



Building Code & Bushfire Hazard Solutions

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Mr Edmund Burke
edmund.burke.ch@gmail.com

2nd April 2020
Our Ref: 190065C
Council ref: DA2019/0762

Re: **REQUEST FOR REVIEW IN DETERMINATION
LOT 166 DP 12749 / 131 THOMPSON STREET, SCOTLAND ISLAND
BUSHFIRE ATTACK LEVEL REVIEW**

Dear Edmund,

Building Code and Bushfire Hazard Solutions P/L has been commissioned to undertake specialist Short Fire Run (SFR) modelling for the subject site at 131 Thompson Street, Scotland Island.

This report and modelling has been prepared in response to the NSW RFS determination of BAL Flame Zone for the proposed dwelling (RFS Ref: DA-2019-02754) which in our opinion is a significant overestimate of the true bushfire risk to the proposed dwelling.

The NSW Rural Fire Service stated in their response for this matter:

"Council is advised that the Bushfire Consultant has utilised the vegetation management located off site, within the front and rear yards of a number of surrounding residential properties both in their determination of the available separation distances as well as the Method 2 Modelling. Earlier discussions with the NSW Rural Fire Service PES Team Leader Kalpana Varghese indicated that as the proposal relies on the management of the surrounding vegetation within the adjoining allotments to an APZ standard, that an onsite visit to more accurately determine the degree of vegetation management be undertaken. Joshua Calandra PES Development Assessment and Planning Officer with background experience in landscape architecture visited the site (6 February 2020) and adjoining properties undertook a vegetation management survey accompanied by a photographic report.

- *Discussions with Mr Calandra, revealed that whilst some of the surrounding properties did exhibit some vegetation management, the overall predominant vegetation standard of the surrounding properties would not support the extent and scope of the separation distances used by the Bushfire Consultant and as such a new alternate solution Method 2 Modelling be employed as part of the Desktop assessment employing revised smaller separation distances.*

- *As a result of the recent site visit undertaken by Josh Calandra and the inability to include many of the adjoining areas as of having managed vegetated yard spaces to an APZ standard the separation distances were revised and a new alternate solution and modelling undertaken as per Method 2 Modelling AS3959 2009. The revised separation distance to the south east was assessed as being 30m and when entered into Method 2 Modelling, resulted in a resultant radiant heat level of 24.35kW/sqm and a flame length of 35.81m (resulting in possible flame immersion due to exceeding the separation distance of 30m) accordingly a BAL FZ determination as applied."*

I offer this advice in respect to my 35 years of firefighting experience where I have been involved in both front line firefighting (obtaining the rank of Captain) and operational planning during major fire events and >7 years of experience in bushfire assessment.

This response has also been prepared by Stuart McMonnies, Manager Bushfire Section Building Code of Bushfire Hazard Solutions P/L (Level 3 accredited Bushfire Practitioner – FPAA) with in excess of 17 years experience in both practical and theoretical terms within the sphere of bushfire assessment, application of bushfire mitigation measures and bushfire fighting serving as a Crew Leader in the NSW Rural Fire Service.

Firstly it must be acknowledged that Scotland Island presents unique characteristics which are very different to traditional urban environments. These characteristics include a 'leafy' nature around dwellings and residential allotments, a combination of sealed and unsealed roads which are rarely used and reduced capacity services.

The objective of applying a Bushfire Attack Level to a new dwelling is to provide measures in the design and materials commensurate with the level of risk to mitigate the threat of bushfire.

An Asset Protection Zone is a fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bush fire hazard and an asset.

During my inspections of the reported and available 44 metre Asset Protection Zone to the southeast (on two (2) separate occasions) I observed management of the understorey of the vegetation around built forms (dwellings, walking paths, water tank, fencing, road and electrical transmission lines). A small pocket of ferns and ground covers was observed however this was broken by managed areas, consistent with the objective of an APZ.

The available 44 metre Asset Protection Zone was also found to have breaks in the tree crowns.

Please refer to the attached photographs for visual evidence of the available 44m APZ to the southeast.

It is therefore of our opinion that the previously reported 44 metre APZ remains valid and satisfies the Performance Criteria of an APZ being *'APZs are managed and maintained to prevent the spread of a fire to the building'*.

Irrespective of the above we have also considered the reduced APZ reported by the NSW Rural Fire Service and subsequent classification of the south-eastern hazard.

In considering the extended bushfire hazard to the southeast the following attributes must also be acknowledged.

- Traditional severe fire behaviour in this region is driven by hot west / north-westerly winds;
- The vegetation to the southeast is surrounded by existing dwellings and Thompson Street;
- The vegetation is located within an existing 'wet' gully and subsequently comprises predominately of known hard to burn species and bracken fern.

As a result of the aforementioned attributes we are of the strong opinion that the available fuels are not conducive to a fire developing into a 'quasi steady state' and would only permit the incipient spread of fire.

A fire originating from the area to the southeast (from the bottom of the gully) and impacting the subject site would be travelling against the traditional prevailing winds for high risk fire days and not perpendicular to the contours – both of which are significant contributors to fire progression / direction.

Fires from this ignition point would also have a limited travel distance of approximately 35 metres.

The arrangement of the built forms (and fuel management) within the area of Thompson Street would also inhibit the lateral spread of a fire.

We are therefore of the opinion that even in applying the modelling undertaken by the NSW RFS the application of a Flame Zone rating simply because a flame length of 35.81 metres was calculated is not appropriate considering the attributes of the hazard (i.e. a sustained flame length of 35.81 metres laying completely over and impacting the proposed dwelling, in which BAL FZ mitigates, is not viable).

This view is further reinforced with the fact that the dwelling is located below the hazard reported by the NSW RFS, thus requiring a significant and highly unlikely downward influence for that scenario to eventuate.

Finally to remove any doubt in the bushfire mitigation measures applied to the proposal we have also undertaken specialist bushfire design modelling which assesses the extended hazard determined by the NSW RFS and applies the Short Fire Run (SFR) methodology.

The NSW Rural Fire Service (NSW RFS) publication 'Short Fire Run – Methodology for assessing bush fire risk for low risk vegetation' is the accepted methodology and industry standard for assessing parcels of vegetation, in low risk areas, which have a shape and size that provides a limited fire development period which reduces the opportunity to support a fully developed bushfire.

Consistent with the NSW Rural Fire Service publication 'Short Fire Run – Methodology for assessing bush fire risk for low risk vegetation' the following assumptions and limitations have been adopted for this assessment.

Assumptions

- Wind direction and speed is constant in the direction of fire spread;
- Slope is considered relatively flat and uniform throughout the length of the fire run;
- Fuel load is distributed equally and is continuous for the entire fire run length;
- The shape of the fire is based on a uniform slope;
- The fire develops from a single ignition point and does not consider time of ignition or fire growth;
- Flaming is restricted to surface, near surface and elevated fuels;
- The fire does not become a crown fire (scorching and intermittent involvement of the canopy fuels permitted, no sustained crown fire).
- Fire run is measured perpendicular to contours.
- No allowance for ember showers has been considered.

Limitations

- Limited to 30 degrees for downslope inputs.
- Limited to 20 degrees for the site slope due to fuel management issues;
- Limited to 15 degrees for upslope;
- Limited to 150 metre fire run length, measured on the effective slope;
- Limited to maximum input of 2 metres in height for elevated fuel (Project Vesta) in forest formations only; and
- Forest and Heath formation fuel loads are as advised by University of Wollongong research.

In this instance we have considered to the fire run to the southeast of the subject site, which is the fire run determined to be the highest level of risk as determined by the NSW RFS.

The following site specific data has been used:

Data	Recording	Comment
Effective slope	7° down	Recorded onsite with inclinometer & verified from 1m contours.
Site slope	11° up	Recorded onsite with inclinometer & verified from 1m contours.
Elevation of receiver	8 metres	Measured from plans.
Vegetation classification and fuel load	Southern Lowland Wet Sclerophyll Forest 20 t/ha / 32.8 t/ha	Sydney Metro Vegetation mapping and site observations. Fuels loads consistent with Appendix A of SFR paper.
Distance from asset to vegetation	30 metres	Measured by NSW Rural Fire Service.
Regional climatic data (FFDI)	100	Sourced from Planning for Bush Fire Protection 2019.
Measured SFR length	150 metres	Maximum fire run used as redundancy.
Average elevated fuel height	0.9 metre	Consistent with Appendix A of SFR paper.
Flame temperature	1090K	Consistent with residential development.

The resultant modelling calculated the maximum radiant heat flux is **11.785 kW/m²**, which equates to a **BAL 12.5** rating under AS3959 – 2009.

Please refer to the attached reports for complete results.

In consideration of the additional information contained within this statement we respectfully request that the NSW Rural Fire Service review their advice provided to Northern Beaches Council in relation to the matter and revise the Bushfire Attack Level to BAL 12.5.

Should you require any further information or clarification please contact our office.

Site inspections and report prepared by
Building Code & Bushfire Hazard Solutions



Ian Tyerman
Bushfire Consultant
Planning for Bushfire Prone Areas
UTS Sydney

Reviewed and endorsed by
Building Code & Bushfire Hazard Solutions P/L



Stuart McMonnies
G. D. Design in Bushfire Prone Areas.
Certificate IV Fire Technology
FPA Australia BPAD Level 3 Accredited Practitioner
BPAD Accreditation No. BPAD9400





View southeast along Thompson Street



View south from Thompson Street (SE of subject site) of existing built forms and water tank within the 44m APZ



Acknowledge pocket of ferns around water tank



Extent of 44m APZ (Note cleared/managed areas adjacent to and beyond dwelling)



View NW along Thompson Street



Built form within the APZ (Note separation of canopy)



Short Fire Run Report

Site Details

Date:	2020-04-01 16:49:50
Site Address:	131 THOMPSON ST, SCOTLAND ISLAND NSW 2105
Local Government Area:	Northern Beaches
Alpine Area:	No

Compliance

Assessor:	Stuart McMonnies
BPAD ID:	9400

Site Parameters

Vegetation Type:	Forest	Effective Slope:	7.00 degrees
FDI:	100.00	Site Slope:	-11.00 degrees
Flame Temperature:	1090.00 K	Overall Fuel Load:	32.80 t/ha
Average Distance to Vegetation:	30.000 m	Surface Fuel Load:	20.00 t/ha
Elevated Fuel Height:	0.900 m	Measured SFR:	150.000 m
		Wind Speed:	30.00 km/hr

Base Calculation

Flame Angle:	60.0 degrees	Elevation of Receiver:	8.000 m (Target)
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Model Results

FROS:	3,890.232 m/hr	Full Ellipse Length:	130.306 m
L/B Ratio:	2.823	Full ROS:	4,020.538 m/hr
HF/BF Ratio:	29.855	Head Width:	54.905 m
Ellipse Length incl. Backfire:	155.024 m	Ellipse Breadth:	54.905 m

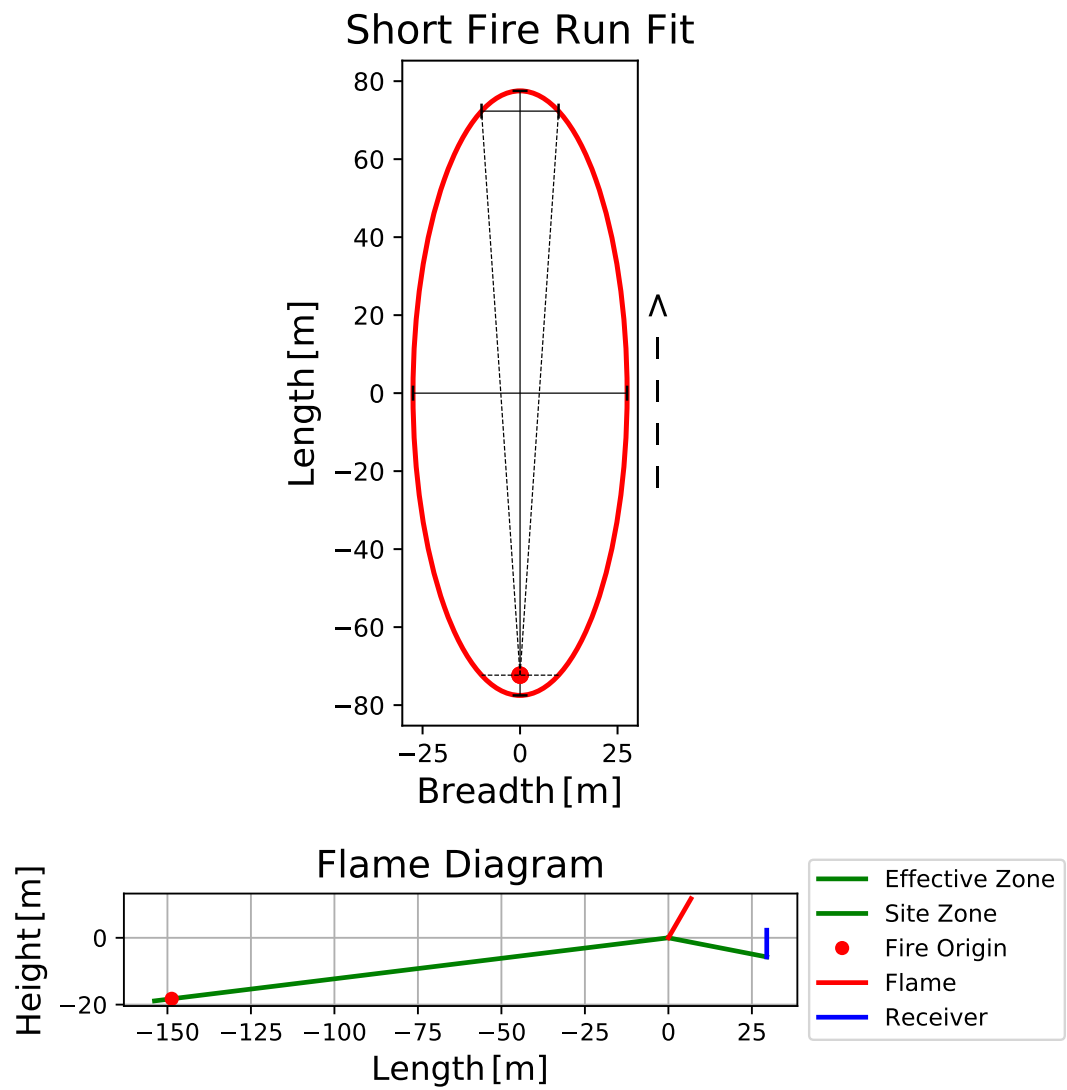
Model Results

SFR Flame Height:	13.529 m
SFR Flame Length:	13.529 m
View Factor:	0.191
Path Length:	26.618 m
Transmissivity:	0.813
SFR Radiant Heat Flux:	11.785 kW/m ²

Bushfire Attack Level

BAL-12.5

Figures



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.”

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