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Bushfire Assessment

Proposed Additions

The Robertson Hotel
1 Fountaindale Road,
Robertson

10 February 2020

(Ref: 18134)

report by
david peterson

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FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER
ABN 28 607 444 833

Contents

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1 Introduction

Street or property name:	1 Fountaindale Road		
Suburb, town or locality:	Robertson	**Postcode:**	2527
Lot/DP no:	Lot 2 DP 610676		
Local Government Area:	Wingecarribee Shire Council		
Type of development:	Special Fire Protection Purpose (SFPP)		

1.1 Background

The Robertson Hotel commissioned Peterson Bushfire to prepare a Bushfire Assessment Report to inform and support a development application for proposed additions to the existing Robertson Hotel located at the above address. This report presents the assessment and recommendations to ensure that the proposed development will comply with the relevant bushfire protection legislation and policy.

This bushfire assessment has been prepared by a consultant accredited by the Fire Protection Association of Australia's BPAD scheme (Accreditation No. BPD-L3-18882).

1.2 Location and description of proposal

The subject land is located at the intersection of Fountaindale Road and the Illawarra Highway on the eastern edge of the village of Robertson (refer to Figure 1). The property contains the Robertson Hotel, constructed in 1924 and set amongst manicured lawns and gardens and fringed by remnants of rainforest.

The subject land is bordered by the Moss Vale Railway Line to the east and south and Fountaindale Road and Illawarra Highway to the west and north. Cleared and managed lands predominate the surrounding landscape, with exception to the east beyond the railway where Robertson Rainforest remains within gullies untouched by adjacent farming activities.

The hotel is operational and attracts weddings and other group bookings. However, the hotel offers an antiquated style of accommodation whereby rooms don't have ensuites, amongst other matters. Therefore, it is proposed to redevelop the hotel by internal refurbishment and additions to provide modern facilities to the contemporary market whilst retaining the heritage element of the site. The proposal can be divided into four components in terms of assessing bushfire protection requirements. These are listed below:

1. Internal refurbishment: The existing hotel will be refurbished to place a bathroom in all rooms and to generally improve the facilities offered. This component of the proposal is considered to be 'infill' development.

2. Hotel addition: A large wing will be added to the eastern side of the hotel to provide additional accommodation. This component of the development is not infill development and will have a compliant APZ.

3. Ecotourism: Cabins will be added along the eastern boundary and within the northern portion of the site. The hotel will act as the refuge building for those cabins to the east, and a refuge building with compliant APZ will form part of the cabins in the north of the site.

4. Ancillary buildings: The existing outdoor pool will be replaced with an indoor pool and thermal baths with amenities. The existing groundskeeper cottage in the southern part of the site will be refurbished.

A development layout plan is included as Figure 2.

1.3 Assessment requirements

The subject land is identified as containing bushfire prone land as mapped on The Wingecarribee Bushfire Prone Land Map (refer to Figure 3). Development proposals involving tourist accommodation on bushfire prone land are defined 'Special Fire Protection Purpose' (SFPP) development by s100B *Rural Fires Act 1997* and require assessment in accordance with the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (RFS 2019), referred to as 'PBP' throughout this report.

Chapter 6 of PBP addresses SFPP development and outlines the assessment methodology and protection measures, such as Asset Protection Zone (APZ) building setbacks from identified hazards, Bushfire Attack Level (BAL) building construction standards to withstand bushfire attack, adequate access for emergency response and evacuation, the provision of water supply for fire-fighting, and vegetation management.

Legend

Subject Land

N

DKGIS

Date: 10/02/2020

0 125 250 500 750

Metres

Figure 1: The Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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Legend

Subject Land

N

DKGIS

Date: 10/02/2020

0 12.5 25 50 75

Metres

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

Figure 2: The Proposal

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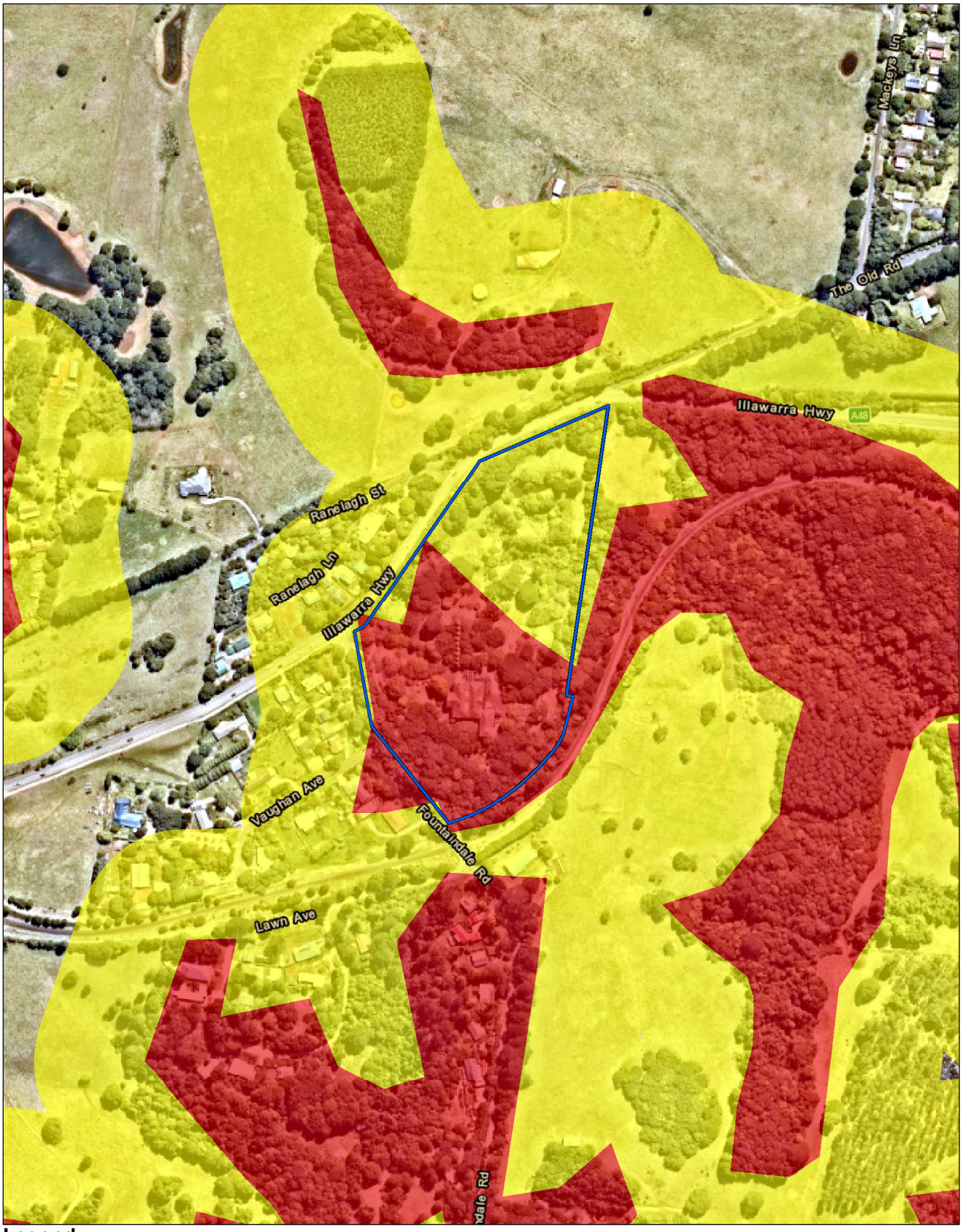

Legend

Subject Land

Bush Fire Prone Land

Vegetation Category 1

Vegetation Category 2

Vegetation Category 3

Vegetation Buffer

N

DKGIS

Date: 10/02/2020

0 25 50 100 150

Metres

Figure 3: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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2 Bushfire hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as APZ location and dimension. This section provides a detailed account of the vegetation communities (bushfire fuels) and the topography (effective slope) that combine to create the bushfire hazard that may affect bushfire behaviour at the site.

The 'predominant vegetation' and 'effective slope' influencing fire behaviour approaching the site has been assessed in accordance with the methodology specified by PBP. The site and hazard were inspected on 2nd October 2018.

2.1 Predominant vegetation

The bushfire hazard within and surrounding the subject land is the vegetation community 'Robertson Rainforest in the Sydney Basin Bioregion' (CEEC). A small exception is a small patch of Southern Highlands Shale Woodland (CEEC) within the subject land located on the northern side of the hotel. Much of the subject land is in a managed state, consisting of lawns and manicured gardens with a canopy of planted exotics. The rainforest hazard occurs at the southern end, along the boundaries and within the gully within the centre of the site north of the pool.

Beyond the subject land Robertson Rainforest occurs to the east beyond the railway and small, patchy remnants occur to the north of the Illawarra Highway amongst farming land and to the south beyond residential properties. To the east, the rainforest forms a narrow corridor between the subject land and the railway. The corridor is separated from the rainforest further east by the railway easement and cleared farming land. The rainforest corridor is the only hazard adjacent the subject land.

The distribution of rainforest within the subject land will alter as a result of the proposal. Some areas will be modified to allow construction and reduce the risk to specific components of the proposal. Vegetation modification is to achieve compliance with PBP whilst retaining the most significant aspects of the rainforest community on site. The proposed extent of hazard is shown on Figure 4.

The Robertson Rainforest is classified as 'rainforest' in accordance with PBP for the determination of APZs and BALs. It is quite a fire-resistant form of rainforest owing to the high rainfall (1,000 – 1,600 mm per year) and closed structure with open understorey and dense fern groundcover. The Robertson Rainforest is well known as an intermediate form between Cool Temperate Rainforests and Southern Warm Temperate Rainforests. The rainforest at the site and adjacent lands to the east align more closely with the intermediate form and display characteristics of the Cool Temperate Rainforest formation. The mid-layer is more typical of the cool temperate environments. This is most likely due to the higher elevation and exposure on the eastern edge of the surrounding plateau. The area of rainforest is unique and acts as a geographical link between the Cool Temperate Rainforests on the mid-north coast (Barrington Tops) and the south coast (Budawang Ranges). Small pockets of the intermediate form of Cool

Temperate Rainforest can also be found below the escarpment cliffs of the northern suburbs of Wollongong and at Loddon Falls west of Bulli.

The Wingecarribee Bush Fire Risk Management Plan (WBFMC 2017) states that the subject land and surrounding lands have not experienced fire in recorded history. This would be a result of the buffering effect of the cooler temperate rainforest and predominance of farming land surrounding the township.

2.1 Effective slope

The slope contributing to the rate of fire spread towards the development consists of downslopes to the south and east in the PBP slope classes of 'downslope 5-10 degrees' and 'downslope 10-15 degrees', and upslopes to the north and west in the PBP slope class of 'upslope/flat'.

Figure 4 indicates the slope classes and the general topography of the land can be appreciated by the 2 m contour intervals shown.

Legend

- Short Fire Run Slope Transect
- Contour - 2m
- Subject Land

Vegetation Formation

- Low Threat - Exclusion
- Rainforest

N

DKGIS

Date: 10/02/2020

0 12.5 25 50 75

Metres

Figure 4: Bushfire Hazard Analysis

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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3 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for SFPP development. The measures required to be assessed are listed in Table 1 below and are discussed in detail in the remainder of this section.

Table 1: PBP bushfire protection measures

Bushfire protection measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from identified hazards including prescriptions of vegetation management within the APZ.
Building construction standards (BALs)	Mapping and application of BALs across the site to highlight affected areas or buildings.
Access	Assessment to include access to and within the site, perimeter access, and design standards of any internal roads.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting.

3.1 Asset Protection Zones (APZ)

An APZ strategy has been developed to address the proposal. Figure 4 maps the proposed APZs. The strategy is three-fold and aimed at achieving compliance for the three groups of development:

1. Hotel addition – alternate solution (Short Fire Run) to achieve 10 kW/m^2 performance requirement.
2. Ecotourism development – acceptable solution to achieve 10 kW/m^2 performance requirement for the refuge building and ensure small patches of vegetation within the site are classified 'low threat vegetation – exclusion'.
3. Ancillary development – provision of defendable space surrounding the pool complex and existing cottage.

3.1.1 Hotel addition

An alternate solution has been used to determine the minimum APZ required to satisfy the performance requirement of PBP (*radiant heat levels at any point on a proposed building will not exceed 10 kW/m^2*). The alternate solution is the Short Fire Run (SFR) model which has been operated in accordance with the RFS document '*Methodology for assessing bush fire risk for low risk vegetation*'. The model version used was developed by Fire Code Australia (https://www.firecode.cloud/site/). SFR modelling reports are included at Appendix 1.

An alternate solution has been used, rather than the acceptable solution dimension listed in Table A2.6 of PBP, as the length of fire run and available fire development period that would be possible through the rainforest corridor to the south and east of the hotel would be significantly less than that assumed by the models underpinning the APZ dimensions specified by PBP. In this case, the SFR model provides a more accurate representation of expected radiant heat flux when a fire reaches the outer edge of the rainforest corridor adjacent the hotel. The model assumes the worst-case scenario of a fire igniting at the southern or eastern edge of the corridor at the railway easement and travelling across the full width of the corridor towards the hotel. The radiant heat flux is determined from the resulting width of the head fire (which is less than the 100 m assumed by the acceptable solution APZ) and reduced flame height (assuming that a canopy fire won't develop in such a short run).

The applicability of the SFR model to this site is attributable to the following risk parameters:

- The rainforest corridor is separated from the rainforest to the east by the railway easement and farming land. Ignition would have to occur within the corridor from a point source (e.g. lighting, arson etc). Fire development and spread from point source ignition within such a narrow corridor would be limited.
- The ability for the Robertson Rainforest to propagate a widespread fire and create spotting is highly unlikely given the formation approaching Cool Temperate Rainforest and the closed nature of the canopy.
- To impact the site, fire spread would need to occur from an easterly direction which is counter to the prevailing approach of problematic fire weather in the region.
- Fire history shows that the area of rainforest has not been subject to a bushfire in recorded history.

The width, shape and separation to other rainforest areas allows the use of the Short Fire Run (SFR) model to determine APZ dimension.

Figure 4 shows four SFR transects through the rainforest corridor. The position of the transects was based on the worst-case scenario (i.e. combination of widest point and steepest slope).

As shown in Table 2 on the following page and in the model reports included at Appendix 1, the applied APZ exceeds the minimum APZ to achieve a radiant heat flux no more than 10 kW/m^2 at the building interface. The applied APZ is indicated on Figure 4.

Table 2: SFR model calculation summary

Input	Transect 1	Transect 2	Transect 3	Transect 4
FDI *(Determined by PBP)*	100			
Effective slope *(Measured underneath hazard perpendicular to contours with 2 m intervals)*	13°	30°	24°	11°
Site slope *(Measured between hazard and development perpendicular to contours with 2 m intervals)*	11°	18°	12°	10°
Vegetation formation *(Refer to Section 2.1)*	Rainforest			
Overall fuel load *(Allocated to vegetation formation as per SFR methodology)*	13.2 t/ha			
Surface fuel load *(Allocated to vegetation formation as per SFR methodology)*	10 t/ha			
Elevated fuel height *(Set at upper end of 'medium' to reflect transition between Cool Temperate Rainforest and Southern Warm Temperate Rainforest formations as per SFR methodology)*	1.4 m			
Flame temperature *(Determined by PBP for SFPP development)*	1200 K			
Elevation of receiver *(Determined by SFR model)*	Peak			
Length of fire run *(Width of vegetated corridor)*	60 m	10 m	24 m	60 m
Output				
Radiant heat flux *(Determined by SFR model)*	9.311 kW/m^2	8.445 kW/m^2	9.097 kW/m^2	9.599 kW/m^2
APZ *(Exceeds SFR model)*	31 m	25 m	28 m	28 m

3.1.2 Ecotourism

The ecotourism component of the proposal comprises of two areas; to the east of the hotel and within the northern part of the site. Both areas will feature their own refuge building with compliant APZ. This will ensure all cabins are within 100 m of a refuge building. The cabins in the eastern portion will utilise the hotel as the refuge building, and the cabins in the northern portion of the site will have a separate refuge building that will double as the reception and small venue room. This refuge building will have an APZ to the surrounding rainforest that complies with the acceptable solutions in the following manner:

a) A 57 m APZ to the rainforest to the east (rainforest on downslope 5-10 degrees).

b) A 20 m APZ to roadside rainforest along the western boundary (this rainforest forms a corridor less than 20 m wide and is separated from other hazards such that it can be classified 'low threat vegetation – exclusion')

The cabins do not require an APZ providing they are within 100 m of a refuge building that has a compliant APZ.

3.1.3 Ancillary development

The pool complex and existing cottage will have a defendable space to the adjoining rainforest that will allow fire-fighters to conduct property protection. The defendable space is to be a minimum of 4 m wide and be free of obstructions to allow fire-fighters to gain access around the building on foot.

3.2 APZ management and landscaping

Those areas of the site that are not mapped as rainforest or low threat vegetation on Figure 4 will be managed to comply with APZ fuel management standards (i.e. Inner Protection Area). The following fuel management standards have been formulated to comply with the following RFS documents guiding APZ establishment and maintenance:

- *Planning for Bush Fire Protection 2019* Appendix 4; and
- *Standards for Asset Protection Zones*.

A summary of the relevant fuel management standards is as follows:

a) Canopy: Trees are to have a discontinuous canopy by achieving gaps between crowns of 2 to 5 m. Small clumps of trees can remain forming one larger crown providing larger gaps to the next adjacent crown of minimum 5 m is achieved.

b) Understorey: Understorey shrubs and saplings should not be within the APZ unless they are within defined and well-managed garden beds separated from the dwelling.

c) Groundcover: Groundcovers such as grasses are to be regularly mowed or slashed to minimal height (i.e. 100 mm).

Landscaping surrounding buildings will need to satisfy the principles listed within Appendix 4 of PBP.

3.3 Building construction standards

The additions to the hotel and the refuge building in the north are required to have a BAL-12.5 construction standard as per Australian Standard *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959). The NSW variation to AS 3959, listed within Section 7.5 of PBP, is also to be applied in addition to the BAL specifications.

The ecotourism cabins proposed to the east of the hotel and northern portion of the site do not require compliance with AS 3959. Similarly, the pool and amenities also do not require compliance and will be separated from the hotel building by more than 6 m.

3.4 Access

Alternate access and egress

PBP requires an access design that enables safe evacuation whilst facilitating adequate emergency and operational response. All bushfire prone areas should have an alternate access or egress option depending on the bushfire risk, the density of the development, and the chances of the road being cut by fire for a prolonged period.

The Illawarra Highway provides the public road access to the subject land. The road complies with PBP and provides access east and west. Robertson township is located less than 600 m to the west.

The existing public road layout satisfies PBP access objectives.

Internal access

The internal roads will be improved and complemented to provide access to all buildings in compliance with PBP Table 5.3B 'Property Access'. The requirements are repeated below:

- *Minimum carriageway width of 4m. Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed.*
- *In forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay.*
- *A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches.*
- *Property access must provide a suitable turning area in accordance with PBP Appendix 3.*
- *Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.*

- *The minimum distance between inner and outer curves is 6m.*
- *The crossfall is not more than 10°.*
- *Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads.*

3.5 Water supply and utilities

Water supply

Buildings will require fire hydrants to be installed to comply with *AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419) so that all sides of a building are within 70 m of a hydrant by lay of the hose (or 90 m with a tanker parked in-line maximum 20 m from the hydrant).

Electricity supply

Electrical supply will be provided underground and therefore complies with PBP.

Gas supply

Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2014 The storage and handling of LP gas*.

4 Conclusion and recommendations

4.1 Conclusive summary

This report presents an assessment of the proposed additions to The Robertson Hotel against the specifications and requirements of *Planning for Bush Fire Protection 2019* (PBP). Bushfire protection measures have been designed to achieve compliance with PBP whilst being sympathetic to the heritage and ecological significance to the site.

The Asset Protection Zone (APZ) strategy is complex and detailed, and addresses three development components of hotel addition, ecotourism and ancillary. An alternate solution utilising the Short Fire Run model has been employed to design the APZ strategy for the hotel additions. This was elected in order to address the low risk of fire initiating and spreading within the narrow corridor of rainforest to the south and east of the hotel. The APZ design for the ecotourism refuge building in the northern part of the site relies on management of the rainforest on site to create patches of low threat vegetation.

Other protection measures include improved access roads, water supply for fire-fighting and construction standards.

The assessment demonstrates that the proposal, together with the recommendations (see Section 4.2 below), complies with *Planning for Bush Fire Protection 2019*.

4.2 Recommendations

The recommendations made within Section 3 of this assessment are repeated below:

1. The subject land is to be managed to achieve APZ fuel management standards (*Planning for Bush Fire Protection 2019* Appendix 4; and *Standards for Asset Protection Zones*) outside of those areas mapped as ‘rainforest’ and ‘low threat vegetation’.

2. Landscaping within the site is to achieve the principles listed in Appendix 4 of *Planning for Bush Fire Protection 2006*.

3. The pool complex and existing cottage is to have a defendable space of minimum 4 m wide free of obstructions to allow fire-fighters to gain access around the building on foot.

4. The hotel additions and refuge building in the northern part of the site is to be designed and constructed to comply with Bushfire Attack Level BAL-12.5 as prescribed by Australian Standard *AS 3959 Construction of buildings in bushfire-prone areas*.

5. The internal road system is to comply with PBP Table 5.3B ‘Property Access’.

6. Fire hydrants are to be installed to comply with AS 2419.1 – *2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419) so that all sides of a building envelope are within 70 m of a hydrant by lay of the hose (or 90 m with a tanker parked in-line maximum 20 m from the hydrant).

7. Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2014 The storage and handling of LP gas*.

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References

NSW Rural Fire Service (RFS). 2019. *Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities and Developers*. Australian Government Publishing Service, Canberra.

NSW Rural Fire Service (RFS). Short Fire Run: Methodology for assessing bushfire risk for low risk vegetation. May 2019.

Standards Australia. 2005. *Fire hydrant installations - System design, installation and commissioning,* AS2419.1, Fourth edition 2005, Standards Australia International Ltd, Sydney.

Standards Australia. 2009 (Amendment 3). *Construction of buildings in bushfire-prone areas*, AS 3959, Third edition 2009, Standards Australia International Ltd, Sydney.

Standards Australia. 2014. *The storage and handling of LP Gas*, AS/NZS 1596-2014, Standards Australia International Ltd, Sydney.

Appendix 1 – SFR model reports

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Short Fire Run Report

Site Details

Date:	2020-02-10 12:07:58
Site Address:	Robertson Hotel - Transect 1
Local Government Area:	Wingecarribee
Alpine Area:	No

Compliance

Assessor:	David Peterson
BPAD ID:	BPAD18882

Site Parameters

Vegetation Type:	Rainforest	Effective Slope:	13.00 degrees
FDI:	100.00	Site Slope:	11.00 degrees
Flame Temperature:	1200.00 K	Overall Fuel Load:	13.20 t/ha
Average Distance to Vegetation:	31.000 m	Surface Fuel Load:	10.00 t/ha
Elevated Fuel Height:	1.400 m	Measured SFR:	60.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle:	75.0 degrees	Elevation of Receiver:	1.330 m (Peak)

Model Results

FROS:	2,942.682 m/hr	Full Ellipse Length:	98.567 m
L/B Ratio:	2.823	Full ROS:	3,041.250 m/hr
HF/BF Ratio:	29.855	Head Width:	21.962 m
Ellipse Length incl. Backfire:	62.010 m	Ellipse Breadth:	21.962 m

Model Results

SFR Flame Height:	15.226 m
SFR Flame Length:	15.226 m
View Factor:	0.102
Path Length:	29.030 m
Transmissivity:	0.816
SFR Radiant Heat Flux:	9.311 kW/m^2

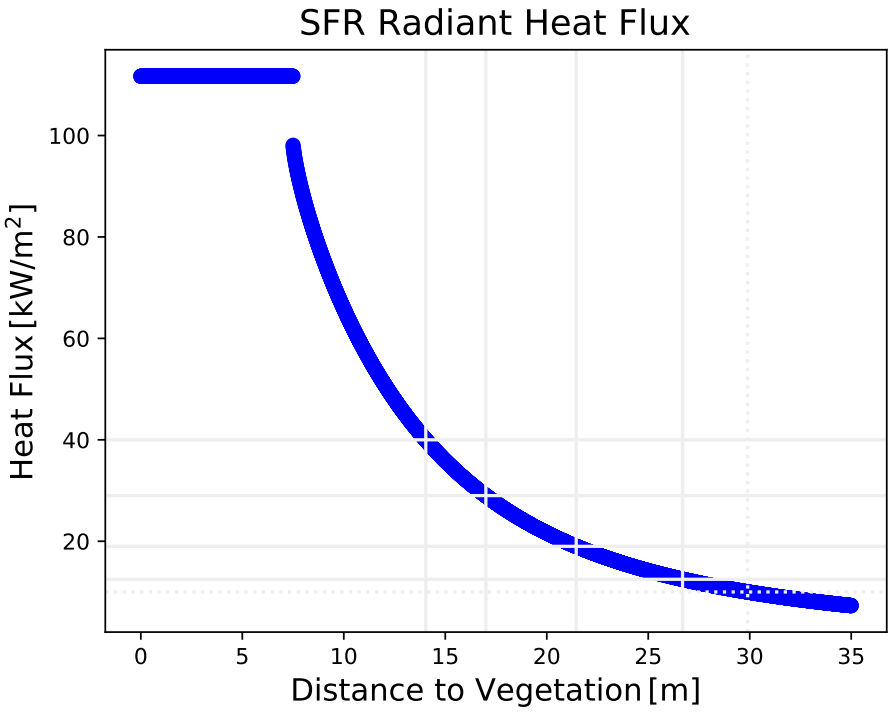
Bushfire Attack Level

BAL-12.5

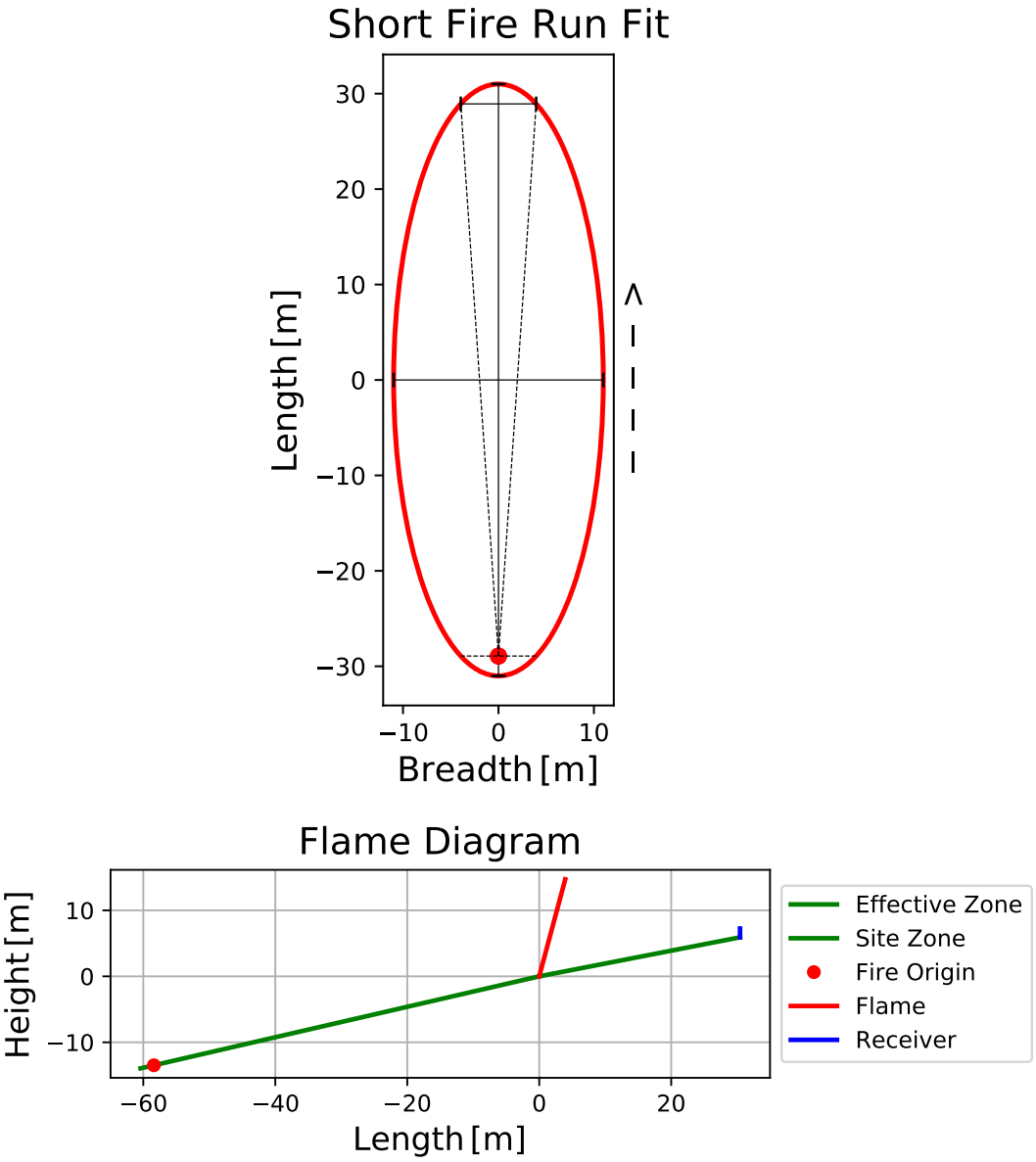
Asset Protection Zone Calculations

BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m^2	29.90 m	1.54 m
BAL-12.5	26.69 m	2.05 m
BAL-19	21.45 m	2.84 m
BAL-29	17.00 m	3.42 m
BAL-40	14.04 m	3.66 m
BAL-FZ	$<$ 14.04 m	

APZ Figures



Figures


Short Fire Run Fit
Length [m]
Breadth [m]
30
20
10
0
−10
−20
−30
−10
0
10
Flame Diagram
Height [m]
Length [m]
10
0
−10
−60
−40
−20
0
20
Effective Zone
Site Zone
Fire Origin
Flame
Receiver

Model Construction

This short fire run model has been created from methods outlined in "AS 3959–2009 Construction of buildings in bushfire-prone areas" and the NSW Rural Fire Service document "Short Fire Run – Methodology for Assessing Bush Fire Risk for Low Risk Vegetation". Its use is intended for experienced bushfire practitioners.

Model Limitations

Users of this short fire run model should have a comprehensive understanding of "AS 3959–2009 Construction of buildings in bushfire-prone areas" and the NSW Rural Fire Service document "Short Fire Run – Methodology for Assessing Bush Fire Risk for Low Risk Vegetation".

As a precaution, this model has been fitted with the following limitations:

- Effective slope limited to 30 degrees for downslope inputs,
- Site slope limited to 20 degrees,
- Effective slope limited to 15 degrees for upslope,
- For forest vegetation type elevated fuel height limited to maximum input of 2 metres.

Users of this model should also note:

- NSW RFS Short Fire Run documentation states that "[Short] Fire runs exceeding 150 meters need to be specifically supported within a Bush Fire Design Brief."

Peterson Bushfire

Short Fire Run Report

Site Details

Date:	2020-02-10 12:07:58
Site Address:	Robertson Hotel - Transect 2
Local Government Area:	Wingecarribee
Alpine Area:	No

Compliance

Assessor:	David Peterson
BPAD ID:	BPAD18882

Site Parameters

Vegetation Type:	Rainforest	Effective Slope:	30.00 degrees
FDI:	100.00	Site Slope:	18.00 degrees
Flame Temperature:	1200.00 K	Overall Fuel Load:	13.20 t/ha
Average Distance to Vegetation:	26.000 m	Surface Fuel Load:	10.00 t/ha
Elevated Fuel Height:	1.400 m	Measured SFR:	10.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle:	42.0 degrees	Elevation of Receiver:	3.450 m (Peak)

Model Results

FROS:	9,509.788 m/hr	Full Ellipse Length:	318.537 m
L/B Ratio:	2.823	Full ROS:	9,828.324 m/hr
HF/BF Ratio:	29.855	Head Width:	3.660 m
Ellipse Length incl. Backfire:	10.335 m	Ellipse Breadth:	3.660 m

Model Results

SFR Flame Height:	35.555 m
SFR Flame Length:	35.555 m
View Factor:	0.088
Path Length:	12.789 m
Transmissivity:	0.861
SFR Radiant Heat Flux:	8.445 kW/m^2

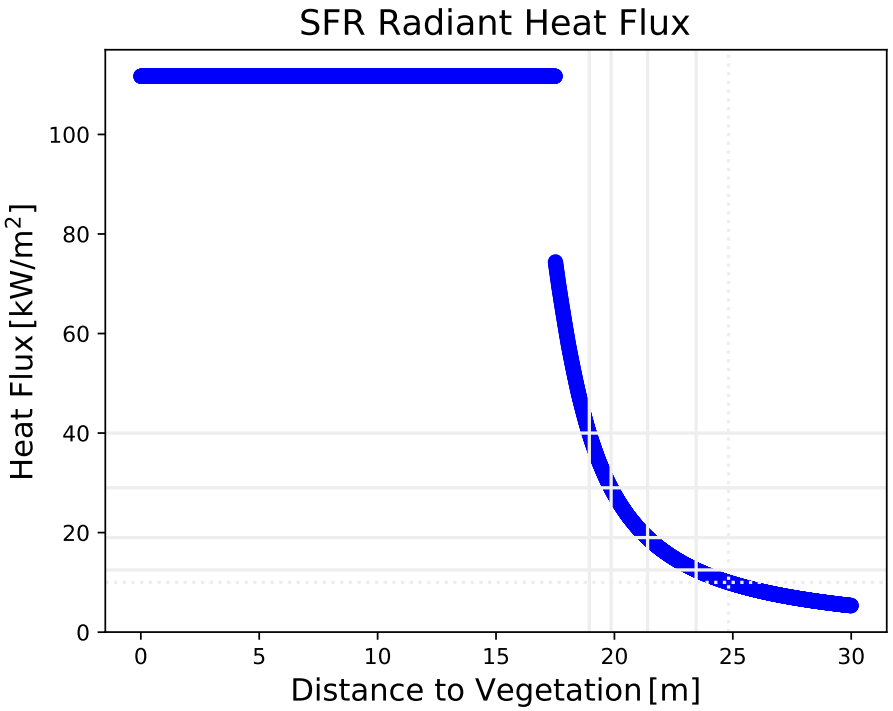
Bushfire Attack Level

BAL-12.5

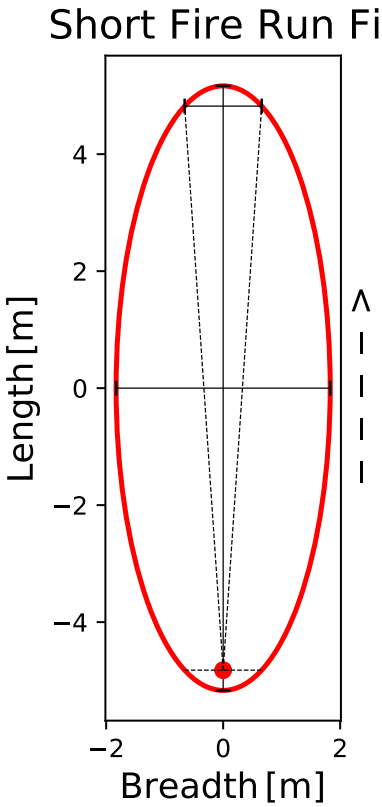
Asset Protection Zone Calculations

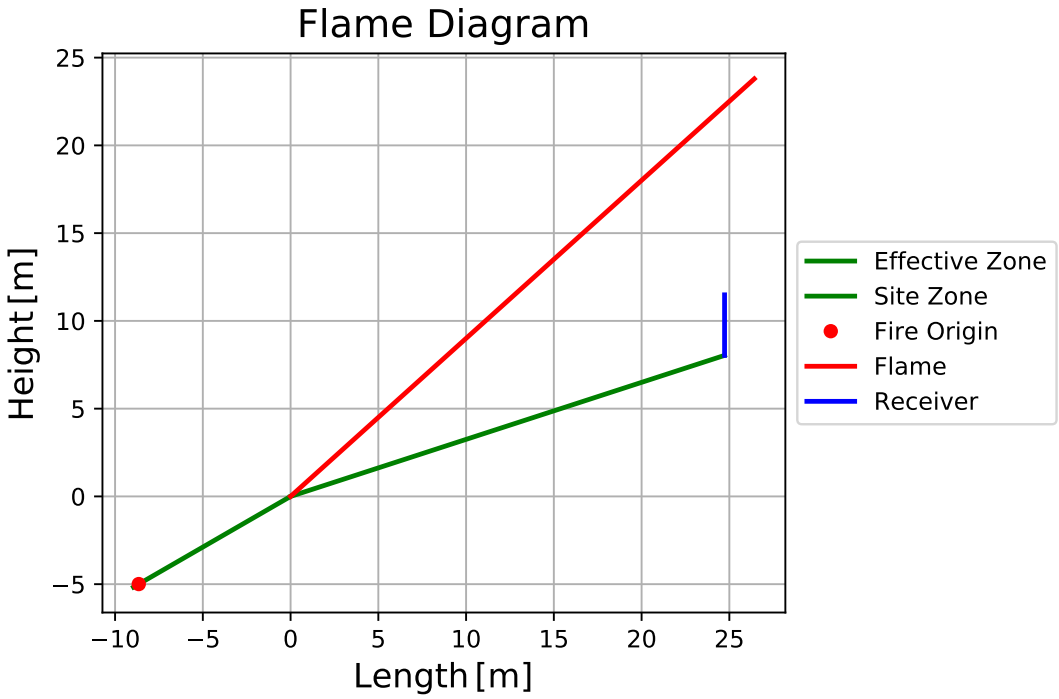
BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m^2	24.82 m	3.36 m
BAL-12.5	23.45 m	3.08 m
BAL-19	21.40 m	2.47 m
BAL-29	19.86 m	2.17 m
BAL-40	18.94 m	1.92 m
BAL-FZ	$<$ 18.94 m	

APZ Figures



Figures


Short Fire Run Fit
Length [m]
Breadth [m]
4
2
0
−2
−4
−2
0
2


Flame Diagram
Height [m]
Length [m]
25
20
15
10
5
0
−5
−10
−5
0
5
10
15
20
25
Effective Zone
Site Zone
Fire Origin
Flame
Receiver

Model Construction

This short fire run model has been created from methods outlined in "AS 3959–2009 Construction of buildings in bushfire-prone areas" and the NSW Rural Fire Service document "Short Fire Run – Methodology for Assessing Bush Fire Risk for Low Risk Vegetation". Its use is intended for experienced bushfire practitioners.

Model Limitations

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- Effective slope limited to 30 degrees for downslope inputs,
- Site slope limited to 20 degrees,
- Effective slope limited to 15 degrees for upslope,
- For forest vegetation type elevated fuel height limited to maximum input of 2 metres.

Users of this model should also note:

- NSW RFS Short Fire Run documentation states that "[Short] Fire runs exceeding 150 meters need to be specifically supported within a Bush Fire Design Brief."

Peterson Bushfire

Short Fire Run Report

Site Details

Date:	2020-02-10 12:07:58
Site Address:	Robertson Hotel - Transect 3
Local Government Area:	Wingecarribee
Alpine Area:	No

Compliance

Assessor:	David Peterson
BPAD ID:	BPAD18882

Site Parameters

Vegetation Type:	Rainforest	Effective Slope:	24.00 degrees
FDI:	100.00	Site Slope:	12.00 degrees
Flame Temperature:	1200.00 K	Overall Fuel Load:	13.20 t/ha
Average Distance to Vegetation:	29.000 m	Surface Fuel Load:	10.00 t/ha
Elevated Fuel Height:	1.400 m	Measured SFR:	24.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle:	54.0 degrees	Elevation of Receiver:	4.500 m (Peak)

Model Results

FROS:	6,285.979 m/hr	Full Ellipse Length:	210.553 m
L/B Ratio:	2.823	Full ROS:	6,496.532 m/hr
HF/BF Ratio:	29.855	Head Width:	8.785 m
Ellipse Length incl. Backfire:	24.804 m	Ellipse Breadth:	8.785 m

Model Results

SFR Flame Height:	26.358 m
SFR Flame Length:	26.358 m
View Factor:	0.097
Path Length:	21.254 m
Transmissivity:	0.836
SFR Radiant Heat Flux:	9.097 kW/m^2

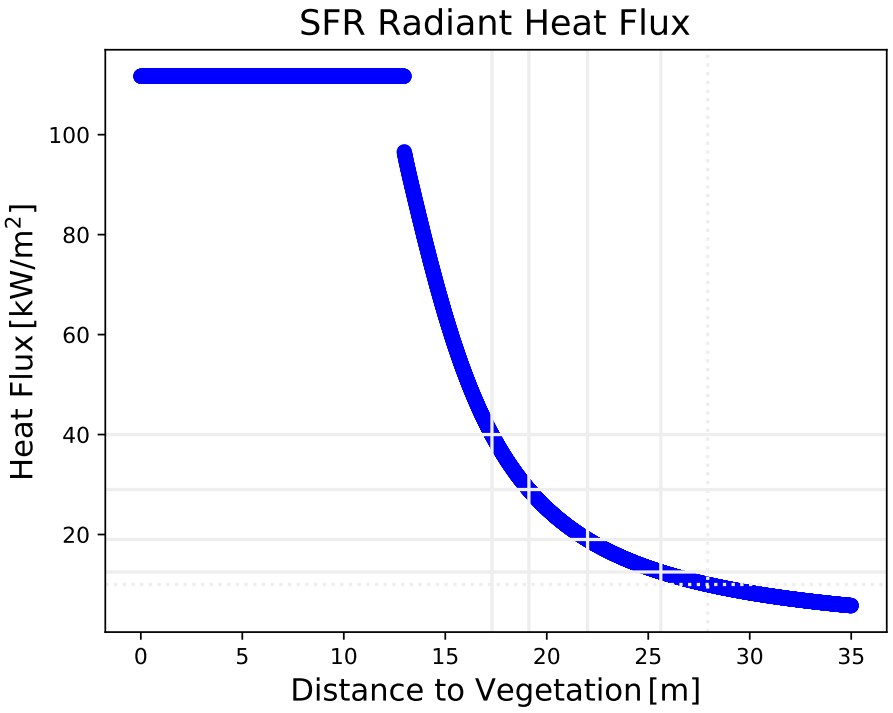
Bushfire Attack Level

BAL-12.5

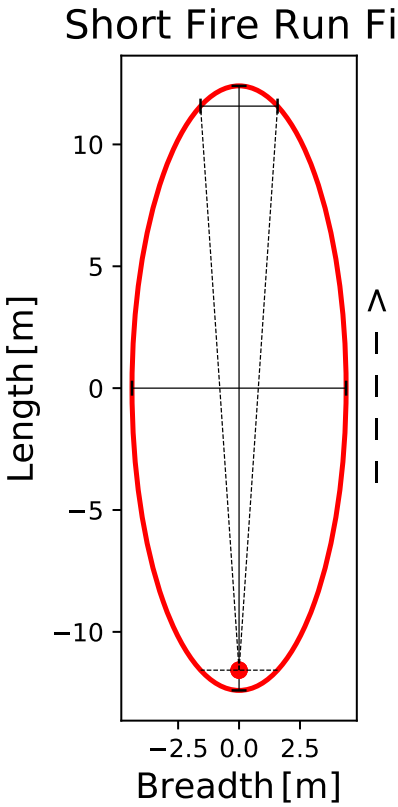
Asset Protection Zone Calculations

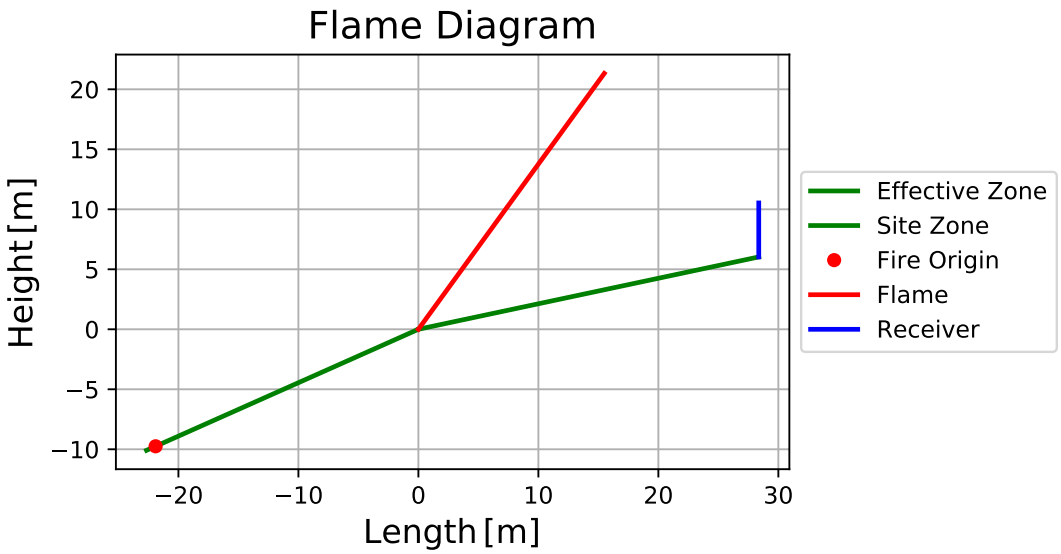
BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m^2	27.93 m	4.59 m
BAL-12.5	25.62 m	4.65 m
BAL-19	22.01 m	4.31 m
BAL-29	19.12 m	4.05 m
BAL-40	17.30 m	3.69 m
BAL-FZ	$<$ 17.30 m	

APZ Figures



Figures


Short Fire Run Fit
Length [m]
Breadth [m]
10
5
0
−5
−10
−2.5
0.0
2.5


Flame Diagram
Height [m]
Length [m]
20
15
10
5
0
−5
−10
−20
−10
0
10
20
30
Effective Zone
Site Zone
Fire Origin
Flame
Receiver

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Peterson Bushfire

Short Fire Run Report

Site Details

Date:	2020-02-10 12:07:58
Site Address:	Robertson Hotel - Transect 3
Local Government Area:	Wingecarribee
Alpine Area:	No

Compliance

Assessor:	David Peterson
BPAD ID:	BPAD18882

Site Parameters

Vegetation Type:	Rainforest	Effective Slope:	11.00 degrees
FDI:	100.00	Site Slope:	10.00 degrees
Flame Temperature:	1200.00 K	Overall Fuel Load:	13.20 t/ha
Average Distance to Vegetation:	29.000 m	Surface Fuel Load:	10.00 t/ha
Elevated Fuel Height:	1.400 m	Measured SFR:	60.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle:	75.0 degrees	Elevation of Receiver:	1.540 m (Peak)

Model Results

FROS:	2,563.367 m/hr	Full Ellipse Length:	85.862 m
L/B Ratio:	2.823	Full ROS:	2,649.228 m/hr
HF/BF Ratio:	29.855	Head Width:	21.962 m
Ellipse Length incl. Backfire:	62.010 m	Ellipse Breadth:	21.962 m

Model Results

SFR Flame Height:	13.780 m
SFR Flame Length:	13.780 m
View Factor:	0.105
Path Length:	27.217 m
Transmissivity:	0.820
SFR Radiant Heat Flux:	9.599 kW/m^2

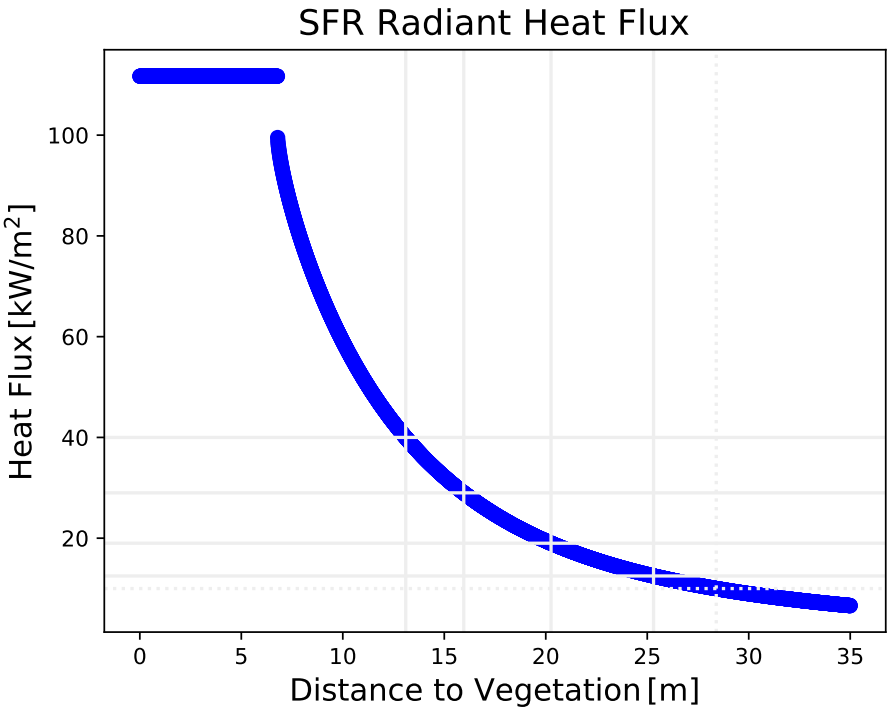
Bushfire Attack Level

BAL-12.5

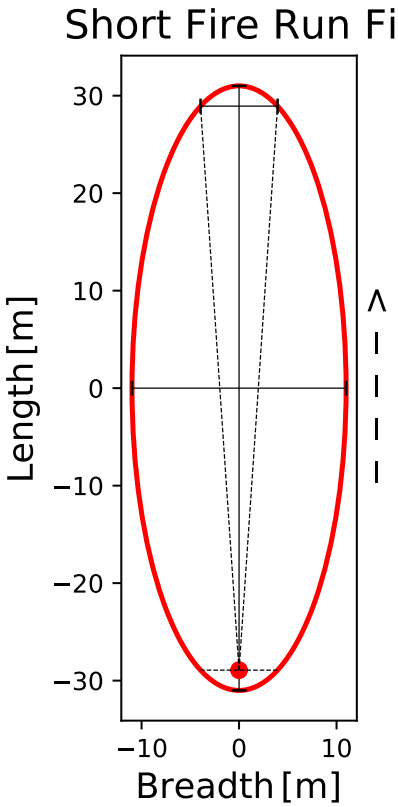
Asset Protection Zone Calculations

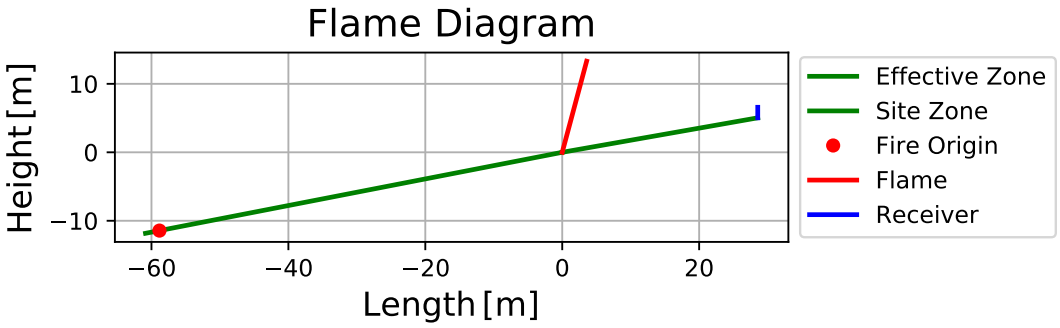
BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m^2	28.40 m	1.65 m
BAL-12.5	25.31 m	2.13 m
BAL-19	20.26 m	2.82 m
BAL-29	15.96 m	3.32 m
BAL-40	13.10 m	3.53 m
BAL-FZ	$<$ 13.10 m	

APZ Figures



Figures


Short Fire Run Fit
Length [m]
Breadth [m]
30
20
10
0
−10
−20
−30
−10
0
10


Flame Diagram
Height [m]
Length [m]
10
0
−10
−60
−40
−20
0
20
Effective Zone
Site Zone
Fire Origin
Flame
Receiver

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expert consulting services

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