Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Locke Estate - Reserve 22674		
Suburb: Siesta Park	**State:** WA	**P/code:** 6280
Local government area: City of Busselton		
Description of the planning proposal: Existing Short Stay Tourism/Caravan and Camping grounds		
BMP Plan / Reference Number: 18620	**Version:** Rev D	**Date of Issue:** 4/07/2019
Client / Business Name: City of Busselton		

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☑	☐
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☑

Is the proposal any of the following special development types (see SPP 3.7 for definitions)?

Unavoidable development (in BAL-40 or BAL-FZ)	☐	☑
Strategic planning proposal (including rezoning applications)	☐	☑
Minor development (in BAL-40 or BAL-FZ)	☐	☑
High risk land-use	☐	☑
Vulnerable land-use	☑	☐

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Method 2 Calcuations used and Vulnerable Land use.

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Gary McMahon	Level 3	35078	11/2019
Company Ecosystem Solutions		**Contact No.** (08) 9759 1960	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner  **Date** 4/07/2019

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Bushfire Management Plan

Locke Estate, Caves Road, Siesta Park

4 July 2019

Prepared for:
City of Busselton

Limitations Statement

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In undertaking this work the authors have made every effort to ensure the accuracy of the information used. Any conclusions drawn or recommendations made in the report are done in good faith and the consultants take no responsibility for how this information and the report are used subsequently by others.

Please note that the contents in this report may not be directly applicable towards another organisation's needs. Ecosystem Solutions Pty Ltd accepts no liability whatsoever for a third party's use of, or reliance upon, this specific report.

STATEMENT OF CONFORMITY – *PLANNING AND DEVELOPMENT ACT 2005*

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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The signatory declares that this Bushfire Management Plan meets the requirements of State Planning Policy 3.7.

Document Control

Client - City of Busselton

Site – Locke Estate, Caves Road, Siesta Park

Version	Revision	Purpose	Author	Reviewer	Submitted	
					Form	Date
Report	Rev A	Draft Report	DP	KP / GM	Electronic (email)	27/02/2019
Report	Rev B	Address comments from City of Busselton	DP	KP / GM	Electronic (email)	10/06/2019
Report	Rev C	Additional comments from City of Busselton	DP	KP / GM	Electronic (email)	18/06/2019
Report	Rev D	Minor comments from City of Busselton	DP	KP / GM	Electronic (email)	4/07/2019

Filename: \\ECONAS\Data\PROJECTS\18620 Locke Estate, Siesta Park BMP\Reports\Locke Estate Siesta Park BMP BEEP Rev C.docx

Contents

List of Figures

List of Tables

Appendices

1 Proposal

Site Details	
Address	Lot 5303, Reserve 22674, Caves Road, Siesta Park
Local Government Area	City of Busselton

Development Application		
Application	**Information Requirements**	**Occupants**
Tourist Short Stay, Caravan Park & Camping Grounds Vulnerable Land Use	Bushfire Management Plan Bushfire Emergency Evacuation Plan	Refuge Open Space can accommodate 1,825 people

Determined BAL					
AS 3959 Assessment Procedure	**Vegetation Classification**	**FDI**	**Effective Slope**	**Separation Distance to any building**	**BAL**
Method 1	Class A Forest	80	Upslope / flat	21 m*	BAL-29

* Separation distance from classified vegetation to nearest proposed building.

This Bushfire Management Plan (BMP) and Bushfire Emergency Evacuation Plan (BEEP) has been prepared for Locke Estate, Caves Road, Siesta Park (hereafter referred to as the 'Site') by Ecosystem Solutions Pty Ltd – Danae Plowman (B.Sc. PG Dip Engy & Env) and Gary McMahon (B.Sc. M. Env Mgmt. PG Dip Bushfire Protection).

Locke Estate is approximately 37.5 ha in area of Crown Land managed by the City of Busselton under Reserve 22674. The Lot is divided into 16 sublots (Figure 1), leased to community organisations for the purpose of camping and holiday accommodation that provides education, cultural or religious activity or affordable accommodation for financially disadvantaged individuals or families requiring respite.

The Site is located within a bushfire prone area, as declared by *State Planning Policy 3.7: Planning in Bushfire Prone Areas* (Figure 2).

Each sublot in the Site has a Conservation Zone along the southern boundary of the estate, that is parallel to Caves Road and the Locke Nature Reserve 41972. This area represents key habitat for the critically

endangered Western Ringtail Possum (*Pseudocheirus occidentalis*). The Conservation Zone within the sublots has varying levels of understorey and therefore the vegetation assessment against AS3959-2009 differs.

The Site also has a Coastal Setback Zone from the lot boundary abutting Geographe Bay which represents an area where cars and buildings should be excluded for the protection against coastal erosion. Some sublots have existing buildings located within the Coastal Setback Zone due to past approvals. Many sublots have experienced a loss of land due to coastal erosion and therefore the Coastal Setback Zone has become an important aspect to adhere to. A portion of this area may be rehabilitated to protect the Site from further impacts with the mature state of plantings considered in the vegetation assessment for post-development.

The area within the Site between the Conservation Zone and Coastal Setback Zone represents a potential developable area (see Figure 10).

The purpose of this BMP and BEEP is to assess the Site and determine the area within the potential developable area that achieves BAL-29 for the location of future buildings and camping / caravan sites. Fire management methods within and around the Site are detailed to reduce the threat to guests, residents and fire fighters in the event of a fire. Also, to assess and determine if the proposal adequately cares for 'vulnerable' people.

Any reference to a policy, guideline or legislative instrument is to be taken as a reference to the policy guideline or legislative instrument as amended or replaced from time to time.

Figure 1 Sublots for Locke Estate, Caves Road, Siesta Park

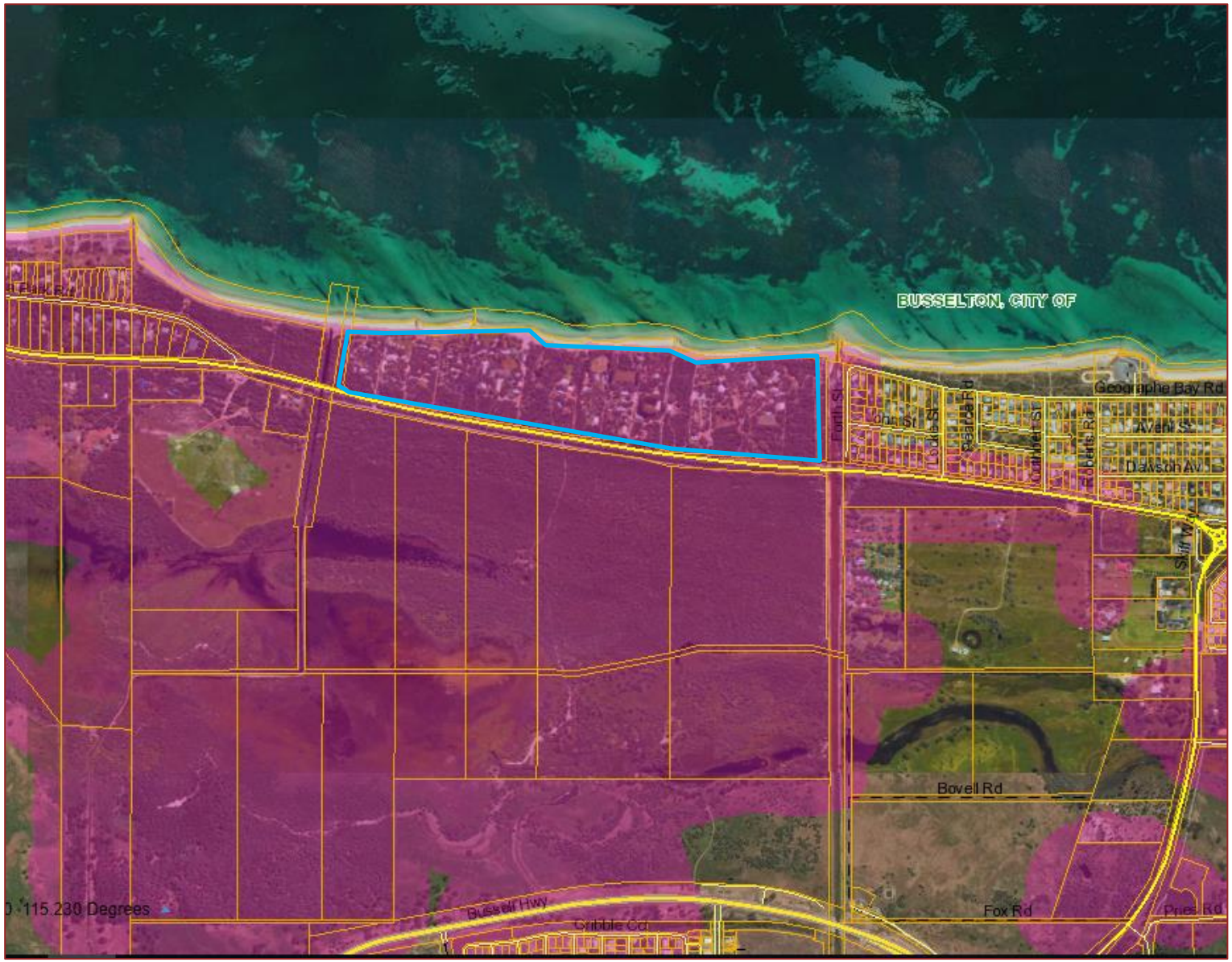


Figure 2 Map of Bushfire Prone Areas for Locke Estate, Caves Road, Siesta Park, within the blue polygon

2 Bushfire Assessment Results

2.1 Assessment Inputs

The BAL Assessment is based on an analysis of the vegetation, surrounding landscape, lands slope and distance between dwellings and any fire hazards. All vegetation within 150 m of the Site was assessed in accordance with Clause 2.2.3 of AS 3959-2009 with vegetation greater than 100 m from the Site excluded under clause 2.2.3.2 (a). As this exclusion includes vegetation of any type, the vegetation has not been included in this report. Photos below with map provided in Figure 3 show the current vegetation. Figure 4 shows the vegetation post-development.

There are two approaches to conduct BAL assessments under AS 3959-2009:

- Method 1 – a simplified procedure that involves five procedural steps to determine BAL and is subject to limitations on the circumstance in which it can be used.
- Method 2 – a detailed procedure using calculations to determine BALs where a more specific result is sought or where the Site conditions are outside the scope of the simplified procedure.

A Method 1 approach was conducted for the following plots:

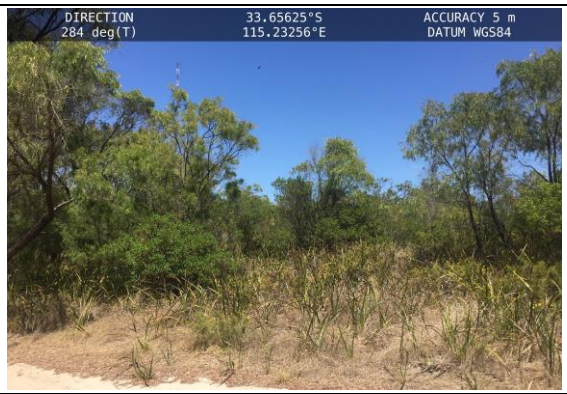
- Plot 1 Class A Forest – Upslope / Flat
- Plot 2 Class B Woodland – Upslope / Flat
- Plot 5 Excluded S 2.2.3.2 (e) and (f)

A Method 2 approach was conducted for the following plots:

- Plot 3 Class B Woodland – Upslope / flat, Transect 1: 42 m
- Plot 4 Class D Scrub – Upslope / flat, Transect 2: 20 m

A Method 2 approach provides a more detailed and accurate assessment of the BAL rating to account for variations in fire runs, intermittent fuel profiles and flame widths which would result in moderated bushfire behaviour compared to the standard Method 1 approach. The default elements used in a Method 1 calculation were used in this situation, apart from the flame length and flame width, which were calculated using the DFES short fire run calculator based on the respective transects. This is discussed in more detail below.

<table>
<tr><td>Plot</td><td>1</td><td>Vegetation Classification or Exclusion Clause</td><td>Class A Forest – Upslope / Flat Method 1</td></tr>
<tr><td colspan="3"> 
</td><td> 
</td></tr>
<tr><td colspan="3">Photo ID: 1</td><td>Photo ID: 2</td></tr>
<tr><td colspan="3"> 
</td><td> 
</td></tr>
<tr><td colspan="3">Photo ID: 3</td><td>Photo ID: 4</td></tr>
<tr><td colspan="3">Description / Justification for Classification:</td><td>Canopy of 30 - 70% cover, including Agonis flexuosa (Peppermint) trees 10 m high with mid layer including Spyridium globulosum, Acacia littoralis, Leucopogon australis, over Rhagodia baccata and Lepidosperma spp.
Photo 2 includes a portion of the area that will be cleared to establish a developable area, as per Figure 4, with an approved clearing permit or exception.</td></tr>
</table>

Plot	2	Vegetation Classification or Exclusion Clause	Class B Woodland – Upslope / Flat Method 1
			
Photo ID: 5			Photo ID: 6
			
Photo ID: 7			Photo ID: 8
Description / Justification for Classification:			Canopy cover 10 – 30% including *Agonis flexuosa* (Peppermint) trees 10 m high with mid layer including *Spyridium globulosum*, *Acacia littoralis*, *Leucopogon australis*, over *Rhagodia baccata* and *Leptospermum* spp. and introduced grass species.

Plot	3	Vegetation Classification or Exclusion Clause	Class B Woodland – Upslope / Flat Method 2
			
Photo ID: 9			Photo ID: 10
Description / Justification for Classification:			Canopy cover 10 – 30% including *Agonis flexuosa* (Peppermint) trees 10 m high with mid layer including scattered *Spyridium globulosum, Acacia littoralis, Leucopogon australis*, over *Rhagodia baccata* and *Lepidosperma* spp. and introduced grass species. Includes Transect 1, 42 m long.

Plot	4	Vegetation Classification or Exclusion Clause	Class D Scrub – Upslope / Flat Method 2
			
Photo ID: 11			Photo ID: 12
			
Photo ID: 13			Photo ID: 14
Description / Justification for Classification:			Vegetation on average 4 m high with *Rhagodia baccata*, *Acacia* spp., *Lepidosperma* spp. and scattered (less than 2%) *Agonis flexuosa*. This plot is currently present as shown in Figure 3 with Figure 4 including areas to become revegetated as per Appendix F to a maximum of 4 m high. Includes Transect 2, 20 m long.

Plot	5	Vegetation Classification or Exclusion Clause	Excluded S 2.2.3.2 (e) and (f)
			
Photo ID: 15			Photo ID: 16
			
Photo ID: 17			Photo ID: 18
Description / Justification for Classification:			Non-vegetated areas including access ways and buildings are excluded under S 2.2.3.2 (e). Low threat vegetation has been excluded under S 2.2.3.2 (f). This includes grasses that are maintained to a height of 10 cm or less which is an ongoing requirement as per this Bushfire Management Plan. Rows of planted trees have been excluded as windbreaks, the ground under these trees will be managed grassland and trees will be maintained in a low fuel state, including pruning all branches within 2 metres of the ground or overhanging within 4 metres of a building.

2.1.1 Method 2 Calculation

The following data was used for the Method 2 calculations.

Climate data

- The default Fire Danger Index for Western Australia (Table 2.1 – AS 3959-2009) of 80 was used in this calculation for all plots.
- 45 km/h wind speed default was used in this calculation.

Fuel Loadings

This determines which bushfire model is more appropriate to the landscape and vegetation.

- Plot 3 used Class B Woodland default fuel loadings with 25 t/ha.
- Plot 4 used Class D Scrub default fuel loadings with 25 t/ha.
- The slope under the classified vegetation was calculated as flat/upslope for all plots. These were measured in the field for this vegetation plot using Nikon Forestry Pro.

Flame Length Calculation

The intensity, rate of spread and flame length calculations using AS 3959-2009 are deemed overly conservative for the Site due to the narrowing of the bushland to the east and west of the Site, limiting the potential head fire width any buildings will be exposed to. AS3959-2009 uses a default 100 m fire run in its modelling. Using an ellipse-shaped fire model as proposed by Alexander (2005) is more appropriate to this situation.

The simplest fire pattern from a single ignition point on flat terrain and under calm conditions, will spread out at an equal rate in all directions from the starting point, in a circular fashion, with the origin at the approximate centre. As time increases and with the influences of wind and slope or both, the fire shape assumes a roughly elliptical shape provided wind is constant. In this model, the flanks of the fire make up an increasing greater proportion of the total perimeter, hence the standard “panel” fire models of AS 3959-2009 can be significantly overstated.

The Department of Fire and Emergency Services (DFES) have prepared a draft Short Run Fire Model for these situations. These calculate a potential Head Fire Width based on the total fire length. The calculation of the Site is shown in Table 1.

Table 1 Short Fire Run & Head Fire Width Calculations (DFES 2016)

Plot	Transect	Fire Run (m)	FDI	Surface Fuel (t/ha)	Slope (˚)	Total Fire Length (m)	Head fire Width (m)
Plot 3	1	42	80	25	0	43.41	15.37
Plot 4	2	10	80	25	0	10.33	3.66

The flame length for the vegetation is calculated by inputting these data into the Method 2 model:

- An appropriate fire behaviour equation to determine the forward rate of spread of a fire;
- A correction for the forward rate of spread based on the effective slope;

The fire behaviour model is McArthur (1973) and Noble *et al* (1980), as shown in Table B1: AS 3959 is:

$$R = 0.0012*FDi*w$$

Where R is the rate of spread in Km/h;

FDI is the McArthur Fire Danger Index; and

w is the surface fuel load (t/ha)

Radiant Heat Flux

Other elements included in the calculations are:

- Flame width (Table 1);
- Elevation of the receiver (this is the level at which the site will receive the incident radiant heat flux); and
- The radiation heat flux is determined from the flame emissive power, the view factor and the atmospheric transmissivity.

Based on the above parameters, Table 2 shows parameters used and resulting Radiant Heat Flux (RHF). Appendix E shows the full details of the calculations for the transect.

Table 2 Method 2 Calculation Inputs and Results

Method 2 Calculation	Plot 3	Plot 4
Transect	1	2
RoS (km/h)	1.43	4.16
Flame length (m)	12.35	11.62
Flame Angle (degrees)	42, 47, 52, 57, 60 & 73	22, 25, 30, 36, 39 & 58
Flame Temp (K)	1,090	1,090
Intensity (kW/m)	18,599	53,815
Min distance to <40 kW/m^2	10 m	7.5 m
Min distance to <29 kW/m^2	**12 m**	**8 m**
Min distance to <19 kW/m^2	15 m	9 m
Min distance to <12.5 kW/m^2	18 m	11 m
Min distance to <10 kW/m^2	21 m	12 m

Figure 3 Current Vegetation Class and Effective Slope

Figure 4 Post Development Vegetation Class and Effective Slope

2.2 Assessment Outputs

The results from the Site assessment are provided in Table 3. The Determined Bushfire Attack Level (highest BAL) for the proposed buildings has been determined in accordance with clause 2.2.6 of AS 3959-2009. A BAL contour map is provided in Figure 5, 6 & 7.

Table 3 Site Assessment Results

Method 1 BAL Determination				
Fire Danger Index - 80 (AS3959-2009 Table 2.1)				
Plot	**Vegetation Classification**	**Effective Slope Under the Classified Vegetation (degrees)**	**Separation Distance to the Classification Vegetation (metres)**	**Bushfire Attack Level**
1	Class A Forest	Downslope >0 to 5 degrees	Min 21 m	BAL-29
2	Class B Woodland	Upslope / Flat	Min 14 m	BAL-29
3	Class B Woodland (Method 2)	Upslope / Flat	Min 12 m (Method 2, Table 2)	BAL-29
4	Class D Scrub (Method 2)	Upslope / Flat	Min 8 m (Method 2, Table 2)	BAL-29
5	Excluded S 2.2.3.2 (e) & (f)	N/A	N/A	BAL-LOW
			Determined Bushfire Attack Level	**BAL-29***

* This is the maximum BAL rating of any proposed new building or camping or caravan site within the Site. The Site locations provided are indicative only and have not been surveyed. The construction requirements of AS 3959-2009 do not apply to existing buildings or temporary structures, including tents and caravans.

As of Feb 2019, a number of Leaseholders have indicated proposed building programs for their sites (Shown in Figure 5). The BAL assessment for these have been included in this plan for completeness. These are based on the design and layout that has been provided at the time of this report. The outcome of the BAL assessment with the associated BAL ratings for the proposed buildings is provided in Table 4. Should the layout, design or location of any of these proposed structures vary, a separate BAL assessment will be required.

Table 4 BAL ratings for proposed buildings

Sublot	Proposed building	BAL Rating
110	1	BAL-29
110	2	BAL-12.5
110	3	BAL-19
110	4	BAL-19
110	5	BAL-29
110	6	BAL-29
110	7	BAL-19
212	New building	BAL-19
220	Extension to existing building	BAL-12.5
220	New building	BAL-12.5

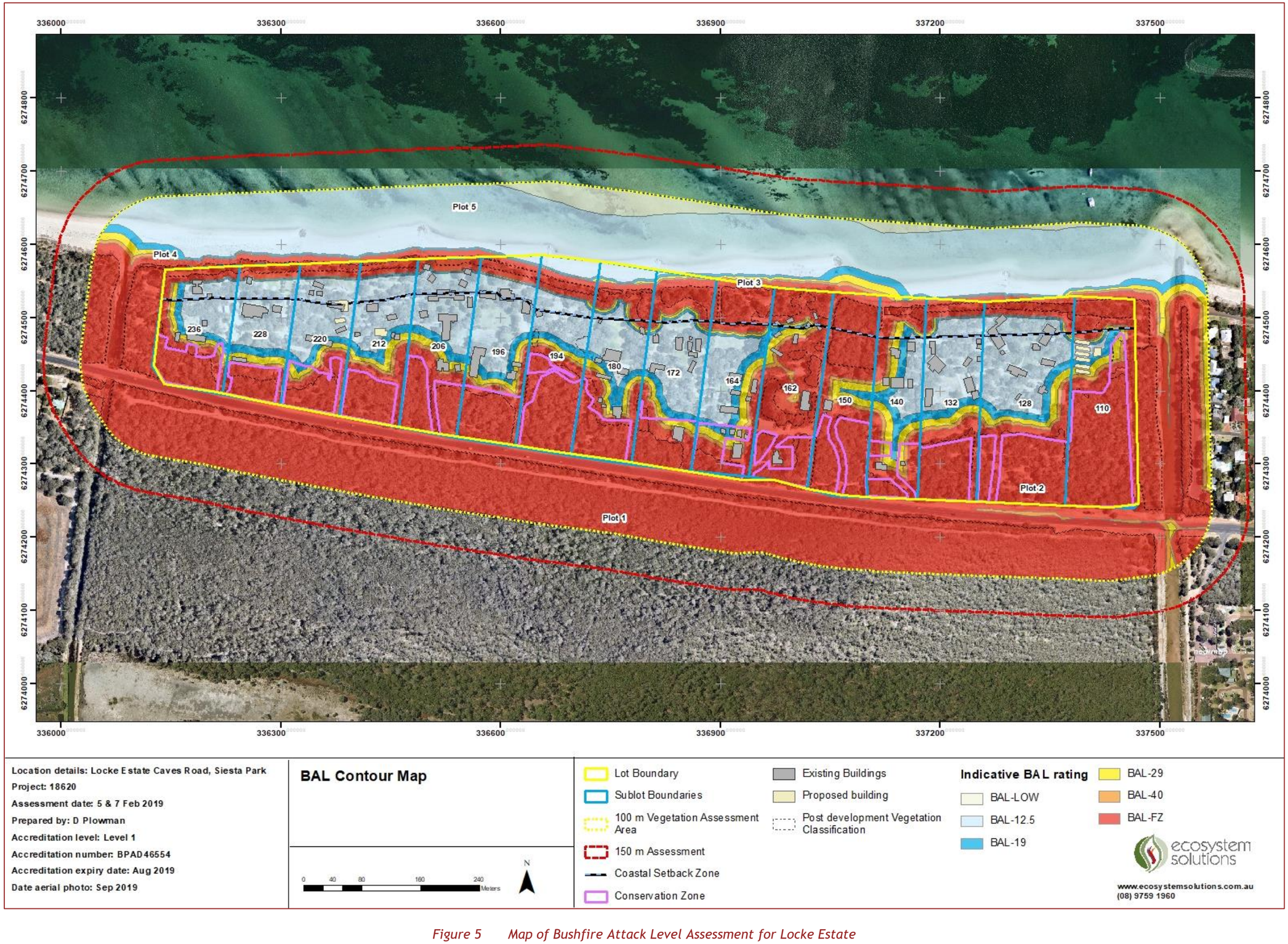


Figure 5 Map of Bushfire Attack Level Assessment for Locke Estate

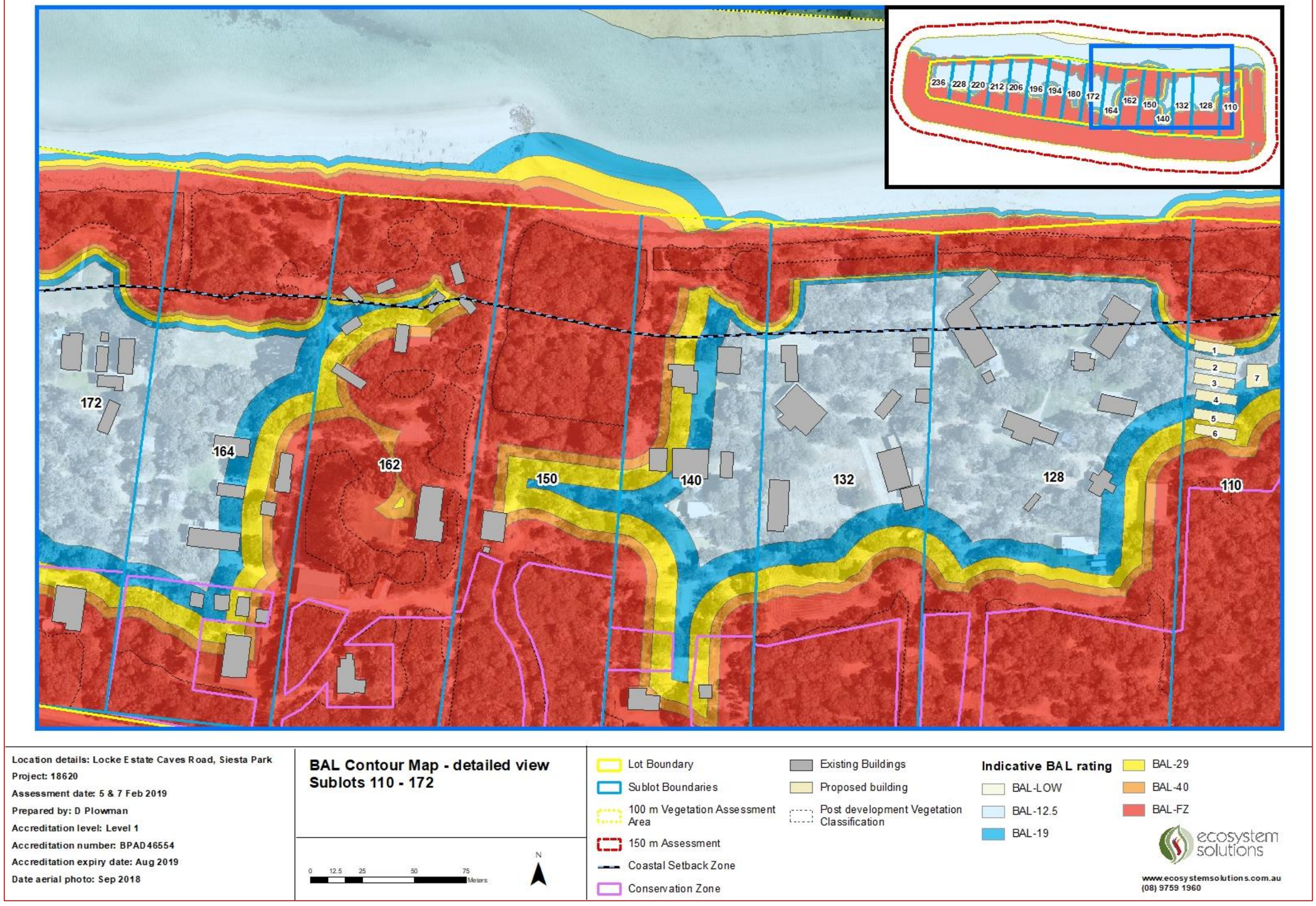


Figure 6 Map of Bushfire Attack Level Assessment for Locke Estate - detailed view Sublots 110 - 172

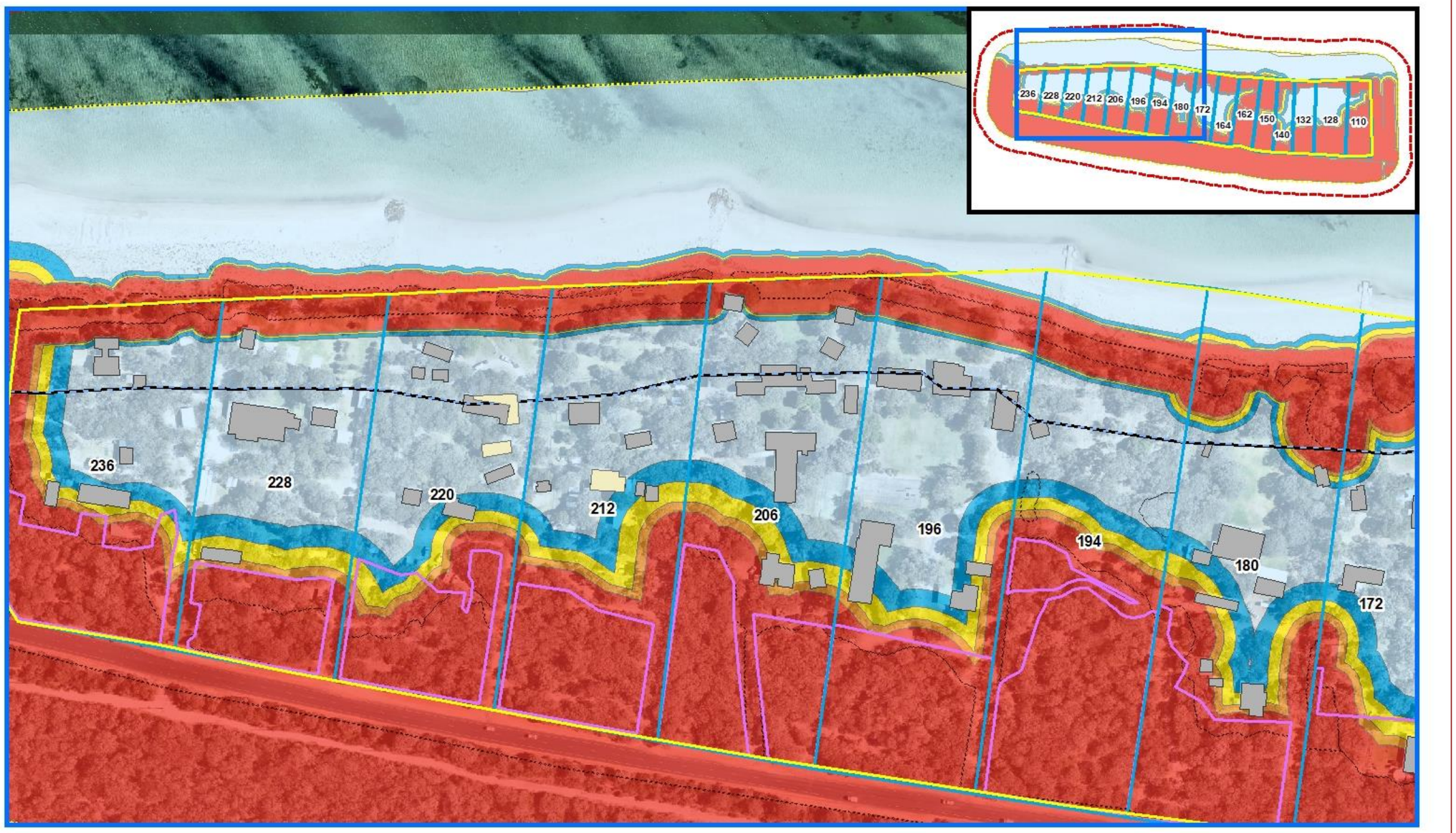


Figure 7 Map of Bushfire Attack Level Assessment for Locke Estate - detailed view Sublots 180 - 236

3 Environmental Considerations

3.1 Native Vegetation – modification and clearing

A basic desktop assessment for environmental values has been completed. Data provided through the Protected Matters Search Tool, accessed 05 February 2019, identified a Threatened Ecological Community and a number of Declared Rare Flora species or species habitat that could occur within the area (Table 5).

Modification to native vegetation is required within the Developable Area (Figure 10) for the purpose of constructing buildings where approved and managing Asset Protection Zones. Asset Protection Zones around all buildings within the Developable Zone and the existing buildings within the Coastal Setback Zone will be maintained with minimal impact to the native vegetation to achieve compliance with the *Guidelines for Planning in Bushfire Prone Areas* with all WA Peppermint Trees (*Agonis flexuosa*) retained, lower branches pruned to 2 m high and the understorey maintained to under 10 cm. Maintenance of the understorey is priority over canopy.

Sublot 150 will require more substantial clearing in order to construct a building within a BAL-29 area. Figure 4 includes an indication of the vegetation that will need to be removed to establish a Developable Area (Figure 10) within BAL-29. Clearing will ensure trees are retained as much as possible to allow for the construction of the buildings, with lower branches pruned to 2 m high and the understorey maintained to under 10 cm.

Sublot 110 propose to install six accommodation buildings and an activity building. Management of the current Class B Woodland to the east of the buildings and a portion of the Class A Forest south east of the buildings, within the sublot will be managed in a low fuel state. This will occur by retaining the WA Peppermint Trees (*Agonis flexuosa*) lower branches pruned to 2 m high and the understorey maintained to under 10 cm. This area will be reticulated.

Ecological values will be retained within the Site with the ongoing management of the Conservation Zone and Coastal Setback Zone (Figure 10).

For any vegetation clearing required within the Site, the Leaseholder will investigate with the City of Busselton for the requirement of a clearing permit. This BMP assumes a permit is granted. For any clearing, a fauna spotter must be present during the clearing to ensure any impact to fauna is managed with the procedure provided in Appendix G.

Table 5 Significant environmental values identified within the Site

Environmental Value	Yes or No	If Yes - describe
Conservation Covenants	No	Not applicable
Bushfire Forever Sites	No	Not applicable
Conservation Category Wetlands and Buffer	No	Not applicable
Threatened Ecological Communities (TECs)	Yes	Banksia Woodlands of the Swan Coastal Plain may occur within the area.
Declared Rare Flora (DRF)	Yes	A number of DRF species or species habitat is likely to occur in the area
Significant through Local Planning or Biodiversity Strategy	Yes	The Site contains ecological values that will be protected within the Conservation Zone and Coastal Setback Zone.

3.2 Re-vegetation / Landscape Plans

The assessment of the current vegetation is provided in Figure 3. Revegetation of the Coastal Setback Zone is required in some areas to protect the Site against coastal erosion. To ensure a worst case scenario is applied, Figure 4 includes revegetation of species with a mature state of planting to be an average of 4 m high in areas which are currently excluded or contains a reduced area of Class D Scrub. The width of vegetation is a maximum of 10 m from the northern lot boundary, or vegetation boundary where coastal erosion has occurred. A reduced width is to be applied to ensure an 8 m setback, managed as an Asset Protection Zone, from any existing building for the building to be located within BAL-29, as per the Method 2 calculation shown in Section 2.1.1. Management of the Asset Protection Zone within the revegetation area is to focus on maintaining the understorey at 10 cm, and pruning trees to 2 m high, rather than managing canopy.

The sublots which require coastal revegetation due to absence of vegetation or reduced areas of vegetation that could be increased to provide further protection includes Sublot 128, 132, 140, 194, 196, 206, 212, 220, 228 and 236.

A species list of suitable coastal vegetation to be used in the revegetation is included in Appendix F. Scattered Peppermint Trees (Agonis flexuosa) with a maximum of 2% of species can be maintained within this revegetation area to provide habitat for Western Ringtail Possums.

Infill planting within the Coastal Setback Zone for all other Sublots should occur with the species and method described in Appendix F and will not increase the classification due to the average height of 4 m.

Infill planting of the Conservation Zone is required in sublot 128 and may be required in other areas. Any planting is not expected to change the vegetation classification due to the nature of the vegetation structure as grass weeds are prominent, or the grass will be managed in a low fuel state under 10 cm.

4 Identification of Bushfire Hazard Issues

Bushfire behaviour is significantly affected by weather conditions. Bushfires will burn more aggressively when high temperatures combine with low humidity and strong winds. Generally, the greatest fire risk occurs from summer through to autumn, when the moisture levels in the soil and vegetation are low.

The Site contains varying levels of remnant vegetation within the Conservation Zone to the south and Coastal Zone to the north representing a moderate risk of bushfire. Areas within the middle of the Site contain mostly managed vegetation with grass maintained to under 10 cm in height, posing a low bushfire risk. To the south and west of the Site are extensive areas of native vegetation within a Nature Reserve, posing an extreme risk of bushfire.

The overall fire risk to people and property within the Site is considered Moderate due to the mixture of managed lands and native vegetation in proximity to the Site. By complying with the requirements of this BMP, this risk can be appropriately managed.

5 Assessment Against the Bushfire Protection Criteria

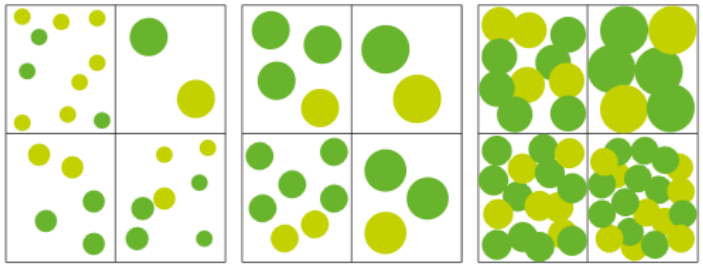
5.1 Compliance with the Acceptable Solutions for each Element

Bushfire Protection Criteria – Element 1 - Location		
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.		
Performance Principle P1: The intent may be achieved where the strategic planning proposal, subdivision or development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low OR a BAL-29 or below applies AND the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of DFES and the decision-maker.		
Acceptable Solution	**Compliance**	**Assessment Statements**
A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	Compliance with this element is achieved.	The BAL Contour for the Site shows that all proposed buildings will be within areas of BAL-29 or less (Table 3, Figure 5, 6 & 7). There will be no new buildings constructed within an area that exceeds BAL-29, represented in Figure 10 as the Developable Area which also excludes the Coastal Setback Zone and Conservation Zone. There is a potential that class 10 buildings (a shed) can be constructed more than 6 m from an existing buildings that is within BAL-40 or BAL-FZ that is also outside the Conservation Zone and Coastal Setback Zone, as these buildings can be constructed to BAL-40 or BAL-FZ under the *Guidelines for Planning in Bushfire Prone Areas*, subject to approval by the City of Busselton. Any revegetation within the Coastal Setback Zone will ensure a separation of 8 m from the revegetated Class D Scrub to ensure these buildings are located in BAL-29. The location of existing buildings and camping / caravan sites within areas of BAL-40 and BAL-FZ are a legacy issue and specifically apply to Sublots 140, 150, 162, 164, 172, 180, 206, 228 and 236. Management of the excluded area in a low fuel state is required according to Figure 10 with the removal of fine fuels (dead vegetation less than 6 mm wide and leaf litter removed and branches up to 2 m high pruned) while retaining all live vegetation due to environmental values, around the buildings.

Bushfire Protection Criteria – Element 2 – Siting and Design		
Intent: To ensure that the siting and design of development minimises the level of bushfire impact.		
Performance Principle P2: The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. That it incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.		
Acceptable Solution	**Compliance**	**Assessment Statements**
A2.1 Asset Protection Zone (APZ) Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements: • Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances. • Location: the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot will be managed in a low-fuel state on an ongoing basis, in perpetuity. • Management: the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' (see Figure 8 below).	Compliance with this element is achieved.	The Developable Area and low fuel zones in the Coastal Setback Zone and Conservation Zone depicted in Figure 10 will be managed in a low fuel state and presentable manner for guests as per Asset Protection Zone requirements (Figure 8) as described in section 3.1, in perpetuity. Any proposed or new building will have an Asset Protection Zone to the following distances: • 21 m to Class A Forest; • 14 m to Class B Woodland (Plot 2); • 12 m to Class B Woodland (Plot 3); and • 8 m to Class D Scrub. This ensures the potential radiant heat impact of a bushfire does not exceed 29 kW/m² for any proposed building. The APZs are contained solely within the Lot, Reserve 22674. APZs do overlap boundaries of the Sublots however, it is a condition of this BMP that the Developable Area is maintained in a low fuel state by all Sublots and the neighbouring Sublots will maintain the APZs that cross into their boundary for future buildings.

- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees (> 5 metres in height):** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

Figure 18: Tree canopy cover – ranging from 15 to 70 per cent at maturity



- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

Figure 8 Asset Protection Zone Requirements from Guidelines for Planning in Bushfire Prone Areas (WAPC, Dec 2017)

Bushfire Protection Criteria – Element 3 – Vehicular Access		
Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.		
Performance Principle P3: The internal layout, design and construction of public and private vehicular access and egress in the subdivision/ development allow emergency and other vehicles to move through it easily and safely at all times.		
Acceptable Solution	**Compliance**	**Assessment Statements**
A3.1 Two Access Routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	Compliance with this element is achieved.	Access into the Site is via Caves Road which can be taken east to Busselton Town and west to Dunsborough town centre. A public road network provides alternative routes to these destinations if required in the event of a bushfire.
A3.2 Public Road A public road is to meet the requirements in Table 6, Column 1 (Figure 9).	Compliance with this element is achieved.	No new public roads are to be constructed as part of this proposal. All public roads in proximity to the Site are in good condition and have been built to standards.
A3.3 Cul-de-sac (including a dead-end road)	Not applicable.	
A3.4 Battle-axe	Not applicable.	

Bushfire Protection Criteria – Element 3 – Vehicular Access		
A3.5 Private driveway >50 m • Requirements in Table 6, Column 3 (Figure 9); • Required where a house site is more than 50 m from a public road; • Passing bays: every 200 m with a minimum length of 20 m and a minimum width of 2 m; • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 m (i.e. kerb to kerb 17.5 m) and within 50 m of a house; • Any bridges or culverts are able to support a minimum weight capacity of 15 t; and • All-weather surface (i.e. compacted gravel, limestone or sealed).	Compliance with this element is achieved.	Each sublot within the Site contains an access road which is longer than 50 m. The access for every sublot is not considered a private driveway as there is not a Care Takers Dwelling within every sublot. However, the access for each sublot does comply with the requirements for a private driveway greater than 50 m, with some containing a compacted sand surface.
A3.6 Emergency Access Way	Not applicable.	
A3.7 Fire Service Access Routes (perimeter roads)	Not applicable.	
A3.8 Firebreak Width Lots greater than 0.5 ha must have an internal perimeter firebreak of a minimum width of 3 m or to the level as prescribed in the local firebreak notice issued by the local government.	Compliance with this element is achieved.	The Site has an effective firebreak with the adjacent drains, Caves Road and beach providing a break in fuel around the Lot. Further breaks in fuel are provided by the access roads into each sublot. The Lot currently does not have an allocated category under the City of Busselton Firebreak and Fuel Hazard Reduction Notice (*which may be subject to review from time to time)* and therefore each sublot does not require separate firebreaks. Subject to any additional requirements under any Firebreak and Fuel Hazard Reduction Notice issued by the City, if there is a change in requirements to maintain firebreaks then the Leaseholders will comply with the requirements.

TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5
*Refer to E3.2 Public roads: Trafficable surface					

Figure 9 Vehicular access technical requirements (Guidelines for Planning in Bushfire Prone Areas Table 6)

Bushfire Protection Criteria – Element 4 – Water		
Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.		
Performance Principle P4: The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for fire fighting purposes.		
Acceptable Solution	**Compliance**	**Assessment Statements**
A4.1 Reticulated Areas The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	Compliance with this element is achieved.	The Site is within a reticulated water supply provided by Busselton Water. Any new building will need to be provided reticulated water in compliance with the Water Corporation's No. 63 Water Reticulation Standard. Compliance will also be achieved with the *Caravan Parks and Camping Grounds Regulations 1997* for those Sublots which allow camping tents and caravans.
A4.2 Non-reticulated Areas	Not applicable to this Site.	
A4.3 Individual lots within non-reticulated areas	Not applicable to this Site.	

5.2 Performance Based Solutions

The Site assessment was conducted in accordance with AS 3959-2009 Simplified Procedure (Method 1). Due to the nature of the Site, a Performance Based Solution is not required.

The Proposal meets the remainder of the compliance requirements for the four Bushfire Protection Criteria Elements.

5.3 Summary of the Assessment Outcomes

This plan provides acceptable solutions and responses to the performance criteria outlined in the *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2017).

The layout and design of the development is such that any future building or camping / caravan site will not be exposed to a radiant heat flux in excess of 29kW/m^2 (BAL-29) provided the management as outlined in the plan is adopted. There is a potential that class 10 buildings (a shed) can be constructed more than 6 m from an existing building that is within BAL-40 or BAL-FZ that is also outside the Conservation Zone and Coastal Setback Zone, as these buildings can be constructed to BAL-40 or BAL-FZ under the *Guidelines for Planning in Bushfire Prone Areas*, subject to approval by the City of Busselton.

Any class 1, 2, 3 or associated 10a structure that may be constructed in the future, or additions planned to existing buildings, shall be designed and built to conform with Australian Standards AS3959-2009:

- BAL-FZ: sections 3 & 9 (Class 10 buildings greater than 6 m from another building only);
- BAL-40: sections 3 & 8 (Class 10 buildings greater than 6 m from another building only);
- BAL-29: sections 3 & 7;
- BAL-19 sections 3 & 6; and
- BAL 12.5 sections 3 & 5.

A summary of the Bushfire Management Strategies to be implemented is provided in Figure 10.

5.4 Vulnerable Development

Appendix C includes an Emergency Evacuation Plan. This plan has followed the *State Government of Victoria CFA Guide to Developing a Bushfire Emergency Plan* to determine whether evacuation or refuges present the safest option. It has followed the *NSW Rural Fire Service – Guide to Developing a Bush Fire Emergency Management Plan*, the *Bushfire Protection Guidelines WA*, and AS 3745-2010 to identify the triggers for Evacuation.

Assumptions:

- The Sublots will be hosted.
- The guests are able bodied.
- Guests can see and smell smoke and can see a fire.
- Guests can read and understand the English language.

There are extensive areas of bushland to the south, east and west of the Site, any evacuation needs to be early before there is any risk of becoming trapped along the egress route. Any evacuation should be by car because a car will provide a level of protection and minimise the time exposed to extreme conditions compared to travel as a pedestrian.

The guests within the Site will be staying within permanent and non-permanent accommodation (eg. caravans and tents) that does not provide sufficient protection from radiant heat. Therefore, evacuation from the Site is the best option, as there is not adequate shelter within the Site during a bushfire event. A Refuge Open Space is provided in the event the evacuation route is not available and should only be used as a last resort.

Key features of the Bushfire Emergency Evacuation Plan to achieve occupant life safety include:

- Establishing alert triggers;
- Establishing evacuation procedure; and
- A clear display of evacuation procedure.

Spatial representation of the proposed risk management measures

LEGEND

- Proposed building
- Lot Boundary
- Class D Scrub
- Sublot Boundaries
- Coastal Setback Zone
- Conservation Zone
- Developable Area
- Existing Buildings
- Low Fuel Zone

NOTES

The minimum Asset Protection Zone (APZ) width for new buildings is the distance required to meet the BAL-29 setback. The area of Low Fuel Zone shall be managed as an APZ with all live vegetation retained including WA Peppermint Trees (Agonis flexuosa), lower branches pruned to 2 m high, grass maintained to under 10 cm and dead vegetation (leaf litter and fine fuels less than 6 mm wide) removed.

Buildings (potential exception of sheds) may only be constructed within the Developable Area which achieves BAL-29 and is outside the Coastal Setback and Conservation Zone with an approved or exempt clearing permit and fauna spotter where vegetation removal is required.

Sublot 150 and 110 will require vegetation clearing in order to construct a builidng within the Developable Area to BAL-29. Clearing will ensure trees are retained as much as possible and Low Fuel Zones are mantained.

Decommission redundant infrastructure within the Coastal Setback Zone and revegetate areas of Class D Scrub as described within Section 3.2. and Appendix F.

The driveway access will comply with the requirements of the Guidelines (A3.5). Maintain any future obligations under the City of Busselton Firebreak and Fuel Hazard Reduction Notice, which may change from time to time. Any gates along the driveway will have a minimum width of 3.6 m.

Installation and upkeep of the APZs and the driveway are the responsibility of the Leaseholder. The measures listed above shall be implemented prior to the occupation of the dwelling and shall continue to be maintained in perpetuity.

N

0 25 50 100 150 200

Meters

PROPERTY / ASSESSMENT DETAILS

Landowner: State of W.A., Management Order City of Busselton
Property Address: Locke Estate Caves Road, Siesta Park
Project No: 18620
Prepared by: D Plowman
Level: Level 1
Accreditation Number: 46556
Accreditation Expiry Date: 08/19

ecosystem solutions
www.ecosystemsolutions.com.au
(08) 9759 1960

Figure 10 Map of Bushfire Management Strategies

6 Responsibilities for Implementation and Management of the Required Bushfire Measures

The responsibilities for the Leaseholder / Occupier and City of Busselton are outlined in Table 6 and Table 7 respectively.

Table 6 Leaseholder / Occupier Responsibilities

Number	Action	Due
1	Ensure the areas within the Conservation Zone retain all vegetation and revegetate where required by the City of Busselton.	Ongoing
2	Revegetate areas within the Coastal Setback Zone as described within Section 3.2. and Appendix F and decommission redundant infrastructure within the Coastal Setback Zone for revegetation.	Ongoing
3	Comply with the *Shire of Busselton Health Local Laws 1997 – Part 8 Lodging House* and/or *Caravan Parks & Camping Grounds Act 1995* & *Caravan Parks & Camping Grounds Regulations 1997* as applicable	Ongoing
4	Ensure a clearing permit is obtained, or the clearing is exempt, for any vegetation clearing within the Site and follow the Fauna Management Procedure (Appendix G) including ensuring a Fauna Spotter is present during vegetation clearing.	Ongoing
5	Establish and maintain low fuel zones and Asset Protection Zones (APZ) to the dimensions and standard stated in the BMP (2.1) with all WA Peppermint Trees (*Agonis flexuosa*) retained, lower branches pruned to 2 m high and the grass maintained to under 10 cm.	Ongoing
6	Maintain vehicular access routes within the Site to the required surface condition and clearances (A3.5).	Ongoing
7	Maintain compliance with the City of Busselton Firebreak and Fuel Hazard Reduction notice (*which may be subject to review from time to time)*, if and when a category for Locke Estate is issued.	Ongoing
8	Ensure that any builders (of future structures on the Lot) are aware of the existence of this Bushfire Management Plan and the responsibilities it contains regarding the application of construction standards corresponding to the determined BAL rating.	Ongoing
9	Ensure all future buildings the leaseholder has responsibility for, are designed and constructed in full compliance with: (a) the requirements of the *WA Building Act 2011* and the bushfire provisions of the Building Code of Australia (BCA) as applicable to WA; and (b) with any identified additional requirements established by this BMP or the relevant local government.	Ongoing

10	Ensure no buildings are constructed in areas above a BAL-29 rating, within the Coastal Setback Zone or within the Conservation Zone. There is a potential exemption of class 10 buildings (a shed) that can be constructed more than 6 m from an existing building that is within BAL-40 or BAL-FZ that is also outside the Conservation Zone and Coastal Setback Zone, subject to approval by the City of Busselton.	Ongoing
11	Be aware updating the Bushfire Management Plan may be required to ensure that the bushfire risk management measures remain effective. Bushfire plans do not expire and are a 'living document'. Updating is required in certain circumstances, including (but not limited to) if site conditions change, if further details are required at subsequent development stages or to reflect new technologies or methodologies in best practice bushfire risk management ('Guidelines' s4.6.4 and s4.6.5).	Ongoing
12	Ensure that there is a Manager who is familiar with this BMP and in particular the Bushfire Emergency Evacuation Plan (Appendix C) and ensure that appropriate arrangements are in place at all times for the BMP and the Bushfire Emergency Evacuation Plan to be complied with.	Ongoing
13	Each Leaseholder shall regularly verify and maintain current contact details within Appendix H and if any details change to notify the City of Busselton.	Ongoing
14	Provide a copy of the Evacuation Diagram (final page of this BMP) to all guests on their arrival at the Site.	Ongoing
15	Conduct Seasonal and Daily (during the fire season) preparations (refer to Appendix C).	Annually / Daily

Table 7 City of Busselton Responsibilities

Number	Action	Due
1	Provide a copy of this Bushfire Management Plan and Bushfire Emergency Evacuation Plan to each leaseholder within the Site.	Post BMP approval
2	Provide a condition within each Lease to state the existence of this Bushfire Management Plan and Bushfire Emergency Evacuation Plan and to comply with the requirements within it.	Allocation of a Lease
3	Review the Bushfire Emergency Evacuation Plan (Appendix C) and Emergency Contact Details (Appendix H) and send an updated copy to each Leaseholder. Note the contact details are current as at June 2019.	Annually
4	Develop and maintain district bushfire fighting services and facilities.	Ongoing
5	Administer the *Bushfire Act 1954* and monitor leaseholder compliance.	Ongoing
6	Promote education and awareness of bushfire prevention and preparation measures though the community.	Ongoing
7	Administer the requirements of the *Planning and Development Act 2005* and the *Building Act 2011*.	Ongoing
8	Maintain public roads in proximity to the Site according to the Guidelines.	Ongoing

Appendix A City of Busselton Firebreak and Fuel Hazard Reduction Notice

BUSH FIRES ACT 1954

PROPERTY COMPLIANCE REQUIREMENTS

Compliance inspections of land will be carried out from 16 November 2018, to assess landowner(s) or occupier(s) of land compliance with the City of Busselton Firebreak and Fuel Hazard Reduction Notice.

- **Rural Residential, Urban and Industrial Land requirements must be compliant by 16 November 2018**
- **Rural Land requirements must be compliant by 15 December 2018**

Local Government may serve a notice pursuant to Section 33 of the Bush Fire Act 1954, requiring the property owner to undertake any extra work to reduce the impact of a fire

- **Rural Residential, Urban and Rural Land requirements must be maintained in accordance with the table overleaf until 12 May 2019** or a later date if the compliance period is extended, in which case a notice will be placed in the local newspaper

FIRE PERMITS

- Permits to burn are required for the whole of the restricted periods and can only be obtained from the Fire Control Officer for your area
- Permits are to be obtained before burning commences (the permit holder must be in possession of the permit during the burn)

FIRE PERMIT APPLICATION

Before you call a Fire Control Officer ensure you have the following information

- Who will be the three able bodied persons in attendance at all times whilst the fire is alight including contact phone number?
- What is the address of the property for which the permit applies?
- What fire fighting equipment and resources will you have at the fire front and is it in good working order?
- What is the size of burn to take place?
- Are there firebreaks installed and can a fire unit get access to the area?
- What material are you burning? Is it dry? Are there any plastics, tyres, treated posts or woods in the piles or area to be burnt? If so, remove them to a safe place.
- Ensure you give 72 hours notice to the Fire Control Officer first; and
- Ensure you notify neighbours 72 hours prior to commencing your burn

For further advice, contact your local Fire Control Officer, as advertised in the City of Busselton's Community Directory or on the City of Busselton website www.busselton.wa.gov.au

GENERAL REQUIREMENTS

- **Garden Refuse Urban Areas (Town sites):** No garden refuse is permitted to be burnt on the ground, in the open air or in an outdoor incinerator within the urban areas of Busselton and Dunsborough town sites at any time of the year
- **Garden Refuse Rural Residential Areas (non-Town sites):** The burning of garden refuse is prohibited from 14 December to 28 February. **During the restricted burning period**, 2 November to 14 December and 1 March to 12 May each year, permits are required to be obtained from the Fire Control Officer in your area for the burning of any garden refuse
- **Burning of toxic materials** and **rubbish** is prohibited at all times
- **Camp fires** are prohibited within the City during the restricted and prohibited burning period
- **Wood** and **coal fuelled barbecues,** including wood fired pizza ovens and chimineas are banned during a total fire ban or in any period when the fire danger forecast is 'Very High' or above
- **Wood fired pizza ovens** must have a spark arrestor fitted
- **Warning:** The use of electric fences during periods of 'Very High' or above may cause fire
- **Owners of tractors** with down swept exhaust systems are encouraged to have an approved spark arrestor fitted as provided in the Bush Fires Act 1954 Regulations
- **Welding, Cutting** and **Grinding Equipment:** A person shall not operate this equipment during the restricted/prohibited burning times on land which is under crop, pasture, stubble and bush unless one working fire extinguisher is provided, work area is clear of flammable materials and there is compliance with any other controls required by a Fire Control Officer.
- **Welding, cutting** and **grinding equipment** is **not permitted** to be used anywhere within the City of Busselton when the fire index is **'extreme'** or above

FIRE DANGER RATING

For the current fire danger rating visit Department of Fire & Emergency Services (DFES) website www.dfes.wa.gov.au or Bureau of Meteorology (BOM) website www.bom.gov.au

CONTRACTORS

Please be advised, if you engage a contractor to gain compliance with this notice it is the property owner, **not the contractor**, who is responsible for the standard and quality of the fire prevention work undertaken and required to be compliant by 16 November (or 15 December if Rural Land) each year and maintained as per this notice throughout whole the fire season.

CONTACT US

For further fire safety information visit the City of Busselton website www.busselton.wa.gov.au or Department of Fire & Emergency Services (DFES) website www.dfes.wa.gov.au

IMPORTANT DATES

The below dates may change due to seasonal fire conditions in which case details will be published in the local newspaper.

RESTRICTED

BURNING PERMITS ARE REQUIRED FROM
2 November 2018 to 14 December 2018 inclusive
and
1 March 2019 to 12 May 2019 inclusive

BURNING PROHIBITED

ALL FIRES PROHIBITED
15 December 2018 to 28 February 2019 inclusive

COMPLIANCE DATE

- **Completion of firebreaks/fuel hazard reduction on all rural residential, urban and industrial land is required to be completed by 16 November 2018 and must be maintained until 12 May 2019**
- **Completion of firebreaks/fuel hazard reduction on all rural land is required to be completed by 15 December 2018 and must be maintained until 12 May 2019**
- **Burning on public holidays during the restricted fire season is prohibited**

Applications for a variation of this the Firebreak and Fuel Hazard Reduction Notice, where ground considerations or environmental concerns prevent compliance with the requirements of this Notice, must be lodged in writing together with a Firebreak and Fuel Hazard Reduction Notice Variation form, prior to **31 October 2018**

The hardest aspect of fire prevention is explaining to your family why you didn't undertake ony!

Actions speak louder than words and actions save lives

Should you require further clarification of the information contained in this notice please do not hesitate to contact the City's Ranger and Emergency Services Department on (08) 9781 0444.

City of Busselton
Geographe Bay

FIREBREAK AND FUEL HAZARD REDUCTION NOTICE

ARE YOU BUSHFIRE READY?

2018/2019 BUSH FIRE SEASON

FIRST AND FINAL NOTICE

Bush Fires Act 1954

Take notice that pursuant to Part 3 Division 6 Section 33 of the Bush Fires Act 1954, landowner(s) or occupier(s) of land shall construct firebreaks and carry out fire prevention work in accordance with the City of Busselton Firebreak and Fuel Hazard Reduction Notice.

Failure to comply with this notice may result in a

$5,000 FINE

Fire Prevention Starts with You!

RING 000 FOR ALL FIRES

FIREBREAK CATEGORY CODE AND SUMMARY OF REQUIREMENTS

ALL REQUIREMENTS IN THIS NOTICE ARE TO BE MAINTAINED THROUGHOUT THE ENTIRE DURATION OF THE FIRE SEASON (1 DECEMBER TO 12 MAY EACH YEAR).

FAILURE TO COMPLY MAY RESULT IN A $5,000 FINE

PLEASE BE ADVISED THAT YOUR PROPERTY MUST COMPLY WITH CATEGORY REQUIREMENTS AS NOTED BY A TICK IN COLUMN A, B, C OR D

CATEGORY *It is the land owner's responsibility to identify the category that relates to their property and to ensure the necessary fire prevention works are completed on time. Please contact the City if you are unsure of your category.*	A	B	C	D
CATEGORY 1 **RURAL** Except plantations and vineyards (for tourist chalets, refer to Estate Fire Management Plan or Individual Fire Management Plan) Sections A, C and D apply to this category.	✓		✓	✓
CATEGORY 2 **URBAN RESIDENTIAL & INDUSTRIAL - COMMERCIAL** Sections A, B, D and E1 Trees, apply to this category. Refer to section E - Interpretation and Additional Requirements (E1 Trees).	✓	✓		✓
CATEGORY 3 & 4 **PLANTATIONS** Fire Management Plan applies	N/A	N/A	N/A	N/A
CATEGORY 5 **PROTEA PLANTATIONS / VINEYARDS** (For tourist chalets, refer to Estate Fire Management Plan or Individual Fire Management Plan) Sections A, B, C and D apply to this category.	✓	✓	✓	✓
CATEGORY 6 **RURAL RESIDENTIAL - LOTS WITH INDIVIDUAL (MINERAL EARTH) BOUNDARY BREAKS** Sections A, B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan	✓	✓	✓	✓
CATEGORY 7 **RURAL RESIDENTIAL - LOTS WITH A STRATEGIC FIREBREAK ON ONE OR MORE BOUNDARIES** Sections A, B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan	✓	✓	✓	✓
CATEGORY 8 **RURAL RESIDENTIAL - LOTS WITHIN A STRATEGIC FIREBREAK AREA WITH NO STRATEGIC FIREBREAKS ON THE LOT BOUNDARIES** Sections B, C and D apply to this category unless the property is subject to Estate Fire Management Plan or Individual Fire Management Plan		✓	✓	✓

A - Firebreak – **The term firebreak includes a mineral earth firebreak. A mineral earth firebreak means a 3 metre wide area of the owner(s)/occupiers(s) land, cleared and maintained totally clear of all vegetation material (living or dead) so there is only mineral earth left. Any overhanging trees and other vegetation must be pruned to a height of 5 metres above the ground level of a mineral earth firebreak.**

Category 1 – Rural: A mineral earth **FIREBREAK** shall be constructed **3 metres** wide, except in pasture or crop areas where a **FIREBREAK** shall be **2 metres** wide. **FIREBREAKS** shall be located adjacent to all external boundaries of the land. Where the land area exceeds 120 hectares, an additional **FIREBREAK** must divide the land into areas of not more than 120 hectares with each part completely surrounded by a **FIREBREAK.**

Category 2 - Urban Residential and Industrial-Commercial: Where the area of land exceeds 2024m² (½ acre) a mineral earth **FIREBREAK** shall be constructed and maintained at least **3 metres** wide and within **6 metres** of the inside of all external boundaries of the land. Where the area of land is 2024m² (½ acre) or less, hazardous material must be removed in accordance with section **B - Fuel Reduction (refer to B1).**

Category 5 - Protea Plantations/Vineyards: A mineral earth **FIREBREAK** shall be 3 metres wide. A low fuel area is to be maintained in accordance with section **B - Fuel Reduction (refer to B2).**

Category 6 and 7 - Rural Residential: A mineral earth **FIREBREAK** shall be constructed **3 metres** wide. On Category 6 Rural Residential land with pasture or crop, a **FIREBREAK** shall be **2 metres** wide and located within **6 metres** of all external boundaries of the land. For Category 7 Rural Residential land, free access along a Strategic **FIREBREAK** is to be maintained at all times and including across the boundary of a lot, by means of a **3.5 metres wide field gate** in the adjoining lot boundary fence.

B - Fuel Reduction

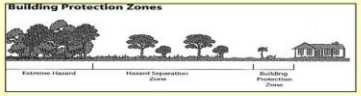
1) **Category 2 - Urban Residential and Industrial-Commercial:** Where the area of land is 2024m² (½ acre) or less, **ALL HAZARDOUS MATERIAL** must be removed from the whole of the land except living trees. In the area remaining, vegetation is to be maintained to a height of no greater than **10 centimetres**; this includes piles of timber, branches and other vegetation. Trees shall be pruned in accordance with section **E – Interpretation and Additional Requirements (refer to E1).**
2) **Category 5 - Protea Plantations/Vineyards:** A **5 metre** low fuel area is to be maintained between the **3 metre FIREBREAK** and the plantation/vineyard area. In this area, vegetation is to be maintained to a height of no greater than **10 centimetres;** this includes piles of timber, branches and other vegetation.
3) **Category 6, 7 and 8 - Rural Residential:** Parkland clearing must be carried out in all open paddocks and along the boundary of the property. Clearing means that all dead vegetation and dry grasses (excluding approved crops, pasture areas and living trees/shrubs) including piles of timber and disused materials must be maintained to a height of no greater than **10 centimetres**.

C - Building Protection Zones (BPZ) – This is a modified area of reduced fuel immediately surrounding a building

BPZ's starve the fire by reducing the fuel levels around your house. These requirements are designed to reduce the fire's intensity and minimise the likelihood of flame contact with buildings. The BPZ gives more protection to families should a fire threaten suddenly and they cannot leave. It also provides extra protection for fire fighters and property owners who may decide to stay with their property.

A BPZ shall be provided for buildings in bush fire prone areas. The surroundings of buildings must comply with the following requirements:

1) The BPZ for existing buildings must be at least 20 metres from any external wall of the building unless varied under an approved Fire Management Plan (FMP) in accordance with section **E - Interpretation and Additional Requirements (refer to E4).**
2) The minimum BPZ for buildings constructed after 1 November 2011, in all cases shall be 25 metres.
3) The BPZ must be located within the boundary of the lot that the building is situated on.
4) Hazardous/flammable materials must not exceed the maximum fuel load specified in Point 5 below with grass areas not exceeding a height greater than 10 cm.
5) Fuel loads must be reduced and maintained at 2 tonne per hectare.
6) Isolated trees and shrubs may be retained, however, the first 5 metres around all buildings is to be clear of all hazardous/flammable materials.
7) Reticulated gardens in the BPZ shall be maintained to a height of no greater than 500 millimetres.
8) Wood piles must be at least 10 metres away from habitable dwellings.
9) Trees in the BPZ must comply with section **E - Interpretation and Additional Requirements (refer to E1).**
10) Where the land has an approved FMP, compliance must be achieved in accordance with the FMP. The FMP may vary the above BPZ requirements.
11) A Hazard Separation Zone (HSZ) is also recommended in the absence of a Fire Management Plan. **Section E - Interpretation and Additional Requirements (refer to E3).**



D – Fuel Storage & Haystack Protection Zones

A **3 metre** mineral earth **FIREBREAK** shall be located within **6 metres** of fuel storage tanks, sheds, gas cylinders and haystacks. The mineral earth firebreak shall be maintained so that it is totally clear of all material (living or dead).

E – Interpretation and Additional Requirements

1) **Trees** On **Urban, Industrial, Rural,** and **Rural Residential** land, all tree branches must be removed or pruned to ensure a clear separation of at least **3 metres** back from the eaves of all buildings and **5 metres** above the top of the roof. Branches that may fall on the house must also be removed. In the **BPZ** the following is 'recommended'; the spacing of individual or groups of trees should be 15 metres apart to provide for a 5 metres separation between tree crowns. There is also a requirement of 2.5 metres between trees and power lines so they do not come into contact and start a fire or bring down a power line.
2) **Hazardous and Flammable Materials** means the accumulation of fuel including burn piles (living or dead) such as leaf litter, twigs, trash, bush, dead trees and scrub capable of carrying a running fire, but excludes standing living trees and isolated shrubs. **NOTE:** All remaining vegetation, piles of timber, branches and other living vegetation must be maintained to a height of no greater than 10 centimetres. To measure and determine fuel loads use DFES's *Visual Fuel Load Guide* at http://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/pages/publications.aspx#5 and select *Visual Fuel Load Guide Swan Coastal (Part 1 & 2).* Surface bush fire fuels should be kept low to the ground.
3) **Hazard Separation Zones (HSZ)** A HSZ is a modified area of reduced fuel load outside of the BPZ and is recommended to assist in reducing the fires intensity when flames are approaching buildings. Both the BPZ and the HSZ are essential strategies for the protection of buildings. A HSZ covers the area 75 metres outside the BPZ.
The HSZ should be modified to have a maximum fuel load of 6-8 tonne per hectare. This can be implemented by fuel reduction methods such as burning, mowing and slashing to remove the hazard. This should not require the removal of living trees or shrubs. **REMEMBER:** reduce the fuel level of the fire to lower the intensity of the blaze. Further information on fuel loading can be found in the *Visual Fuel Load Guide* available by calling DFES or via their website at www.dfes.wa.gov.au
4) **Fire Management Plan (FMP)** A FMP is a comprehensive plan for the prevention and control of bushfires which may apply to individual land holdings. A notification, pursuant to the Transfer of Land Act 1893 (as amended) may be placed on the Certificate(s) of Title of the land for medium to long term fire management to reduce the occurrence and minimise the impact of uncontrolled bush fires, thereby reducing the threat to life, property and the environment. The land owner must comply with the FMP. **Building in bush fire prone areas**, new dwellings and other forms of accommodation, as well as additions to existing buildings are to be constructed in accordance with in *Australian Standard 3959-2009.* In designated bush fire prone areas, the minimum BPZ in all cases shall be 25 metres. Further information on this and other information relating to fire safety issues can be found on the City's website www.busselton.wa.gov.au

Appendix B Risk Analysis

RISK ANALYSIS

NSW Rural Fire Service, 2014, Development Planning: A guide to developing a Bushfire Emergency Management and Evacuation Plan

Site Information		
Type of premise	Community use	
Occupants	Tourists (camping / caravan or accommodation) for adults / youth/ children	
Needs	Unfamiliar with locality and may be unfamiliar with English language.	
Special health considerations	Occupants are able bodied, but some may suffer asthma/breathing difficulty in the presence of smoke.	
Facility is in a bushfire prone area	Yes	
Evacuation		
How accessible is the premise	Caves Road provides access from the Site to two different destinations in two different directions.	Suitable
Quality of roads	Caves Road is a major road with 8 m wide horizontal and 6 m vertical clearance.	Suitable
Does the transport route go through a bush fire prone area	Yes, the Site is bushfire prone including Caves Road. However as two access routes are available, it is unlikely both routes will be blocked in the event of a bushfire.	Suitable
Shelter		
Building conditions	The current buildings within the Site were constructed prior to the requirements of *Guidelines for Planning in Bushfire Prone Areas* with the application of AS3959-2009. Camping tents and caravans are not required to meet the requirements within AS3959-2009 as these are temporary structures.	Limited
Is the premise likely to be affected by significant radiant heat	The areas within the Site are rated as BAL-40 and BAL-FZ. However there are areas that will be retained in a low fuel state with a Refuge Open Space within BAL-2 to be used in the event of a bushfire. A Refuge Open Space is available within BAL-2 which represents safe conditions.	Suitable
Is a defendable space available	Yes, firebreaks, access tracks, Asset Protection Zones and areas maintained in a low fuel state are within each sublot.	Suitable
Is there a designated assembly point	Yes, each Leaseholder has a designated assembly point.	Suitable

Are ground conditions maintained	Yes, firebreaks, access tracks, Asset Protection Zones and areas maintained in a low fuel state according to the *Guidelines for Planning in Bushfire Prone Areas* are within each sublot.	Suitable

CONCLUSION

Early Evacuation - Summary	
Are occupants' needs better suited to evacuation	It is not a primary or essential place of residence. Evacuation early in the development of the fire is the best course of action, non-permanent accommodation including tents and caravans will not provide sufficient protection from a bushfire attack. In the event that early evacuation to a townsite has failed or is not possible, the Manager will direct guests to move to the Refuge Open Space area.
Destination	Busselton town centre or Dunsborough town centre via Caves Road
Transport	Private vehicle
Are special needs addressed	Special needs occupants are not a specific target, but individual care must include evacuation, ie the vehicle for arrival must be available.

Refuge Open Space - Summary	
Is the area fit for purpose	Yes, subject to the implementation of the Bushfire Management Plan. The Refuge Open Space is an area within the Site that has been calculated to experience a BAL-2 (radiant heat of 2 kW/m^2 or less) in a bushfire event (calculations in Appendix D).
Is the area maintained in a low fuel state	Within the Site areas will have Asset Protection Zones with grass maintained under 10 cm and trees with lower branches pruned to 2 m high.
Is there a designated area away from a direct threat of bushfire	Yes. The Refuge Open Space is a designated area away from a direct threat of bushfire as it has been calculated to have a radiant heat of BAL-2, or lower, as shown in the Bushfire Emergency Evacuation Plan.
Has the area appropriate defendable space	Yes, the beach is mostly cleared of vegetation with areas within the Site with firebreaks and Asset Protection Zones.
Are there amenities provided	Yes, each sublot which is currently leased will have water and toilets.
Is there disabled access to the area	No, access across sand to the Refuge Open Space may be difficult for those with disability. Support from the Manager will be required.
Is there sufficient supervision of occupants	Yes, the facilities will be hosted. Occupants will be unfamiliar with bushfire and may become distressed. Clear explanation and instruction is required.

Appendix C Bushfire Emergency Evacuation Plan

BUSHFIRE EMERGENCY EVACUATION PLAN

To be reviewed by the City of Busselton on an annual basis.

FACILITY DETAILS

Location	Lot 5303 Locke Estate, Caves Road, Siesta Park
Contact Person	Refer to Appendix H
Position	Leaseholders
Phone	Refer to Appendix H
Occupants	Refuge Open Space can accommodate 1,825 people

Table 1 Emergency Contact Details

Name of Organisation	Service Provided	Phone Number/Website
Fire Brigade	Report a fire/receive assistance	000
Department of Fire & Emergency Services (DFES)	Alerts and Warnings, Fire Danger Ratings, Total Fire Bands	13 3337 www.dfes.wa.gov.au twitter.com/dfes.wa
Bureau of Meteorology bom.gov.au/weather/WA	Fire Danger Ratings and Weather	bom.gov.au/weather/wa
ABC Local Radio South West WA	News and Updates	Radio frequency 684 AM http://www.abc.net.au/southwestwa/

CARING FOR VULNERABLE PEOPLE

The maximum Bushfire Attack Level that will be experienced at the peak of the fire within the proposed buildings is BAL-29 with areas of the existing facilities within BAL-FZ. By comparison this is well above the level of human tolerance (BAL-3). Early evacuation from the Site in the case of a bushfire in the area is vital for preservation of life.

Fire typically has a progressive build up to a peak followed by a progressive decay; the peak (fire front) lasting between two to five minutes.

Conditions during a fire can be hazardous and frightening. Ignited embers and heavy smoke can be expected, visibility can be significantly reduced, and it can be extremely windy and noisy. Unless prepared, and as may be expected of vulnerable visitors – people can become frightened and make dangerous choices. For this reason, **early evacuation to a townsite is the best option**.

The **Refuge Open Space should only be used as a last resort**, when evacuation becomes unsafe, as heat, smoke and embers from a bushfire event will impact guests when within the Refuge Open Space. The likely wind direction during a bushfire event will be from the south or south west, which is also the location of the bushfire and therefore will increase the impacts of smoke and embers on those within the Refuge Open Space. While the Refuge Open Space has been calculated to be within a BAL-2 area, and should preserve life, the conditions will be distressing and traumatic, particularly for children. Therefore, **early evacuation to a townsite should always be considered as the primary and priority option**.

METHODS OF WARNING

The Department of Fire and Emergency Services (DFES) provides community and emergency advice about predicted and current conditions that advise about the level of bushfire threat.

The Fire Danger Rating (FDR) is based on the forecast weather conditions, the higher the rating the higher the threat. During Summer, a 'High' FDR is likely to be issued frequently and therefore the seasonal and daily actions (refer to below) are provided to manage this risk.

'Extreme' or 'Catastrophic' ratings are the highest level and represent unsafe conditions. On days where these FDR levels are achieved (or if known the day prior) guests will be advised by the Manager of the heightened risk of a bushfire event that could occur at any time and that as a minimum they must vacate the area and stay within a lower bushfire risk area (for example within Busselton town centre) during the hottest part of the day (for example 10 am to 4pm). Due to the heightened risk of a bushfire event on these Extreme and Catastrophic days with the possibility of a bushfire event occurring at any time, including at night, guests will be informed by the Manager of the evacuation and refuge procedures and be prepared to evacuate or move in their vehicles to the Refuge Open Space area should a bushfire event arise.

A ‘Catastrophic’ rating is the highest level and on days where this FDR level is achieved (or if known the day before) guests will be advised that the safest option is for them to leave the facility and find alternative accommodation within an area of lower bushfire risk. It is however acknowledged that this may not be a viable option for all guests, it is likely a Catastrophic day would occur in peak tourist season and other accommodation options may be booked out. Rather than forcing guests to leave with nowhere else to go, they will be asked to leave the park during the hours of 10 am to 4 pm as advised above if they are unable to find alternative accommodation in a lower bushfire risk area.

It is assumed visitors are able bodied, can smell smoke and see fire and understand the English language.

It is recommended that people use a range of sources to stay up to date about a bushfire. This includes using the sources listed in Table 1, being alert and aware of your surroundings and talking with neighbor’s and visitors about your actions.

PREPARATION

Firefighting equipment

Install the following firefighting equipment (Leaseholders):

1. Fire extinguishers within each kitchen with instruction of use
2. Water hose able to reach every part of the building and caravan / camping site
3. Display the emergency evacuation diagram within each accommodation building or kitchen.

Seasonal preparation

Prior to each bushfire season, approximately December to March each year, it is important to be aware of the potential bushfire climate. The Bureau of Meteorology produces a quarterly climate outlook video which includes an assessment on the potential for a bushfire. It is recommended to watch this video prior to each bushfire season (Table 1). In addition, Leaseholders are to ensure that they comply with *Shire of Busselton Health Local Laws 1997 - Part 8 Lodging House* and /or *Caravan Parks & Camping Grounds Act 1995* & *Caravan Parks & Camping Grounds Regulations 1997* as applicable.

Conduct seasonal works, to be undertaken at the commencement of the Bushfire Season (Leaseholder):

1. Ensure all access ways have the appropriate vertical and horizontal clearances in good traversable condition.
2. Ensure Asset Protection Zones are maintained in a low-fuel state.
3. Ensure all gas cylinders are positioned with pressure relief valve facing away from the building and not within 6 m of a flammable material.

4. Ensure fire hoses and firefighting equipment is in working order. Check the charge level on all fire extinguishers is adequate.
5. Ensure all emergency contacts are current including contacts with neighbouring Managers.
6. Ensure written evacuation procedures are current and Managers are fully conversant with the procedures.
7. Ensure evacuation logistics and resourcing are fully provided for.
8. Ensure the plan and evacuation details are clearly displayed and conveniently located for all visitors, with a copy of the emergency evacuation plan diagram provided to all guests on their arrival at the Site.
9. Verify contacts.
10. Ensure the Refuge Open Space area is clearly understood and location is clearly known.
11. Ensure arrangements have been made for fire drills to be conducted prior to and during the bushfire season and that fire drills are conducted.

Daily preparation during the fire season

Conduct daily preparation during the fire season, during the day as appropriate (Leaseholder):

1. Check the DFES website for any alerts.
2. Ensure visitors upon arrival are bushfire aware and familiar with the importance of early evacuation to a townsite and that the use of Refuge Open Space is a last resort only, as well as being aware of the evacuation procedures.
3. Ensure evacuation logistics and resourcing are fully provided for and immediately accessible, including that a suitable vehicle is immediately accessible to evacuate all guests.
4. Inspect grounds to:
    - Ensure flammable materials are not stored adjacent to buildings.
    - Ensure firefighting equipment and access-ways are clear of any obstructions.

CONTROLLED EVACUATION

Action Triggers

A controlled evacuation is defined as an evacuation of all personnel and guests where there is adequate time to allow guests to pack up and leave with their belongings. An evacuation can trigger an emotive response and allowing enough time for guests to gather their belongings and evacuate to a secure

location, away from the risk of fire is the preferred course of action. It should be noted that a bushfire situation can change rapidly and an emergency evacuation may need to be triggered during a controlled evacuation. Regular communication to guests should be maintained at all times to ensure the evacuation type is adequately communicated. The triggers for a controlled evacuation are:

- Direct advice or Watch and Act warning from Emergency services (DFES, Police);
- Signs of smoke arising from nearby areas; or
- Fire within 3 kms or 3 hrs of the Site.

Actions

Upon a direct instruction from Emergency Personnel aware of your circumstance, follow their evacuation instructions.

Evacuate to Busselton town centre or Dunsborough town centre:

1. Notify all personnel and guests.
2. Account for all persons.
3. Allow guests to collect their belongings and connect caravans.
4. In a life threatening emergency call triple zero (000).
5. Drive east on Caves Road to Busselton town centre (option A), or west on Caves Road to Dunsborough town centre (option B), or away from the fire according to advice.

EMERGENCY EVACUATION

Action Triggers

The triggers for an emergency evacuation are:

- Direct advice from Emergency services (DFES, Police);
- Signs of smoke arising from the immediate surrounds; or
- Fire within 1 kms or 1 hrs of the Site.

Actions

Upon a direct instruction from Emergency Personnel aware of your circumstance, follow their evacuation instructions.

Evacuate to Busselton town center or Dunsborough town centre:

1. Notify all personnel and visitors.
2. Account for all persons.
3. Encourage guests to leave immediately and do not allow caravans to leave.
4. In a life threatening emergency call triple zero (000).
5. Drive east on Caves Road to Busselton town centre (option A), or west on Caves Road to

Dunsborough town centre (option B), or away from the fire according to advice.

REFUGE OPEN SPACE

LAST RESORT ONLY – OPTION C - USE ONLY IF EVACUATION VIA OPTIONS A AND B HAVE FAILED – RESORT TO REFUGE OPEN SPACE

The Refuge Open Space should only be used as a last resort, when evacuation during a bushfire event becomes unsafe, as heat, smoke and embers will impact guests when within the Refuge Open Space. While the Refuge Open Space has been calculated to be within a BAL-2 area, and should preserve life, the conditions will be distressing and traumatic, particularly for children. Therefore, early evacuation should always be considered as the primary and priority option.

Alert Triggers

Uncontrolled fire observed, in or adjacent to the Site, or a DFES Emergency Warning to Stay in Place has been issued.

Actions

1. Call - 000 – DFES and notify them of your actions;
2. Notify all personnel and Guests to proceed to the designated Refuge Open Space and to remain there;
3. Account for all persons;
4. Check for regular updates by using the contact details provided in Table 1;
5. Call 000 for any life threatening emergency;
6. Once the All Clear has been issued from Emergency Services or when the fire front has passed and conditions appear safe, vacate the Refuge Open Space and inspect the Site for any smoldering fires which are to be extinguished (Manager only);
7. Once the Site appears safe allow Guests to return to their belongings.
8. Manager to ensure all guests have adequate accommodation and transport to vacate the area once ready to do so.

EVACUATION DIAGRAM

If you see smoke, fire within 3 hrs or 3 km,

EVACUATE

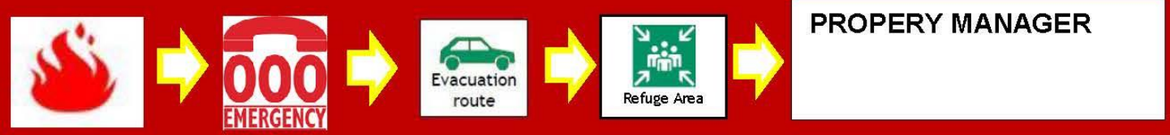
1. Call 000 Fire
2. Close all windows
3. Head to Busselton or Dunsborough via Caves Road
4. Advise Property Manager
5. Return when safe

If you see fire, or direct advice from DFES

REFUGE OPEN SPACE –LAST RESORT

1. Call 000 Fire
2. Proceed to the Refuge Open Space area immediately.
3. Do not leave Refuge Open Space Area until advised it is safe to do so by emergency services.

Notify guests of the heightened bushfire risk on Extreme or Catastropic days with the advice to remain in low bushfire risk areas (within Dunsborough Town). Monitor the ABC Local Radio South West WA, 684 AM, or the DFES website for updates.



Appendix D Refuge Open Space Calculations

Refuge Open Space Calculations

An area of BAL-2 or less has been determined to the north of the Site along Geographe Bay, for guests to use as a Refuge Open Space as an emergency option in the event of a bushfire. This option is to be used as a last resort only, in the event a bushfire is within the Site and the evacuation route becomes inaccessible.

The area available for use as Refuge Open Space has been determined based on the setbacks required from each vegetation plot to achieve a BAL-2 or lower rating. These setbacks have been determined by using a method 2 calculation with an increased flame temperature of 1200 k, as required by the *Design and Construction of Community Bushfire Refuges* (ACBC, 2014), compared to a default value of 1090 k used in method 1 calculations. For Plot 3 Class B Woodland upslope / flat and Plot 4 Class D Scrub upslope / flat, the narrow vegetation results in a reduced potential flame width, which has also been used in the method 2 calculations for these plots, with the potential flame width calculated using the Transect 1 and Transect 2 lengths in the DFES short fire run calculator, as described in Section 2.2.1 of the Locke Estate, Caves Road, Siesta Park BMP, compared to the 100 m default flame length used in method 1 calculations. The default method 1 inputs were used for all other parameters for all vegetation plots, as described in Section 2.1.1 of the Locke Estate, Caves Road, Siesta Park BMP. The method 2 calculations for each plot, detailing the setbacks required to achieve a BAL-2 or lower rating, are provided in Figure 1, 2, 3 & 4 below. This results in an approximate area of BAL-2 to be 3,650 m^2.

The maximum occupancy of the Refuge Open Space has been determined by allowing 2 m^2 per person within the BAL-2 area, with an approximate total area 3,650 m^2 the Refuge Open Space can accommodate 1,825 people. The area allocated for each person within the Refuge Open Space has been determined based on allowing people to sit or stand huddled together. There is no guidance provided on the amount of area required for each person in an emergency situation (*NSW Rural Fires Service*, 2017) and it is anticipated in an extreme event, such as a bushfire, people will want to stay in close proximity to each other.

The Refuge Open Space is along the water line of Geographe Bay, which has a shallow sand bank along the front of Locke Estate with a depth of less than 1 m Mean Higher High Water (average high tide height) for approximately 500 m from the shoreline according to the Cape Naturaliste Nautical Chart published by the Department of Transport. Therefore, even during high tide, there will be adequate area for guests to stand in the Refuge Open Space.

Table 1 Distances required for the Refuge Open Space to achieve BAL-2

Method 2 BAL Determination			
Fire Danger Index - 80 (AS3959-2009 Table 2.1)			
Vegetation Classification	**Effective Slope Under the Classified Vegetation (degrees)**	**Separation Distance to the Classification Vegetation (metres)**	**Radiant heat flux**
Plot 1 Class A Forest	Upslope / Flat	Minimum 155 m	1.93 kw/m^2
Plot 2 Class B Woodland	Upslope / Flat	Minimum 120 m	1.98 kw/m^2
Plot 3 Class B Woodland	Upslope / Flat	Minimum 53 m	1.94 kw/m^2
Plot 4 Class C Scrub	Upslope / Flat	Minimum 26 m	1.97 kw/m^2
		Determined Bushfire Attack Level	**BAL-2**

Calculated February 25, 2019, 1:26 pm (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Surface fuel load	25 t/ha	Flame angle	83 °
Overall fuel load	35 t/ha	Panel height	19.65 m
Vegetation height	n/a	Elevation of receiver	9.82 m
Effective slope	0 °	Fire intensity	43,400 kW/m
Site slope	0 °	Transmissivity	0.7
Distance to vegetation	155 m	Viewfactor	0.0246
Flame width	100 m	Radiant heat flux	1.93 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

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

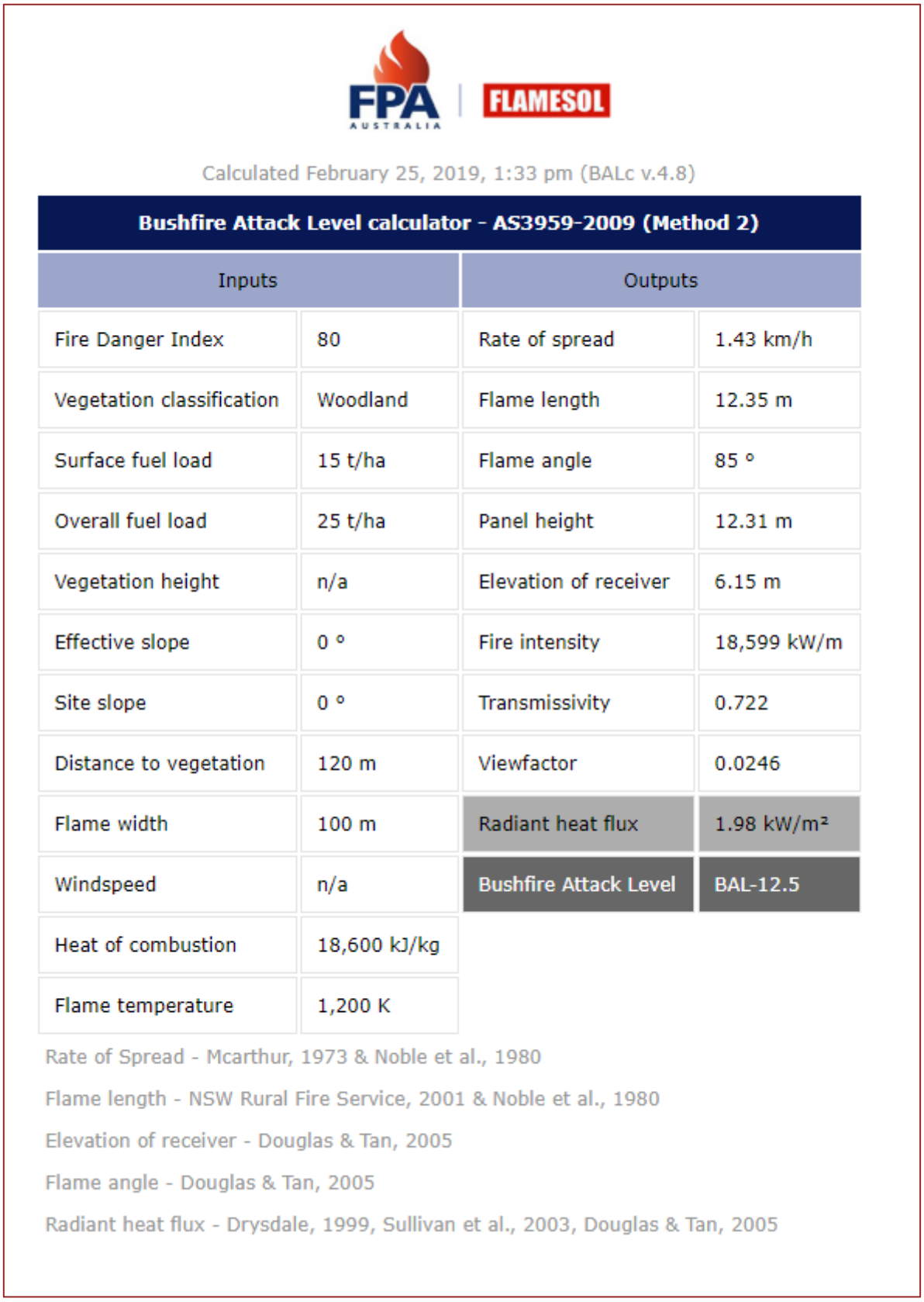
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Figure 1 Calculation for Plot 1 Class A Forest Upslope / Flat



Calculated February 25, 2019, 1:33 pm (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.43 km/h
Vegetation classification	Woodland	Flame length	12.35 m
Surface fuel load	15 t/ha	Flame angle	85 °
Overall fuel load	25 t/ha	Panel height	12.31 m
Vegetation height	n/a	Elevation of receiver	6.15 m
Effective slope	0 °	Fire intensity	18,599 kW/m
Site slope	0 °	Transmissivity	0.722
Distance to vegetation	120 m	Viewfactor	0.0246
Flame width	100 m	Radiant heat flux	1.98 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

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

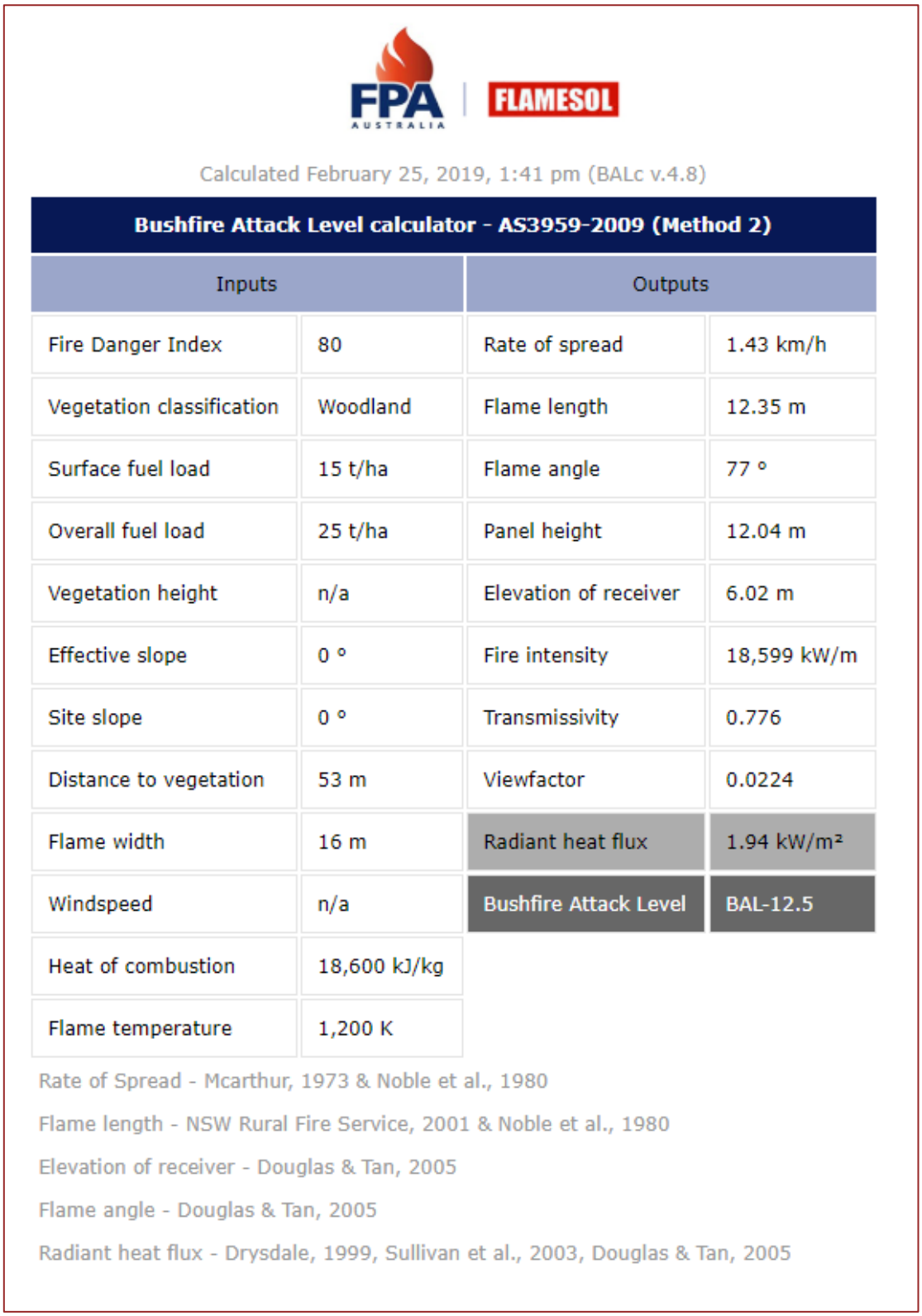
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Figure 2 Calculation for Plot 2 Class B Woodland Upslope / Flat



Calculated February 25, 2019, 1:41 pm (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.43 km/h
Vegetation classification	Woodland	Flame length	12.35 m
Surface fuel load	15 t/ha	Flame angle	77 °
Overall fuel load	25 t/ha	Panel height	12.04 m
Vegetation height	n/a	Elevation of receiver	6.02 m
Effective slope	0 °	Fire intensity	18,599 kW/m
Site slope	0 °	Transmissivity	0.776
Distance to vegetation	53 m	Viewfactor	0.0224
Flame width	16 m	Radiant heat flux	1.94 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

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

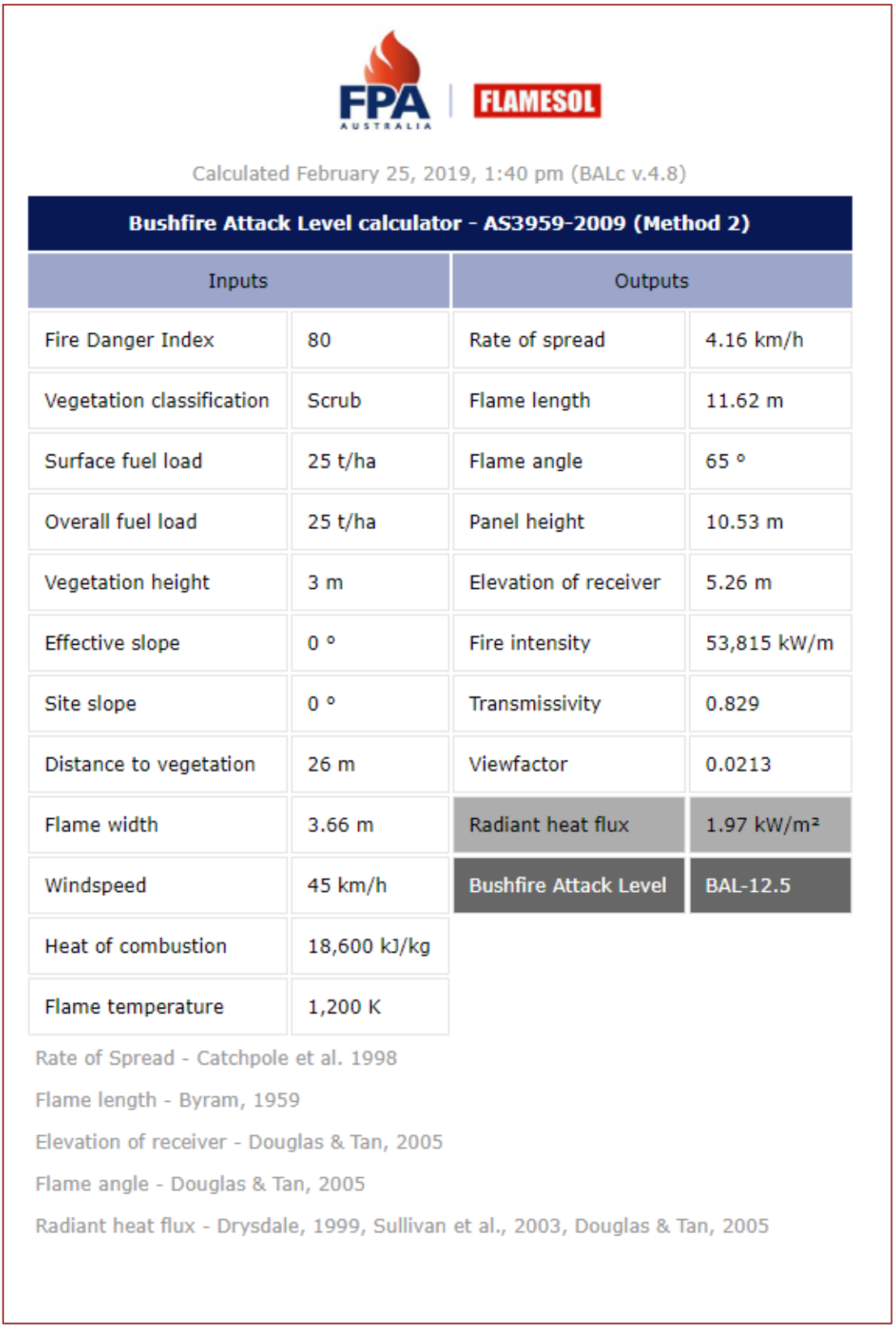
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Figure 3 Calculation for Plot 3 Class B Woodland Upslope / Flat



Calculated February 25, 2019, 1:40 pm (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Surface fuel load	25 t/ha	Flame angle	65 °
Overall fuel load	25 t/ha	Panel height	10.53 m
Vegetation height	3 m	Elevation of receiver	5.26 m
Effective slope	0 °	Fire intensity	53,815 kW/m
Site slope	0 °	Transmissivity	0.829
Distance to vegetation	26 m	Viewfactor	0.0213
Flame width	3.66 m	Radiant heat flux	1.97 kW/m²
Windspeed	45 km/h	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

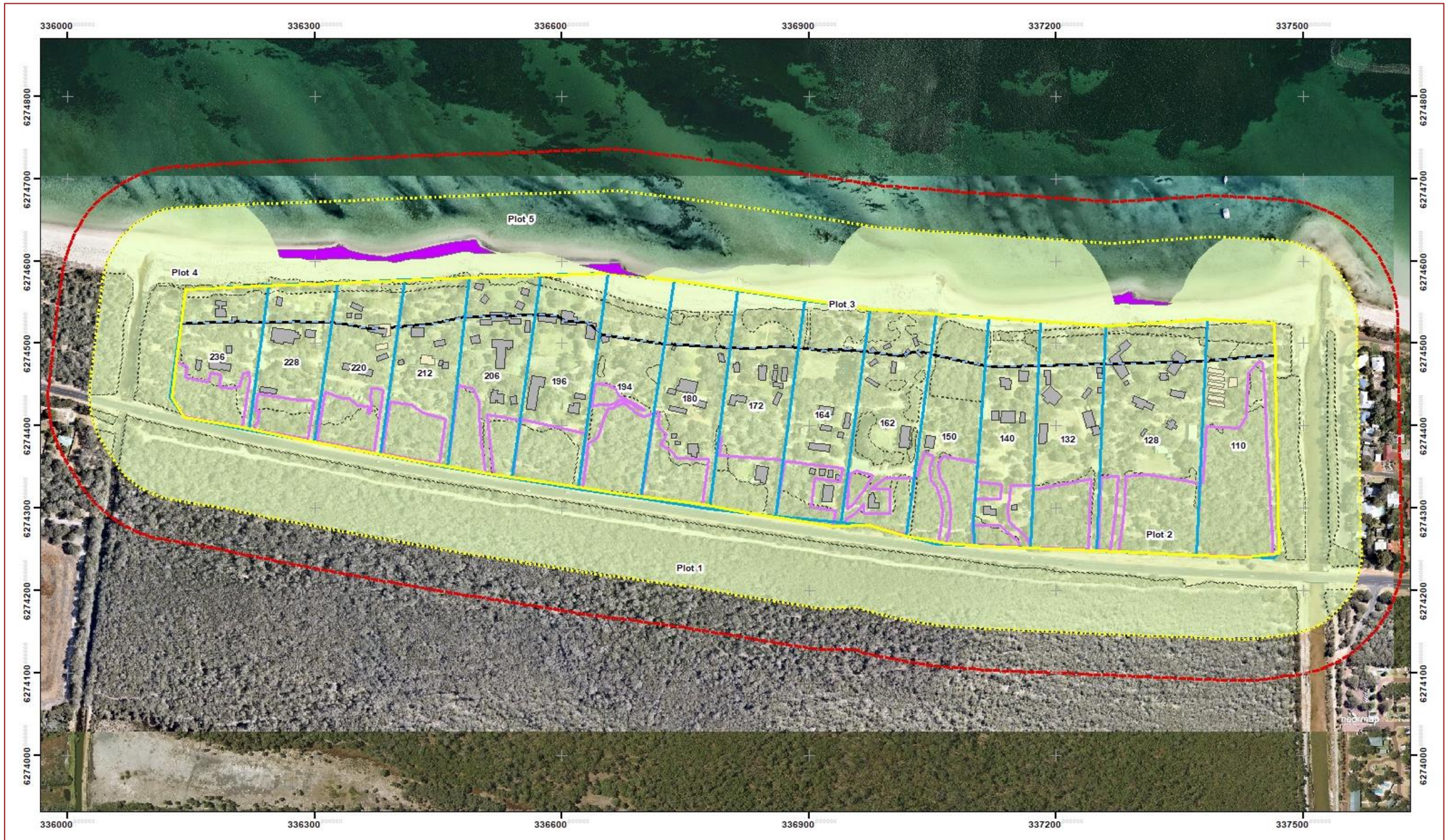
Flame angle - Douglas & Tan, 2005

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

Figure 4 Calculation for Plot 4 Class D Scrub, Upslope / Flat

Potential Bushfire Attack level

Based on the calculations with the above inputs, the distances required from each vegetation plot to achieve a BAL-2 or lower rating is illustrated spatially below.



Location details: Locke Estate Caves Road, Siesta Park
Project: 18620
Assessment date: 5 & 7 Feb 2019
Prepared by: D Plowman
Accreditation level: Level 1
Accreditation number: BPAD46554
Accreditation expiry date: Aug 2019
Date aerial photo: Sep 2018

Refuge Open Space

0 40 80 160 240 Meters

N

- Lot Boundary
- Sublot Boundaries
- 100 m Vegetation Assessment Area
- 150 m Assessment
- Coastal Setback Zone
- Conservation Zone
- Existing Buildings
- Proposed building
- BAL-2 Contour
- Post development Vegetation Classification
- Refuge Open Space

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Figure 5 Refuge Open Space Map

Appendix E Method 2 Calculations

Calculated February 11, 2019, 4:38 pm (MDc v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	1.43 km/h
Vegetation classification	Woodland	Flame length	12.35 m
Surface fuel load	15 t/ha	Flame angle	42 °, 47 °, 52 °, 57 °, 60 ° & 73 °
Overall fuel load	25 t/ha	Elevation of receiver	4.13 m, 4.51 m, 4.86 m, 5.18 m, 5.35 m & 5.9 m
Vegetation height	n/a	Fire intensity	18,599 kW/m
Effective slope	0 °	Transmissivity	0.883, 0.873, 0.861, 0.847, 0.84 & 0.789
Site slope	0 °	Viewfactor	0.5921999999999999, 0.4319, 0.2873, 0.1931, 0.1557 & 0.0415
Flame width	16 m	Minimum distance to < 40 kW/m²	9.499999999999982 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	11.59999999999997 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	14.59999999999996 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	17.99999999999999 m
		Minimum distance to < 10 kW/m²	20.10000000000002 m

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

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

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Calculated February 14, 2019, 5:08 pm (MDc v.4.8)

Minimum Distance Calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Surface fuel load	25 t/ha	Flame angle	22 °, 25 °, 30 °, 36 °, 39 ° & 58 °
Overall fuel load	25 t/ha	Elevation of receiver	2.17 m, 2.45 m, 2.9 m, 3.41 m, 3.65 m & 4.93 m
Vegetation height	m	Fire intensity	53,815 kW/m
Effective slope	0 °	Transmissivity	0.896, 0.892, 0.887, 0.88, 0.875 & 0.841
Site slope	0 °	Viewfactor	0.5732, 0.4243, 0.281, 0.184, 0.1465 & 0.039
Flame width	3.66 m	Minimum distance to < 40 kW/m²	7.29999999999999 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	7.999999999999988 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	9.099999999999984 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	10.49999999999998 m
		Minimum distance to < 10 kW/m²	11.39999999999998 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Appendix F Revegetation Plan for Coastal Setback Zone

General Strategies

Several broad revegetation strategies are adopted within this plan.

- All plant species used are endemic to the local landscape and surrounding native vegetation.
- Only plants appropriate to the soil type and coastal environment will be used.
- All plants are to be planted as tube stock. The quality of tube stock is to be guaranteed by the nursery.
- All plants are to be free of disease symptoms and nutrient deficiencies and possess well developed root systems.
- Species were chosen specifically to provide habitat for fauna such as the Western Ringtail Possum, Southern Brown Bandicoot and small bird species, and to be able to withstand the harsh coastal environment for erosion protection.
- Revegetation areas have been allocated based on fire management considerations, described in Section 3.2. of the Locke Estate, Caves Road, Siesta Park BMP. This is also shown visually in Figure 4 and 10.
- This Revegetation Plan has been prepared with regards for the potential of any planted material to become a fire hazard upon maturity. Consideration has been given for AS 3959-2009 and *Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017)*.
- Each revegetation area is to have species that will produce a continuous canopy with an average maximum height of 4 m, allowing the mature state of planting to be classified as Closed Scrub 13, Class D Scrub, from AS 3959-2009 (Figure 11).
- The width of revegetation is to be a maximum of 10 m from planted trunks to the northern lot boundary, or to the vegetation boundary where coastal erosion has occurred. A reduced width can only be applied to ensure an 8 m setback from any existing building is applied for the building to be located within BAL-29, as per the Method 2 calculation shown in Section 2.1.1. of the Locke Estate, Caves Road, Siesta Park BMP.
- An access path to the beach can be retained through the revegetated area.

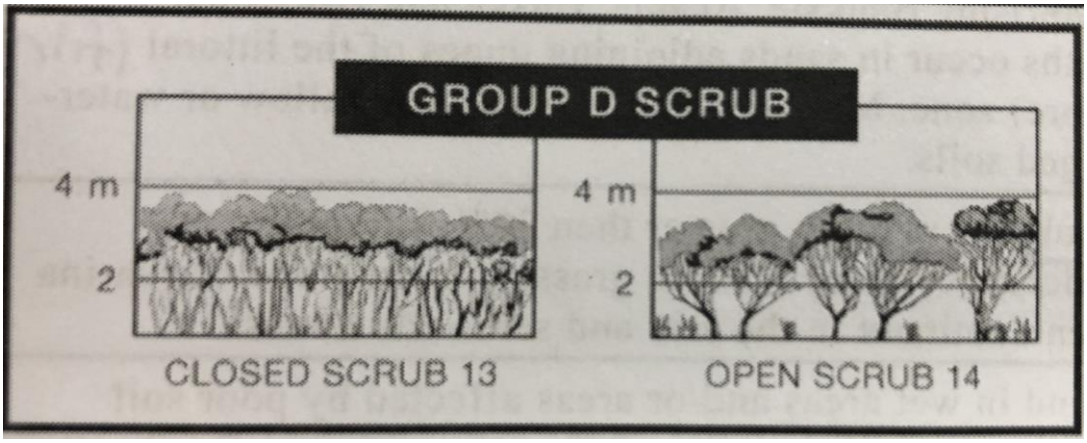

Figure 11 Revegetation area to comply with Class D Scrub (AS 3959-2009)

Revegetation Methodology

The approach to revegetation will be the same in each area outlined below.

Weed Control

Weed control is a major factor for the successful establishment of vegetation across the proposed development.

Most of the Site is dominated by grassy weeds which can present a flashy fuel hazard. These will need to be controlled prior to any ground preparation and planting. Grass weeds within the Site include, but are not limited to, Kikuyu (*Pennisetum clandestinum*), Veldt Grass (*Ehrharta calycina*) and Tambookie Grass (*Hyparrhenia hirta*).

The area will be ripped to remove grasses or will be sprayed with an appropriate herbicide, prior to planting.

- The revegetation areas should be slashed to remove the bulk of grass weeds.
- Given the presence of highly invasive grass weeds, a Fluazifop herbicide (E.g. Fusillade) should be used to control grass weeds.
- Extreme caution needs to be applied to ensure that any overspray of chemicals does not affect native vegetation. Chemical treatment must only occur when weather conditions are stable with no wind or rain.
- An initial spraying of the areas to be planted, with a translocated (systemic) knockdown herbicide (e.g. Glyphosate) will occur at an appropriate rate. This aims to reduce any seed set at the site. Bioactive

formulations will be used to ensure that there are no adverse effects in winter wet areas or dams that are likely part of a wider water catchment area.

- Once each site has been ripped, a mixture of knockdown and residual herbicide (e.g. Glyphosate, Simazine mix) will be sprayed along each mound.
- Approximately 1 week before any planting, the site will be inspected for weed invasion. If the weed burden is high, a further knockdown and residual mix will be applied. The chemical used will be appropriate for the species found.
- The WA Department of Agriculture and the Local Government authority are to be consulted for the most appropriate control methods and/or chemicals for all site preparation and weed management before and during revegetation across the proposed development site.
- Further inspections and weed control will be conducted within the revegetation areas and the remnant vegetation within the Site as necessary, as part of the monitoring programme outlined below.

Soil Preparation

All of the revegetation areas will need to be prepared to produce loose, well-drained and aerated soils, ready for plant establishment.

- In conjunction with the weed control measures outlined above, holes will be augured or dug to a depth that allows the plants to be planted at a depth 2/3 of total plant height. This will assist root development and increase plant survival, vigour and stability.
- Place a small amount of coastal wetting agent at the bottom of the hole. This will maintain water around plant roots and assist with soil hydrophobia.
- Where possible the holes will be mounded to allow for increase aeration and water holding capacity.
- Holes should be established in April to May, prior to planting, when the soils are relatively dry to optimise the shattering effect.

Pest Management

There are a number of pests that can affect revegetation activities. Rabbits and kangaroos have the potential to damage and destroy emerging seedlings. Tree guards (corflute with a jarrah stake) need to be installed for all seedlings planted at the site to protect them from grazing animals (and also provide a beneficial microenvironment for the plants early establishment). Tree guards can become a liability /amenity problem and can cause problems for plants if left too long once plants have established and should be removed two years post planting or when plants are outgrowing guards.

Planting

Planting will occur in autumn/early winter or immediately after the first few days of rain for the season.

- Seedlings will be planted by hand using Potti-Putki tree planter or mechanical planter at an average spacing of 1 m between plants.
- Tree guards and stakes will be installed around each seedling planted.

Dense planting of species is important to provide protection for the Southern Brown Bandicoot. The minimum density is provided in Table 1 with a suitable species list for coastal vegetation with an average height of 4 m is provided in Table 2.

Table 8 Revegetation Density

Sublot Number	Approximate Area	Density	Approximate total number of plants
128	10 m depth by 122 m wide Total 1,220 m^2	1 m^2	610*
132	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
140	10 m depth by 40 m wide Total 400 m^2	1 m^2	80*
194	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
196	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
206	10 m depth by 80 m wide with 6 m separation from any building Total 650 m^2	1 m^2	650
212	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
220	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
228	10 m depth by 80 m wide Total 800 m^2	1 m^2	800
236	10 m depth by 800 m wide Total 1,000 m^2	1 m^2	1,000

* Currently vegetated, assuming 50 % current density

Table 9 Revegetation Species List

Species*	Maximum Height	Benefit
Trees		
*Agonis flexuosa**	10 m	Western Ringtail Possum
Shrubs		
*Melaleuca lanceolata**	5 m	High salt, wind & drought tolerance
Acacia saligna	4 m	Western Ringtail Possum
Acacia cyclops	4 m	Soil Stabiliser
Atriplex isatidea	2 m	Butterflies
Templetonia retusa	3 m	Birds
Scaevola crassifolia	3 m	Bees and Butterflies
Olearia axillaris	3 m	Soil Stabiliser
Spyridium globulosum	5 m	Soil Stabiliser
Hibbertia cuneiformis	3 m	Birds
Understorey		
Darwinia citriodora	1.5 m	Birds
Lepidosperma gladiatum	1 m	Southern Brown Bandicoot Western Ringtail Possum
Rhagodia baccata	0.5 m	Soil Stabiliser
Carpobrotus virescens	0.2 m	Soil stabiliser

*Maximum 2% of total species allowed

Environmental Weeds

The existing areas of remnant vegetation within the Site have a number of introduced flora species that are impacting upon the environmental values of the Site.

Some high priority weeds that are, or may become, a problem to agriculture or the environment can be formally "declared" under the *Agriculture and Related Resources Protection Act 1996*. When it is declared, a plant is placed in one or more categories according to the control strategies considered appropriate. Landowners with declared plants on their property are obliged to control them at their own expense.

Environmental weeds are plants that establish themselves in natural ecosystems and proceed to modify natural process, usually adversely, resulting in the decline of the communities they invade. They usually have no legal standing.

Impacts of environmental weeds on ecosystem function include:

- Resource competition;
- Prevention of seedling recruitment;
- Alterations to geomorphological processes;
- Alterations to the hydrological cycle;
- Changes to the soil nutrient status;
- Alterations to fire regimes;
- Changes to the abundance of indigenous fauna; and
- Genetic changes (CALM, 1999).

The impacts weeds have can vary between weed species. The Environmental Weed Strategy for Western Australia (CALM, 1999) ranks the potential effects of weed species based on three criteria:

- Invasiveness: the ability of the species to invade bushland in good or excellent condition;
- Distribution: the current or potential distribution of the species including consideration of known history of spread distribution elsewhere in the world; and
- Environmental impacts: the ability of the species to change the structure, composition and function of ecosystems.

This results in each Environmental Weed species have a priority rating of High, Moderate, Mild or Low.

Environmental weeds require management to ensure the long-term survival of the natural ecosystem. The management and control of environmental weeds should be seen in the context of the restoration of the environments they invade (CALM, 1999).

Environments undergoing disturbances often provide opportunities for weed species to establish and grow. Most weeds are spread by human activities, although a few invade by themselves through the

dispersal of seed by wind. The main sources include the dumping of garden refuse, via machinery (car tyres, graders, tractors) or through human movement through tracks etc.

The principal mechanisms for weeds establishing in an area include:

- Elevated nutrient levels (either run-off or fertiliser drift);
- Physical disturbances to the soil;
- Increased soil moisture from shading or reduced water infiltration; and
- Increased light at the margins of vegetation.

Underlying Principles

The major goals of controlling weeds within bushland areas are to allow the bush to regenerate and maintain and enhance its conservation values. The Bradley method of bush regeneration is one method that suits many situations as it does not involve replanting and allows native plants to re-establish themselves (Bradley 1971, Bradley, 1988, Buchanan, 1989). This approach involves the systematic removal of weeds to allow native plants to re-establish. While the approaches used in this strategy are based upon the Bradley method, we also utilise the appropriate and prudent use of herbicides to control weeds in certain circumstances (e.g. when the density of weeds is too high, or the physical removal is likely to enhance spread), which is not one of the original tenants of the approach. That being said, the underlying principles of the Bradley method are still advocated in our approach. These are listed below.

- *Always work from areas of native plants in good condition, and then move outwards towards more weed infested areas.*

Starting in areas of good condition provides an opportunity for these areas to remain in good condition and because the density of weeds is less, the feasibility of removing weeds from these areas and restoring ecological functions to the patch is higher. Starting by removing weeds scattered though otherwise weed-free bush prevents the deterioration of these areas. Within the Site, Vegetation C – *Taxandria linearifolia, Agonis flexuosa* over *Pteridium esculentum* is the vegetation in the best condition, and priority should be placed on weed management within this vegetation.

- *Make minimal disturbance.*

Most weeds need disturbance and sunlight for successful regeneration. By minimising the disturbance to the site, the chances of another suite of weed species replacing the one removed is reduced. Any soil that is disturbed should be returned in its original layers to ensure that any native seed stored in the soil will be able to germinate. This also applies to the natural mulch layers in a work area. After weeding, it is recommended that mulch from the surrounding area be added to any gaps that result, to minimise weed regeneration and enhance natural regeneration.

- *Let native plant regeneration dictate the rate of weed removal.*

Weeds need to be removed at a rate that allows for natural regeneration to occur; this is especially the case in areas where revegetation is not occurring. If a large area of weeds is removed at one time, the likelihood of another type of weed replacing the one removed is increased. If a small area is weeded at a time, native regeneration can occur at its own rate.

Weed Control Techniques

Weed control is defined as the removal or control of weeds using hand removal and or the application of selected herbicides. In specific circumstances, large machinery is used when the extent of the infestation is very large and will not cause significant destabilisation, erosion or other damage. Weeding techniques should be appropriate to the weed type, growth form and to the existing site conditions.

Where possible, weed removal should be carried out prior to the annual seed set. It is important to plan for herbicide control of target species according to a weeding calendar that recognises the weed's life form and seasonality (i.e. flowering, fruiting and seed set). Section 4.6 outlines a recommended weeding calendar for the site.

The application of herbicides must be conducted in accordance to the labelling requirements or the manufacturer's Material Safety Data Sheet and must be undertaken by personnel trained in the use of herbicide chemicals. The application of any herbicide for purposes not specified on the labelling requires an Off-Label Permit for the National Registration Authority in Canberra. Care must also be taken when applying herbicides near drainage lines and waterways to avoid excessive use, which is not only expensive and wasteful, but potentially damaging to the water bodies into which runoff will flow and the plants, animals and ecosystems that inhabit them.

A summary of Weed Control Techniques, based on the underlying principles previously outlined, follow. These are based on recommendations from the Australian Association of Bush Regenerators (AABR).

1- **Weeds with Underground Reproductive Structures Removal Techniques:**

Hand Removal of Plants with a Taproot

- Remove and bag seeds or fruits;
- Push a narrow trowel or knife into the ground beside the tap root, carefully loosen the soil and repeat this step around the taproot;
- Grasp the stem at ground level, rock plant backwards and forwards and gently pull removing the plant; and
- Tap the roots to dislodge soil, replace disturbed soil and pat down.

Crowning

- Remove and bag stems with seed or fruit;
- Grasp the leaves or stems together so the base of the plant is visible;
- Insert the knife or lever at an angle close to the crown;
- Cut through all the roots around the crown; and

- Remove and bag the crown.

Herbicide Treatment – Stem Swiping
- Remove any seed or fruit and bag; and
- Using an herbicide applicator, swipe the stems/leaves.

Considerations:
- Further digging may be required for plants with more than one tuber;
- Some bulbs may have small bulbils attached or present in the soil around them which need to be removed;
- It may be quicker and more effective to dig out the weed;
- Protect native plants and seedlings; and
- For bulb and corm species the most effective time to apply herbicide is after flowering and before fruit is set.

Exotic vegetation should be removed and stockpiled in a clear area away from adjoining bushland. This stockpile should be removed from the site at a convenient time. As part of the regular maintenance of the restored area any re-growth of the exotic plant species should be removed and disposed of appropriately.

2- Small Hand-Pullable Plants Removal Techniques:

Hand Removal
- Remove any seeds or fruits and carefully place into a bag;
- Grasp stem at ground level, rock plant backwards and forwards to loosen roots and pull out; and
- Tap the roots to dislodge any soil, replace disturbed soil and pat down.

Considerations:
- Leave weeds so roots are not in contact with the soil, e.g. hang in a tree, remove from site or leave on a rock.

3- Woody Weeds Removal Techniques:

Cut and Paint (Woody weeds to 10 cm basal diameter)
- Make a horizontal cut close to the ground using secateurs, loppers or a bush saw; and
- Immediately apply herbicide to the exposed flat stump surface.

Considerations:
- Cuts should be horizontal to prevent herbicide from running off the stump, sharp angle cuts are hazardous;
- Herbicide must be applied immediately before the plant cells close (within 30 seconds) and translocation of herbicide ceases;
- If plants resprout cut and paint the shoots after sufficient re-growth has occurred; and
- Stem scraping can be more effective on some woody weeds.

Stem Injection

- At the base of the tree drill holes at a 45 degree angle into the sapwood;
- Fill each hole with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

Frilling or Chipping

- At the base of the tree make a cut into the sapwood with a chisel or axe;
- Fill each cut with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

Considerations:

- Plants should be actively growing and in good health;
- Deciduous plants should be treated in spring and autumn when leaves are fully formed;
- For multi-stemmed plants, inject or chip below the lowest branch or treat each stem individually; and
- Herbicides must be injected immediately before plant cells close (within 30 seconds) and translocation of herbicide ceases.

4- Vines and Scramblers Removal Techniques:

Hand Removal

- Take hold of one runner and pull towards yourself;
- Check points of resistance where fibrous roots grow from the nodes;
- Cut roots with a knife or dig out with a trowel and continue to follow the runner;
- The major root systems need to be removed manually or scrape/cut and painted with herbicide; and
- Any reproductive parts need to be bagged.

Stem Scraping

- Scrape 15 to 30 cm of the stem with a knife to reach the layer below the bark/outer layer; and
- Immediately apply herbicide along the length of the scrape.

Considerations:

- A maximum of half the stem diameter should be scraped. Do not ringbark;
- Larger stems should have two scrapes opposite each other; and
- Vines can be left hanging in trees after treatment.

5-Grass Weed Removal Techniques

Hand Removal

- Remove any seeds or fruits and carefully place into a bag;
- Grasp stem at ground level, rock plant backwards and forwards to loosen roots and pull out; and
- Tap the roots to dislodge any soil, replace disturbed soil and pat down.

Considerations:

- Remove weeds from location to prevent re-infestation

Spot Spraying.

- Use a small hand sprayer or backpack
- Adjust the nozzle to a single stream spray
- Spray appropriate herbicide onto the target plant.

Considerations

- Avoid spraying non-target species
- Shield neighbouring non-target species with a bucket or other protection.
- Special shields can be used to protect non-target species and to ensure that stream of herbicide from sprayer does not drift onto non-target species.

Blanket Spraying

- Use backpack sprayer or machinery based equipment
- Used in areas of dense weeds with no native vegetation or when using a selective herbicide (e.g. Fusilade ®)

Considerations

- If any native species present, make sure they are not affected by the selective herbicide.

6- Use of Herbicides

Herbicides should not be applied prior to rain occurring. This reduces the herbicides effectiveness as well as being transported in runoff to creeklines and waterways. An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds.

It is recommended that the use of herbicides should be considered when:

- there are small areas of dense weeds with few or no native plants to protect;
- there are large areas of weeds; and
- the weeds are growing too rapidly for physical removal.

The spraying of weeds must only be undertaken by experienced persons with Chemcert or equivalent qualifications. If contractors are used, they and their firm must be licensed by the Health Department of Western Australia. The success of each treatment must be evaluated by the operator after a set period of time and re-applied (if necessary) according to the labelled effectiveness for each herbicide.

Monitoring and Performance Criteria

Monitoring of the plants survival rate should occur periodically post planting. Monitoring assesses if the plant is alive, free of disease and disturbance.

The performance criteria for successful revegetation includes:

- 80% survival rate of plants two years post planting; and
- no more than 10% weeds.

To achieve an 80% survival rate, infill planting may be required. It is recommended an additional 40% are planted in Year 2 and 10% are planted in Year 3 for each area. A greater amount may be required in exceptional circumstances.

A summary of the proposed revegetation and monitoring schedule is provided in Table 3.

Tree Guards

Tree guards are crucial for plant establishment; however, they must be maintained. If not checked regularly and managed, guards can damage plants and or be ineffective against predation. When monitoring of plant survival, check the tree guards are intact and in a secure position. Once plants have been established, approximately two years post planting, tree guards should be completely removed. Table 3 provides an indication of monitoring frequency for plant survival

Table 10 Indicative Planting and Monitoring Schedule by month.

Year	Year 1												Year 2												Year 3					
Task	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Order plants																															
Assess Weeds and control as required																															
Planting																															
Remove initial planting tree guards																															
Monitor plant survival and control weed																															
Order Infill Plants (as required)																															
Infill Planting (as required)																															

Note successful revegetation is seasonally dependant and the seasonal timings are critical.

Appendix G Fauna Management Procedure

Fauna Management Procedure

Management Protocols

The following Management Protocols for the Site have been adopted from the draft Department of Biodiversity Conservation and Attractions – DBCA guidelines (2009):

- The removal of any trees or vegetation will be reducing the potential habitat area for Western Ringtail Possums (WRPs) however the Site will retain large areas of potential habitat within the Coastal Setback Zone, Conservation Zone and trees within the rest of the Site.
- A permit under Regulation 15 of the *Wildlife Conservation Act* will be obtained to facilitate the handling of any endangered fauna.
- A fauna handler will be contracted to be on Site during the vegetation removal.
- The Site will be surveyed and the areas to be cleared marked out prior to any vegetation clearing occurring.
- Immediately prior to any clearing, the fauna handler will conduct a survey of the targeted vegetation to determine the location of any dreys /hollows that may be occupied by WRPs or any other fauna. These trees will be marked with flagging tape around the trunk, between waist and eye level, so that the tape is clearly visible from all directions.
- Prior to commencing, the machinery operators will be clearly briefed/inducted by the fauna handler, who will explain to the operators which areas of the Site are more sensitive or potentially occupied by fauna and the techniques and protocols that will be needed to be employed during the project operations (as outlined below).
- An agreed means of communication between the operators and the expert will be established as part of the briefing, to ensure that the safety of any fauna not seen by the operator can be communicated by the fauna handler. Operators will be required to abide by these communication guidelines and briefing instructions at all times.
- Clearing will be undertaken in a systematic manner that minimises disturbance to fauna.
- The fauna handler will be on-Site during the clearing process of all the areas with suitable habitat, not just those presumed to be active. The spotter will direct the operators and monitor the process and ensure that any trees that are cleared are done so in a manner that allows the animals to be safely removed. In addition, they will supervise any animal handling or the rescue of any injured animals should this be required.

- For the removal of vegetation, all trees to be cleared, irrespective of whether a WRP is seen, should be bumped or shaken first. After this, the machine operator should wait and observe the tree for a short period of time. If any animals are present, the bumping or shaking may cause any WRP or other fauna to move and provide a greater chance that the operator will see the animal prior to pushing the tree over.
- In the event that a WRP or another animal is observed in a tree about to be cleared:
    - if there are habitat areas adjoining that are to be retained, the tree should be gently lowered to the ground to enable the animal to safely evacuate. The possum spotter will ensure that the animals are encouraged to move towards and occupy the trees to be retained.
    - if there are no trees or habitat areas to be retained within the proximity of the tree to be removed, the expert should rescue the animals prior to the tree being pushed down.
    - If the animal cannot be easily removed due to the density of the canopy, the machine operator will be briefed on the slow remove of canopy, in a systematic way, to allow the animal to move away from the machine. This will allow the animal to move to outer areas of remaining canopy, where, after the removal of the other areas, it should be able to be removed, or captured using a cherry picker or grabbing the animal as the operator slowly lowered the tree to the ground.
- Where possible, dreys will be inspected and removed from trees to be cleared. Any dreys remaining will be thoroughly checked for possible baby WRP or other animals.
- Operators will be briefed to take care when removing understorey vegetation (including grasses and other weeds present at the time) as WRP may be present in these areas. These areas will be walked through and inspected prior to any machines entering the areas and clearing the vegetation.
- If the operators encounter any injured animals during the clearing, the possum spotter will make arrangement for the care and welfare of any injured animals.
- Operators will be made aware that displaced WRP may shelter in stockpiled vegetation. To minimise any accidental injury or death of WRP, personnel involved in the removal or disposal of stockpiles will be made aware of the potential presence of WRP. If any animals are present, they will be removed by the possum spotter and managed in accordance with guidelines from DBCA and this management plan.
- Any temporary stockpiles of vegetation should be placed in cleared areas as far as possible away from the retained remnant vegetation. These should be removed from Site or chipped as quickly as possible to prevent re-occupation by WRP.
- If any stockpiles are left on-Site and cannot be immediately removed or chipped, the stockpile will be inspected by a possum spotter, immediately prior to any removal, burning or chipping of the stockpile.

- Any animals captured and removed will be relocated to this habitat in close proximity to the capture point.
- The possum spotter will provide the DBCA with a report on the impact of WRP during the habitat removal process within 28 days of completing the vegetation clearing.

The nominated possum spotter or expert will need to meet the following requirements:

- They will have appropriate equipment to administer emergency care to any injured or displaced WRP (e.g. heat pack, box, blankets etc.) available at all times.
- They need to have a suitable care facility or have made arrangements with an appropriate carer who can care for or rehabilitate any injured WRP.
- They will notify an appropriate person at DBCA (District or Regional Wildlife/Nature Conservation staff) regarding any WRP going into care and provide them with details of any incident, type of injury and carer details.
- They must be able to recognise suitable WRP habitat adjacent to the clearing areas.

Translocations

Should any animals be present in the trees to be removed on the day of the clearing, it is recommended that these animals be captured in accordance with the above protocols and held until the clearing event nearby has completed (estimated maximum capture time would not exceed 2 hours).

The animals will be checked for health and then released into the nearest suitable tree with quality habitat that is being retained. Full details of capture point, release point, timing and conditions will be recorded and provided in the report and return for the Regulation 15 permit.

It is recommended that any animals found during the clearing will be removed and relocated to the closest safe habitat area available.

Should animals be relocated, post clearing monitoring will be conducted to ensure overcrowding or habitat quality decline is not an issue.

Natural systems, however, involve variables that are difficult to predict or control. Although unlikely, should post clearing monitoring indicate that habitat overcrowding or other unexpected circumstances arise and that contingent translocation has become necessary, the DBCA will be consulted and, if necessary, the number of WRP will be determined and the DBCA advice on animal management will be followed.

Post Clearing Reporting

A post clearing report will be prepared and submitted to the DBCA, along with a copy of the "Possum Spotters" report and returns on the impact on WRP during the habitat removal process. This report will be submitted to DBCA within 28 days of completion of the clearing event. The report will detail the impact on WRP that occurred during the clearing such as:

- Date/s of clearing and disturbance;
- Description of the process of vegetation removal;
- Number of WRP observed/removed, their locations prior to clearing and release or dispersed locations;
- Number of dreys observed or removed; and
- Number of WRPs injured or killed, including the name of the fauna carer or veterinarian nursing the injured WRPs.

Conclusion and Summary of Management Commitments

The purpose of this mitigation plan is to:

- Provide a management framework for WRP and other significant fauna within the Site to contribute to, and be consistent with, the long-term objective of conserving WRPs within the region; and
- Address and satisfy State legislation and approval processes, specifically the *Wildlife Conservation Act (WA) 1950* and the *Environmental Protection and Biodiversity Conservation Act (Cwth) 1999*.

In order to address these objectives, a management framework has been developed to satisfy all requirements and a summary of the management commitments made within this document are summarised in Table 1.

The DBCA may modify the implementation requirements of this Procedure in order to achieve satisfactory protection of WRP and provide for sufficient suitable habitat with suitable crown connections being established to facilitate the long-term survival of WRP on the Site.

Table 1: Summary of Management Commitments

Management Aspect	Detail of Commitment
Habitat Management	The proponent will ensure that habitat areas not being cleared are managed, both during the construction and subsequent maintenance period, to avoid any damage or loss of habitat values for WRPs.
Clearing Management	The proponent will ensure that any clearing necessary to facilitate the development of the Site will be conducted in accordance with the DBCA guidelines and as outlined in this report. The clearing will be conducted to maximise the ability of WRP to safely disperse where appropriate, or to physically relocate to adjacent areas of suitable habitat or as directed by the DBCA.
Pre-Clearing Survey	Immediately prior to clearing commencing, a qualified Fauna Spotter will undertake a pre-clearing survey of the proposed area to determine the exact location of any dreys or WRP present.
Contingencies	The Fauna Spotter commits to liaise with the DBCA to determine appropriate contingency responses should WRP counts or habitat quality assessments, post clearing, indicate that overcrowding or canopy decline is occurring.
Reporting	The Fauna Spotter will provide a post clearing report to the DBCA containing monitoring data and an analysis of the data in the context of the management framework for the Site and the need for any contingency actions or responses if required.

Appendix H Emergency Contact Details

Emergency contact details, current as at June 2019. It is the responsibility of each Leaseholder to maintain current details and to notify the City of Busselton when details change.

Sublot	Site No.	Site	Name	Contact Details
110	16	Masonic Care for Aged (WA)	Mark Jones	9409 2322
128	15	Legacy Fund of Perth (Inc)	Stephen & Angie Stoll	0414 983 414 9755 4530
132	14	Australian Medical Procedures Research Foundation (Fresh Start Recovery Program)	Jeff Claughton	9381 1333
140	13	Uniting Church in Australia Property Trust (WA)	Don Elson	0414 935 916
150	12	Workpower Inc Kyle Andrews Foundation (Board)	Roger Lewis	0419 912 227
162	11	Scripture Union of WA Inc	Chris & Dianne Abbott	0458 554363 9755 4363
164	10	Abundant Life Centre Inc	Ian & Gillian	9755 4336
172	9	Busselton Gospel Chapel Inc	Rob & Carole	9755 4561
180	8	Diocesan Youth and Recreation Inc	Lindsay & Joanne	9755 4556
194	7	Nurture Works Foundation	Wayne Warfield	9751 2435
196 & 206	5 & 6	Baptist Union of WA	Andrew & Rebecca	9755 4151
212	4	The Bunbury Diocesan Trustees	Eric & Samantha	0417 175 668
220	3	Apostolic Church Trust	Jurrien & Wendy	9755 4014
228	2	Seventh Day Adventist	Kerry & Kevin	9755 4399
236	1	Scout Association of WA	John Hill	0417 221 169