



AUSTRALIAN BUSHFIRE CONSULTING SERVICES



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PO Box 212 Berowra Heights 2082

NSW RFS
Locked Bag 17
Granville NSW 2142

16th January 2020
Ref 19-224-1

Attn: NSW RFS Planning and Environment Services

RE: BARRA BRUI HOCKEY FIELD / PRE DA APPLICATION

Dear Sir / Madam,

On behalf of Kur ring gai Council please accept this submission for a pre DA review of the proposed alterations and additions to the existing facility known as the "Barra Brui Sportsground".

The subject site currently provides for a soccer field with associated play equipment, parking, clubhouse facilities and amenities. The site is split zoned RE1 Public Recreation and E2 Environmental Conservation. The site is known as 2A Burraneer Avenue, St Ives, NSW, spanning Lot 825 DP 752031 & Lot 7318 DP 1158573. The property is generally surrounded by small lot residential development to the north, south and west and Garigal National Park is located to the east of the site.

The proposed development is redevelopment of the site converting the existing playing field to a synthetic hockey field (water field) with associated supporting infrastructure. The proposed works involve field infrastructure including a dugout, viewing gallery, resurface of the playing field and alterations and additions to the existing clubhouse, or demolition of existing and construction of a new clubhouse.

Legislative Context:

This review has applied the November 2019 version of Planning for Bush Fire Protection 2019. The main focus of this review is the redevelopment of the existing clubhouse located within the southwest area of the site.

In terms of bushfire protection, the proposed clubhouse redevelopment will not be assessed as a Special Fire Protection Purpose Development (SFPP) (place of public assembly Class 9B) as it will fall within the exclusions permissible under the size threshold of being less than 500 m sq.

PBP 2019:

Section 8.3.11 Public assembly buildings

Public assembly buildings are not defined as SFPP by the RF Reg but require referral under EP&A Act s.4.14 to the NSW RFS. Buildings used for public assembly with a floor space area of greater than 500m² are required to consider bush fire. These developments will be treated technically as SFPP due to the evacuation challenges presented by large numbers of occupants.

The proposed development also includes Class 10 structures such as viewing stands (portable or elevated aluminium benches). In terms of providing a common sense approach the scale of the proposed seating is small and is no different than spectators gathering on foot to view games at any opportune location around the oval. In this regard the site already provides for this type of use / gathering and no change is proposed.

It is noted that;

- the construction of seating is non-combustible,
- the increase in site capacity is not greater than that currently provided,
- the application provides a better outcome in terms of construction and emergency management for the site.

Confirmation that the proposal is not Special Fire Protection Purpose Development (SFPP) is requested as part of this review.

Other Class 10 structures such as the score board, dug outs, fences, etc are also proposed. Aside from areas of perspex fencing adjacent the dugouts these structures will be made from non-combustible materials.

The proposal will include detached Class 10 structures and seating provisions that are located greater than 6 metres from the clubhouse. Structures located greater than 6 metres from the clubhouse attract “*no bushfire protection requirements*” in accordance with section 8.3.2 of PBP 2019. Any ancillary structure located within 6 metres of the clubhouse (such as a fence, seating, mast etc) will be made from non-combustible materials.



Image 01: Aerial image extract from NSW Gov. Spatial Services SIX Maps dataset

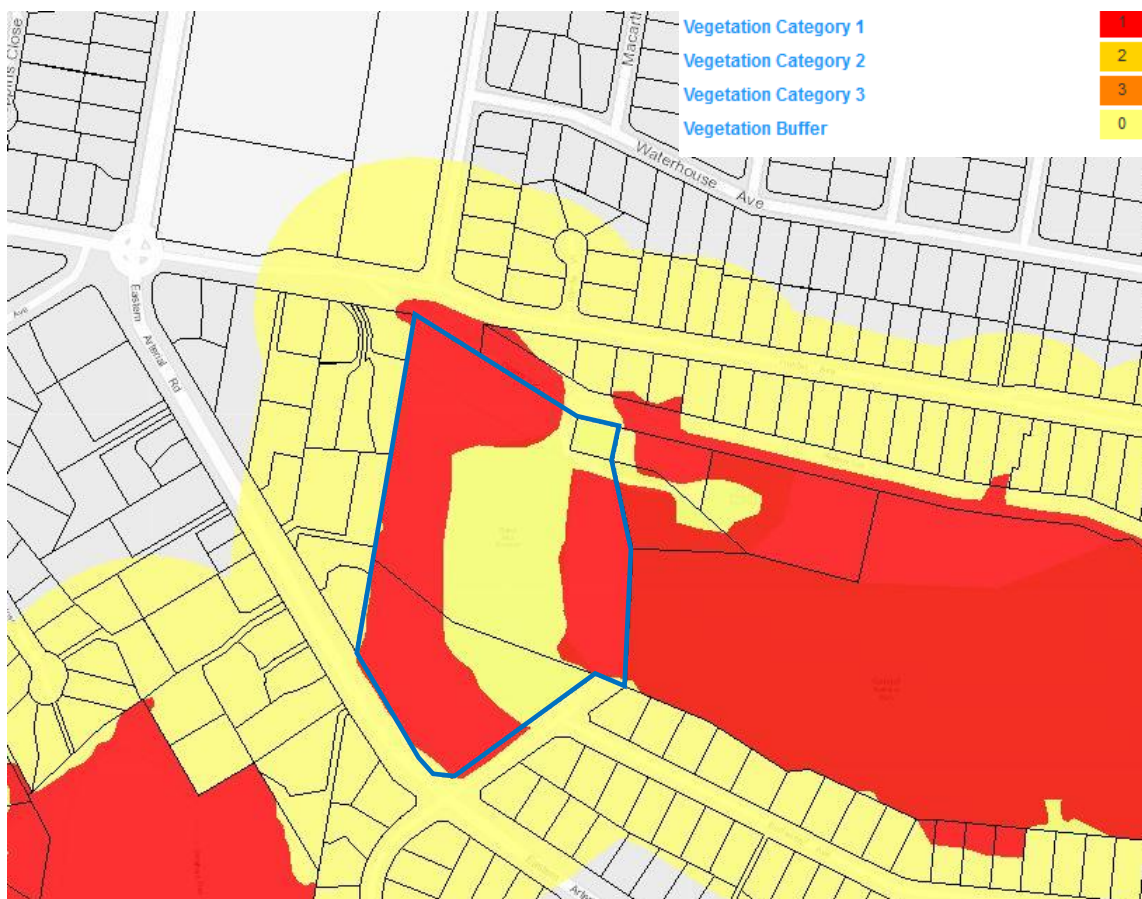


Image 02: Extract of Council's Bushfire Prone Land Map from Dept. of Planning Property Information.



Image 03: Council's LEP Zone Map extract from Department of Planning Property Information.

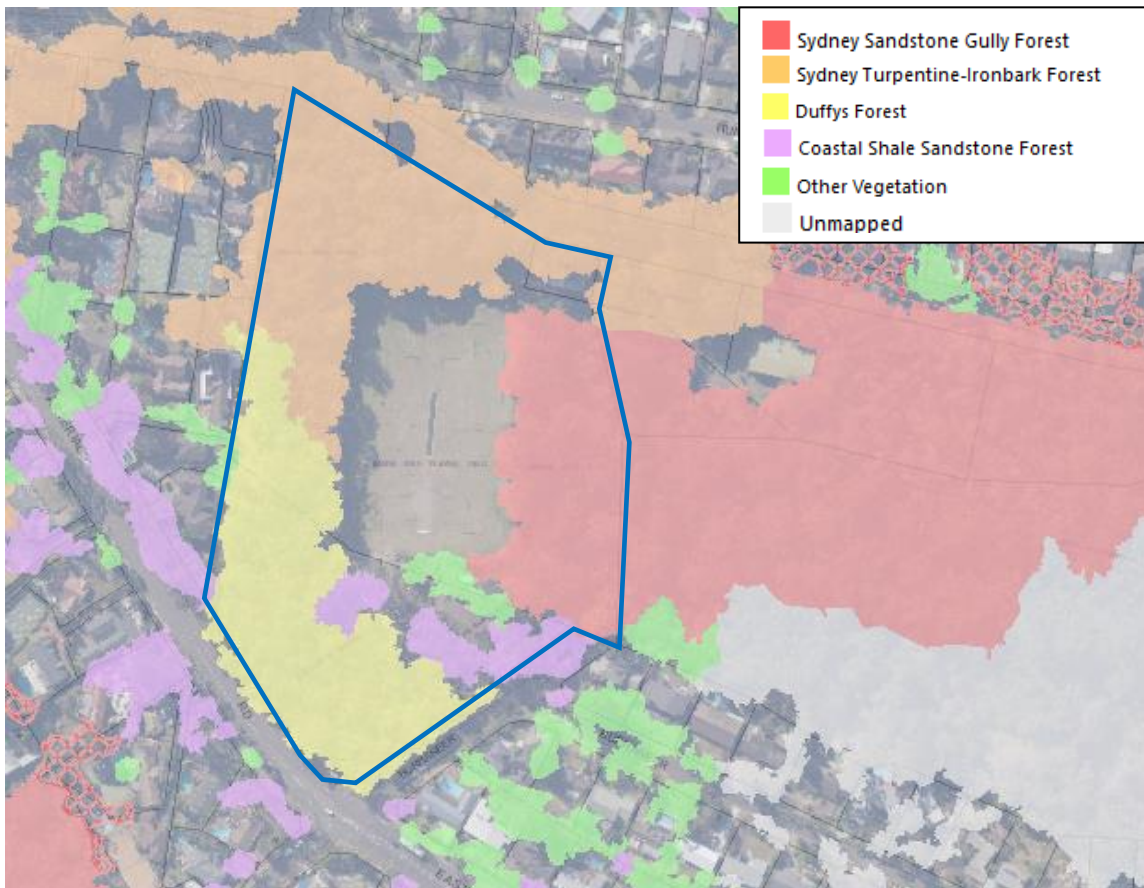


Image 04: Vegetation mapping from Ku ring gai Council Webmap database



Image 05: Extract from NSW Gov Biodiversity Values Map database

Bushfire Assessment summary:

LGA	Ku ring gai Council
FFDA	100
Flame Temp	1080 Kelvin
Vegetation	
North,	Sydney Turpentine Iron Bark Forest Keith Class Northern Hinterland Wet Sclerophyll Forest Forest Fuels 20/33.1 t/ha surface/total Fire front width 50 metres
West and south,	Duffys Forest EEC Keith Class Northern Hinterland Wet Sclerophyll Forest Forest Fuels 20/33.1 t/ha surface/total
East	Sydney Sandstone Gully Forest Keith Class North Coast Wet Sclerophyll Forests Assessed using Table A1.12.5 PBP 2019
Slope assessment from existing / proposed clubhouse footprint	
Hazard Slope	0 degrees level or upslope to the north 5 degrees upslope to the south 10 degrees upslope to the west 13 degrees downslope to the east
Site Slope	0 degrees level to the north, south & west 5 degrees downslope to the east

Early in the project it was advised that:

Vegetation to the east of the field is national park containing sandstone vegetation communities, whilst vegetation to the north and west of the field is mapped as Duffys Forest and Sydney Turpentine Ironbark Forest both threatened vegetation communities under the NSW Biodiversity Conservation (BC) Act 2016. As such Council is seeking an outcome that addresses bushfire mitigation and safety requirements while minimising impacts upon the adjoining bushland.

Asset Protection Zones:

The proposed development is redevelopment of an existing clubhouse and is considered infill development. Based on my site assessment of the current vegetation management with no further vegetation clearing to occur the Bushfire Attack Level to existing structure and any redevelopment of this building is BAL Flame Zone.

To achieve compliance with the aims and objectives of PBP 2019 as infill development the following investigative process was undertaken.

The current building is made from essentially noncombustible materials; however, it is not constructed to compliance with AS3959 – 2009 *Construction of buildings in bushfire prone areas* (AS3959 - 2009). The asset protection zone and defendable space are virtually nonexistent to the western aspect, narrowing to approximately 1 metre at the southwestern corner of the building, with trees touching or overhanging the building.

There is currently no emergency management plan in place for the site and no provisions for onsite fire fighting water supply. The site could be occupied on Catastrophic Fire Danger Days.

Redevelopment of the structure has considered siting the development so that it avoids possible flame contact, provides a clear defendable space around the footprint and ensures that the building can be designed and constructed in accordance with AS3959 – 2009. There have been examples in the past where similar development has been approved in BAL FZ and BAL 40 area, however for this proposal a BAL 29 threshold has been targeted.

Vegetation Assessment:

To the north and east the hazard assessment is a Forest and fuel loads in accordance with the NSW RFS document *Comprehensive Vegetation Fuel Loads February 2019* have been applied.

The assessment to the west and south has used short fire run modelling / reports attached. Clearly to the west the fire run is less than 50 metres and to the south the fire runs only exceed this threshold on small and tangential aspects. The total size of the vegetated area to the south is approx. 0.55 ha, well less than 1 ha potential fire development area.

Any fire impacting in the vegetation surrounding the building is likely to be caused by spotting from fires within the larger tracks of vegetation in Garigal NP to the east. This would occur under easterly weather influences with fires driven parallel or away from the development footprint. Any fire impacting under other weather situations could result in fire runs impacting from the south and west. Any fire impacting directly from the west would be an incipient fire on a less than 50 metre fire run. Should a fire impact from the southern aspect it would also be an incipient fire on short fire runs and with a less than 1 ha development period.

Note PBP 2019 allows for downgrades of vegetation assessment as follows:

Remnant vegetation is a parcel of vegetation with a size of less than 1 Ha or a shape that provides a potential fire run that could threaten buildings not exceeding 50m. These remnants are considered a low hazard and APZ setbacks and building construction standards for these may be the same as for rainforests.

Although the vegetation to the south (and possibly even to the west) could be arguably assessed as a remnant hazard, using short fire run modelling is considered a more conservative approach and builds a redundancy into the package of bushfire protection measures.

To achieve a 29 kW/m² footprint & BAL 29 construction using fire modelling the following asset protection zones will be provided around the building:

BAL 29	Asset Protection Zone
North	≥ 21 metres
West	12 metres
East	45 metres
South	14 metres

Short fire modelling is an alternate solution and confirmation from the NSW RFS is sought to confirm this approach and the model inputs are appropriate for the site and proposed development.

Asset Protection Zone Summary:

Applying the APZ from the existing footprint will impact the vegetated EEC Duffys Forest surrounding this development. An alternative is to demolish the existing building altogether and shift it eastward, locating all APZs outside the vegetated EEC. The potential APZ impact would then be limited to one tree that currently overhangs the building and possibly one tree adjacent the existing playground (subject to a more specific assessment). Ongoing management of the existing batter between the childcare and the oval, the existing car park area and the sports oval itself is assumed.

The site has to capacity to provide for a building envelope and asset protections zones that achieve a BAL 29 construction footprint. Attached to this review is an overlay showing indicative APZs around the existing footprint and potential building area with APZs located outside the existing vegetation.

Landscaping & Asset Protection Zones:

All Asset Protection Zones will be managed as an inner protection area. It is recommended that all grounds around the proposed clubhouse for a minimum distance of 21 metres to the north, 12 metres to the west, 14 metres to the south and 45 metres to the east are to be maintained as an asset protection zone / inner protection area as detailed in the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 4 of PBP 2019.

Building Construction & Design:

Australian Standard 3959 – 2009 'Construction of buildings in bushfire-prone areas' provides for six (6) levels of building construction these being BAL - Low, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40 and BAL - FZ. The Australian Standard 3959 specifies construction standards for buildings within various Bushfire Attack Levels as determined by the Planning for Bushfire Protection document. The NSW Rural Fire Service will not accept deemed to satisfy provisions for BAL Flame Zone and the NCC requires consultation with the RFS during a development application process. This is further enforced under s4.14 of the EPA Act 1979.

The potential Bushfire Attack Level to the clubhouse was determined to be BAL 29. The proposed new clubhouse will be constructed to comply with section 3 and 7 BAL 29 of AS 3959 – 2009 and the additional requirements detailed within Table 7.4b under PBP 2018.

In all design fire modelling the elevation of receiver has been calculated as "default" forcing the fire models to calculate the highest potential impact at any given height above the building footprint. Therefore, there is no variation required in APZs for a single or two storey structure.

Any detached Class 10 structures and seating provisions that are located greater than 6 metres from the clubhouse attract "*no bushfire protection requirements*". Any ancillary structure located within 6 metres of the clubhouse (such as a fence, seating, masts etc) will be made from non-combustible materials.

Access:

The following are the requirements for property access within PBP 2019 that I consider applicable to the proposed development:

- minimum carriageway width of 5.5 metres two way within the car park,
- minimum carriageway width of 4 m passing the building envelope through to the oval, narrowing to no less than 3.5 metres for a distance of no greater than 30 metres where the obstacle cannot reasonably be avoided or removed,
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches,
- 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 3°; and maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads,
- the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating

Note: A suitable turning area is provided by virtue of vehicle access through to the oval.

Services:

Planning for Bush Fire Protection also addresses the installation of services (i.e. water, electricity and gas) within bushfire prone areas. The following requirements for services will be provided to the development.

Water Supply:

A 10,000 litre static water supply (SWS) will be provided as part of any future development application. The SWS does not have to be dedicated solely for firefighting purposes and can be part or a combination of tanks used for other purposes and allow for the circulation of fresh water. The onus will be on the property manager to provide suitable water supply arrangements for firefighting that meet the RFS requirements and ensure that any water sources are maintained at the appropriate capacity.

The SWS shall have:

- a 65mm Storz outlet with a ball valve fitted to the outlet for firefighting purposes and
- ball valve and pipes are adequate for water flow and are metal, and
- supply pipes from tank to ball valve have the same bore size to ensure flow volume, and
- underground tanks are clearly marked and,
- underground tanks have an access hole of 200mm and access for a fire appliance is provided to within 4 metres of the access hole, and
- above-ground tanks are manufactured from concrete or metal, and
- raised tanks have their stands constructed from non-combustible material

Electricity:

The location of an electricity service limits the possibility of ignition of surrounding bush land or the fabric of buildings

- Where practicable, electrical transmission lines are underground.
- Where overhead electrical transmission lines are proposed:
 - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
 - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines

Gas:

The location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.

- reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;

Emergency management plans:

A Bushfire Emergency Evacuation Plan will be prepared in accordance with the NSW Rural Fire Service Guidelines for the Preparation of Emergency/ Evacuation Plan.

This plan shall include a guide for the orderly relocation of people from the site well in advance of bushfire impact or the safe refuge onsite as the primary response to imminent bushfire impact (avoiding late evacuation) and non-occupation of the clubhouse on days of predicted catastrophic fire danger ratings.

Specific triggers for relocation or safe refuge procedures to be instigated will be identified. A means of contacting and consulting with the NSW RFS advising them of any response actions will be addressed.

Conclusion:

Redevelopment of the existing clubhouse has considered the specific objectives that apply to infill development detailed within PBP 2019. The proposed development should avoid possible flame contact, provide a clear defendable space around the footprint and ensure that the building can be designed and constructed in accordance with *AS3959 – 2009*.

This assessment has included an alternate solution approach to optimize asset protection zones. Pre DA concepts that feedback is sought on include;

- confirmation that the proposal is not Special Fire Protection Purpose Development,
- confirmation of short fire run assessment and attached fire modelling is appropriate,
- confirmation that class 10 structures located greater than 6 metres from the clubhouse attract no specific bushfire construction requirements.

Future development consent is also expected to include recommendations on service supply (water electricity and gas) access provisions and emergency manage planning.

Comments have been provided are based on the requirements of the *Environmental Planning and Assessment Act 1979*, the *Rural Fires Act 1997*, the *Rural Fires Regulations 2013*, the RFS document known as '*Planning for Bush Fire Protection 2019* and Australian Standard 3959 2009 'Construction of buildings in bushfire-prone areas'.

Should you have any further questions please do not hesitate to contact me.

Australian Bushfire Consulting Services



Wayne Tucker

Managing Director
G. D. Design in Bushfire Prone Areas.
Certificate IV Fire Technology
Ass Dip Applied Science
FPA Australia BPAD Level 3 Accredited Practitioner
BPAD Accreditation No. BPAD9399

List of attachments:

Attachment 01: Fire Run Modelling West & South (Short fire run models)

Attachment 02: Fire run modelling North (Fully developed fire model reduced fire front width)

Attachment 03: Short Fire Run Modelling BAL 29 APZ Overlay Existing Footprint

Attachment 04: Short Fire Run Modelling BAL 29 APZ Overlay Potential Footprint

Short Fire Run Report

Southern aspect

Site Details

Date: 2019-10-14 15:11:06
Site Address: Barra Brui South
Local Government Area: Ku ring gai
Alpine Area: No

Compliance

Assessor: Wayne Tucker
BPAD ID: 9399

Site Parameters

Vegetation Type:	Forest	Effective Slope:	-5.00 degrees
FDI:	100.00	Site Slope:	0.00 degrees
Flame Temperature:	1090.00 K	Overall Fuel Load:	33.10 t/ha
Average Distance to Vegetation:	14.000 m	Surface Fuel Load:	20.00 t/ha
Elevated Fuel Height:	2.000 m	Measured SFR:	50.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle: 46.0 degrees | Elevation of Receiver: 5.410 m (Peak)

Model Results

FROS:	1,699.729 m/hr	Full Ellipse Length:	56.934 m
L/B Ratio:	2.823	Full ROS:	1,756.662 m/hr
HF/BF Ratio:	29.855	Head Width:	18.302 m
Ellipse Length incl. Backfire:	51.675 m	Ellipse Breadth:	18.302 m

Model Results

SFR Flame Height: 15.032 m
SFR Flame Length: 15.032 m
View Factor: 0.427
Path Length: 8.779 m
Transmissivity: 0.868
SFR Radiant Heat Flux: 28.229 kW/m²

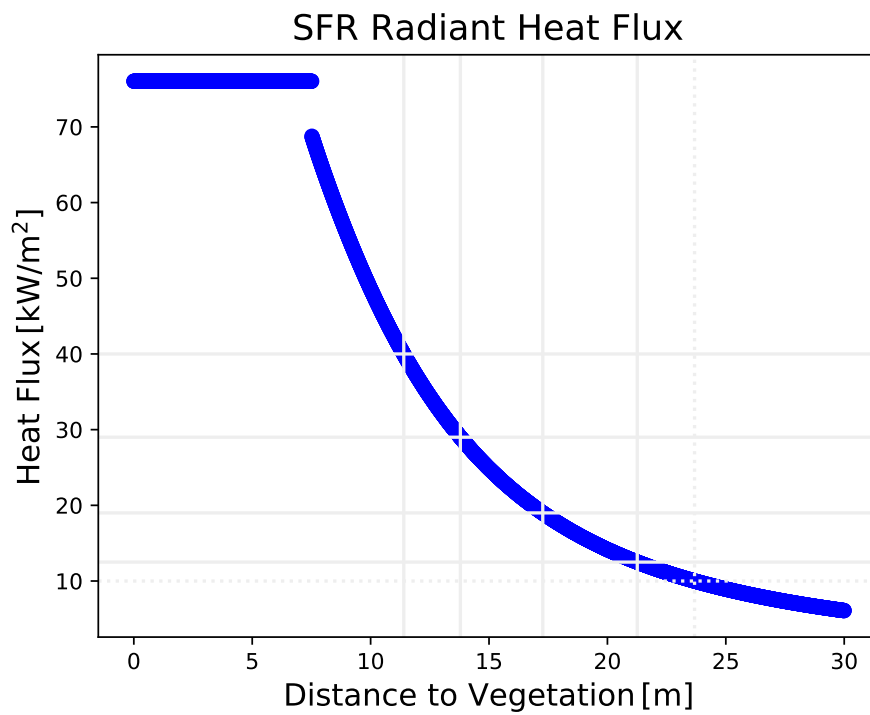
Bushfire Attack Level

BAL-29

Asset Protection Zone Calculations

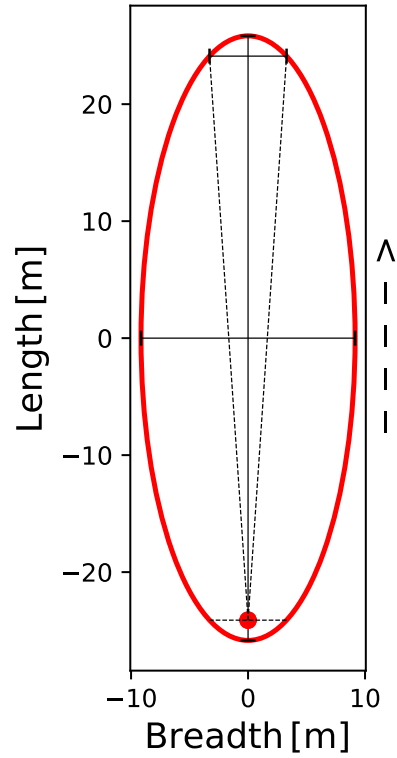
BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m ²	23.68 m	6.44 m
BAL-12.5	21.26 m	6.23 m
BAL-19	17.27 m	5.84 m
BAL-29	13.79 m	5.41 m
BAL-40	11.40 m	4.83 m
BAL-FZ	< 11.40 m	

APZ Figures

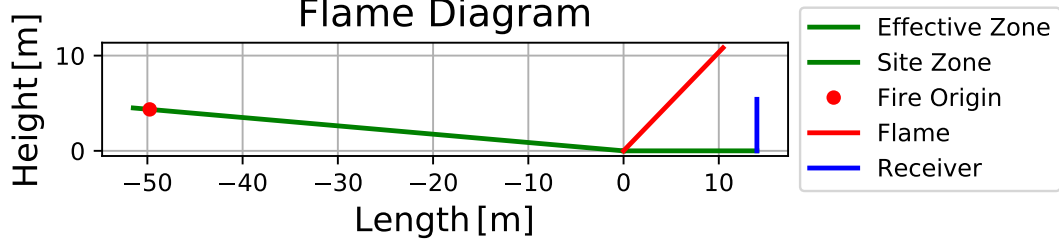


Figures

Short Fire Run Fit



Flame Diagram



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,
- Short fire run limited to 150 metre fire run length,
- For forest vegetation type elevated fuel height limited to maximum input of 2 metres.

<p>To the extent permitted under Law, this service is provided under an AS-IS basis. Fire Code Australia shall never, and without any limit, be liable for any damage, cost, expense or any other payment incurred by the user as a result of the Fire Code Australia’s actions, failure, bugs and/or any other interaction between the provider and user’s end-equipment, computers, other software or any third party, end-equipment, computer or services. Moreover, Fire Code Australia shall never be liable for any defect in source code written by the user when relying on Fire Code Australia or using Fire Code Australia’s source code.</p>

Short Fire Run Report

Western Aspect

Site Details

Date: 2019-11-01 12:41:17
Site Address: Barra Brui West
Local Government Area: Ku ring gai
Alpine Area: No

Compliance

Assessor: Wayne Tucker
BPAD ID: 9399

Site Parameters

Vegetation Type:	Forest	Effective Slope:	-10.00 degrees
FDI:	100.00	Site Slope:	0.00 degrees
Flame Temperature:	1090.00 K	Overall Fuel Load:	33.10 t/ha
Average Distance to Vegetation:	12.000 m	Surface Fuel Load:	20.00 t/ha
Elevated Fuel Height:	2.000 m	Measured SFR:	50.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle: 51.0 degrees | Elevation of Receiver: 4.550 m (Peak)

Model Results

FROS:	1,203.783 m/hr	Full Ellipse Length:	40.322 m
L/B Ratio:	2.823	Full ROS:	1,244.104 m/hr
HF/BF Ratio:	29.855	Head Width:	18.302 m
Ellipse Length incl. Backfire:	51.675 m	Ellipse Breadth:	18.302 m

Model Results

SFR Flame Height: 11.714 m
SFR Flame Length: 11.714 m
View Factor: 0.401
Path Length: 8.314 m
Transmissivity: 0.870
SFR Radiant Heat Flux: 26.530 kW/m²

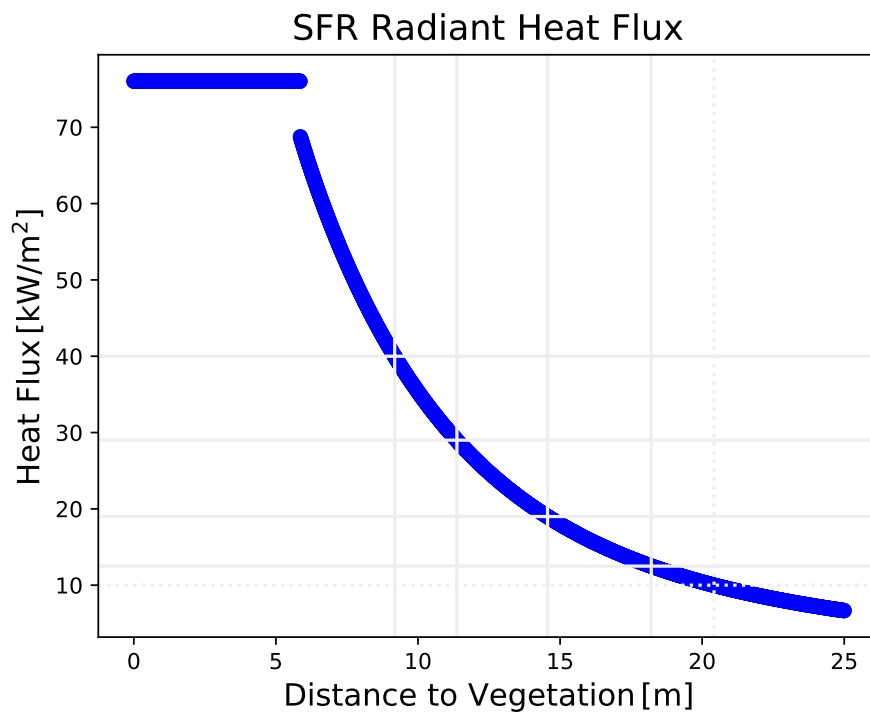
Bushfire Attack Level

BAL-29

Asset Protection Zone Calculations

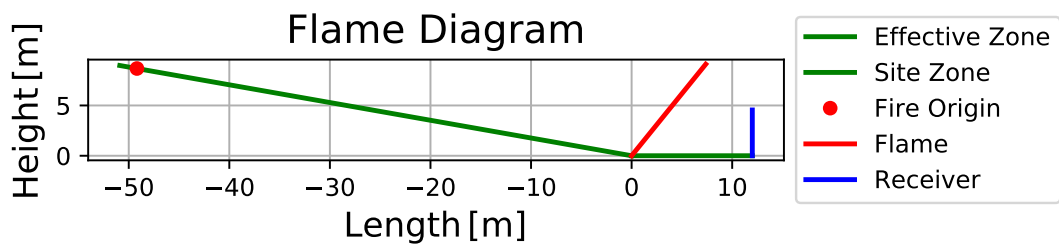
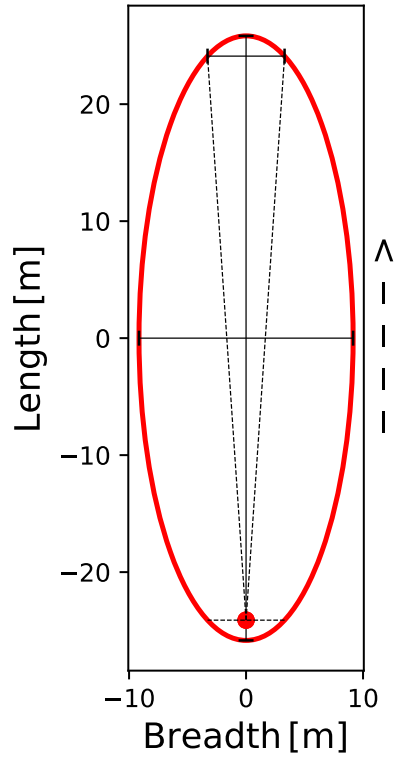
BAL Threshold	APZ Minimum Distances	Receiver Elevation
10 kW/m ²	20.42 m	5.17 m
BAL-12.5	18.21 m	5.07 m
BAL-19	14.56 m	4.80 m
BAL-29	11.37 m	4.49 m
BAL-40	9.18 m	4.07 m
BAL-FZ	< 9.18 m	

APZ Figures



Figures

Short Fire Run Fit



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.

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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”.

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NBC Bushfire Attack Assessment Report V3.0

AS3959 (2009) Appendix B - Detailed Method 2

Print Date: 19/12/2019

Assessment Date: 3/11/2019

Site Street Address: Barra Brui, St Ives
Assessor: Wayne Tucker; Australian Bushfire Consulting Services Pty Ltd
Local Government Area: Ku-ring-gai **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Forest North

Vegetation Information

Vegetation Type:	Forest	Vegetation Group:	Forest and Woodland
Vegetation Slope:	0 Degrees	Vegetation Slope Type:	Level
Surface Fuel Load(t/ha):	20	Overall Fuel Load(t/ha):	33.1
Vegetation Height(m):	2		Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope:	0 Degrees	Site Slope Type:	Level
Elevation of Receiver(m):	Default	APZ/Separation(m):	21

Fire Inputs

Veg./Flame Width(m):	50	Flame Temp(K)	1090
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Calculation Parameters

Flame Emissivity:	95	Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600	Ambient Temp(K):	308
Moisture Factor:	5	FDI:	100

Program Outputs

Category of Attack:	HIGH	Peak Elevation of Receiver(m):	8.21
Level of Construction:	BAL 29	Fire Intensity(kW/m):	41044
Radiant Heat(kW/m2):	27.51	Flame Angle (degrees):	57
Flame Length(m):	19.57	Maximum View Factor:	0.428
Rate Of Spread (km/h):	2.4	Inner Protection Area(m):	21
Transmissivity:	0.844	Outer Protection Area(m):	0

Asset Protection Zone - Option 3 Short Fire Run/ Existing Building



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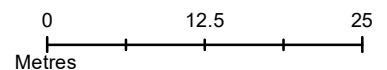
ABN 23 622 676 493
PO Box 212 Berowra Heights 2082

Barra Brui Playing Fields, Lot 825 DP 752031 and Lot 7318 DP 1158573, Reference 19-244



Legend

- Contour - 2m
- Building
- Subject Land
- Lot
- Vegetation Formation**
- Forest - Short Fire Run
- Asset Protection Zone - Short Fire Run Model



Imagery: © Nearmap
Coordinate System: GDA 1994 MGA Zone 56

Asset Protection Zone - Option 4 Short Fire Run/ Potential Building Area



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Barra Brui Playing Fields, Lot 825 DP 752031 and Lot 7318 DP 1158573, Reference 19-244



Legend

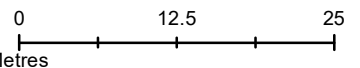
- Contour - 2m
- Potential Building Envelope
- Subject Land
- Lot

- Vegetation Formation**
- Forest - Short Fire Run

Asset Protection Zone - Short Fire Run Model

- Asset Protection Zone - 12m
- Asset Protection Zone - 14m

DKGIS
1:600
Date: 8/01/2020



Imagery: © Nearmap
Coordinate System: GDA 1994 MGA Zone 56