Bushfire Management Plan

Vancouver Beach Resort, Albany

Prepared for
Cherry Martin

8 March 2019

BPAD
Bushfire
Planning & Design
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1 Introduction

1.1 Project overview

Eco Logical Australia (ELA) has been commissioned by Cherry Martin to prepare a Bushfire Management Plan (BMP) to support a Development Application (DA) being prepared by their client to develop Vancouver Beach Resort, in Goode Beach, Albany (hereafter referred to as the subject site). The proposed development involves the construction of a tourist resort and associated infrastructure (**Figure 1, Figure 2**).

The subject site is located within a designated bushfire prone area as per the *Western Australia State Map of Bush Fire Prone Areas* (DFES 2017), which triggers bushfire planning requirements under *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015) and reporting to accompany submission of the DA in accordance with the associated *Guidelines for Planning in Bushfire Prone Areas v1.1* (the Guidelines; WAPC 2017).

SPP 3.7 (Policy Measure 6.6) also requires development applications for vulnerable land uses (such as tourist resorts) in areas between BAL-12.5 and BAL-29 to be accompanied by a BMP, an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.

1.2 Purpose and application of the plan

The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to the subject site through implementation of a range of bushfire management measures in accordance with the Guidelines. The BMP outlines how future on-site assets can be protected during the peak bushfire season.

A Bushfire Emergency Evacuation Plan (BEEP) is also being prepared for the proposed development. The BMP and BEEP are intended to be used in conjunction with one another to ensure that the intent of SPP 3.7 is achieved.

Figure 1: Site overview

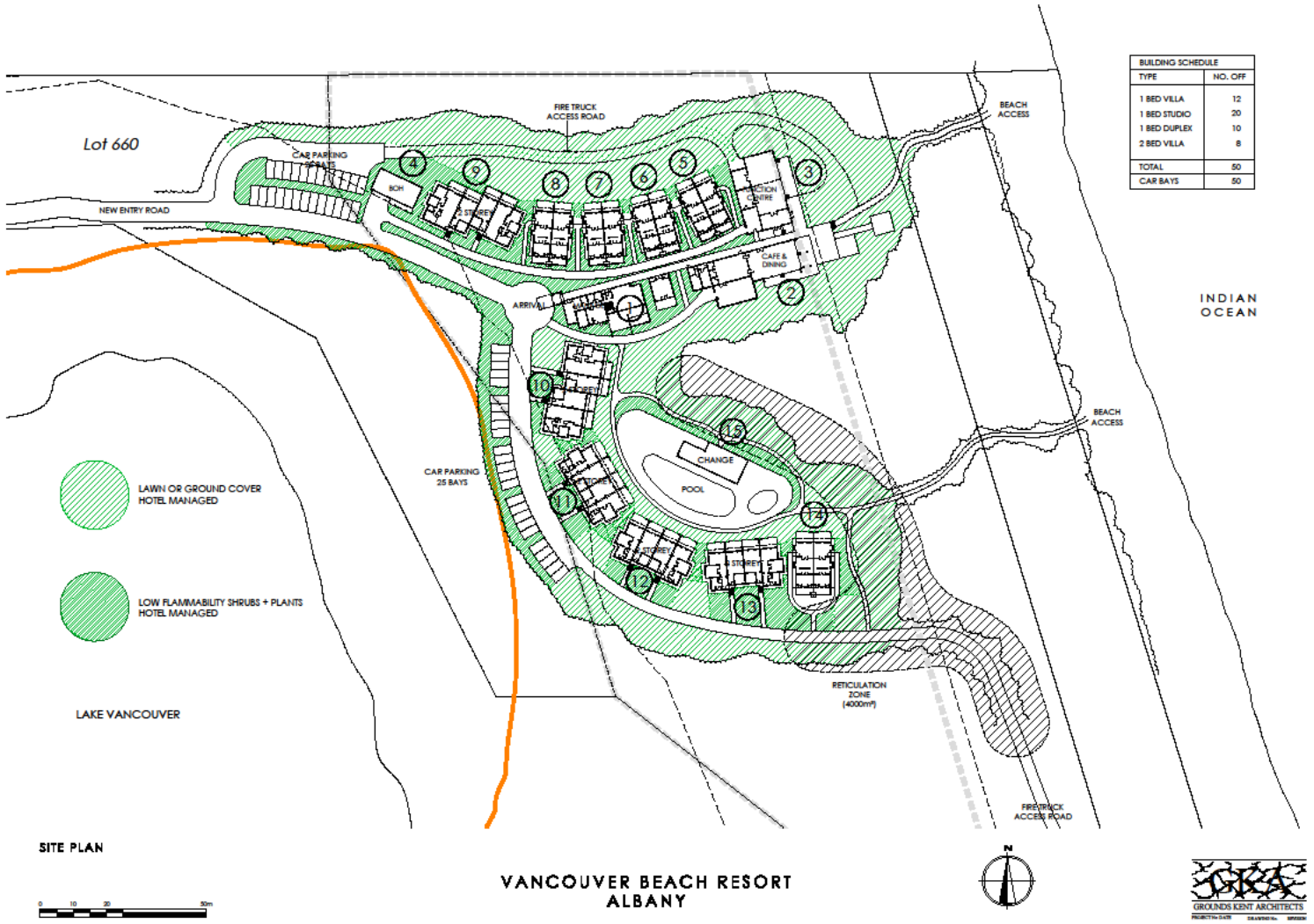

Figure 2: Concept plan

2 Spatial consideration of bushfire threat

2.1 General

The subject site is located within the City of Albany, in the Goode Beach locality, south-east of Shoal Bay, approximately 8 km from the Albany town centre. The subject site is situated within undeveloped bushland, north of the developed areas of Goode Beach.

2.2 Bushfire fuels

Vegetation within the subject site and surrounding 100 m (the assessment area) was assessed in accordance with *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas* (SA 2009) and with regard given to the *Visual guide for bushfire risk assessment in Western Australia* (DoP 2016) by Biodiverse Solutions (2017) (**Appendix 1**).

The following vegetation classes and exclusions were identified within the assessment area as depicted in **Figure 3** and listed below:

- Class A forest;
- Class B woodland;
- Class C shrubland;
- Class D scrub;
- Class G grassland; and
- Exclusion as per clause 2.2.3.2 (e) (i.e. non-vegetated areas).

Photographs and their locations relating to each vegetation type are included in the vegetation assessment report prepared by Bio Diverse Solutions (2019) included in **Appendix 1**.

Vegetation within the development area depicted in **Figure 3** will be cleared/modified as part of the development. Vegetation within landscaping areas will be maintained as Low Threat Vegetation as per clause 2.2.3.2 (f) of AS 3959-2009 and maintained by the resort managers in perpetuity. In addition, some vegetation on land adjacent to the subject site within the control of the City of Albany will be cleared to facilitate the implementation of an Asset Protection Zone supporting an on-site bushfire refuge building. This clearing has been agreed to by the City of Albany and DFES during consultation regarding the development of evacuation measures.

The BAL assessment addresses this topic further in **Section 2.5**.

2.3 Topography and slope under vegetation

The subject site is generally of a flat nature with some minor undulation associated with the near-coastal nature of the site. Slope under the classified vegetation is depicted in **Figure 3** and ranges from flat land or effectively upslope to between 5-10 degrees downslope.

The BAL assessment addresses this topic further in **Section 2.5**.

2.4 Bushfire history, risk of ignition and potential bushfire scenarios

Vegetation within the subject site has not been subject to a bushfire within the past 20 years (Landgate 2017). The accumulation of bushfire fuels over this time and moderate-high risk of ignition associated with high levels of public access and proximity to urban areas would potentially facilitate a potential bushfire occurrence within the subject site and surrounds.

Such an occurrence would most likely occur to the west or north of the subject site in association with longer fire runs (compared to those to the east which are limited due to the proximity of this interface to the coast) and prevailing winds (BoM 2017).

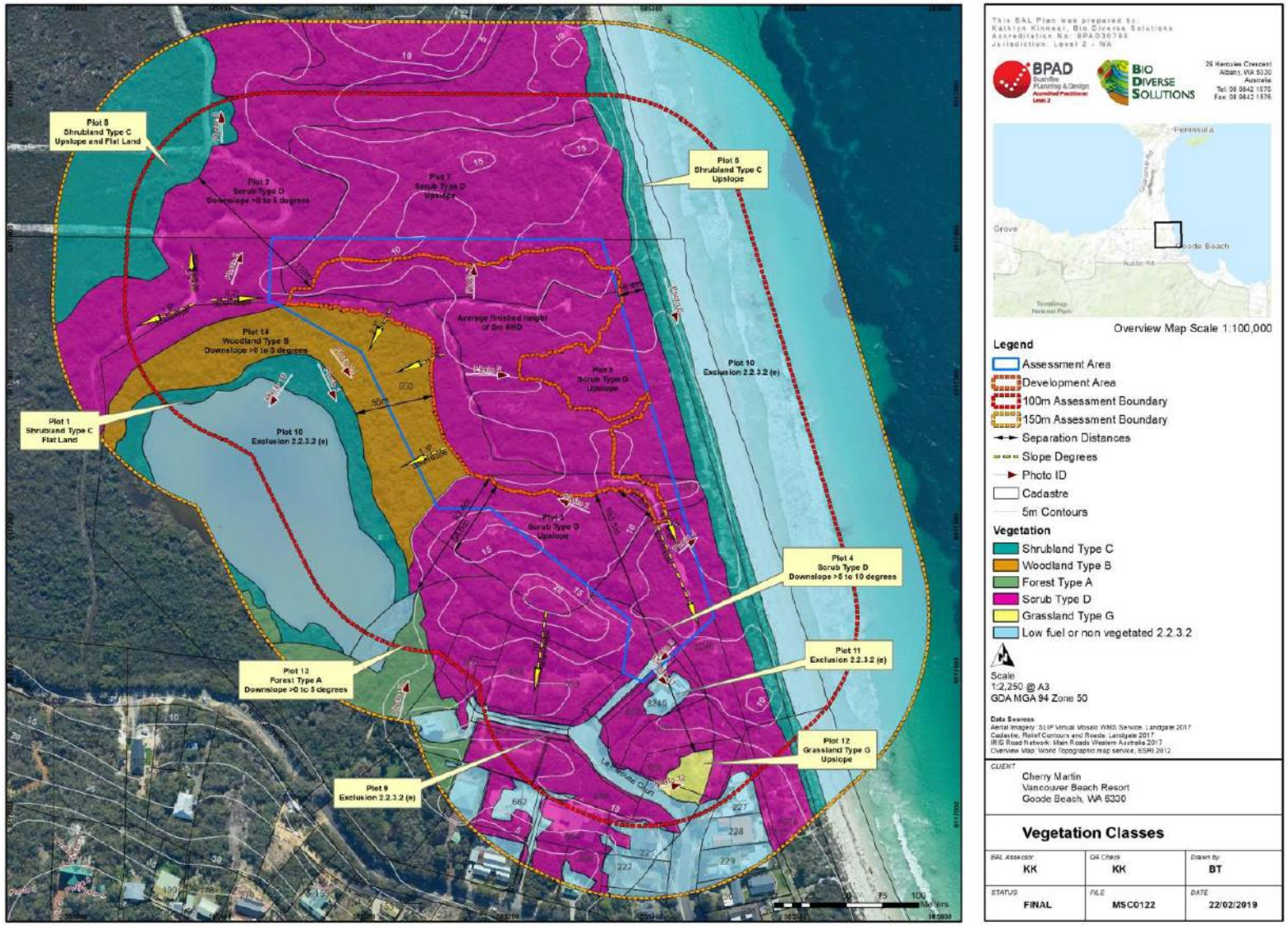

Figure 3: Pre-development vegetation class (BDS 2019)

2.5 Bushfire Attack Level (BAL) assessment

All land located within 100 m of the classified vegetation depicted in **Figure 3** is considered bushfire prone and is subject to a BAL assessment in accordance with AS 3959-2009.

The Method 1 procedure for calculating the BAL (as outlined in AS 3959-2009) incorporates the following factors:

- State adopted Fire Danger Index (FDI) rating;
- Vegetation class;
- Slope under classified vegetation; and
- Distance between proposed development areas and the classified vegetation.

Based on the specified BAL, construction/setback requirements for proposed buildings can then be assigned.

The vegetation assessment for the subject site was undertaken by Bio Diverse Solutions (2019) and is included in **Appendix 1**. ELA has not been on-site to verify this assessment.

2.5.1 Fire Danger Index

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

2.5.2 Vegetation class

Vegetation class is described in **Section 2.2**, depicted in **Figure 3** and listed below:

- Class A forest;
- Class B woodland;
- Class C shrubland;
- Class D scrub; and
- Class G grassland.

Some vegetation on land adjacent to the subject site within the control of the City of Albany will be cleared to facilitate the implementation of an Asset Protection Zone supporting an on-site bushfire refuge building. This clearing has been agreed to by the City of Albany and DFES during consultation regarding the development of evacuation measures. This clearing has been factored into the BAL assessment and is depicted in Figure 4.

2.5.3 Slope under classified vegetation

Slope under classified vegetation is described in **Section 2.3**, depicted in **Figure 3** and summarised in **Table 1**.

2.5.4 Distance between proposed development areas and classified vegetation

Separation distances between proposed development areas within the subject site and classified vegetation are depicted in **Table 1**.

2.5.5 Method 1 BAL calculation

A Method 1 BAL calculation (in the form of BAL contours) has been completed for the proposed development in accordance with AS 3959-2009 methodology (**Table 1**). The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL.

The assessed BAL ratings for the development are depicted as BAL contours in Figure 4**.**

All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

Table 1: Method 1 BAL calculation (BAL contours)

Plot	Vegetation classification	Effective slope	Hazard separation distance	BAL rating	Comment
13	Class A forest*	Downslope >0-5 degrees	<20 m	BAL-FZ	No development proposed in this area
			20-<27 m	BAL-40	No development proposed in this area
			27-<37 m	BAL-29	No development proposed in this area
			37-<50 m	BAL-19	No development proposed in this area
			50-<100 m	BAL-12.5	No development proposed in this area
14	Class B woodland	Downslope >0-5 degrees	<13 m	BAL-FZ	No development proposed in this area
			13-<17 m	BAL-40	No development proposed in this area
			17-<25 m	BAL-29	Development proposed in this area
			25-<35 m	BAL-19	Development proposed in this area
			35-<100 m	BAL-12.5	Development proposed in this area
4	Class D scrub	Downslope >5-10 degrees**	<12 m	BAL-FZ	No development proposed in this area
			12-<17 m	BAL-40	No development proposed in this area
			17-<24 m	BAL-29	No development proposed in this area
			24-<35 m	BAL-19	No development proposed in this area

Plot	Vegetation classification	Effective slope	Hazard separation distance	BAL rating	Comment
			35-<100 m	BAL-12.5	No development proposed in this area
2	Class D scrub	Downslope >0-5 degrees	<11 m	BAL-FZ	No development proposed in this area
			11-<15 m	BAL-40	No development proposed in this area
			15-<22 m	BAL-29	Development proposed in this area
			22-<31 m	BAL-19	Development proposed in this area
			31-<100 m	BAL-12.5	Development proposed in this area
3, 5, 7	Class D scrub	Upslope / Flat land	<10 m	BAL-FZ	No development proposed in this area
			10-<13 m	BAL-40	No development proposed in this area
			13-<19 m	BAL-29	Development proposed in this area
			19-<27 m	BAL-19	Development proposed in this area
			27-<100 m	BAL-12.5	Development proposed in this area
1, 6, 8	Class C shrubland**	Upslope / Flat land	<7 m	BAL-FZ	No development proposed in this area
			7-<9 m	BAL-40	No development proposed in this area
			9-<13 m	BAL-29	No development proposed in this area
			13-<19 m	BAL-19	No development proposed in this area
			19-<100 m	BAL-12.5	No development proposed in this area

Plot	Vegetation classification	Effective slope	Hazard separation distance	BAL rating	Comment
12	Class G grassland*	Upslope / Flat land	<6 m	BAL-FZ	No development proposed in this area
			6-<8 m	BAL-40	No development proposed in this area
			8-<12 m	BAL-29	No development proposed in this area
			12-<17 m	BAL-19	No development proposed in this area
			17-<50 m	BAL-12.5	No development proposed in this area
9, 10, 11	Excluded as per clause 2.2.3.2	N/A: BAL-LOW			

* Class A forest and Class G grassland vegetation occurs within the 100 m wide assessment area but are located greater than 100 m (Class A) and 50 m (Class G) from proposed buildings and therefore these classifications will not result in a BAL rating.
** These BAL contours may apply to proposed buildings within the subject site, however they have been overridden by higher BAL ratings as a result of closer/higher classed vegetation.

2.6 Identification of issues arising from the BAL contour assessment

The current development design shows all proposed buildings located outside of areas subject to BAL-FZ or BAL-40 ratings. Provided this design remains true and proposed buildings are constructed to the appropriate standard; no issues relating to the BAL assessment are expected.

Should there be any changes in development design or vegetation/hazard extent that requires a modified bushfire management response, then the above BAL contours will need to be reassessed for the affected areas and documented in a brief addendum to this BMP prepared to accompany a future planning/building application.

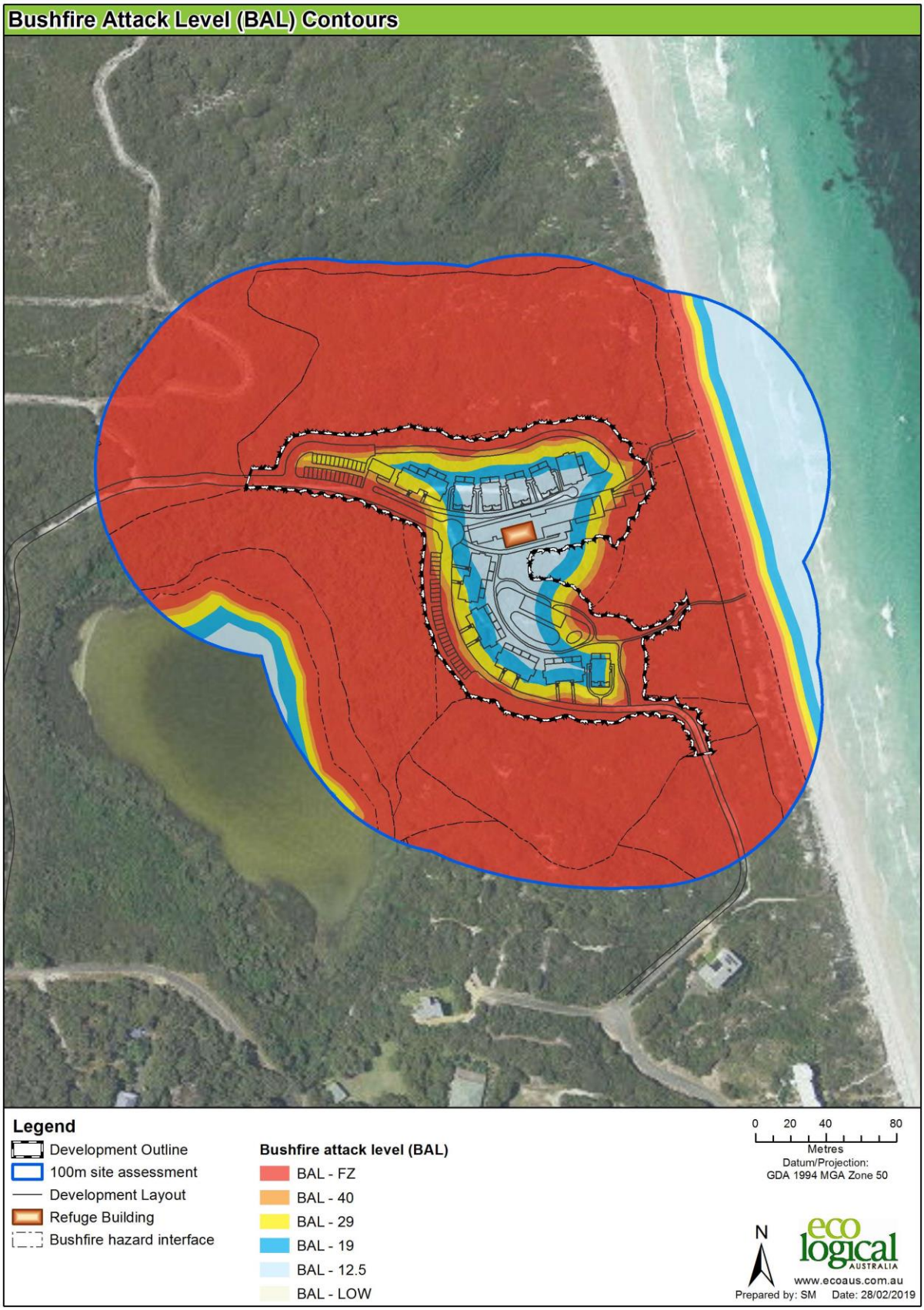

Figure 4: Bushfire Attack Level (BAL) map

3 Proposal compliance and justification

Proposed development of the Vancouver Beach Resort is required to comply with SPP 3.7 and the Guidelines, as required under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.

b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.5 Information to accompany development applications

Any development application to which policy measure 6.2 applies is to be accompanied by the following information prepared in accordance with the Guidelines:

a) (i) a BAL assessment. BAL assessments should be prepared by an accredited Level 1 BAL Assessor or a Bushfire Planning Practitioner unless otherwise exempted in the Guidelines; or

a) (ii) a BAL Contour Map that has been prepared for an approved subdivision clearly showing the indicative acceptable BAL rating across the subject site, in accordance with the Guidelines. BAL Contour Maps should be prepared by an accredited Bushfire Planning Practitioner; and

b) the identification of any bushfire hazard issues arising from the BAL Contour Map or the BAL assessment; and

c) an assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance within the boundary of the development site.

6.6 Vulnerable or high-risk land uses

6.6.1 In areas where BAL-12.5 to BAL-29 applies

Subdivision and development applications for vulnerable or high-risk land uses in areas between BAL-12.5 to BAL-29 will not be supported unless they are accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority for emergency services. Subdivision applications should make provision for emergency evacuation. Development applications should include an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

- 5.1: Avoid increasing the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact is paramount;
- 5.2: Reduce vulnerability to bushfire through the identification and assessment of bushfire hazards in decision-making at all stages of the planning and development process;
- 5.3: Ensure that planning proposals and development applications take into account bushfire protection requirements and include specified bushfire protection measures where land has or will have a moderate or extreme bushfire hazard level, and/ or where a rating higher than BAL-Low applies; and
- 5.4: Achieve a responsible approach between bushfire management measures and landscape amenity and biodiversity conservation values, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7 and the Guidelines, bushfire management measures, as outlined in **Section 4** have been devised for the proposed development accordance with Guideline acceptable solutions to meet compliance with bushfire protection criteria. 'Acceptable solutions' have been used to meet all performance principles where possible. Compliance with Element 3 has been unable to be achieved, however the proposal meets the requirements of the *Draft Position Statement: Tourism land uses within bushfire prone areas* (DPLH 2018) and is considered compliant with the intent of SPP 3.7.

The assessment against bushfire protection criteria is provided in **Section 4.**

A Bushfire Emergency Evacuation Plan has been prepared for the proposed development (as a separate document) in accordance with Policy Measure 6.6 of SPP 3.7.

4 Bushfire management measures

This section assesses the subject site against the Bushfire Performance Criteria and acceptable solutions outlined in the Guidelines and listed below:

- Location;
- Siting and design of development;
- Vehicular access; and
- Water.

ELA has identified a range of bushfire management measures that on implementation will enable all proposed areas to be developed with a manageable level of bushfire risk whilst maintaining compliance with the intent of the Bushfire Performance Criteria. The bushfire management measures are discussed in the following subsections and depicted in Figure 6 where applicable.

4.1 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 strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL–29 or below, and the risk can be managed. For minor development in areas where BAL–40 or BAL–FZ applies, demonstrating that the risk can be managed to the satisfaction of the Department of Fire and Emergency Services and the decision-maker.

Table 2 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 2: Element 1 - Location

Solution	AS	PS	N/A	Comment
A1.1 Development location	☒	☐	☐	All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

4.1.1 Acceptable Solution A1.1 Development location

The strategic planning proposal, subdivision and development application is located in an area that on completion will be subject to a BAL-29 or below for all habitable buildings.

Management measures / development response

As depicted in **Figure 4**, all proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

Asset Protection Zones (APZs) as detailed in **Section 4.2** will be implemented to ensure that these BAL ratings do not increase over the course of time.

4.2 Element 2 – Siting and design of development

Intent: To ensure that the siting 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 minimises the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.

Table 3 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 3: Element 2 – Siting and design of development

Solution	AS	PS	N/A	Comment
A2.1 Asset Protection Zone (APZ)	☒	☐	☐	APZs will be maintained between all proposed buildings and classified vegetation in the form of carparks, roads, as well as other non-vegetated and landscaped areas.

4.2.1 Acceptable Solution A2.1 Asset Protection Zone (APZ)

Every building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:

a. 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 fire does not exceed 29kW/m² (BAL 29) in all circumstances.

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

c. Management: the APZ is managed in accordance with the requirements of '*Standards for Asset Protection Zones*' (below):

- 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 5).

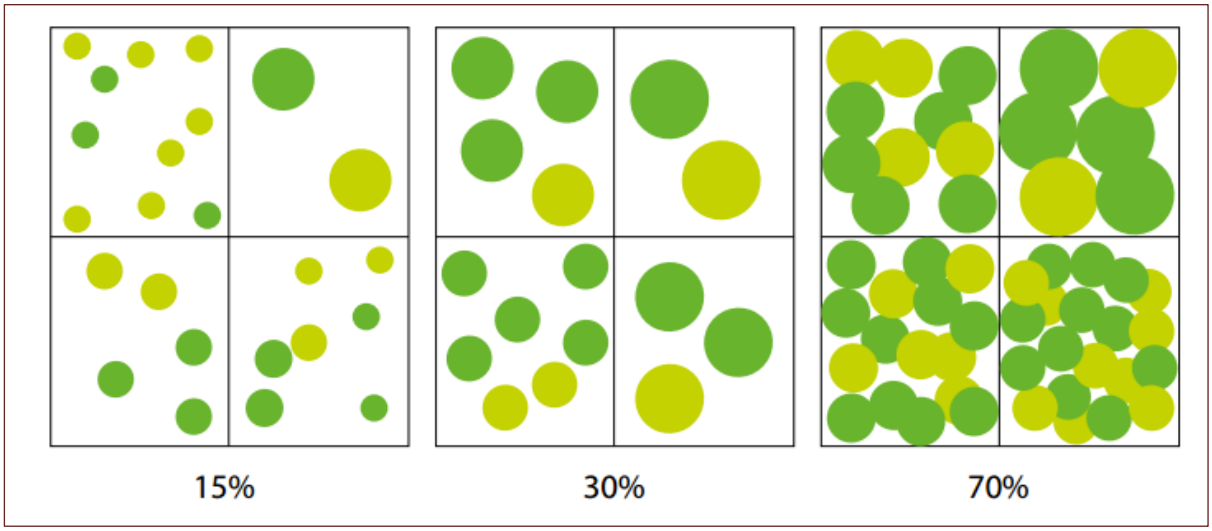

Figure 5: Illustrated tree canopy cover projection (WAPC 2017)

- **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.

Management measures / development response

The Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level. Hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot.

The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

The APZ proposed as part of this development is illustrated in Figure 6. This APZ will encompass carparks, roads, as well as other non-vegetated and landscaped areas and will be maintained as an APZ in perpetuity by resort management.

4.3 Element 3 – Vehicular access

Intent: To ensure that the vehicular access serving a subdivision/development is safe in the event of a bushfire occurring.

Performance Principle (P3): The internal layout, design and construction of public and private vehicular access in the subdivision/development allows emergency and other vehicles to move through it easily and safely at all times.

Non-compliant

The proposed development will provide one formal access point to La Perouse Road to the west. Access to the south will also be provided in the form of an emergency access way (EAW) which will provide an alternate route of egress for residents and visitors and ingress for fire services in the event of a bushfire as depicted in Figure 6. Both of these access routes however, are to the same destination.

The vehicular access is non-compliant as both proposed access routes exit onto the same non-compliant dead-end road (La Perouse Road) where access to two destinations is not available.

The main access point to the proposed development is approximately 490 m from the intersection of La Perouse Road with La Perouse Court. La Perouse Road has a total length of approximately 870 m.

The EAW will exit to La Perouse Court, which is a cul-de-sac approximately 212 m long. These distances are longer than the maximum 200 m length for dead-end roads and all proposed access ways traverse an extreme bushfire hazard.

La Perouse Road connects to Vancouver Beach Road which exists onto French Bay Road, both of which are non-compliant dead-end roads.

The proposed vehicular access network is a response to the surrounding road assets which do not include a public road connecting the subject site to the south. As the provision of a public road in this area is outside of the control of the developer; the proposed development is unable to provide two forms of access which are available to the public at all times.

The BEEP prepared to support this development provides contingency actions in accordance with the requirements of the *Draft Position Statement: Tourism land uses within bushfire prone areas* (DPLH 2018). These contingencies include early closure of the resort, off-site evacuation and as a last resort, refuge on site in a suitable building. Inputs for the BEEP are justified in **Section 4.5**.

4.4 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 firefighting purposes.

Table 4 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 4: Element 4 – Water

Solution	AS	PS	N/A	Comment
A4.1 Reticulated areas	☒	☐	☐	
A4.2 non-reticulated areas	☐	☐	☒	Reticulated area
A4.3 Individual lots within non-reticulated areas	☐	☐	☒	Reticulated area

4.4.1 Acceptable solution 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.

Management measures / development response

The proposed resort will be provided a reticulated water supply through extension of adjacent services. The reticulated system will ensure a year-round supply of water is provided for the resort which meets minimum domestic and emergency water supply requirements. This will be further detailed during future stages of planning.

4.4.2 Acceptable solution A4.2 Non-reticulated areas

Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements:

- Volume: minimum 50,000 litres per tank;
- Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof);
- Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds;
- Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank; and
- Water tanks and associated facilities are vested in the relevant local government.

Management measures / development response

The subject site is located within a reticulated area and therefore A4.2 is not applicable.

4.4.3 Acceptable solution A4.3 Individual lots within non-reticulated areas

Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres.

Management measures / development response

The subject site is located within a reticulated area and therefore A4.3 is not applicable.

4.5 Additional management strategies

The BEEP prepared to support the proposed development identifies on-site and off-site refuges, triggers for evacuation and roles and responsibilities of the resort manager.

The site is only accessible via La Perouse Road which, in essence is a large cul-de-sac. The design of the surrounding public road network does not allow for alternative access and is a legacy issue. As a result of these constraints, the BEEP provides contingency measures to address identified risks including:

- Clear triggers for off and onsite evacuation (to be updated to support future planning applications);
- An on-site refuge for use in an emergency (i.e. a building constructed to the requirements of a 'community refuge' as per the Australian Building Codes Board 'Design and Construction of Community Bushfire Refuges' that can accommodate the maximum number of people on site [200 people); and
- The proposed building located within the site and position to limit radiant heat exposure to <10 kW/m^2.

ELA has identified a suitable on-site refuge location (Function Centre/Cafe) for visitors and staff to use in the event of a bushfire. Early evacuation is always preferable however, in the event that this cannot occur, this building (which will be constructed to specified standards) will provide a 'safer-place' option for visitors. The location of this building has been determined using a Method 2 BAL assessment (refer to **Appendix 2**) to ensure it is located in an area subject to a radiant heat flux of <10kW/m^2.

Triggers for evacuation have been identified in the Bushfire Emergency Evacuation Plan and will be updated to support future planning applications in accordance with SPP 3.7. This will include: potential closures of the site under certain Fire Danger Ratings (FDR), triggers for off-site evacuation and procedures for staff and visitors in the event of an emergency etc.

4.5.1 Bushfire Emergency Evacuation Plan inputs

The BEEP has been written with the following inputs underpinning the drivers for evacuation:

- Evacuation time has been calculated on the following scenario:
    - It requires 5 minutes to access a vehicle within the subject site;
    - The average speed while travelling within the site would be 10 km/h;
    - The distance from buildings to the primary egress point is approximately 500 m and the distance to the emergency access point is approximately 400 m;
    - Total time to exit the subject building and get to La Perouse Road is 8 minutes;
    - Average speed travelling from La Perouse Road to Albany Leisure and Aquatic Centre (ALAC) (identified off site refuge) would be 55 km/h;
    - The distance from La Perouse Road to ALAC is 25 km;
    - Total time to travel from La Perouse Road to ALAC is 27 minutes (this has been assumed as worst-case scenario as the road network may not be hindered and can be travelled at the speed limits;
    - Identified travel speeds are considered highly conservative to allow for a significant factor of safety;
- Total time calculated to evacuate to the offsite refuge under the above conditions is 35 minutes;
- 105 minutes (1 hr, 45 minutes) have been allowed for the evacuation trigger which allows for a significant factor (x3) of safety.

Assumptions for fire rate of spread:

- Forest Fire Danger Index (FFDI) – 80;
- Assumed landscape slope within 10 km of the subject site is generally upslope/ flat land in all directions;
- Two fire direction scenarios have been considered and their associated Rate of Spread (RoS) calculated based on a fire from the north or south as a forest fire:
    - North/south - forest fire RoS – 2.4 km/h (approx. 4.2 km in 105 mins);
    - Fires originating from the west are likely to compromise the evacuation route and as such, off-site evacuation is not recommended in this case unless otherwise advised by emergency services;
- Based on the above identified evacuation time of 105 mins:
    - If there is a fire heading from the north or south and is approximately within 4.2 km of the subject site, then no patrons should evacuate off site and instead, move to the on-site refuge (the Function Centre/Cafe);
    - If there is a fire heading from the west, then no patrons should evacuate off site and instead, move to the 'on-site refuge (the Function Centre/Cafe);
- Any direction or evacuation messages from DFES or other emergency personnel will override the above trigger actions.

Roles and responsibilities:

- It is the responsibility of the Resort Manager to monitor bushfire risk to the site using Emergency WA / or DFES website or ABC Radio or 'National Bushfires' app;
- It is also the responsibility of the patrons to monitor bushfire risk as well; and
- Both patrons and staff should follow the above timings in the case of a bushfire.

It should be noted that the above assumptions are extremely conservative in nature in accordance with the precautionary principle.

ALAC has been identified as a designated evacuation centre by the City of Albany.

Figure 6: Spatial representation of bushfire management strategies

5 Implementation and enforcement

Implementation of the BMP applies to resort management and the City of Albany to ensure bushfire management measures are adopted and implemented on an ongoing basis. A summary of the bushfire management measures described in **Section 4**, as well as a works program, is provided in Table 5. These measures will be implemented to ensure the ongoing protection of proposed life and property assets is achieved. Timing and responsibilities are also defined to assist with implementation of each measure.

Table 5: Proposed works program

Bushfire management measure	Timing for application	Responsibility
Creation of APZs	Prior to occupation of the resort	Resort management
Maintenance of APZs	As required to achieve 2 t/ha threshold all year	Resort manager
Implementation of increased building construction standards	During construction of the proposed building	Construction contractor
Construction of roads, cul-de-sac and emergency access way as per the Guidelines	During construction of the proposed resort	Construction contractor
Provision of reticulated water supply	During construction of the proposed building	Construction contractor
Compliance with the bushfire emergency evacuation and risk management plan for the proposed building	Prior to occupation of the proposed building	Resort manager
Compliance with current fire control order	All year round as specified in the current fire control order	Resort manager

In the author's professional opinion, the bushfire protection requirements listed in this assessment provide an adequate standard of bushfire protection for the proposed development. As such, the proposed development is consistent with the aim and objectives of SPP 3.7 and associated guidelines.

References

Bio Diverse Solutions. 2017. *AS 3959 Bushfire Attack Level (BAL) Contour Plan Report – Vancouver Beach Resort.* Albany.

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Appendix 1 Vegetation classification assessment report (Biodiverse Solutions [2019])

Vegetation Classification to AS3959-2009

Site Details			
Address:	Vancouver Beach Resort		
Suburb:	Goode Beach	**State:**	W.A.
Local Government Area:	City of Albany		
Stage of WAPC Planning	N/A		
Report use:	BMP report prepared by ELA for Vancouver Beach Resort		

BAL Contour Plan Details			
Report / Job Number:	MSC0122	**Report Version:**	FINAL V3
Assessment Date:	7/2/2017	**Report Date:**	22/02/2019
Practitioner	Kathryn Kinnear	**Accreditation No.**	BPAD 30794

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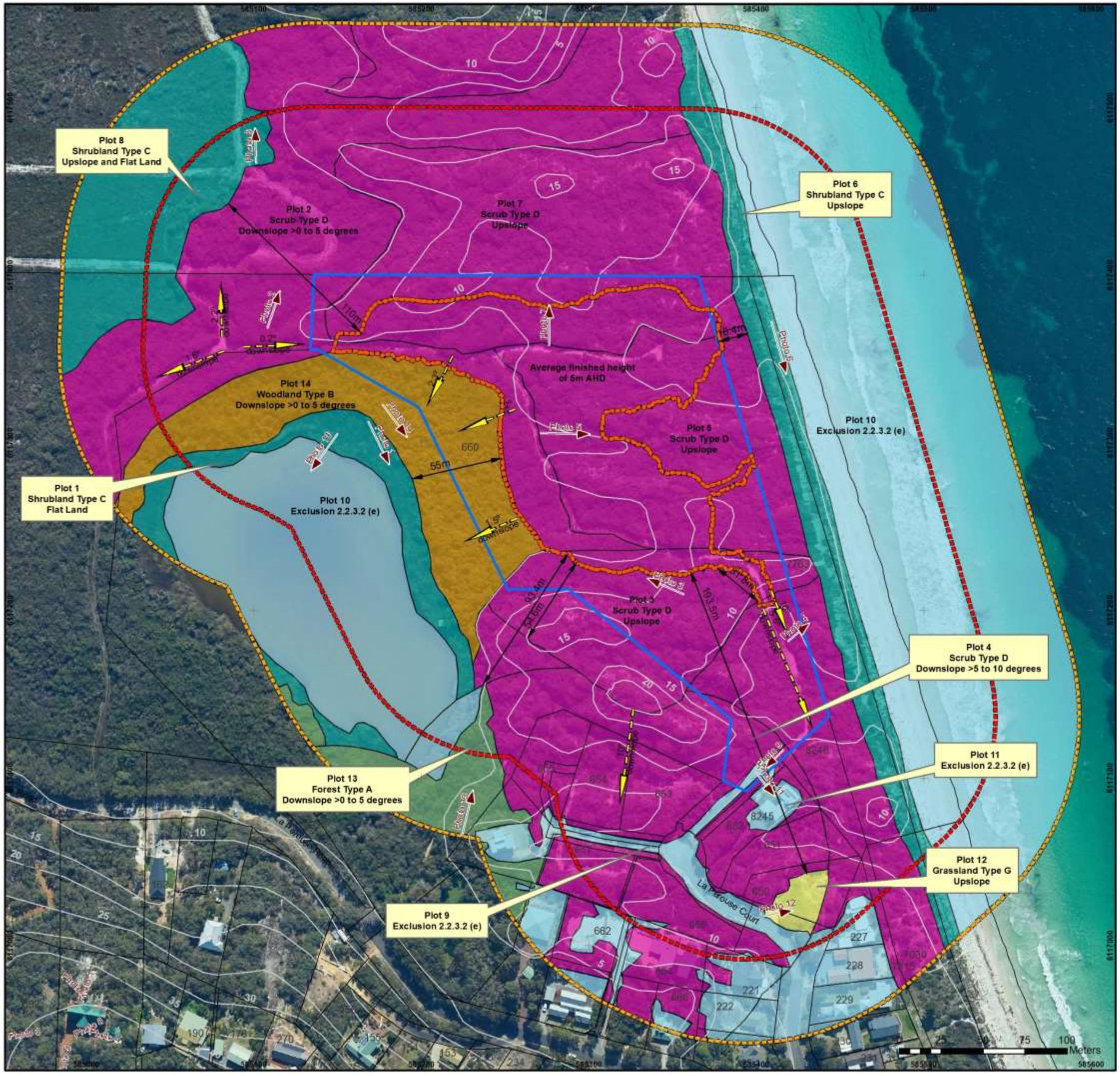
BPAD Bushfire Planning & Design Accredited Practitioner Level 2

Development Proposal / Background Information

The proposed Vancouver Beach Resort is situated in Goode Beach in the City of Albany. This report details the site and adjacent bushfire fuels as classified to AS3959-2009 by Kathryn Kinnear (Level 2 Bushfire Practitioner BPAD 230794). The information contained within this report is to be utilised by Eco Logical Australia (Level 3 BPAD Practitioners) for the preparation of the Bushfire Management Plan (BMP) and Bushfire Emergency Evacuation Plan (BEEP).

Vegetation Classification

Site assessment occurred on the 7th February 2017 by Kathryn Kinnear (BPAD 30794). All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on the Vegetation Classes Map Page 3.



This BAL Plan was prepared by:
Katbryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

29 Hercules Crescent
Albany, WA 6330
Australia
Tel: 08 9842 1575
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Overview Map Scale 1:100,000

Legend

- Assessment Area
- Development Area
- 100m Assessment Boundary
- 150m Assessment Boundary
- Separation Distances
- Slope Degrees
- Photo ID
- Cadastre
- 5m Contours

Vegetation

- Shrubland Type C
- Woodland Type B
- Forest Type A
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:2,250 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2017
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Cherry Martin
Vancouver Beach Resort
Goode Beach, WA 6330

Vegetation Classes

BAL Assessor	*QA Check*	*Drawn by*
KK	KK	BT
STATUS	*FILE*	*DATE*
FINAL	MSC0122	22/02/2019

SECTION 1 - Vegetation Classification

All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2. 3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Map Page 3.

Plot	**1**	**Classification or Exclusion Clause**	**Shrubland Type C**
			Wetland shrubs along Lake Vancouver to the east of the subject site. Effective Slope: Flat land. Consisting almost solely of native sedges. A small number of stunted Banksias. Uniformly to 1.5m in height. Fuel loading at 15t/ha.
Photo Id 1: View looking south along Lake Vancouver.			
Plot	**2**	**Classification or Exclusion Clause**	**Scrub Type D**
			Peppermint scrub to the north and west of the proposed development. Occasional Banksias, sedges away from seasonally wet areas. Heights to 4m and averaging 3.5m. Occasional 5m tree. Foliage cover >30%. Effective Slope: Downslope >0-5 degrees. Fuel loading 25t/ha.
Photo Id 2: View looking north east under Plot 2.			

Plot	3	Classification or Exclusion Clause	Scrub Type D
			Situated within the proposed development. Undulating sand dunes. Consisting of Peppermints, Banksias, sedges, *Spyridium globulosum*, and other native scrubs. Coastal scrubs to 4m and averaging 3.5m. Some edge effect of Peppermints to 5m along access track. Fuel loading to 25t/ha. Foliage cover >30%. Effective Slope: Upslope.

Photo Id 3: View looking northwest under Plot 3.

Plot	4	Classification or Exclusion Clause	Scrub Type D
			Coastal Peppermint scrub situated to the south of the proposed development. Undulating sand dunes. Effective Slope: Down slope >5-10 degrees. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spyridium globulosum*, and other native scrubs. Height to 4m and averaging 3.5m. Foliage cover >30%. Fuel loading to 25t/ha.

Photo Id 4: View looking east along the internal access track within Plot 4.

Plot	5	Classification or Exclusion Clause	Scrub Type D
			Area of coastal peppermint scrub on the eastern side of the proposed development. Undulating sand dunes fringing the foreshore area. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spyridium globulosum*, and other native scrubs. Minor downslopes in gullies. Effective Slope calculated to be Upslope on completed development (average finished heights of 5-6m AHD levels of development). Height to 4m and averaging 3.5. Foliage cover >30%. Fuel loading to 25t/ha.
Photo Id 5: View looking east under plot 5.			

Plot	6	Classification or Exclusion Clause	Shrubland Type C
			Shrubland situated on the coastal foreshore area. Directly adjacent to beach in a narrow perpendicular strip. Low coastal shrubs consisting of low shrubs, herbs and coastal sedges. Height averaging 0.5m. Fuel loading 15t/ha. >30% foliage cover.
Photo Id 6: View looking south along coastline.			

Plot	7	Classification or Exclusion Clause	Scrub Type D
			Coastal scrubs along the northern edge of the development proposal. Undulating sand dunes fringing the foreshore area. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spyridium globulosum*, and other native scrubs. Height to 4m and averaging 3.5m. Some edge effects noted with occasional Peppermints reaching 5m along access tracks. Foliage cover >30%. Fuel loading to 25t/ha.
Photo Id 7: View looking north into plot 7.			

Plot	8	Classification or Exclusion Clause	Shrubland Type C
			Shrubland situated to the northwest of the proposed development. Low coastal heaths and sedges to 1.5m averaging 1m. Effective Slope: Upslope and flat land. Fuel loading 15t/ha. >30% foliage cover.
Photo Id 8: View looking north across plot 8.			

Plot	9	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e)
			Roads, driveways, firebreaks and other hardstand areas. Excluded under clause 2.2.3.2 (e).
Photo Id 9: Looking southwest along La Perouse Court to the south of the development area.			
Plot	**10**	**Classification or Exclusion Clause**	**Exclusion 2.2.3.2 (e)**
			Bodies of water. Lake Vancouver located to the west of the development area.
Photo Id 10: View looking southwest across Lake Vancouver.			

Plot	11	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e)
			Buildings excluded under clause 2.2.3.2 (e). Buildings in already developed areas to the south.
Photo Id 11: View looking at dwelling directly to the south of the subject lot.			
Plot	**12**	**Classification or Exclusion Clause**	**Grassland Type G**
			Unmanaged grasses on cleared vacant block to the south of the development area. Some bare areas with minimal fuel. Included in assessment area due to being 100m from subject site (cadastral boundary) Effective Slope: Upslope. Fuel loading 3-4.5 t/ha.
Photo Id 12: View looking at grassed area directly to the south of the subject lot.			

Plot	13	Classification or Exclusion Clause	Forest Type A
			Pepper mint forest located to the south west of the proposed development. Multi layered vegetative structure dominated by Peppermint trees with the occasional Eucalypt averaging 7.8m over the plot, understorey consisting of Woolly Bush, Basket Bush, sedges and Buffalo grass. Downslope >0-5 degrees. Foliage cover: >30–70%. Fuel loading: 25–35 t/ha.
Photo Id 13: View looking north through Forest Type A.			
Plot	**14**	**Classification or Exclusion Clause**	**Woodland Type B**
			Paperbark open woodland to the west of the proposed development. Occasional Banksias, sedges understorey in seasonally wet areas, near Lake Vancouver. Heights to 4m and averaging 3.5m. Occasional 5m tree. Foliage cover 10-30% Effective Slope: Downslope >0-5 degrees. Fuel loading 15-25t/ha.
Photo Id 14: View looking south through Woodland Type B to the west of the subject site.			

Comments on Vegetation Classifications:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification Assessment process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to AS3959 Table 2.3; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

SECTION 3: DISCLAIMER

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas Version 1.1 (WAPC, 2017), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

AS3959-2009 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.
(AS3959, 2009)

Building to AS39590-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

SECTION 4: Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2009 (Incorporating Amendment Nos 1, 2 and 3).

SIGNED, ASSESSOR:  ..... DATE: 22/02/2019

Kathryn Kinnear, Bio Diverse Solutions
Accredited Level 1 BAL Assessor
Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)

BIO DIVERSE SOLUTIONS

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

References

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas Vers 1.1. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015 & 2016) map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:
https://maps.slip.wa.gov.au/landgate/bushfireprone/

Appendix 1: – Concept Plan

SITE LOCATION PLAN

VANCOUVER BEACH RESORT
ALBANY

GROUNDS KENT ARCHITECTS

BIO DIVERSE SOLUTIONS

Appendix 2 – State Bushfire Prone Area Mapping

(SLIP 21/5/2016)

https://maps.slip.wa.gov.au/landgate/bushfireprone2016/

Appendix 3 – APZ Standards to apply

An Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (WAPC, 2017). This is also defined as a "defendable zone". Internal to the site development area an APZ is to apply utilising Low threat or non-vegetated areas as classified by AS3959-2009 Section 2.2.3.2. The developer will be responsible for the maintenance of the APZ until the lot is handed over to strata managers. The APZ area will extend across the whole lots to ensure setbacks to BAL remains in perpetuity. Any replanting, revegetation and landscaping across the lots is to be to an APZ standard as per WAPC Guidelines.

WAPC Guidelines for an APZ (WAPC, 2017)

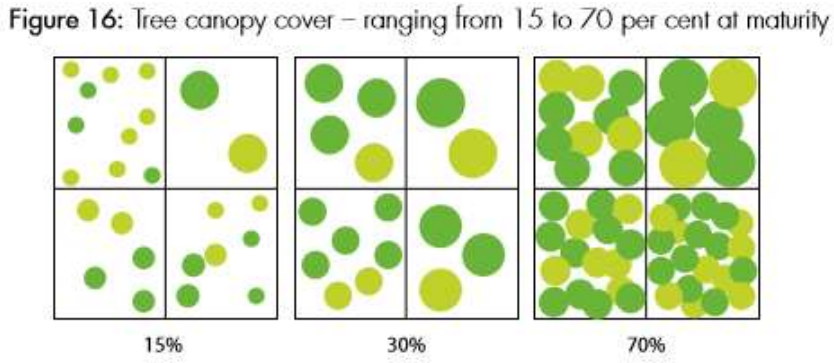
Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

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. See Figure 2 (WAPC Figure 16, Appendix 4) below.

Figure 1 – Tree Canopy Cover



(WAPC, 2017)

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 5m^2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 millimetres or less.

Appendix 2 Method 2 BAL calculation

ECO LOGICAL AUSTRALIA PTY LTD
ABN 87 096 512 088
www.ecoaus.com.au

Doug Van Bavel

Land Use Planning Officer

Department of Fire and Emergency Services

Reference: 5966

7 March 2018

Dear Doug,

Re: Refuge Area – Vancouver Beach Resort
LOT 660 LA PEROUSE ROAD, GOODE BEACH - PROPOSED LOCAL STRUCTURE PLAN NO. 9

Eco Logical Australia (ELA) has prepared this document to respond to comments made by the Department of Fire and Emergency Services (DFES) on the Bushfire Management Plan (BMP; Eco Logical Australia 2017) prepared to support the Structure Plan for Lot 660 La Perouse Road, Goode Beach (i.e. Vancouver Beach Resort). This response focuses only on the location of a refuge building for the resort. All other comments from DFES will be addressed through updates to the BMP and Bushfire Emergency Evacuation Plan (BEEP).

In response to comments received from DFES, the project team has revised the site plans for the proposed resort to include a 'Refuge Building' to serve as a shelter in the event of a bushfire. The location of the proposed refuge building (i.e. the function centre) has been determined using principles outlined in *Neighbourhood Safer Places – Guidelines for the Identification and Inspection of Neighbourhood Safer Places in* NSW (New South Wales Rural Fire Service 2017). The specific focus of the revised design was to relocate the proposed refuge building into an area subject to a radiant heat flux of 10kW/m^2 (kilowatts per square meter) or less. Accommodation buildings will still be located in area subject to a Bushfire Attack Level (BAL) rating of BAL-29 or less.

A Method 2 Bushfire Attack Level (BAL) Assessment was undertaken for the proposed building to ensure it is situated in an area subject to a radiant heat flux of 10kW/m^2 or less. Worst-case vegetation classifications and slope were used for the assessment, and the assessment inputs are detailed below in **Table 1**. Calculations are provided in **Appendix A** and the building location (including setbacks identified in the Method 2 BAL assessment) is depicted in **Appendix B**.

Table 1: Bushfire Attack Level (BAL) calculation

Vegetation Classification	FDI	Fuel load	Effective Slope	Site slope	Flame temperature	Separation	Radiant Heat Exposure
Class B woodland	80	Surface fuel load: 15 t/ha Overall fuel load: 25 t/ha	5° downslope	0°	1200K	55.5 m	9.98 kW/m^2
Class D scrub	80	Surface fuel load: 25 t/ha Overall fuel load: 25 t/ha	5° downslope	0°	1200K	50 m	9.78 kW/m^2

If you have any questions about any aspect of this, please contact me on (08) 6218 2200.

Yours sincerely,

Daniel Panickar
Senior Consultant / Bushfire Lead - WA
FPAA BPAD Certified Practitioner
No. BPAD37802-L2

Bruce Horkings

Senior Bushfire Consultant

FPAA BPAD Certified Practitioner No. BPAD29962-L3

Appendix A – Method 2 Calculations

Calculated February 23, 2018, 6:21 pm (BALc v.4.7)

Vancouver Beach Resort 10kW - Woodland

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.03 km/h
Vegetation classification	Woodland	Flame length	16.21 m
Surface fuel load	15 t/ha	Flame angle	78 °
Overall fuel load	25 t/ha	Panel height	15.86 m
Vegetation height	n/a	Elevation of receiver	7.93 m
Effective slope	5 °	Fire intensity	26,263 kW/m
Site slope	0 °	Transmissivity	0.773
Distance to vegetation	55.5 m	Viewfactor	0.1155
Flame width	100 m	Radiant heat flux	9.98 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

Calculated February 23, 2018, 6:23 pm (BALc v.4.7)

Vancouver Beach Resort 10kW - Scrub

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	5.88 km/h
Vegetation classification	Scrub	Flame length	13.62 m
Surface fuel load	25 t/ha	Flame angle	79 °
Overall fuel load	25 t/ha	Panel height	13.37 m
Vegetation height	3 m	Elevation of receiver	6.68 m
Effective slope	5 °	Fire intensity	75,987 kW/m
Site slope	0 °	Transmissivity	0.78
Distance to vegetation	50 m	Viewfactor	0.1123
Flame width	100 m	Radiant heat flux	9.78 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

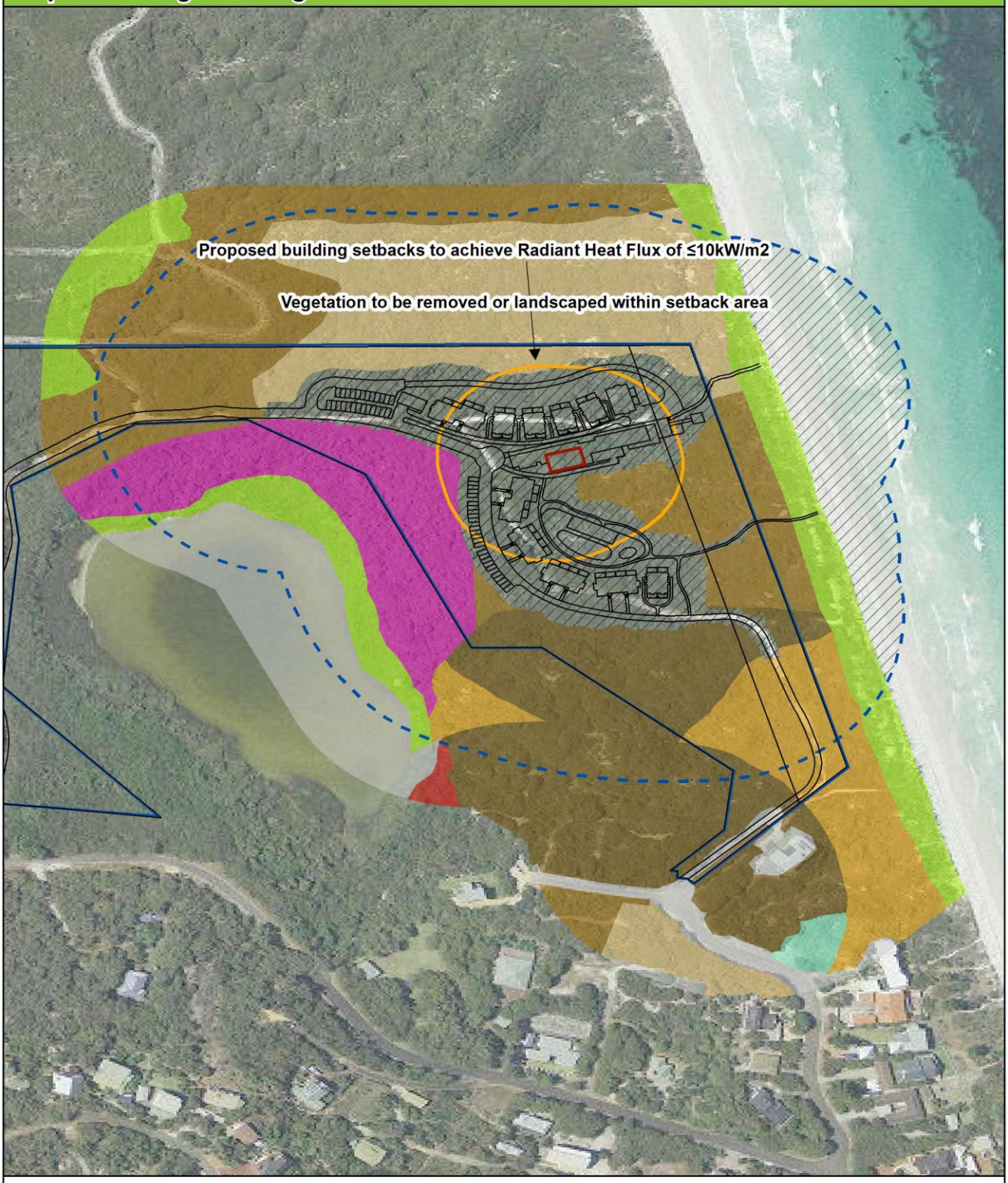
Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

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

Appendix B – Proposed location of Refuge Building

Proposed Refuge Building



Subject Lot
Development Outline
100m wide assessment area
Non-vegetated/Low threat vegetation

Vegetation type, slope range

Excluded as per clause 2.2.3.2 (e) and (f) of AS3959-2009
Forest Type A, >5 to 10
Grassland Type G, Flat
Low fuel or non vegetated 2.2.3.2, Flat
Scrub Type D, Flat
Scrub Type D, >0 to 5 degrees
Scrub Type D, >5 to 10 degrees
Scrub Type D, upslope
Shrubland Type C, upslope
Woodland Type B, >0 to 5 degrees

0 20 40 80
Metres
Datum/Projection:
GDA 1994 MGA Zone 56

N

eco logical AUSTRALIA
www.ecoaus.com.au

Prepared by: EB Date: 28/02/2018

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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