance

#### 3.1 Bushfire hazard performance criteria

The PFBFP Guidelines document a suite of bushfire hazard performance criteria and acceptable solutions to guide proposed developments in achieving suitable and effective bushfire mitigation and protection of life and property. The relationship between the various bushfire hazard levels and development performance criteria is set out in Table 4.

Portions of vegetation within conservation POS areas and within 100 m of the project area were assessed as containing a moderate to extreme bush fire hazard rating. As development is generally to be avoided in these areas, a comprehensive suite of bush fire mitigation strategies will need to be employed to meet Guideline requirements and achieve compliance with performance criteria for a moderate hazard level or lower.

Bush fire mitigation will therefore need to focus on the key areas of development location, vehicular access, water supply, siting of development and design of development. In order to achieve a compliant development, performance criteria for these elements will need to be met through adoption of recommended and applicable acceptable solutions, as outlined in the Guidelines.

Table 4: Bushfire hazard levels and performance criteria

Bushfire hazard level	Bushfire protection performance criteria required
Low hazard	Development does not require special bushfire planning controls. Despite this, DFES strongly recommends that ember protection features be incorporated in design where practicable.
Moderate hazard	Performance criteria for: <ul style="list-style-type: none"> <li>• location (Element 1)</li> <li>• vehicular access (Element 2)</li> <li>• water (Element 3)</li> <li>• siting of development (Element 4)</li> <li>• design of development (Element 5).</li> </ul>
Extreme hazard	Development is to be avoided in areas with these hazard levels.

Source: WAPC et al. (2010)

Section 3.2 provides a discussion surrounding the compliance of the proposed subdivision with the above the PFBFP Guidelines. The completed fire management compliance checklist is provided in Appendix 1.

#### 3.2 Bushfire mitigation

##### 3.2.1 Development location

Strategic location, layout and management of future development at the planning stage can reduce future fire threat and risk to critical life and property assets. The current situation is that some vegetation adjacent to the project area was classed as containing a Moderate to Extreme bushfire hazard. Adequate separation of proposed dwellings from these hazards in the form of Building Protection Zones will be required to maintain compliance with PFBFP Guidelines. Figure 6a illustrates the relevant BALs and Building Protection Zones for the assessment area.

Figure 6b displays an alternate scenario, whereby all vegetation within 100 m of the project area boundaries is cleared prior to development. In this scenario, the only BALs applicable to the project area will be associated with POS areas. The most appropriate figure will be referred to at the time of development depending on whether clearing has been undertaken outside of the project area.

### 3.2.2 Vehicular access

The proposed vehicular access network will provide a minimum of two links to the surrounding public road network (Figure 2a). The proposed vehicular access network will also provide buffers and access for emergency service vehicles between proposed buildings and the surrounding bushland extent.

All public roads and private driveways will be constructed to specifications in accordance with Main Roads WA and DFES requirements and the proposed subdivision does not contain any cul-de-sacs or battle axes. The proposed road network will also serve as a fire service access route for emergency services. No additional emergency access routes, gates, firebreaks or signs are required under the PFBFP Guidelines.

These characteristics of the proposed development will ensure compliance with performance criteria for vehicular access.

### 3.2.3 Water supply

Water supply services will be extended throughout the project area from surrounding areas of residential development, which will result in provision of a reticulated mains water supply for proposed residences.

A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements.

The above measures will ensure the development meets performance criteria for water supply (Element 3) by adopting acceptable solution A3.1.

### 3.2.4 Siting and design of development

Several lots within the project area are likely to be situated within 100 m of classified vegetation. Figure 6a illustrates where Building Protection Zones and areas requiring heightened construction standards for buildings (i.e. BALs) are located within the assessment area. Heightened construction standards compliant with BAL 29, BAL 19 and BAL 12.5 will be applied to affected lots in association with mitigation measures outlined in sections 3.2.1 to 3.2.3 to ensure compliance with performance criteria for siting and design of development.

Figure 6b displays an alternate scenario, whereby all vegetation within 100 m of the project area boundaries is cleared prior to development. In this scenario, the only BALs applicable to the project area will be associated with POS areas. The most appropriate figure will be referred to at the time of development depending on whether clearing has been undertaken outside of the project area.

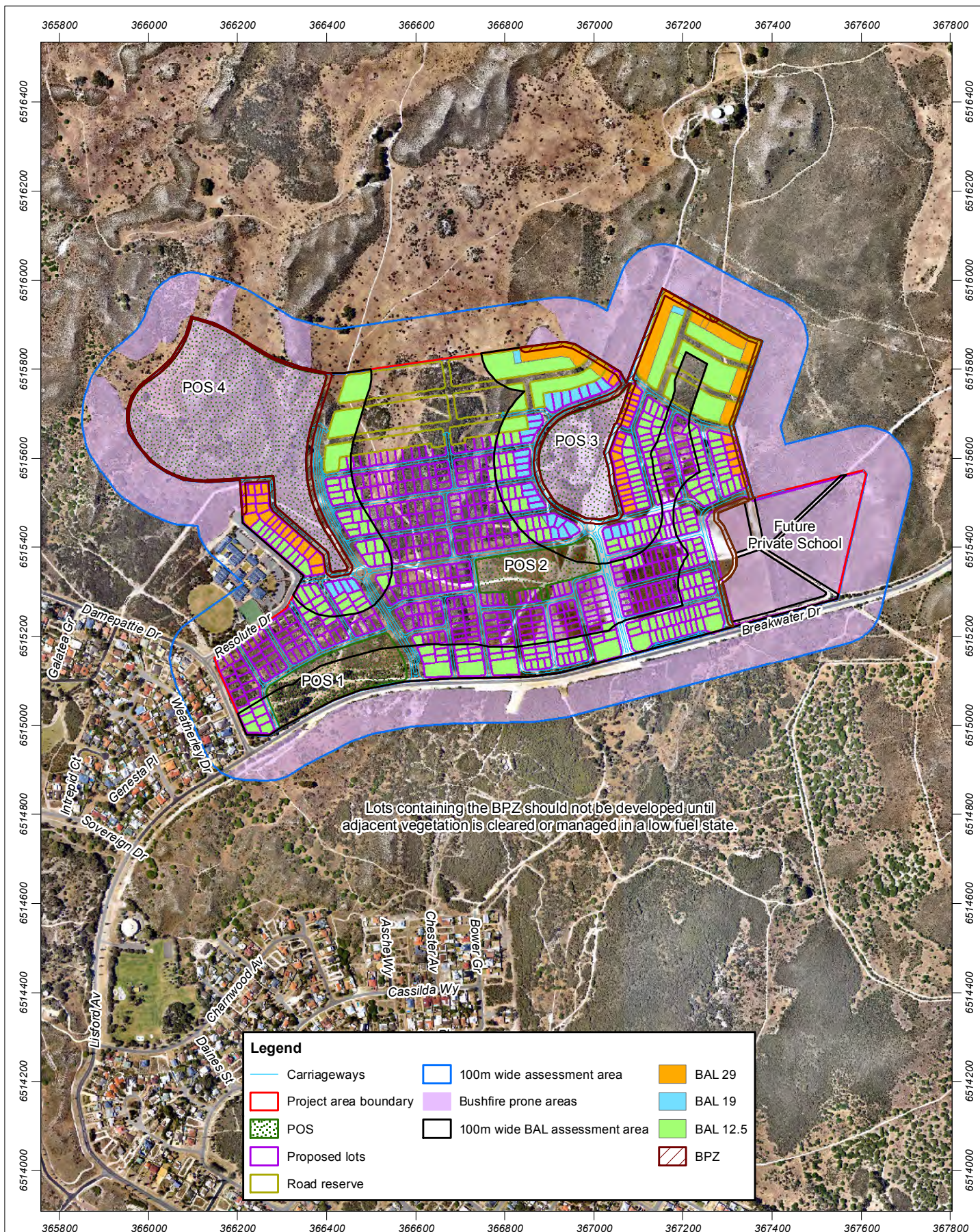
### 3.2.5 Additional bushfire mitigation strategies

The following bushfire mitigation strategies should be considered in addition to the strategies listed previously, including:

1. Emergency suppression response: in the event that wildfire occurs within or adjacent to the development area, a fast emergency suppression response time (within 30 minutes) can be achieved from local volunteer and career bushfire brigades.
2. Detailed evacuation plan and designation of safe fire refuge: on construction of the proposed development, Straten recommends that the responsible authority have in place a detailed evacuation plan, including location and signage of designated safe fire refuge area/s.
3. Compliance with City of Wanneroo (CoW) Fire Management Requirements: the responsible authority will be required to maintain compliance with the current City of Wanneroo Fire Management Requirements (Appendix 2).
4. Ensure Muster Points are provided: Muster points should be clearly demarcated on evacuation plans and using on-site signage. Patrons should also be made aware of their location.

These additional bushfire mitigation measures should be described in a detailed Fire Management Plan should one be required.





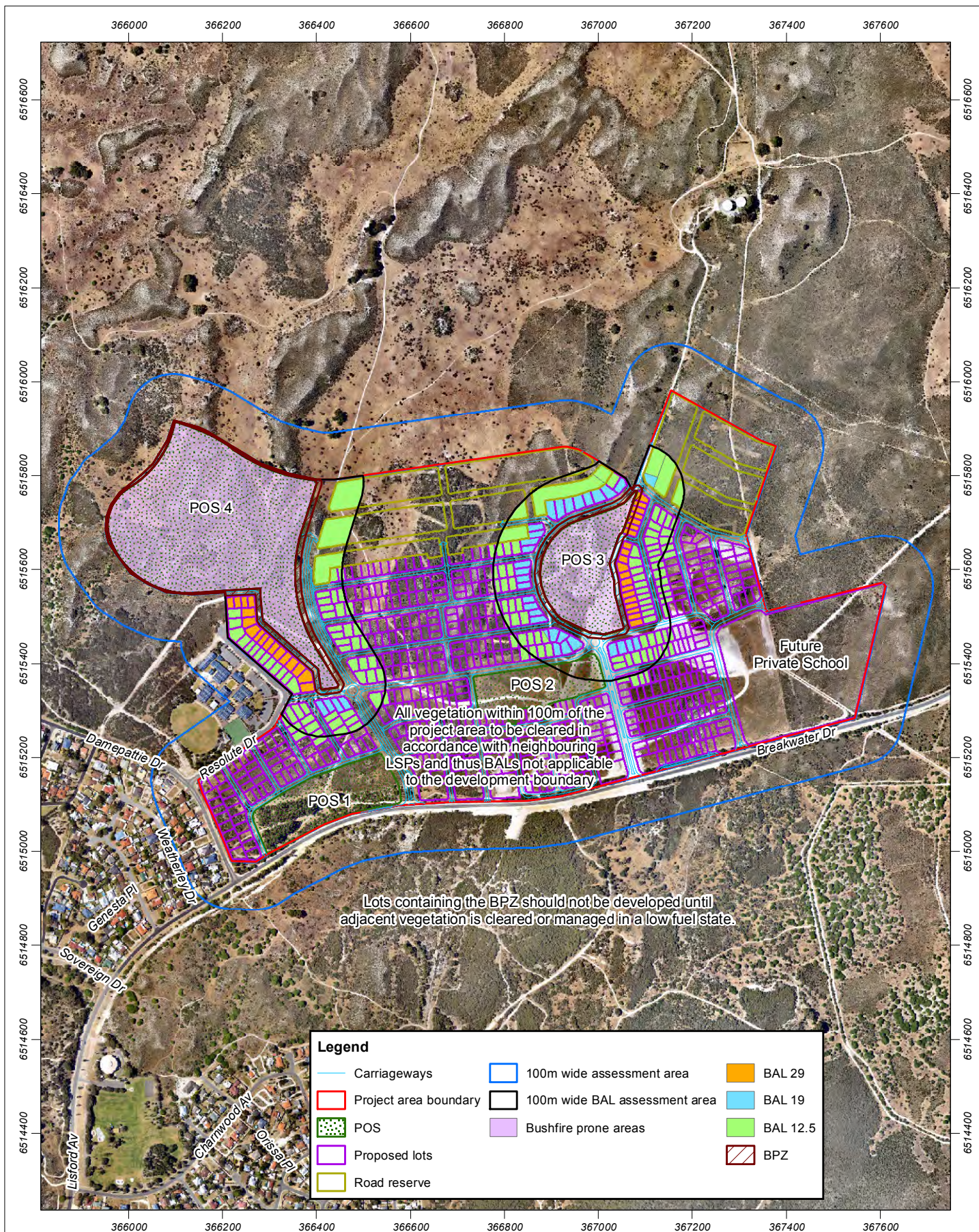
**Figure 6a: Indicative Building Protection Zones and BALs**

Scale 1:11,620 at A4

0 100 200 300 m

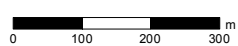
Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 27/01/2016  
 Author: JCrute  
 Source: Aerial image and concept plan: Client 2015 and 01/2016.





**Figure 6b: Indicative Building Protection Zones and BALs**

Scale 1:11,000 at A4



Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 27/01/2016

Author: JCrute

Source: Client 2015.

Path: Q:\Consult\2015\ADS\ADS15158\ArcMap documents\R001\Rev1\ADS15158\_01\_R001\_Rev1\_F006b.mxd



## 4. Conclusion and compliance with PFBFP Guidelines

Strategen has undertaken a bushfire hazard assessment and BAL assessment of the proposed subdivision application area at the Breakwater Precinct and surrounding vegetation. Findings of the assessments have revealed that a number of future lots within the proposed development are likely to be situated within 100 m of classified vegetation. Application of bushfire mitigation measures outlined in section 3.2 will ensure that additional protection is offered to buildings located within the project area in the event of a bushfire.

The location of all lots within the proposed subdivision area and mitigation measures outlined in section 3.2 will ensure that the current development design, location and layout will achieve full compliance with PFBFP Guideline requirements for planning in bushfire prone areas. Additional bushfire mitigation strategies which should be considered for the proposed development are outlined in section 3.2.5.

The need for a FMP as a condition of subdivision will depend on the bushfire hazard to the south of the development and the final plans for the proposed conservation areas. Figure 6a and Figure 6b display different development scenarios with Figure 6b showing all vegetation within 100 m of the project area boundaries cleared prior to development. In this scenario, the only BALs applicable to the project area will be associated with POS areas. The most appropriate figure will be referred to at the time of development depending on whether clearing has been undertaken outside of the project area.

## 5. References

- Beard JS 1990, *Plant Life of Western Australia*. Kangaroo Press, Kenthurst, New South Wales.
- Department of Planning and Western Australian Planning Commission (DoP & WAPC) 2014a, *Draft State Planning Policy 3.7 Planning for Bushfire Risk Management*, Western Australian Planning Commission, Perth.
- Department of Planning and Western Australian Planning Commission (DoP & WAPC) 2014b, *Draft Planning for Bushfire Risk Management Guidelines*, Western Australian Planning Commission, Perth.
- Fire and Emergency Services Authority (FESA) 2012, *Visual Fuel Load Guide for the scrub vegetation of the Swan Coastal Plain and Darling Scarp including Geraldton Sandplains & Leeuwin Ridge Regions of Western Australia*, Bush Fire and Environmental Protection Branch, Fire and Emergency Services Authority, Perth.
- Hedde EM, Loneragan OW & Havel JJ 1980, *Darling System, Vegetation Complexes*, Forest Department, Perth.
- Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 Construction of Buildings in Bushfire-Prone Areas*, Standards Australia, Sydney, New South Wales.
- Western Australian Planning Commission, Department of Planning and Fire and Emergency Services Authority (WAPC et al.) 2010, *Planning for Bush Fire Protection Guidelines (Edition 2)*, Western Australian Planning Commission and Fire and Emergency Services Authority, Western Australia.



## **Appendix 1**

### **Compliance checklist**



Compliance checklist for performance criteria and acceptable solutions

Element	Acceptable solution	Compliance	Yes/No	Explanation (if no)
1. Location	A1.1 Development location	Does the proposal comply with performance criteria P1 by applying acceptable solution A1.1?	Yes	
2. Vehicular access	A2.1 Two access routes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.1?	Yes	
	A2.2 Public roads	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.2?	Yes	
	A2.3 Cul-de-sacs	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.3?	Yes	
	A2.4 Battle axes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.4?	N/A	No battleaxes proposed
	A2.5 Private driveways	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.5?	Yes	
	A2.6 Emergency access ways	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.6?	N/A	No emergency access ways needed
	A2.7 Fire service access routes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.7?	Yes	
	A2.8 Gates	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.8?	N/A	No gates needed
	A2.9 Firebreak widths	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.9?	N/A	No firebreaks needed
	A2.10 Signs	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.10?	N/A	No signs needed
3. Water	A3.1 Reticulated areas	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.1?	Yes	
	A3.2 Non-reticulated areas (a)	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.2?	N/A	Project area will be reticulated
	A3.3 Non-reticulated areas (b)	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.3?	N/A	Project area will be reticulated
4. Siting of development	A4.1 Hazard separation – moderate to extreme bush fire hazard level	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.1?	Yes	
	A4.2 Hazard separation – low bush fire hazard level	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.2?	Yes	
	A4.3 Building protection zone	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.3?	Yes	
	A4.4 Hazard separation zone	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.4?	Yes	
	A4.5 Reduction in bush fire attack level due to shielding	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.5?	N/A	

Element	Acceptable solution	Compliance	Yes/No	Explanation (if no)
5. Design of development	A5.1 Compliant development	Does the proposal comply with performance criteria P5 by applying acceptable solution A5.1?	Yes	
	A5.2 Non-compliant development	Does the proposal comply with performance criteria P5 by applying acceptable solution A5.2?	N/A	Development is compliant

Note: Performance criteria and acceptable solutions are in accordance with *Planning for Bush Fire Protection Guidelines (Edition 2)* (WAPC et al. 2010).

### **Applicant Declaration**

I declare that the information provided is true and correct to the best of my knowledge.

Full name: Roger Banks

Applicant signature: 

Date: 10/06/2015



**Appendix 2**  
**City of Wanneroo 2014-2015 firebreak**  
**notice**



# Protect your home and property from bushfires

NOTICE TO ALL OWNERS OR OCCUPIERS OF LAND IN THE DISTRICT OF THE CITY OF WANNEROO REGARDING FIREBREAKS.

The City of Wanneroo hereby gives notice pursuant to Section 33 of the **Bush Fires Act 1954** to all owners or occupiers of land in its district that they are required on or before 15 November, or within 14 days of becoming the owner or occupier of the land if that occurs after the 15 November, to annually plough, cultivate, scarify, or otherwise clear firebreaks as specified in this Notice and thereafter up to, and including the 30 April, annually, to maintain the firebreaks clear of flammable matter.

## 1. Land having an area of 2000m<sup>2</sup> or more

A firebreak not less than 3 metres wide and 3 metres high immediately inside and around all external boundaries of the land must be cleared.

## 2. Land having an area of less than 2000m<sup>2</sup>

A firebreak not less than 2 metres wide and 2 metres high immediately inside and around all external boundaries of the land must be cleared.

## 3. Buildings

A firebreak not less than 3 metres wide immediately around all external walls of every building must be cleared. Whenever a firebreak is cleared by burning the provisions of the Act and Regulations made thereunder must be observed. If pursuant to Item (2) of this Notice, mowing or slashing is carried out the height of vegetation thereafter must not exceed, as far as is reasonably practicable, 20mm over the entire area of the firebreak. The use of chemicals is subject to all restrictions imposed by the Department of Agriculture. Attention is drawn to the Flammable Liquids Regulations made under the Explosives and Dangerous Goods Act 1961, which requires a site on which flammable liquid is stored to be totally cleared of all flammable material for a minimum distance of 5 metres surrounding the site.

If it is considered to be impracticable for any reason to comply with the provisions of this Notice, application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the requirements of this Notice must be complied with.

## Penalty

An owner or occupier of land who fails or neglects in any respect to comply with the requirements of this Notice is liable to a maximum fine of \$5,000.

## DATES TO REMEMBER

- **Firebreaks must be cleared by 15 November (AND KEPT CLEAR UNTIL APRIL 30)**
- **Burning permits required all year round**
- **Burning prohibited between 1 December to 31 March**

## When and how to obtain a fire permit

Permits are available from the City of Wanneroo at the following locations:

### WANNEROO ANIMAL CARE CENTRE

Located at the rear of the Ashby Operations Centre,  
1204 Wanneroo Road, Ashby  
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week\* from 4pm - 6pm  
\*Except Good Friday

### CITY OF WANNEROO CIVIC CENTRE

23 Dundobar Road, Wanneroo  
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

### TWO ROCKS VOLUNTEER FIRE BRIGADE



Captain / Fire Control Officer  
Seatrees Estate, Two Rocks  
Please phone 0427 026 000 before attending

## NEED ADVICE?

Further advice about how to protect your home, constructing firebreaks, and when and how to burn off, is available from the City of Wanneroo during office hours on 9405 5000.

PROTECT YOUR HOME  
AND PROPERTY FROM  
BUSHFIRES



23 Dundobar Road, Wanneroo, WA 6065  
Locked Bag 1, Wanneroo, WA 6946  
T : (08) 9405 5000 F : (08) 9405 5499  
After Hours : 1300 13 83 93  
E : [enquiries@wanneroo.wa.gov.au](mailto:enquiries@wanneroo.wa.gov.au)  
[wanneroo.wa.gov.au](http://wanneroo.wa.gov.au)  



## Keeping your home safe from fire

There are a number of ways you can help keep your home safe from fire:

- Install smoke detectors in your home
- Clear vegetation away from the walls of your home
- Clear all rubbish and flammable material from around your home to create a 20 metre circle of safety
- Store firewood, timber, petrol, and kerosene well away from your home
- Prior to summer, clean all leaves and debris from your gutters
- Don't have flammable trees such as conifers near buildings
- Have branches trimmed that overhang the house or powerlines
- Fit wire insect screens or shutters to windows and glass doors

If a firebreak is impractical along your boundary for environmental or other reasons notify the City of Wanneroo by 1 October to obtain permission to install firebreaks in alternative positions, or of a different nature.

### ALTERNATIVE METHODS OF REDUCING FIRE HAZARDS ON VACANT LAND

- For urban land less than 2000m<sup>2</sup>, if mowing or slashing is carried out, the height of the vegetation must not exceed, as far as is reasonably practical, 20mm over the entire area of the firebreak
- The use of chemicals is subject to all restrictions imposed by the Department of Agriculture
- Mulching • Disposal at an authorised rubbish tip site

## When and how to burn

### NO BURNING FROM 1 DECEMBER - 31 MARCH

Burning off - that is, bush/running fire including grass, on any land is totally prohibited between 1 December and 31 March. Fire permits for burning material other than garden rubbish are required all year round.

A person in control of the fire must stay with the fire until it is completely extinguished.

### GARDEN RUBBISH AND REFUSE

The burning of garden refuse is permitted between the hours of 6pm and 11pm, provided the fire danger rating is not VERY HIGH, SEVERE, EXTREME or CATASTROPHIC or a TOTAL FIRE BAN has been declared.

Fire danger rating signs are located at the following locations:

- Corner of Joondalup Drive and Wanneroo Road
- Wanneroo Road, south of the Yanchep Beach Road turn off
- Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
- Neaves Road, Mariginiup • Old Yanchep Road, Pinjar
- Gnangara Road, Landsdale • Country Side Drive, Two Rocks

Other points to remember when burning garden refuse and rubbish are:

- All bush and flammable material must be thoroughly cleared within two metres of all points of the site of the fire
- The material must be on the ground, and be no more than one metre wide and one metre high

Only one heap may be burnt at any one time  
Incinerators may be used providing:

- The incinerator is properly constructed and designed to prevent the escape of sparks of burning material
- The incinerator is situated not less than two metres away from a building or fence
- An area of two metres surrounding the incinerator is clear of all flammable material

### BARBECUES

Only gas or electric barbecues may be lit during VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger rating or declared TOTAL FIRE BAN. The lighting of solid fuel barbecues is not permitted on these days.

### SMOKE NUISANCES

City of Wanneroo residents are advised to be mindful of smoke issues associated with any burning that they conduct. Steps should be taken to avoid undue smoke impact to neighbours and adjacent roads. Smoke across roadways can severely impact motorists' visibility and therefore road safety. Issues of smoke nuisance are regulated by the Waste Avoidance and Resource Recovery Act 2007.

### CAMPFIRES

Campfires must not be lit on VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger days or declared TOTAL FIRE BAN. A person must remain in attendance at the site during the whole time the fire is burning. The user must extinguish the fire using water or earth before leaving the area.

## Hints for safer burning

- Don't light a fire on a hot or windy day
- Don't burn more than you can control
- Let your neighbours know you'll be burning material
- Make sure smoke and sparks will not affect your neighbour's washing or enter open windows
- Cut or rake long grass around trees, building and fences before burning
- Burn against the wind
- On a sloping block, burn from the top down
- Keep a hose or spray pack at hand to dampen down fierce fires
- If in doubt, don't burn material yourself - call the Volunteer Fire Brigade
- Stay with the fire until it is completely extinguished
- Where possible, don't burn any closer than 20 metres from your home or other buildings

## Penalties

Under the Bush Fires Act 1954, failing to comply with regulations can result in a fine ranging from \$250 to \$250,000 or imprisonment.

Failure to maintain 2/3 metre firebreak \$250  
as per firebreak order

Offence relating to lighting fire in the open air \$250

Setting fire to bush during prohibited burning times \$250

Failure of occupier to extinguish bush fire \$250

Major offences result in Court action with fines ranging from \$250 to \$250,000 or imprisonment for 14 years.

### THE BIGGEST PENALTY OF ALL

The biggest penalty of all would be losing your loved ones or home to fire. Please ensure you, your family and your home are kept safe by taking the necessary precautions.

## Special rural and residential land

Owners and occupiers of special rural and special residential land should be aware of their responsibilities to take bush fire prevention measures, while ensuring they do not contravene Town Planning Scheme provisions which control the removal of vegetation in Special Residential and Special Rural Zones.

These special rural zones were created in areas of natural flora, and the Scheme recognises the importance of preserving the natural environment in these areas. Anyone found cutting down, lopping or damaging trees in these areas without City approval may be guilty of an offence.

However, bush fire prevention, including the installation of firebreaks, is essential regardless of the zoning of the land.

Below are some guidelines for installing firebreaks in special rural zones to prevent bush fires, while minimising damage to the natural environment.

- A 3 metre wide and 3 metre high firebreak should be cleared around the perimeter of special rural or special residential lots
- These firebreaks need not be strictly around the perimeter, but may deviate according to the flora
- The firebreak does not have to be ploughed but can instead be created by clearing and removing all flammable material
- Care should be taken to avoid damaging or removing significant trees and shrubs
- Avoid the build up of undergrowth and leaf litter



### **Appendix 3**

**Construction standards for BAL 29, BAL 19  
and BAL 12.5 as per AS 3959-2009**



## **SECTION 7 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 29 (BAL — 29)**

### **7.1 GENERAL**

A building assessed in Section 2 as being BAL—29 shall comply with Section 3 and Clauses 7.2 to 7.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 7.2 to 7.8 (see Clause 3.8).

NOTE: BAL—29 is primarily concerned with protection from ember attack and radiant heat greater than 19 kW/m<sup>2</sup> up to and including 29 kW/m<sup>2</sup>.

### **7.2 SUBFLOOR SUPPORTS**

This Standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with—

- (a) a wall that complies with Clause 7.4; or
- (b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or
- (c) a combination of Items (a) and (b) above.

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be—

- (i) of non-combustible material; or
- (ii) of bushfire-resisting timber (see Appendix F); or
- (iii) a combination of Items (i) and (ii) above.

NOTE: This requirement applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 7.7).

**C7.2** Combustible materials stored in the subfloor space may be ignited by embers and cause an impact to the building.

### **7.3 FLOORS**

#### **7.3.1 Concrete slabs on ground**

This Standard does not provide construction requirements for concrete slabs on ground.



## **7.3.2 Elevated floors**

### **7.3.2.1** *Enclosed subfloor space*

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with—

- (a) a wall that complies with Clause 7.4; or
- (b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or
- (c) a combination of Items (a) and (b) above.

### **7.3.2.2** *Unenclosed subfloor space*

Where the subfloor space is unenclosed, flooring material, including bearers, joists and flooring less than 400 mm above finished ground level, shall be—

- (a) non-combustible (e.g., concrete, steel); or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or
- (d) a system complying with AS 1530.8.1; or
- (e) a combination of any of Items (a), (b), (c) or (d) above.

This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level.

## **7.4 EXTERNAL WALLS**

### **7.4.1 Walls**

Walls shall be one of the following:

- (a) Made of non-combustible material (e.g., full masonry, brick veneer, mud brick, concrete, aerated concrete).

or

- (b) Made of timber-framed or steel-framed walls that are sarked on the outside of the frame and clad with—
  - (i) fibre-cement external cladding, a minimum of 6 mm in thickness; or
  - (ii) steel sheet; or

- (iii) bushfire-resisting timber (see Appendix F); or
- (iv) a combination of any of Items (i), (ii) or (iii) above.

or

- (c) A combination of Items (a) and (b) above.

#### **7.4.2 Joints**

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material can be applied over the frame prior to fixing any external cladding.

#### **7.4.3 Vents and weepholes**

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where they are less than 3 mm (see Clause 3.6).

### **7.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS**

#### **7.5.1 Bushfire shutters**

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

- (a) non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

#### **7.5.2 Windows**

Windows shall comply with one of the following:

- (a) They shall be completely protected by a bushfire shutter that complies with Clause 7.5.1.

or

- (b) They shall comply with the following:

- (i) Window frames and window joinery and shall be made from one of the following:

- (A) Bushfire-resisting timber (see Appendix F).

or

- (B) Metal.

or

(C) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel, and the frame and the sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.

(iii) Glazing shall be toughened glass minimum 5 mm.

(iv) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D) that portion shall be screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(v) The openable portions of windows shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **7.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)**

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 7.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, protected on the outside by a screen door or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(D) a fully framed glazed door, where the framing is made from non-combustible materials or from bushfire-resisting timber (see Appendix F).

(ii) Externally fitted hardware that supports the panel in its functions of opening and closing shall be metal.

(iii) Where doors incorporate glazing, the glazing shall be toughened glass, minimum 5 mm.

(iv) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D), that portion shall be screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(v) Doorframes shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) Metal.

or

(C) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(vi) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(vii) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

#### **7.5.4 Doors—Sliding doors**

Sliding doors shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 7.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doorframes shall be of bushfire-resisting timber (see Appendix F) or aluminium or steel.

(ii) Externally fitted hardware that supports the panel in its functions of opening and closing shall be metal.

(iii) Where sliding doors incorporate glazing, the glazed assembly shall be toughened glass minimum 6 mm except where both the fixed and openable portions of doors are screened by a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(iv) Sliding doors shall be tight-fitting in the frames.

### **7.5.5 Doors—Vehicle access doors (garage doors)**

The following apply to vehicle access doors:

(a) Vehicle access doors shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a combination of any of Items (i), (ii) or (iii) above.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).

(d) Vehicle access doors shall not include ventilation slots.

## **7.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)**

### **7.6.1 General**

The following apply to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(d) A pipe or conduit that penetrates the roof covering shall be non-combustible.

### **7.6.2 Tiled roofs**

Tiled roofs shall be fully sarked. The sarking shall—

- (a) have a flammability index of not more than 5, when tested to AS 1530.2;
- (b) be located directly below the roof battens;
- (c) cover the entire roof area including the ridge; and
- (d) extend into gutters and valleys.

### **7.6.3 Sheet roofs**

Sheet roofs shall—

- (a) be fully sarked in accordance with Clause 7.6.2, except that foil-backed insulation blankets may be installed over the battens;

or

- (b) have any gaps greater than 3 mm under corrugations or ribs of sheet roofing and between roof components sealed at the fascia or wall line and at valleys, hips and ridges by—

- (i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or
- (ii) mineral wool; or
- (iii) other non-combustible material; or
- (iv) a combination of any of Items (i), (ii) or (iii) above.

### **7.6.4 Veranda, carport and awning roofs**

The following apply to veranda, carport and awning roofs:

- (a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 7.6.1, 7.6.2, 7.6.3, 7.6.5 and 7.6.6.

- (b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 7.4 shall have a non-combustible roof covering and the support structure shall be—

- (i) of non-combustible material; or
- (ii) bushfire-resisting timber (see Appendix F); or
- (iii) timber rafters lined on the underside with fibre-cement sheeting a minimum of 6 mm in thickness, or with material complying with AS 1530.8.1; or
- (iv) a combination of any of Items (i), (ii) or (iii) above.

### 7.6.5 Roof penetrations

The following apply to roof penetrations:

- (a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to flash the penetration shall be non-combustible.
- (b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.
- (c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.
- (d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass, minimum 4 mm, shall be used in the outer pane of the IGU.
- (e) Where roof lights are installed in roofs having a pitch of less than 18 degrees to the horizontal, the glazing shall be protected with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.
- (f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level, or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### 7.6.6 Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

- (a) Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.
- (b) Gables shall comply with Clause 7.4.
- (c) Fascias and bargeboards shall—
  - (i) where timber is used, be made from bushfire-resisting timber (see Appendix F); or
  - (ii) where made from metal, be fixed at 450 mm centres; or
  - (iii) be a combination of Items (i) and (ii) above.
- (d) Eaves linings shall be—
  - (i) fibre-cement sheet, a minimum 4.5 mm in thickness; or
  - (ii) bushfire-resisting timber (see Appendix F); or
  - (iii) a combination of Items (i) and (ii) above.

(e) Eaves penetrations shall be protected the same as for roof penetrations (see Clause 7.6.5).

(f) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **7.6.7 Gutters and downpipes**

This Standard does not provide construction-specific material requirements for downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

With the exception of box gutters, gutters shall be metal or PVC-U.

Box gutters shall be non-combustible and flashed at the junction with the roof, with non-combustible materials.

## **7.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS**

### **7.7.1 General**

Decking shall be either spaced or continuous (i.e., without spacing).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

**C7.7.1** Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other ‘permissible gaps’) in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.

### **7.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings**

#### **7.7.2.1** *Materials to enclose a subfloor space*

The subfloor spaces of verandas, decks, steps, ramps and landings are considered to be ‘enclosed’ when—

(a) the material used to enclose the subfloor space is—

(i) non-combustible; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(iv) a combination of any of Items (i), (ii) or (iii) above; and



(b) all openings greater than 3 mm are screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

#### **7.7.2.2 Supports**

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

#### **7.7.2.3 Framing**

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

#### **7.7.2.4 Decking**

Decking shall be—

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

### **7.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings**

#### **7.7.3.1 Supports**

Support posts, columns, stumps, stringers, piers and poles shall be—

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

#### **7.7.3.2 Framing**

Framing of verandas, decks, ramps or landings (i.e., bearers and joists) shall be—

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or
- (c) a combination of Items (a) and (b) above.

#### **7.7.3.3 Decking**

Decking shall be—

- (a) of non-combustible material; or
- (b) of bushfire-resisting timber (see Appendix F); or

(c) a combination of Items (a) and (b) above.

#### **7.7.4 Balustrades, handrails or other barriers**

Those parts of the handrails and balustrades less than 125 mm from any glazing or any combustible wall shall be—

(a) of non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a combination of Items (i) and (ii) above.

Those parts of the handrails and balustrades that are 125 mm or more from the building have no requirements.

#### **7.8 WATER AND GAS SUPPLY PIPES**

Above-ground, exposed water and gas supply pipes shall be metal.

## **SECTION 6 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 19 (BAL — 19)**

### **6.1 GENERAL**

A building assessed in Section 2 as being BAL—19 shall comply with Section 3 and Clauses 6.2 to 6.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 6.2 to 6.8 (see Clause 3.8).

NOTE: BAL—19 is primarily concerned with protection from ember attack and radiant heat greater than 12.5 kW/m<sup>2</sup> up to and including 19 kW/m<sup>2</sup>.

### **6.2 SUBFLOOR SUPPORTS**

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, piers and poles.

NOTE: The exclusion of requirements for subfloor supports applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 6.7).

**C6.2** Ideally, storage of combustible materials beneath a floor at this BAL would not occur and on this assumption, there is no requirement to enclose the subfloor space or to protect flooring materials from bushfire attack. However, should combustible materials be stored, it is recommended the area be protected as materials stored in the subfloor space may be ignited by embers and cause an impact to the building.

### **6.3 FLOORS**

#### **6.3.1 Concrete slabs on the ground**

This Standard does not provide construction requirements for concrete slabs on ground.

#### **6.3.2 Elevated floors**

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

### **6.4 EXTERNAL WALLS**

#### **6.4.1 Walls**

That part of an external wall surface that is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18

degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be made from—

- (a) non-combustible material; or
- (b) fibre-cement external cladding, a minimum of 6 mm in thickness; or
- (c) bushfire-resisting timber (see Appendix F); or
- (d) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (e) a combination of any of Items (a), (b), (c) or (d) above.

This Standard does not provide construction requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

#### **6.4.2 Joints**

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material may be applied over the outer face of the frame prior to fixing any external cladding.

#### **6.4.3 Vents and weepholes**

Vents and weepholes in external walls shall be screened with mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where they are less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

### **6.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS**

#### **6.5.1 Bushfire shutters**

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

- (a) non-combustible material; or
- (b) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (c) bushfire-resisting timber (see Appendix F); or
- (d) a combination of any of Items (a), (b), or (c) above.

#### **6.5.2 Windows**

Window assemblies shall comply with one of the following:

- (a) They shall be completely protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings, having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery, shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species, as specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and the sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing, shall be metal.

(iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings, having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be toughened glass, minimum 5 mm, or glass blocks with no restriction on glazing methods.

NOTE: Where double-glazed units are used, the above requirements apply to the external face of the window assembly only.

(iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used. Where annealed glass is used, the fixed and openable portions of windows shall be screened externally with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(v) Where toughened glass is used, the openable portions of windows shall be screened internally or externally with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(vi) Glazed elements that are designed to take internal screens shall use toughened glass and the openable portion shall be screened in such a way to have no gaps greater than 3 mm in diameter. Screening material shall be a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **6.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)**

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) a fully-framed glazed door, where the framing is made from materials specified for bushfire shutters (see Clause 6.5.1).

(ii) Where doors incorporate glazing, the glazing shall be toughened glass minimum 5 mm.

(iii) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(iv) Where the doorframe is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D) the doorframe shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species, as specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(v) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

#### **6.5.4 Doors—Sliding doors**

Sliding doors shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be toughened glass, minimum 5 mm.

(ii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall be mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present or during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iii) Sliding doors shall be tight-fitting in the frames.

#### **6.5.5 Doors—Vehicle access doors (garage doors)**

The following apply to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

- (iv) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (v) a combination of any of Items (i), (ii), (iii) or (iv) above.
- (b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.
- (c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).
- (d) Vehicle access doors shall not include ventilation slots.

## **6.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)**

### **6.6.1 General**

The following apply to all types of roofs and roofing systems:

- (a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.
- (b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.
- (c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **6.6.2 Tiled roofs**

Tiled roofs shall be fully sarked. The sarking shall—

- (a) have a flammability index of not more than 5, when tested to AS 1530.2;
- (b) be located directly below the roof battens;
- (c) cover the entire roof area including the ridge; and
- (d) be installed so that there are no gaps that would allow the entry of embers where the sarking meets fascias, gutters, valleys and the like.

### **6.6.3 Sheet roofs**

Sheet roofs shall—

- (a) be fully sarked in accordance with Clause 6.6.2, except that foil-backed insulation blankets may be installed over the battens;

or



(b) have any gaps greater than 3 mm under corrugations or ribs of sheet roofing and between roof components sealed at the fascia or wall line and at valleys, hips and ridges by—

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii), or (iii) above.

#### **6.6.4 Veranda, carport and awning roofs**

The following apply to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 6.6.1, 6.6.2, 6.6.3, 6.6.5 and 6.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 6.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separate from the main roof space.

#### **6.6.5 Roof penetrations**

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, arials, vent pipes and supports for solar collectors shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass of minimum 4 mm shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.

(f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level, or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

#### **6.6.6 Eaves linings, fascias and gables**

The following apply to eaves linings, fascias and gables:

- (a) Gables shall comply with Clause 6.4.
- (b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 6.6.5.
- (c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

#### **6.6.7 Gutters and downpipes**

This Standard does not provide material requirements for—

- (a) gutters, with the exception of box gutters; and
- (b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

### **6.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS**

#### **6.7.1 General**

Decking shall be either spaced or continuous (i.e., without spacings).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

**C6.7.1** Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other ‘permissible gaps’) in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.

## **6.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings**

### **6.7.2.1** *Materials to enclose a subfloor space*

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall comply with Clause 6.4.

### **6.7.2.2** *Subfloor supports*

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, stringers, piers and poles.

### **6.7.2.3** *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

### **6.7.2.4** *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

- (a) non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (d) a combination of any of Items (a), (b), or (c) above.

## **6.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings**

### **6.7.3.1** *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

### **6.7.3.2** *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

### **6.7.3.3** *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

- (a) non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (d) a combination of any of Items (a), (b), or (c) above.

#### **6.7.4 Balustrades, handrails or other barriers**

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

### **6.8 WATER AND GAS SUPPLY PIPES**

Above-ground, exposed water and gas supply pipes shall be metal.

## **SECTION 5 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 12.5 (BAL — 12.5)**

### **5.1 GENERAL**

A building assessed in Section 2 as being BAL—12.5 shall comply with Section 3 and Clauses 5.2 to 5.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 5.2 to 5.8 (see Clause 3.8).

NOTE: BAL—12.5 is primarily concerned with protection from ember attack and radiant heat up to and including  $12.5 \text{ kW/m}^2$  where the site is less than 100 m from the source of bushfire attack.

### **5.2 SUBFLOOR SUPPORTS**

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, piers and poles.

NOTE: The exclusion of requirements for subfloor supports applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 5.7).

**C5.2** *Ideally, storage of combustible materials beneath a floor at this BAL would not occur and on this assumption, there is no requirement to enclose the subfloor space or to protect flooring materials from bushfire attack. However, should combustible materials be stored, it is recommended the area be protected as materials stored in the subfloor space may be ignited by embers and cause an impact to the building.*

### **5.3 FLOORS**

#### **5.3.1 Concrete slabs on ground**

This Standard does not provide construction requirements for concrete slabs on the ground.

#### **5.3.2 Elevated floors**

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

### **5.4 EXTERNAL WALLS**

#### **5.4.1 Walls**

That part of an external wall surface that is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less

than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be of—

- (a) non-combustible material; or
- (b) fibre-cement external cladding, a minimum of 6 mm in thickness; or
- (c) bushfire-resisting timber (see Appendix F); or
- (d) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (e) a combination of any of Items (a), (b), (c) or (d) above.

There are no requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

#### **5.4.2 Joints**

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material may be applied over the outer face of the frame prior to fixing any external cladding.

#### **5.4.3 Vents and weepholes**

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where the vents and weepholes are less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

### **5.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS**

#### **5.5.1 Bushfire shutters**

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

- (a) non-combustible material; or
- (b) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (c) bushfire-resisting timber (see Appendix F); or
- (d) a combination of any of Items (a), (b) or (c) above.

#### **5.5.2 Windows**

Window assemblies shall comply with one of the following:

- (a) They shall be completely protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

Or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.

(iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be Grade A safety glass minimum 4 mm, or glass blocks with no restriction on glazing methods.

NOTE: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

(iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used.

(v) The openable portions of windows shall be screened with mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **5.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)**

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or



(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) a fully framed glazed door, where the framing is made from materials required for bushfire shutters (see Clause 5.5.1), or from a timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

(ii) Where doors incorporate glazing, the glazing shall comply with the glazing requirements for windows.

(iii) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(iv) Where any part of the door assembly is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D), that part of the door assembly shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(v) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

#### **5.5.4 Doors—Sliding doors**

Sliding doors shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be Grade A safety glass complying with AS 1288.

(ii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall be a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present or during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iii) Sliding doors shall be tight-fitting in the frames.

#### **5.5.5 Doors—Vehicle access doors (garage doors)**

The following apply to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a timber species specified in Paragraph E1 and listed in Table E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv) above.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).

(d) Vehicle access doors shall not include ventilation slots.

#### **5.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)**

### **5.6.1 General**

The following apply to all types of roofs and roofing systems:

- (a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.
- (b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.
- (c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### **5.6.2 Tiled roofs**

Tiled roofs shall be fully sarked. The sarking shall—

- (a) have a flammability index of not more than 5;
- (b) be located directly below the roof battens;
- (c) cover the entire roof area including the ridge; and
- (d) be installed so that there are no gaps that would allow the entry of embers where the sarking meets fascias, gutters, valleys and the like.

### **5.6.3 Sheet roofs**

Sheet roofs shall—

- (a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens;

or

- (b) have any gaps greater than 3 mm, under corrugations or ribs of sheet roofing and between roof components, sealed at the fascia or wall line and at valleys, hips and ridges by—

- (i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or
- (ii) mineral wool; or
- (iii) other non-combustible material; or
- (iv) a combination of any of Items (i), (ii) or (iii) above.

### **5.6.4 Veranda, carport and awning roofs**

The following apply to veranda, carport and awning roofs:

- (a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1, 5.6.2, 5.6.3, 5.6.5 and 5.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 5.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roof space.

#### **5.6.5 Roof penetrations**

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass, minimum 4 mm, shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.

(f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level or, the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(g) Vent pipes made from PVC are permitted.

#### **5.6.6 Eaves linings, fascias and gables**

The following apply to eaves linings, fascias and gables:

(a) Gables shall comply with Clause 5.4.

(b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 5.6.5.

(c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

#### **5.6.7 Gutters and downpipes**

This Standard does not provide material requirements for—

- (a) gutters, with the exception of box gutters; and
- (b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

### **5.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS**

#### **5.7.1 General**

Decking shall be either spaced or continuous (i.e., without spacing).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

***C5.7.1** Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other ‘permissible gaps’) in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.*

#### **5.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings**

##### **5.7.2.1 Materials to enclose a subfloor space**

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall comply with Clause 5.4.

##### **5.7.2.2 Supports**

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

##### **5.7.2.3 Framing**

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

#### **5.7.2.4 Decking**

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

- (a) non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a timber species, as specified in Paragraph E1 and listed in Table E1 of Appendix E;
- (d) PVC-U; or
- (e) a combination of any of Items (a), (b), (c) or (d) above.

### **5.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings**

#### **5.7.3.1 Supports**

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

#### **5.7.3.2 Framing**

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

#### **5.7.3.3 Decking**

This Standard does not provide construction requirements for decking unless it is less than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

- (a) non-combustible material; or
- (b) bushfire-resisting timber (see Appendix F); or
- (c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or
- (d) a combination of any of Items (a), (b) or (c) above.

### **5.7.4 Balustrades, handrails or other barriers**

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

## **5.8 WATER AND GAS SUPPLY PIPES**

Above-ground, exposed water and gas supply pipes shall be metal.