Proposed Residential Building Development
Bushfire Assessment & Compliance Report
20 Bubalo Street
(Subdivision of 41 Warriewood Road)
Lot 30 in the approved subdivision of
Lot 32 Section C DP 5464
Warriewood NSW 2102

4 December 2019

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Reviewed by:		

Executive Summary – Achievable (Recommended) AS3959 Level of Compliance

Construction Standard	**Building Elevation / Section**
Flame Zone	
BAL 40	
BAL 29	
BAL 19	
BAL 12.5	**All Elevations**
Standard BCA Provisions	

Table of Contents

General Introduction

The following report outlines an assessment for the statutory compliance of the proposed residential building development to occur within 20 Bubalo Street, Warriewood NSW 2102 – Lot 30 in the approved subdivision of 41 Warriewood Road (Lot 32 Section C DP 5464) - herewith 'the subject property', and at least 140m beyond (herewith 'the study area'). Appendix 1 / Map 1 denote the subject property and study area.

Australian Standard 3959:2009/2018 (Construction of buildings in bushfire prone areas) and the *Building Code of Australia 2019* (BCA 2019) are the primary building compliance documents considered for this assessment. AS3959:2018 being the Deemed to Satisfy (DTS) provision or acceptable construction standard.

Methodology for this site assessment for bushfire attack is based on *NSW Planning for Bushfire Protection Guideline 2006* (PBP 2006) and specifically, *Addendum: Appendix 3, 2010.*

Terrain (slope) considered by this assessment is based on the Department of Lands Online Six Viewer contours and a site inspection (2/12/2019) of the subject property.

Vegetation extent within the subject area has been derived from available online Council vegetation mapping, aerial photo interpretation (API) and a site inspection (2/12/2019) conducted prior to finalising this report.

The extent and location of the proposed new residential building is based on drawings by New South Homes, Thornleigh, (Job No. 195509, Sheet Nos. 0 – 9, Revision F, Dated 15/11/2019).

Photographic evidence (Dated 2/12/2019) of the subject property and surrounds is appended to this report (Appendix 2 – Site Photos).

Note: The proposed development is located within a new residential subdivision.

This new residential subdivision was approved under the s34 processes (Northern Beaches Council Ref No. NO491/16, Dated 29 November 2017) and received a Bush Fire Safety Authority from the NSW Rural Fire Service (Reference No. D16/3779, Dated 28 August 2017).

This bushfire assessment, specifically prepared for Lot 30 of this subdivision, supports the parameters of the original bushfire assessment that was approved as part of the subdivision processes. This assessment also utilises 'Method 2' – Appendix B of AS3959-2009 to determine Lot specific APZ and BAL Ratings, unique to the development.

1.0 Property Details

Applicants Name: New South Homes (herewith, 'the proponent')

Council: Northern Beaches Council (Northern Beaches LGA)

Council Reference: N/A

Lot: 30 – in the approved subdivision of **Lot 32 Section C DP 5464**

Area: 352.50m^2

Address/Location: 20 Bubalo Street, Warriewood NSW 2102.
(approved subdivision of 41 Warriewood Road)

Zoning: 'R3 – Medium Density Residential'
(Pittwater LEP 2014)

Bushfire Prone Land: YES

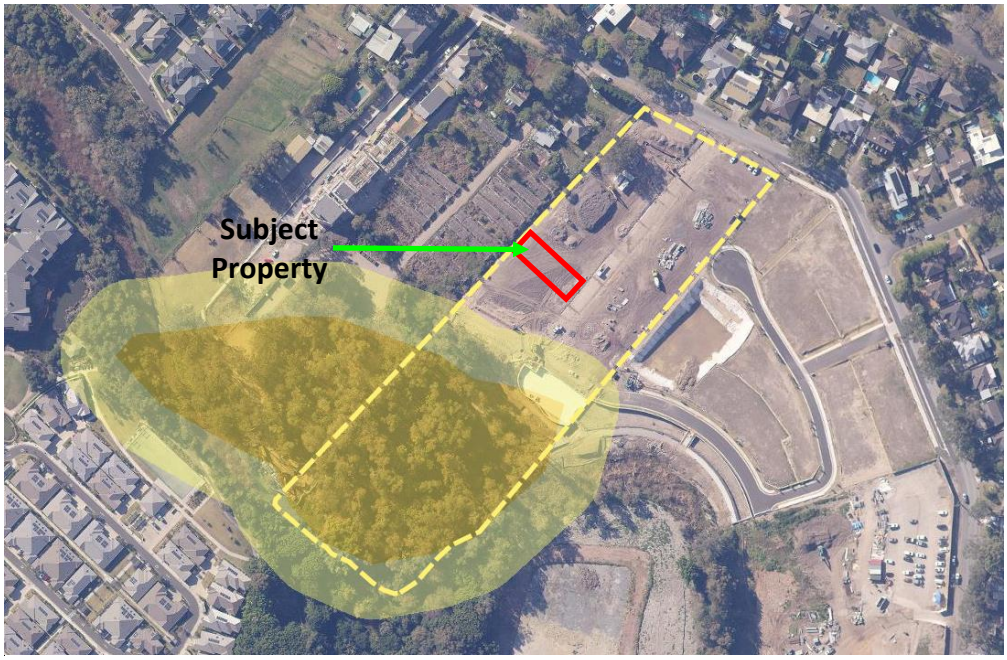
Aspect: The site currently has a South Westerly aspect.

The subject property is mapped as being bushfire prone as currently shown by the Pittwater Council LGA Bushfire Prone Land Map (s10.3 EP&A Act 1979). The parent site is located partially within the '30m bushfire vegetation buffer area' and is constrained by vegetation classified as 'Category 2 Bushfire Vegetation'. In this regard, any new building development should conform to the specifications and requirements of the document *'Planning for Bushfire Protection 2006'*, produced by the NSW Rural Fire Service, that are relevant to the development; as otherwise required under *Section 4.14 of the Environmental Planning & Assessment Act 1979.*

Other Known Constraints:

A desktop assessment of the publicly available council mapping and planning enquiry system has found no other constraints to be considered in regard to development upon the subject property

No other known significant environmental features have been noted, recorded or advised of as part of this assessment.



Extract Warringah LGA Bushfire Prone Land Map

2.0 Type of Proposal

☑ **New Building**	☑ **Urban**	☐ Dual Occupancy
☐ Rural Residential	☐ Alterations/Additions	☐ Isolated Rural

Proposal Description

The proposed building development is to construct a new residential building/dwelling structure (Class 1 (a) – as defined by BCA). The proposed works include the construction of a new two level detached residence, and all associated infrastructure.

The extent and location of the proposed new residential building is based on drawings by New South Homes, Thornleigh, (Job No. 195509, Sheet Nos. 0 – 9, Revision F, Dated 15/11/2019).

The approximate location/site of the proposed building (herewith 'the subject development') is as denoted in Appendix 1 – Map 2.

3.0 Bushfire Attack

3.1 Vegetation (bushfire hazard) within 100m of the proposed building

The vegetation within the study area is mapped as 'Bushfire Prone Vegetation Category 2' on Council Bushfire Prone Land Maps.

The vegetation constraining the development is located within the public reserve, running down into Narrabeen Creek, generally South West of the subject development. The vegetation within the study area is considered to be predominantly 'Coastal Flats Swamp Mahogany Forest'.

Based on a determination of vegetation formation using the Keith 2004 Identification Key, the bushfire vegetation having the potential to affect the subject development, based on a site visit, is most representative of 'Forested Wetlands'.

PBP 2006 states, *'for the purposes of assessment, the following are not considered a hazard or as a predominant vegetation class/formation and can be included within an asset protection zone;*

- *non-vegetated areas including roads, footpaths, cycle ways, waterways, buildings, rocky outcrops and the like; and*
- *Reduced vegetation including maintained lawns, golf course fairways, playgrounds or sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries.*

The proposed development is located within a new residential subdivision, with all adjoining residential sites considered 'cleared and managed lands'.

The development site also has access to a new road reserve along the South Eastern boundary (Bubalo Street).

3.2 Distance/Separation between building line and bushfire hazard

For the purposes of bushfire safety compliance, this assessment notes that the subject property is generally clear of persistent bushfire vegetation.

Considering the location of the proposed development and the extent of the mapped bushfire vegetation on adjoining lands, the achievable separation distance has been assessed as:

Direction	Distance
South West	**>46m**

3.3 Effective slope that will influence bushfire behaviour

The effective slope within approximately 100m of the subject development site, which would influence bushfire behaviour, has been assessed as predominately;

Direction	Effective Slope
South West	**1 Degree Downslope**

3.4 Fire Danger Index (FDI) for Local Government Area (LGA)

☑ **100** ☐ 80 ☐ 50

Northern Beaches Council (formally Pittwater Council) – Greater Sydney Region
(Table A2.3 PBP, 2006)

3.5 Determination of Bushfire Attack Level (AS 3959:2009 – Method 2)

Direction	Vegetation	Slope	Minimum Distance	BAL Exposure Level
West	**Forested Wetlands**	**1 Degree Downslope**	**>46m**	**RHF = 8.13 kW/m^2 FL = 14.94m ∴ BAL – 12.5**

4.0 Construction Standards (AS 3959-2018 – BCA DTS)

4.1 AS 3959:2018 Construction for Bushfire Attack Level

Building Elevations	Vegetation	Slope	Minimum Distance	Construction Standard
All Elevations	**Forested Wetlands**	**1 Degree Downslope**	**>46m**	**BAL – 12.5**

Considering the subject developments location and the calculated extent of the APZ area recommended by this report, the subject development is capable of complying with AS3959:2018.

5.0 Water Supplies

5.1 Reticulated Water Supply

☑ **Yes** ☐ No ☐ Proposed

The subject development/building is currently connected to a reticulated water supply which services the existing residential area within Bubalo Street.

Apart from the above, the proponent has not provided any specific advice (at the time of this assessment) regarding the reticulated water infrastructure and mains size, supply pressure or guarantee of delivery.

Considering the building site denoted by this report (and corresponding access / driveways), the subject building would be <90m from the nearest and reasonably available fire hydrant connection point (approximately 45m) as denoted in attached Map 1.

PBP acceptable solutions for a reticulated water supply area (relevant to the subject development) states that:

- *fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles.*
- *hydrants are not located within any road carriageway.*
- *all above ground water and gas service pipes external to the building are metal, including and up to any taps.*

Fire fighting water supply recommendations are as listed section 9.3 (Bushfire Safety & Compliance Recommendations).

5.2 Distance to hydrant from subject proposed development

The distance from the furthest part of the proposed development to a reticulated hydrant is approximately 45m.

5.3 Existing or planned water supply provided for fire fighting purposes

☑ **Yes** ☐ No ☑ **Proposed**

As stated, the travel distance associated with this development is 45m, and as such, is technically able to comply with the acceptable solutions for reticulated water supplies.

6.0 Gas Supplies

Reticulated Gas: ☑ **Yes** ☐ No (available)

Bottled Gas: ☐ Yes ☑ **No**

7.0 Electricity Supplies

The subject development site is currently serviced by an underground electrical supply grid, which services the residential subdivision within Bubalo Street.

The connection to the new residence will also be located underground.

8.0 Vehicle Access/Egress (Property Access)

PBP acceptable solutions for property roads (for this specific development location) states that;

'*No specific access requirements apply in an urban area where a 70m unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply)'.*

Access to the subject property will be by way of a sealed all weather driveway, directly off Bubalo Street.

Bubalo Street is part of the public road system. It is a sealed all weather road approximately 7m in width within a road reserve of approximately 16m. Bubalo Street has a speed limit of 50 kph.

The public road system servicing the proposed development is able to provide safe operational access for emergency services and egress in varying directions for evacuating residents.

9.0 Bushfire Safety/Compliance Recommendations

9.1 Defendable Space / Asset Protection Zone (APZ) Recommendations

Recommendation 1.

As denoted in Appendix 1 – Map 2, the entire site identified as **'Recommended Inner Protection Area (IPA)'** is to be managed/maintained as an APZ area for the life of the development.

The above recommendation should ensure that no easily combustible material, structures, available forest fuel/bushfire vegetation or other items be installed, stored or allowed to re-accumulate and become contiguous within the area. The IPA extent should not support or carry a running bushfire towards the subject development site and associated infrastructure.

The area identified as **Inner Protection Area (IPA)** should be managed in terms of PBP A2.2 (vi) which states: *The IPA is critical to providing a defendable space and managing heat intensities at the building surface. The IPA should provide a tree canopy cover of less than 15% and should be located greater than 2 m from any part of the roofline of a dwelling. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 m from an exposed window or door. Trees should have lower limbs removed up to a height of 2 m above the ground.*

9.2 Construction Standard Recommendations

Construction standards have been determined from the following sections of the planning legislation and based on the relevant bushfire assessment as discussed above.

AS 3959-2018 Section 3 Construction General
(See Recommendation 2)

AS 3959-2018 Section 5 Construction for Bushfire Attack Level 12.5 (BAL 12.5)
(See Recommendation 2 & 3)

AS 3959-2018 Section 7 Construction for Bushfire Attack Level 29 (BAL 29)
(See Recommendation 2 & 3)

Planning for Bushfire Protection Addendum – Appendix 3 (2010)
Section A 3.7. 'Additional Construction Requirements' - NSW State Variation
(See Recommendation 4)

Recommendation 2.

Where any part of a garage, carport, veranda or similar roofed structure is attached to, or shares a common roof space with, or is within 10m of, a building required to comply with the standard (AS 3959-2018), the entire attached structure shall comply with the construction requirements of the standard (as per Recommendation 3), as applicable to the subject building.

Alternatively, the structure may be separated from the subject building by a wall complying with Section 3.2.1 a) or b) of the standard (i.e. fire rated construction as specified).

Recommendation 3.

Predicated upon the maintenance of the APZ area as per Recommendation No. 1 of this report, it is recommended the proposed residence incorporate, as a minimum, the following levels of construction as per *AS 3959 – 2018 Construction of Buildings in Bushfire Prone Areas;*

All Elevations ('Alterations and Additions')

Construction for Bushfire Attack Level 12.5 (BAL 12.5) – Section 5 (AS3959-2018)

Recommendation 4.

Any Verandas, Decks, Steps, Ramps and Landings

The provisions of **AS3959-2018 Clause 5.7** relating **only** to the construction of verandas, decks, steps, ramps and landings within Section 5 – BAL 12.5 **shall be replaced** with the provisions of **AS3959-2018 Clause 7.7** (Section 7 - BAL 29).

Recommendation 5.

General

- All new retaining walls shall be 'non-combustible'
- All new fencing shall be 'non-combustible' or 'Bushfire Resistant Timber'

9.3 Water Supply Recommendations

Recommendation 6.

- Reticulated supply in urban subdivision with hydrant spacing, sizing and pressures to comply with AS 2419.1 – 2005. (As per Acceptable Solutions, PBP 2006, Section 4.1.3). **This is reasonably assumed.**
- Any above ground and external water supply pipes (including taps) incorporated as part of the subject building development and potentially exposed to radiant heat from any adjacent bush fire hazard are to be of metal design and manufacture.

9.4 Gas Supply Recommendations

Recommendation 7.

- Any future gas connection is installed and maintained in accordance with AS1596 and the requirements of relevant authorities.
- Metal piping should be used.
- Polymer sheathed flexible gas supply lines to gas meters adjacent to the building are not used.

9.5 Electricity Supply Recommendations

Recommendation 8.

As the electricity supply is located underground, no additional electricity supply conditions (above and beyond standard Council and Energy Supplier conditions) are required for PBP compliance.

9.6 Vehicle Access/Egress Recommendations

Recommendation 9.

The proposed building development will continue to incorporate an all weather driveway area for vehicle access and parking within the subject property.

The access road / driveway will continue to provide direct access Bubalo Street.

No additional vehicle access requirements are recommended.

10.0 Compliance or non-compliance with PBP Specific Objectives for infill. (As per PBP 2006 Section 4.3.2)

Specific Objective	Comment
Ensure that the bushfire risk to adjoining land is not increased.	The subdivision is pre-existing. The construction of this building will not increase the bushfire risk to adjoining land. Subsequent bushfire fuel management from within the subject property will effectively reduce the risk to both the subject property and adjoining premises.
Provide a minimum defendable space.	A complying APZ (defendable space) has been recommended. This space consists of an area maintained as an IPA.
Provide better bushfire protection, on a redevelopment site, than the existing situation. This should not result in new works being exposed to greater risk than an existing building.	The site is located within an existing subdivision. Recommendations, relating to the construction of the building, include strict building construction standards.
Ensure that the footprint of the proposed building does not extend towards the hazard beyond existing building lines on neighbouring land.	The building will be contained within the approved building envelope. It does **not** extend towards the hazard beyond the existing building lines /development on adjoining lands.
Not result in an increased bushfire management and maintenance responsibility on adjoining land owners unless they have agreed to the development	The development has not increased bushfire management and maintenance on adjoining landowners. For the purpose of this application, the management and maintenance responsibilities on adjoining landowners have not increased beyond existing legislative requirements.
Ensure building design and construction; enhance the chances of occupant and building survival.	The recommendations (above) relating to the design and construction of the building include a range of 'bushfire protection measures' that will enhance the chances of occupant and building survival.

11.0 Compliance or non-compliance with PBP performance criteria and intent for bushfire safety protection measures for infill development.

Performance Criteria	Comment
APZ A defendable space is provided on site. An APZ is provided and maintained for the life of the development.	**Can Comply** – Recommendation No. 1 A defendable space will be provided within the site boundaries, with the entire site being maintained as an IPA. This is complimented by 'cleared and managed lands' on adjoining properties.
Siting and Design Buildings are sited and designed to minimise the risk of bushfire attack.	**Can Comply** – Recommendation Nos. 1 – 5 The proposed development will be located within the approved building envelope. Predicated upon the proposed building standards and recommended APZ areas stated by this report, the risk of bushfire attack should be minimised upon the subject development/building.
Construction Standards Demonstrated that the proposed building can withstand bushfire attack in the form of wind, smoke, embers, radiant heat and flame contact.	**Can Comply** – Recommendation Nos. 2 – 5 Predicated upon the recommended APZ areas and siting requirements, BAL 12.5 construction standards can achieve the performance requirements of the planning legislation.
Access Safe, operational access is provided (and maintained) for emergency service personnel in suppressing a bushfire while residents are seeking to relocate, in advance of a bushfire (satisfying the intent and performance criteria for access roads in sections 4.1.3 and 4.2.7).	**Can Comply** - Recommendation No. 9 Access/Egress is provided from Bubalo Street. The access arrangements are sufficient for operational fire fighting and emergency egress.
Water and Utility Services Adequate water and electricity services are provided for fire fighting operations. Gas and electricity services are located so as not to contribute to the risk of fire to a building.	**Can Comply** – Recommendation Nos. 6 & 8 **Can Comply** – Recommendation Nos. 7 & 8

Landscaping Designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions.	**Can Comply** – Recommendation No. 1

12.0 Statement assessing the environmental impact of any proposed bushfire protection measures.

Bushfire Protection Measure	Likely Environmental Impact	Comment
APZ (Rec. No.1)	Insignificant	The recommended APZ within the subject property is currently clear of all persistent vegetation.
Construction Standard (Rec. Nos. 2 - 5)	Insignificant	Building to be constructed within approved / current building envelope.
Water Supply for fire fighting (Rec. No. 6)	Insignificant	A reticulated water supply currently services the existing development.
Utility service protection (Rec. Nos. 6 - 8)	Insignificant	Utilities are currently installed and not proposed to be significantly altered from the existing situation.
Vehicle Access (Rec. No. 9)	Insignificant	Direct access to public road system is by way of short driveway.

13.0 Conclusion/Summary

Based on the above assessment and the 9 recommendations to protect persons and property from danger that may arise from a bushfire, the Consent Authority should determine that this development proposal can comply with *Planning for Bushfire Protection, 2006* as required under *Section 4.14 of the Environmental Planning and Assessment Act 1979.*

As a considered opinion, the recommended mitigation measures and construction requirements as stated in this report would reasonably address the aims and objectives of PBP 2006, consistent within the relative and current bushfire risk to the subject development site.

The recommended mitigation measures include the establishment of an Asset Protection Zone, maintained as an IPA (Recommendation No.1) and the use of BAL 12.5 construction standards.

As infill development, the residence will be able to fully comply with the Acceptable Solutions provided within PBP 2006.

In this regard, the subject development can reasonably facilitate PBP objectives in as far as;

- Affording occupants of any building adequate protection from exposure to bushfire;
- Providing for a defendable space to be located around buildings;
- Providing appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and/or material ignition;
- Ensuring that safe operational access and egress for emergency service personnel and residents is available;
- Providing for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ; and
- Ensuring that utility services are adequate to meet the needs of fire fighters (and others assisting in bush fire fighting).

Should any of the above information require clarification or further discussion, please contact the author.

Scott Jarvis

Graduate Diploma Design for Bushfire Prone Areas
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(Note: Scott Jarvis is a recognised / suitably qualified consultant pursuant to Rural Fire Service of NSW requirements - Community Resilience Fact Sheet - Requirements for Suitably Qualified Consultants 8/15, Fast Fact 5/10 Version 3 Dated 7 March 2011 & Development Control Practice Note 1/10 Version 2 Dated 4 February 2011)

References/Further Reading

Australian Standard 3959-2009/2018, Construction of buildings in bushfire prone areas – Standards Australia.

Building Code of Australia (2019) – Australian Building Codes Board, Canprint.

Environmental Planning and Assessment Act (1979) – NSW Government Printer.

- Section 4.14 Consultation and Development Consent Certain Bushfire Prone Land
- Section 10.3 Bushfire Prone Land

Rural Fires Act (1997) – NSW Government Printer

Landscape and building design for bushfire areas (2003) – Ramsay G C & Rudolf L, CSIRO Publishing, Collingwood Victoria.

Ocean shores to desert dunes: the native vegetation of NSW and the ACT (2004) – Keith D, NSW Dept of Environment and Conservation, Hurstville NSW.

Planning for Bushfire Protection. A guide for councils, planners, fire authorities and developers (2006) – NSW Rural Fire Service.

Addendum: Appendix 3 - Planning for Bushfire Protection. A guide for councils, planners, fire authorities and developers (2010) – NSW Rural Fire Service.

Standards for Asset Protection Zones – NSW Rural Fire Service

Appendix 1

Map 1 – Overview

Map 2 – Study Area / Subject Lot / Slopes / APZ extent

Proposed Development

Recommended Inner Protection Area (IPA)

Subject Property Lot 30 DP TBC

Hydrant

Study Area

Slope Direction

Appendix 2 – Site Photo (2/12/2019)

Subject site, looking NW

Adjacent residential sites, looking SW

Adjacent residential sites, looking NW

Adjacent residential sites, looking NE

Bubalo Street, looking SW

Bubalo Street, looking NE

Existing underground electrical supply

Reticulated water / hydrant in pathway

Vegetation within reserve, looking S

Vegetation within reserve, looking W

Appendix 3 – RHF Calculations (Method 2 AS3959-2009)

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 12/3/2019 **Assessment Date:** 12/3/2019

Site Street Address:	20 Bubalo Street, Warriewood		
Assessor:	Scott Jarvis; Sydney Bushfire Consultant		
Local Government Area:	Pittwater	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
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: South West to Creek Line

Vegetation Information

Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	1 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	20

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	6	**APZ/Separation(m):**	46

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1090

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:	LOW	**Peak Elevation of Receiver(m):**	6.53
Level of Construction:	BAL 12.5	**Fire Intensity(kW/m):**	19929
Radiant Heat(kW/m2):	8.13	**Flame Angle (degrees):**	79
Flame Length(m):	14.94	**Maximum View Factor:**	0.138
Rate Of Spread (km/h):	1.93	**Inner Protection Area(m):**	46
Transmissivity:	0.776	**Outer Protection Area(m):**	0