Bushfire Threat Assessment

3 Quarry Road and 4 Vineys Road, Dural

Prepared by:

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Document Status

Version	Purpose of Document	Orig	Review	Review Date
Draft	Draft for internal review	LV	SG	29 June 2016
Draft	Draft for Client review	SG	SG	30 June 2016

Approval for Issue

Name	Signature	Date
Stuart Greville		30 June 2016

BPD-PD Certification

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BPAD Bushfire Planning & Design Accredited Practitioner Level 2

Summary

RPS has been engaged by H Investments International Pty Ltd to undertake a Bushfire Threat Assessment (BTA) for a proposed seniors housing at Lot 2A DP158064 and Lot 1 DP230172, also known as 3 Quarry Road and 4 Vineys Road, Dural, NSW. The proposed development is classified as a Special Fire Protection Purpose (SFPP) development under Planning for Bushfire Protection 2006 (PBP 2006) given its function is to provide housing accommodation for more senior people. The occupants of the proposed development may be more vulnerable to bush fire attack and therefore may require greater protection from such threats as well as assisted evacuation.

The assessment aims to consider and assess the bushfire hazard and associated potential threats relevant to such a proposal, and to outline the minimum mitigative measures which would be required in accordance with the provisions of the *Planning for Bush Fire Protection, 2006* that has been released and adopted through the *Environmental Planning & Assessment Amendment* (Planning for Bush Fire Protection) *Regulation 2007 &* the *Rural Fires Amendment Regulation 2007.*

In order to determine whether the proposed development is bushfire prone, and if so, which setbacks and other relevant Bush Fire Protection Measures (BFPM) will be appropriate, this assessment adheres to the methodology and procedures outlined in "Planning for Bushfire Protection" (NSW Rural Fire Service, 2006) (hereafter referred to as 'PBP 2006') and cl. 44 of the Rural Fires Regulation 2013.

This BTA found the land surrounding the site to support vegetation consistent with *Forest* and *Rainforest* vegetation formations as described by PBP 2006.

In summary, the following key recommendations have been generated to enable the proposed SFPP development to comply with PBP 2006:

- The entire development site is to be managed as an inner protection area (IPA) as outlined with section 4.1.3 and Appendix 5 of 'Planning for Bushfire Protection 2006 and the NSW Rural Fire Services' document 'Standards for Asset Protection Zones';
- All proposed structures to be built on the site should have due regard to the specific considerations given in the BCA, which makes specific reference to the Australian Standard (AS3959 – 2009) *Construction of buildings in bushfire prone* areas;
  - The western elevations and the entire roof structure of Buildings C and D shall comply with Sections 3 and 7 (BAL-29) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
  - The northern and eastern elevations, and the entire roof structure of Buildings H and I shall comply with Sections 3 and 7 (BAL-29) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
  - All remaining elevations and structures shall comply with Sections 3 and 5 (BAL-12.5) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
- Internal roads are to be constructed in accordance with PBP 2006 as outlined in section 3.3 of this report;
- Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site;
- The proposed facility is to be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure should comply with AS2419.1, 2005; and
- A Bush Fire Emergency Management and Evacuation Plan shall be prepared consistent with 'Development Planning A Guide to Developing a Bush Fire Emergency Management and Evacuation

Plan December 2014' and Australian Standard AS3745 2010 'Planning for Emergencies in Facilities'.

In conclusion, should the recommendations above be duly considered and incorporated, the proposed development will provide an adequate level of protection to life and property on the site, however they will not prevent a bushfire from occurring offsite or radiating from the site.

Finally, the implementation of the adopted measures and recommendations forwarded within this report are based on a thorough assessment under the Planning for Bushfire Protection 2006 to manage the risk caused by bushfire to people, property and public safety. The recommended bushfire protection measures will contribute to the amelioration of the potential impact of any bushfire upon the development site, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

Terms and Abbreviations

Abbreviation	Meaning
AHIMS	Aboriginal Heritage Information Management System
APZ	Asset Protection Zone
AS2419-2005	Australian Standard – Fire Hydrant Installations
AS3959-2009	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BCA	Building Code of Australia
BRMC	Bushfire Risk Management Committee
BFRMP	Bush Fire Risk Management Plan
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPL	Bush Fire Prone Land
BPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
BTA	Bushfire Threat Assessment
EPA Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act 1997*
FDI	Fire Danger Index
FMP	Fuel Management Plan
ha	hectare
IPA	Inner Protection Area
LEP	Local Environment Plan
LGA	Local Government Area
OPA	Outer Protection Area
PBP 2006	Planning for Bushfire Protection 2006
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation
RPS	RPS Australia East Pty Ltd
HSC	Hornsby Shire Council
TSC Act	*NSW Threatened Species Conservation Act 1995*

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1.0 Introduction

RPS has been engaged by H Investments International Pty Ltd to undertake a Bushfire Threat Assessment (BTA) for a proposed seniors housing at Lot 2A DP158064 and Lot 1 DP230172, also known as 3 Quarry Road and 4 Vineys Road, Dural, NSW, hereafter referred to as the 'site' (**Figure 1**). The proposed development is classified as a Special Fire Protection Purpose (SFPP) development under Planning for Bushfire Protection 2006 (PBP 2006) given its function is to provide housing accommodation for seniors including people requiring full-time assisted care. The occupants of the proposed development may be more vulnerable to bush fire attack and therefore may require greater protection from such threats as well as assisted evacuation.

In accordance with Section 91 of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act) and Section 100B of the NSW *Rural Fires Act 1997* (RF Act), a bushfire safety authority must be obtained prior to developing bushfire prone land for the purpose of a SFPP.

In order to determine whether the proposed development is bushfire-prone, and if so, which setbacks and other relevant Bush Fire Protection Measures (BFPM) will be appropriate, this assessment adheres to the methodology and procedures outlined in PBP 2006 and cl. 44 of the Rural Fire Regulation 2013 (RF Regulation 2013).

1.1 Site Particulars

Locality	3 Quarry Road and 4 Vineys Road, Dural, NSW
LGA	Hornsby Shire Council
Titles	Lot 2A DP158064 and Lot 1 DP230172
Area	The site is approximately 30,000 m^2 in total.
Zoning	The site is zoned RU2 Rural Landscape under Hornsby Local Environmental Plan (LEP) 2013 (refer to **Figure 2**).
Boundaries	The site is situated within a rural residential and industrial area. Lots surrounding the site are a combination of garden plantations, rural residential properties, cleared lands, remnant vegetation and industrial buildings. Quarry road runs along the southern boundary of the site with Vineys Road running along the north.
Current Land Use	Part of the site contains remnant vegetation (Lot 2A) with the remainder of the site containing cleared lands associated with a rural residential property, a dwelling and some remnant vegetation.
Topography	The site is relatively flat with a lower lying drainage line running east to west across the centre of the site.
Climate / Fire History	The site lies within a geographical area with a Fire Danger Index (FDI) rating of 100. Extreme bushfire weather is therefore associated with long periods of drought, high temperatures, low humidity and gusty often north-westerly winds. A portion of Lot 1 DP230172 within the site is classified by Hornsby Council as Vegetation Buffer 100m and 30m on the Bushfire Prone Land Map (2014) **Figure 3**.

Legend

- Site Location
- Pacific Hills Christian School
- Cadastre
- 10m Contours
- Drainage

N

Vineys Lane

Vineys Rd

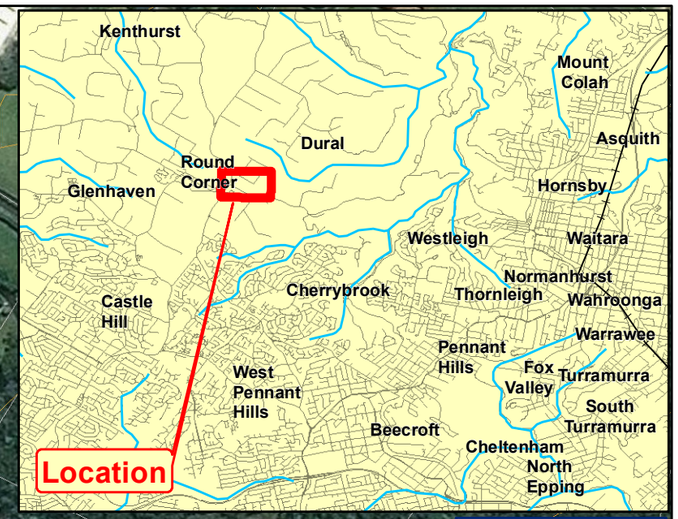
Old Northern Rd

New Line Rd

Quarry Rd

Pacific Hills Christian School

220 210 200 190 180



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0 50 100 150 m

SCALE 1:2,500 AT A3 SIZE

TITLE : **FIGURE 1: SITE LOCATION**

LOCATION : **DURAL, NSW**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **30/06/2016**

PURPOSE: **BTA**

VERSION (PLAN BY): A A3 (amy.obrien)

PATH: J:\JOBS\131k\131350 Dural\Drafting\Arcgis Map Documents\BTA\131350 Figure 1 Site Location UPDATE A A3 20160509.mxd

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JOB REF: **PR131350-2**

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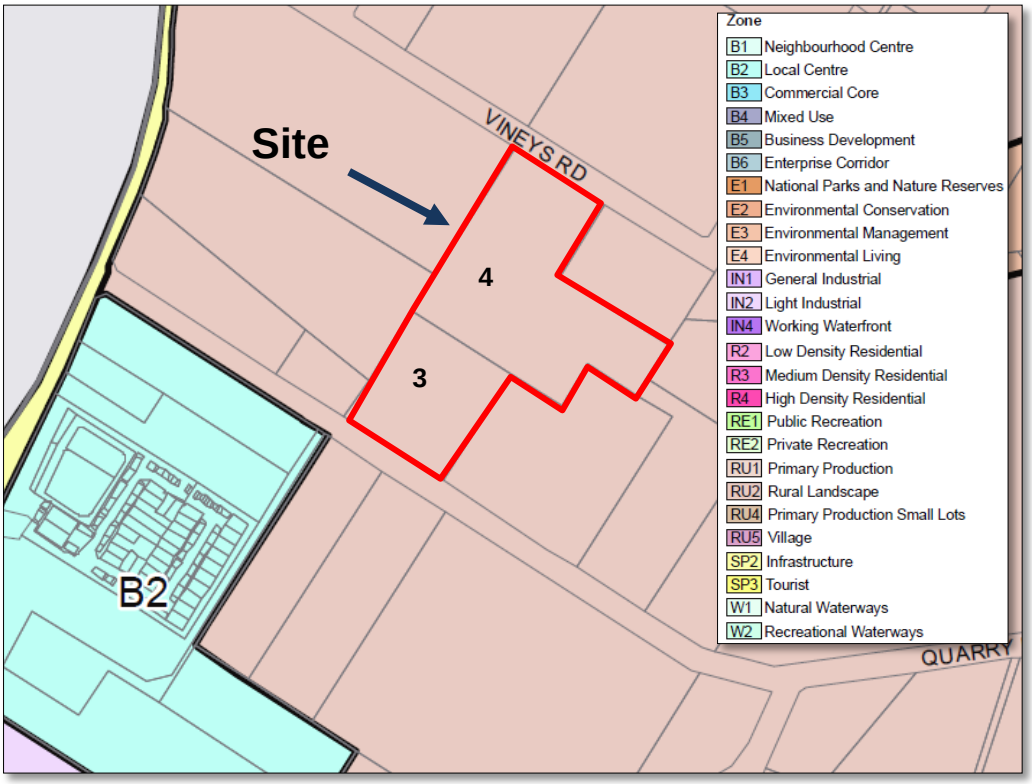

Figure 2 Hornsby LEP Land Zoning Map

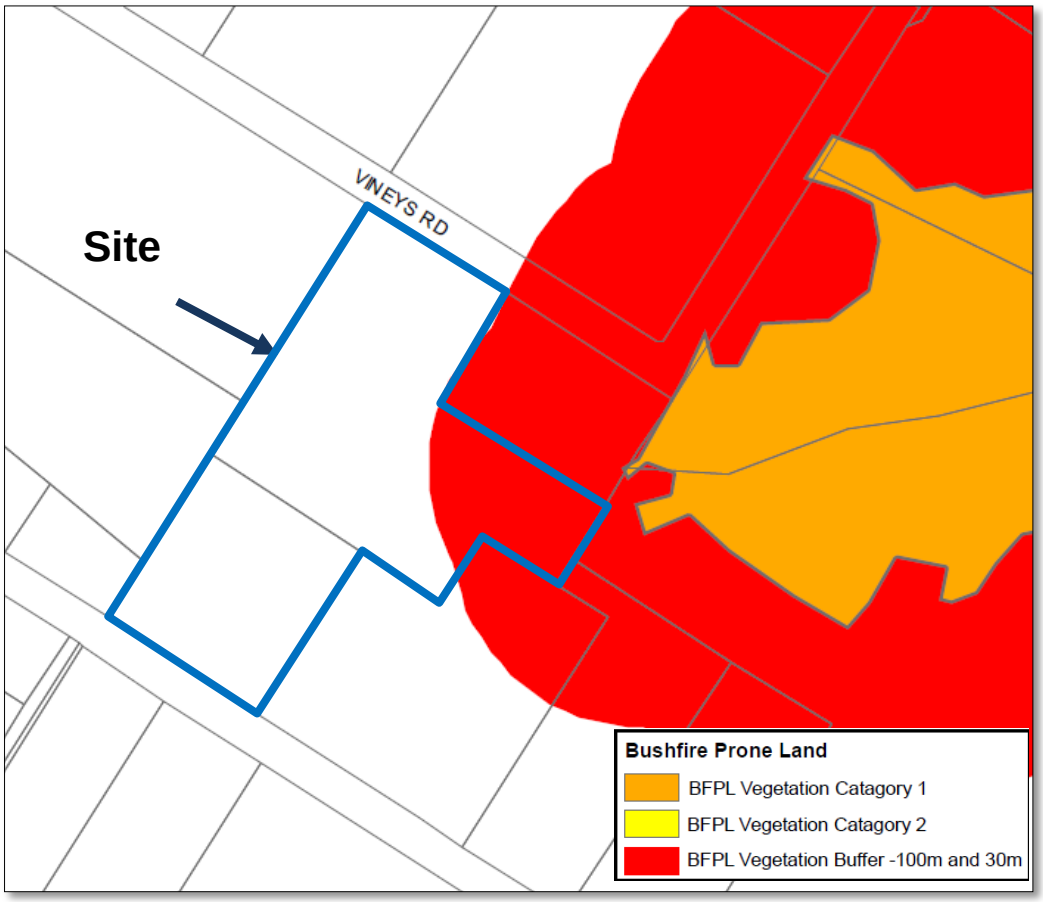

Figure 3 Bushfire Prone Land Map of the Site (Hornsby Council)

1.2 Description of Proposal

The proposed development comprises the construction of a residential aged care facility with a capacity of 74 beds as well as 219 self-care housing units contained within 8 three storey buildings (see **Figures 4** and **5**). The development is intended to provide for a transitional environment for over 55s that can remain in the same development as their needs change with age. The development will allow for a variety of living arrangements with a variety of care options available to all residents.

The Concept Plan for the Project is contained in **Appendix 1**.

Figure 4 Eastern perspective (Marchese Partners)

Figure 5 Ground Floor Plan (Marchese Partners)

1.3 Objectives of Assessment

This assessment has been undertaken in accordance with Clause 44 of the RF Regulation. This BTA also addresses the six key Bush Fire Protection Measures (BFPMs) in a development assessment context being:

(1) The provision of clear separation of buildings and bush fire hazards, in the form of fuel-reduced Asset Protection Zones (and their components being Inner Protection Areas and Outer Protection Areas);

(2) Construction standards and design (Bushfire Attack Levels);

(3) Appropriate access standards for residents, fire-fighters, emergency workers and those involved in evacuation;

(4) Adequate water supply and pressure;

(5) Emergency management arrangements for fire protection and / or evacuation; and

(6) Suitable landscaping, to limit fire spreading to a building.

1.4 Specific Objectives for Special Fire Protection Purpose Developments

The aims and objectives listed in section 1.2.1 of PBP 2006 remain applicable to SFPP developments, however further consideration has been given to SFPP developments due to the nature of these environments and the occupants they accommodate. Occupants of SFPP developments are generally more vulnerable to bush fire attack therefore specific objectives have been put in place to ensure greater protection is provided (section 4.2.3 PBP 2006). Specific objectives include:

- To provide for the special characteristics and needs of occupants; and
- Provide for safe emergency evacuation procedures.

With the above in mind, consideration needs to be given to the appropriate Asset Protection Zone (APZ) for the circumstance. The intent of an APZ is to provide sufficient space for firefighters to safely operate while supporting or evacuating occupants. This can be achieved by ensuring firefighters and occupants are not exposed to radiant heat levels greater than 10kW/m^2 at the point of entry/ egress to the building.

It is noted that the published intent of APZs focuses on ensuring people are not exposed to excessive radiant heat levels. Neither the intent of measures nor the Performance Criteria refer to the 10kW/m^2 maximum radiant heat level also applying to buildings.

The Deemed-to-Satisfy (DTS) option to satisfy the Performance Criteria requires the provision of an APZ in accordance with PBP 2006; in this instance the DTS Acceptable Solution is equivalent to a 70m APZ. Additional investigation was conducted using the NBC Bushfire Attack Assessor V2.1 to determine the required setback to achieve 10kW/m^2. The results found that a 50m setback is acceptable.

Accordingly, an Alternate Solution may be developed to achieve the Performance Criteria by developing a fire safety strategy that contains Emergency Evacuation Procedures to require occupants to evacuate away from the bushfire threat.

2.0 Bushfire Hazard Assessment

2.1 Vegetation Assessment

2.1.1 Methodology

Vegetation classification over the site and surrounding area has been carried out as follows:

- Aerial Photograph Interpretation to map the vegetation classification and extent;
- Site inspection (28th April 2016); and
- Reference to regional vegetation community mapping.

In accordance with PBP 2006, an assessment of the vegetation over a distance of 140m in all directions from the site was undertaken. Vegetation that may be considered a bushfire hazard was identified in all directions from the development footprint. The vegetation classification is based on the revised Table 2.3 in AS3959-2009.

2.1.2 Predominant Vegetation Formation

The determined vegetation classifications are displayed in **Table 1** and **Figure 6**. **Plates 1** – **2** depict the site and surrounding vegetation.

Table 1 Vegetation Classification

Direction of Bushfire Attack	Vegetation or other infrastructure	Classification of Vegetation Formations AS3959-2009	Overall Fuel Load (PBP 2006)
North	Gardens, small plantations and cleared lands	No Hazard	NA
East	Rural residential properties and remnant vegetation	No Hazard / *Forest*	20-25 tonnes/ha
South	Cleared lands, industrial buildings, Quarry Road and existing rural residential	No Hazard	NA
West	Gardens plantations	*Rainforest** (Plantations <1ha)	8-10 tonnes/ha

* The plantation to the west of the site is less than 1 hectare in size and is therefore considered to be a low hazard. Appendix 2 of PBP 2006 states that APZ setbacks and building construction standards for low hazard threats will be the same as for rainforest.

Plate 1 Forest vegetation and a drainage line to the east of the site

Plate 2 Example of Plantation hazard to the west

Legend

- Site Location
- 140m Vegetation Buffer
- 100m Slope Buffer
- Building Footprint
- Pacific Hills Christian School
- Cadastre
- Drainage
- 10m Contours

Vegetation Classification

- Cleared/ Managed Land
- Forest
- Pine Plantation
- Vegetation Cleared/ to be Removed

N

220

210

190

180

Pacific Hills Christian School

0 50 100 150 m

SCALE 1:2,500 AT A3 SIZE

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TITLE : **FIGURE 6: VEGETATION CLASSIFICATION**

LOCATION : **DURAL, NSW**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **30/06/2016**

PURPOSE: **BTA**

VERSION (PLAN BY): A A3 (amy.obrien)

PATH: J:\JOBS\131k\131350 Dural\Drafting\Arcgis Map Documents\BTA\131350 Figure2 Vegetation Classification A A3 20160505.mxd

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2.2 Effective Slope Assessment

2.2.1 Methodology

Slope assessment has been undertaken as follows:

- Aerial photography;
- Detail survey; and
- Site inspection (28th April 2016).

An assessment of the slope over a distance of 100m of the hazard direction from the site boundary was undertaken. The effective slope was then calculated under the classified vegetation. The topography of the site has been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the site.

2.2.2 Effective Slope

The effective slope of the bushfire hazard is documented in **Table 2** below.

Table 2 Site Slope Assessment

Direction of Vegetation	Hazard	Slope Classification
East	Forest	4.5° Downslope
West	Rainforest	Upslope

2.3 Significant Environmental Features

Given the disturbed nature of the site, no significant environmental features occur.

2.4 Significant Threatened Species

A search of the Atlas of NSW Wildlife Database was conducted on 2nd May 2016. The Atlas includes records of threatened species listed under both the NSW *Threatened Species Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. No threatened species have been recorded on the site.

2.5 Cultural Significance

A search of The Aboriginal Heritage Information Management System (AHIMS) (**Appendix 2**) confirmed that there are no records of Aboriginal or Cultural Heritage places on the site.

2.6 Bushfire Risk Management

The RF Act requires each bushfire management committee to prepare a bushfire risk management plan for a nominated area; commonly defined by local government area boundaries. The Hornsby/Ku-ring-gai Bushfire Management Committee developed the Hornsby/Ku-ring-gai Bush Fire Risk Management Plan (BFRMP) which was endorsed in November 2009 and approved in March 2010. The BFRMP investigated the high risk human settlements in the Hornsby Local Government Area and ranked them according to the assessed bushfire risk and the likely consequence of a bushfire attack.

BFRMPs are often not site specific, and individual sites or development do not have a statutory obligation to prepare a BFRMP, however it is often recommended as part of preparedness, a BFRMP is prepared.

Hornsby/Ku-ring-gai Bush Fire Risk Management Plan

The site does not lie within any designated assets outlined within the BFRMP. It is recommended that the BFRMP be updated to include the development once construction is complete.

Bushfire Management Zones were identified within the BFRMP to identify the management intent for a specific area. A description of the different bushfire management zones are described in **Table 3** below.

Table 3 Bushfire Management Zones

Zone	Purpose	Suppression Objectives (s)	Zone characteristics
Asset Protection Zone (APZ)	To protection human life, property and highly valued public assets and values.	To enable the safe use of Direct Attack suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document *Standards for Asset Protection Zones.*
Strategic Fire Advantage Zone (SFAZ)	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bushfires and reduce the potential for spot fire development;	To improve the likelihood and safe use of: **Parallel Attack** suppression strategies with the zone. To enable the safe use of **Indirect Attack** (back burning) in high to very high fire weather conditions within the zone. To prevent crown fire development within the zone; and/or To minimise spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependent upon: • Topography; • Aspect; • Spotting propensity; • Location of adjacent firebreaks; • Mosaic pattern of treatment; Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practises should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone (LMZ)	To meet relevant land management objectives in areas where APZs or SFAZs are not appropriate.	As per the land management and fire objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management eg. heritage and/or fire protection eg. broad scale mosaic burning objectives.
Fire Exclusion Zone (FEZ)	To exclude bushfires	N/A	Variable dependant on size of fire sensitive area requiring protection.

Figure 7 Hornsby Bush Fire Risk Management Plan

Figure 7 displays the context of the site in relation to other assets included in the BFRMP. The red hatching represents Human Residential, the orange hatching represents Economic Assets and the blue hatching is Strategic Fire Advantage Zone.

The Hornsby/Ku-ring-gai BFMC includes a series of treatment actions available for implementation at any particular site exposed to a bushfire threat. **Table 4** describes the available treatment actions.

Table 4 Asset specific treatments used in the Hornsby/Ku-ring-gai BFMC area

Strategy	Targeted treatments used in the BFMC
Ignition Management	▪ Suspended fire generated activities on days of very high to extreme fire danger ▪ Undertake patrols of National Parks during TOBANS ▪ Maintain vegetation as per Network Management Plan
Hazard Reduction	▪ Perform annual maintenance along APZ ▪ Maintain APZ by burning ▪ Undertake mosaic burning in SFAZ ▪ Undertake mosaic burning in LMZ
Community Engagement	▪ Manage CFU as per NSWFB policy ▪ Conduct FireWise activity
Preparedness	▪ Inspect and maintain fire trail as required ▪ Manage CFU as per NSWFB policy

3.0 Bushfire Protection Measures

3.1 Asset Protection Zones

An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property (refer to **Figure 6**). The required width of the APZ varies with slope and the type of hazard. An APZ can consist of both an Inner Protection Area (IPA) and an Outer Protection Area (OPA). The respective IPA and OPA widths for the required APZs are as detailed in **Table 5**. An APZ can include the following:

- footpaths;
- lawns;
- discontinuous gardens;
- swimming pools;
- driveways;
- unattached non-combustible garages with suitable separation from the dwelling;
- open space / parkland; and
- car parking.

Isolated areas of vegetation are generally not a bushfire hazard as they are not large enough to produce fire of an intensity that will threaten dwellings. These areas include narrow strips of vegetation along road corridors.

3.1.1 Determining the Appropriate Setbacks

The site lies within the Hornsby LGA and therefore is assessed under a FDI rating of 100. The Detailed Assessment (Method 2) outlined in Australian Standard *AS3959-2009 Construction of buildings in bushfire prone areas* was used to calculate the required setback to achieve BAL-29. Additional modelling was carried out adopting a flame temperature of 1200k to determine the separation distance required to achieve less than 10kW/m^2. The NBC Bushfire Attack Assessor V2.1 was used to model the bushfire radiant heat exposure which determined the applicable bushfire attack level.

Refer to **Table 5** for required APZs.

Table 5 APZ Components

Direction of Hazard	Vegetation Classification	Slope	Required APZ (PBP 2006)	AS3959-2009 (Method 2)	
				BAL-29	BAL-10
East	*Forest*	4.5° Downslope	70m	29m	49m
West	*Rainforest*	Upslope	30m	10m	19m

3.2 Dwelling Design and Construction

The determinations of the appropriate Bushfire Attack Level (BAL) are based upon parameters such as weather modelling, fire-line intensity, flame length calculations, as well as vegetation and fuel load analysis. The determination of the construction level is derived by assessing the:

- Relevant FDI = 100
- Flame temperature = 1200K
- Slope
- Vegetation classification; and
- Building location.

Performance criteria outlined in section 4.2.7 of PBP 2006 for SFPP developments state that radiant heat levels of greater than 10kW/m^2 will not be experienced by occupants or emergency services workers entering or exiting a building. Additionally, exits are to be located away from the hazard side of the building.

3.2.1 Bushfire Attack Level for the Proposed Development

The Detailed Assessment (Method 2) outlined in Australian Standard *AS3959-2009 Construction of buildings in bushfire prone areas* was used to calculate the Bushfire Attack Level for the site. The NBC Bushfire Attack Assessor V2.1 was used to model the bushfire radiant heat exposure which determined the applicable bushfire attack level.

Refer to **Table 6** and **Figure 8** for the BALs calculated for the site.

Table 6 Required BAL (AS 3959-2009)

Direction of Hazard	Vegetation Classification	Average slope of land in degrees	Separation Distance from Threat	Bushfire Attack Level (BAL)
East	*Forest*	4.5° Downslope	0m-<25m	BAL – FZ
			25m - <29m	BAL – 40
			29m - <35m	BAL – 29
			35m - <44m	BAL – 19
			44m - <49m	BAL – 12.5
			49m - <100m	**BAL – 10**
West	*Rainforest*	Upslope	0m-<8m	BAL – FZ
			8m - <10m	BAL – 40
			10m - <13m	BAL – 29
			13m - <17m	BAL – 19
			17m - <19m	BAL – 12.5
			19m - <100m	**BAL – 10**

Legend

- Site Location
- 140m Vegetation Buffer
- 100m Slope Buffer
- Building Footprint
- Cadastre
- Pacific Hills Christian School
- Drainage
- 10m Contours

Vegetation Classification

- Cleared/ Managed Land
- Forest
- Pine Plantation
- Vegetation Cleared/ to be Removed

Required Bushfire Attach Level (AS 3959-2009)

- BAL - FZ
- BAL - 40
- BAL - 29
- BAL - 19
- BAL - 12.5
- BAL - 10

N

IMPORTANT NOTE

1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan. This plan is strictly limited to the Purpose and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter. The plan is presented without the assumption of a duty of care to any other person (other than the Client) ("Third Party") and may not be relied on by Third Party.

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   c. any inaccuracies or other faults with information or data sourced from a Third Party;
   d. RPS Australia East Pty Ltd relying on surface indicators that are incorrect or inaccurate;
   e. the Client or any Third Party not verifying information in this plan where recommended by RPS Australia East Pty Ltd;
   f. lodgment of this plan with any local authority against the recommendation of RPS Australia East Pty Ltd;
   g. the accuracy, reliability, suitability or completeness of any approximations or estimates made or referred to by RPS Australia East Pty Ltd in this plan.

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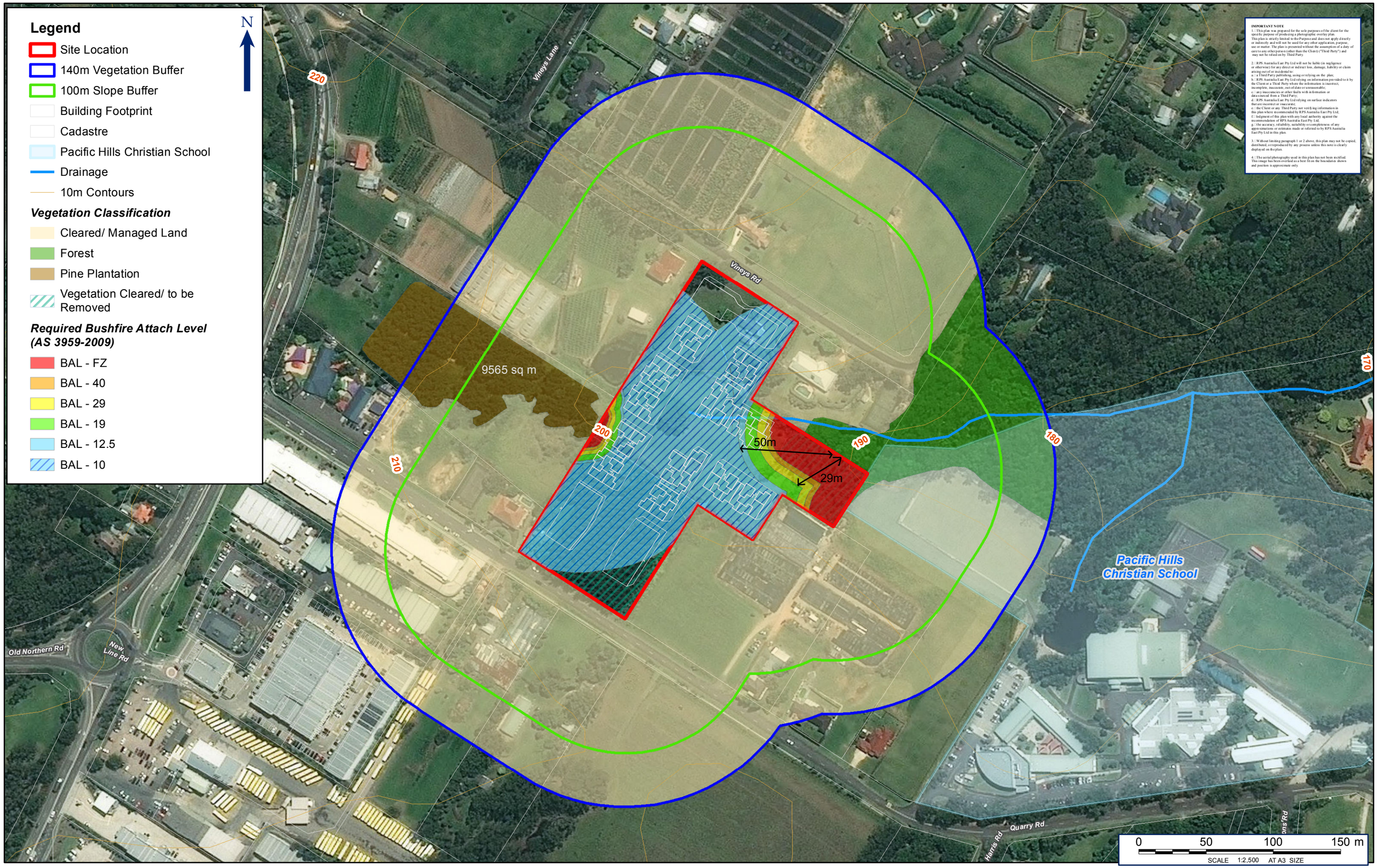
4. The aerial photography used in this plan has not been rectified. This image has been overlaid as a best fit on the boundaries shown and position is approximate only.



TITLE : **FIGURE 8: REQUIRED BUSHFIRE ATTACK LEVEL (AS 3959-2009)**

LOCATION : **DURAL, NSW**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **30/06/2016**

PURPOSE: **BTA**

VERSION (PLAN BY): A A3 (amy.obrien)

PATH: J:\JOBS\131k\131350 Dural\Drafting\Arcgis Map Documents\BTA\131350 Figure3 Bals B A3 20160511.mxd

CLIENT: **H INVESTMENTS INTERNATIONAL PTY LTD**

JOB REF: **PR131350-2**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
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3.3 Access

In the event of a serious bushfire threat to the proposed development, it will be essential to ensure that adequate ingress/ egress and the provision of defendable space are afforded in the building design.

Two ingress and egress points to the site are situated off Vineys Road to the north and Quarry Road to the south. Access will provide a through road that dissects the site entirely, and contains two roundabouts to slow internal traffic.

In addition to vehicle access, all pedestrians paths should be clearly signposted to direct evacuating occupants towards the main building during emergency situations.

The following summarises the access requirements of PBP 2006 for SFPP developments:

- be two-wheel drive, sealed, all weather roads;
- internal perimeter roads are provided with at least two traffic lane widths (carriageway 8m minimum kerb to kerb) and shoulders on each side;
- roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and area clearly sign posted as a dead end;
- traffic management devices are constructed to facilitate access by emergency service vehicles;
- a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided;
- curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress;
- the minimum distance between inner and outer curves is six metres;
- maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees;
- crossfall of pavement is not more than 10 degrees;
- roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge);
- roads are clearly sign-posted; and
- the internal road surfaces and bridges have capacity to carry fully-loaded firefighting vehicles (15 tonnes).

Refer to **Appendix 1** for the architectural plans displaying access.

3.4 Water

Associated with any kind of development upon the land, it is expected that water mains will be extended into the site. Provision of access to this supply should be provided for fire-crews in the form of readily accessible and easily located fire hydrants. Fire hydrant spacing, sizing and pressure should comply with AS 2419.1 – 2005. Hydrants are not to be 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.

3.5 Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS 1596 – 2002. It is expected that the location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.

3.6 Fire Fighting Capability

To facilitate quick and efficient action by the Fire Brigade / Rural Fire Service upon arrival, it is recommended that all necessary connections / pumps etc be clearly marked and visible, and in good working order. Dural Rural Fire Brigade is located 1.2 km east of the site on Quarry Road.

3.7 Landscaping

Landscaping should be designed and managed to minimise flame contact and radiant heat to buildings and the potential for wind driven embers to cause ignitions.

In choosing plants for landscaping consideration should be given to plants that possess properties, which help to protect buildings. If the plants themselves can be prevented from ignition, they can improve the defence of buildings by:

- filtering out wind-driven burning debris and embers;
- acting as a barrier against radiation and flame; and
- reducing wind forces.

Consequently landscaping of the site should consider the following:

- meet the specifications of an Inner Protection Area (IPA) detailed in PBP 2006;
- priority given to retaining or planting species which have a low flammability and high moisture content;
- priority given to retaining or planting species which do not drop much litter in the bushfire season and which do not drop litter that persists as ground fuel in the bush fire season; and
- create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.

3.8 Fuel Management

Careful thought must be given to the type and physical location of any proposed site landscaping. Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Bearing in mind the desired aesthetic and environment sought by site landscaping, some basic principles have been recommended to help minimise the chance of such works contributing to the potential hazard on site.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered.

It is reiterated again that it is essential that any landscaped areas and surrounds are subject to ongoing fuel management and reduction to ensure that fine fuels do not build up.

3.9 Emergency Evacuation Management

The occupants of SFPP developments are often more vulnerable to bushfire attack as they are less familiar with their surroundings and may be less educated in relation to bush fire impacts. Furthermore, these residents are less likely to be able to defend the property from bushfire attack. It is imperative that evacuation management is clearly defined to ensure that harm to employees and occupants and loss of life does not occur.

It is recommended that an Emergency Management Plan (EMP) be developed to outline all actions and procedures for occupants of the site in the event of an emergency bushfire. The EMP should consider the distance and time required to evacuate to the nearest potential off site refuge area when determining the preferred emergency management procedure. A Shelter-in-Place refuge area might be a more acceptable solution in unforeseen bushfire emergencies. The EMP should have regard to the RFS guidelines 'Development Planning: A guide to developing a Bush Fire Emergency Management and Evacuation Plan' (2014).

The EMP should be circulated to all employees and they should be made aware that on days when the RFS decide the Fire Danger Rating is **Catastrophic**, emergency evacuation should be made a priority.

Due to the nature of the development it is recommended that an annual emergency simulation exercise is undertaken by all employees of the resort to satisfy local emergency services and prepare all personnel for a possible fire event.

4.0 Conclusion and Recommendations

It is clear from this investigation and assessment that the site constitutes Bushfire Prone Land. In accordance with the provisions of PBP 2006, the recommendations outlined within this assessment will substitute as appropriate actions to reduce the risk of damage and/or harm in the event of a bushfire event.

This BTA found the land surrounding the proposed development to support vegetation consistent with a combination of *Forest* and *Rainforest* as described by PBP 2006.

In summary, the following key recommendations have been generated to enable the proposed development to comply with PBP 2006:

- The entire development site is to be managed as an inner protection area (IPA) as outlined with section 4.1.3 and Appendix 5 of 'Planning for Bushfire Protection 2006 and the NSW Rural Fire Services' document 'Standards for Asset Protection Zones';
- All proposed structures to be built on the site should have due regard to the specific considerations given in the BCA, which makes specific reference to the Australian Standard (AS3959 – 2009) *Construction of buildings in bushfire prone* areas;
  - The western elevations and the entire roof structure of Buildings C and D shall comply with Sections 3 and 7 (BAL-29) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
  - The northern and eastern elevations, and the entire roof structure of Buildings H and I shall comply with Sections 3 and 7 (BAL-29) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
  - All remaining elevations and structures shall comply with Sections 3 and 5 (BAL-12.5) AS3959-2009 and section A3.7 Addendum Appendix 3 of 'Planning for Bush Fire Protection 2006';
- Internal roads are to be constructed in accordance with PBP 2006 as outlined in section 3.3 of this report;
- Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site;
- The proposed facility is to be linked to the existing mains pressure water supply and that suitable hydrants be clearly marked and provided for the purposes of bushfire protection. Fire hydrant spacing, sizing and pressure should comply with AS2419.1, 2005; and
- A Bush Fire Emergency Management and Evacuation Plan shall be prepared consistent with 'Development Planning A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan December 2014' and Australian Standard AS3745 2010 'Planning for Emergencies in Facilities'.

This assessment has been made based on the bushfire hazards in and around the site at the time of inspection and production (June 2016).

Finally, the implementation of the adopted measures and recommendations forwarded within this report are based on a thorough assessment under the Planning for Bushfire Protection 2006 to manage the risk caused by bushfire to people, property and public safety. The recommended bushfire protection measures will contribute to the amelioration of the potential impact of any bushfire upon the development estate, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

5.0 Bibliography

Hornsby Shire Council (2013) Local Environmental Plan: Land Zoning Map – Sheet LZN_009: Accessed online from: http://www.legislation.nsw.gov.au/maps/df41f88b-7b6a-c39c-f7f0-f0d832286424/4000_COM_LZN_009_020_20130903.pdf

Hornsby Shire Council (2014) Sheet 009 Bushfire Prone Land Map 2014. Accessed online from: http://www.hornsby.nsw.gov.au/__data/assets/pdf_file/0010/80101/Bushfire-Prone-Land-Map-009.pdf

Hornsby/Ku-ring-gai Bush Fire Management Committee (2010) *Hornsby/Ku-ring-gai Bush Fire Risk Management Plan*. Accessed online from: http://www.rfs.nsw.gov.au/__data/assets/pdf_file/0018/2376/Hornsby-Kur-ring-gai-BFRMP.pdf

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NSW Rural Fire Service (2005). Standards for Asset Protection Zones. NSW Rural Fire Service.

Ramsay, GC and Dawkins, D (1993). *Building in Bushfire-prone Areas – Information and Advice.* CSIRO and Standards Australia.

Rural Fire Services (2014) *Development Planning: A guide to developing a Bush Fire Emergency Management and Evacuation Plan*. Accessed online from: http://www.rfs.nsw.gov.au/__data/assets/pdf_file/0020/29270/Development-Planning-Guide-to-developing-a-Bush-Fire-Emergency-Management-and-Evacuation-Plan.pdf

Rural Fires and Environmental Assessment Legislation Amendment Act 2002.

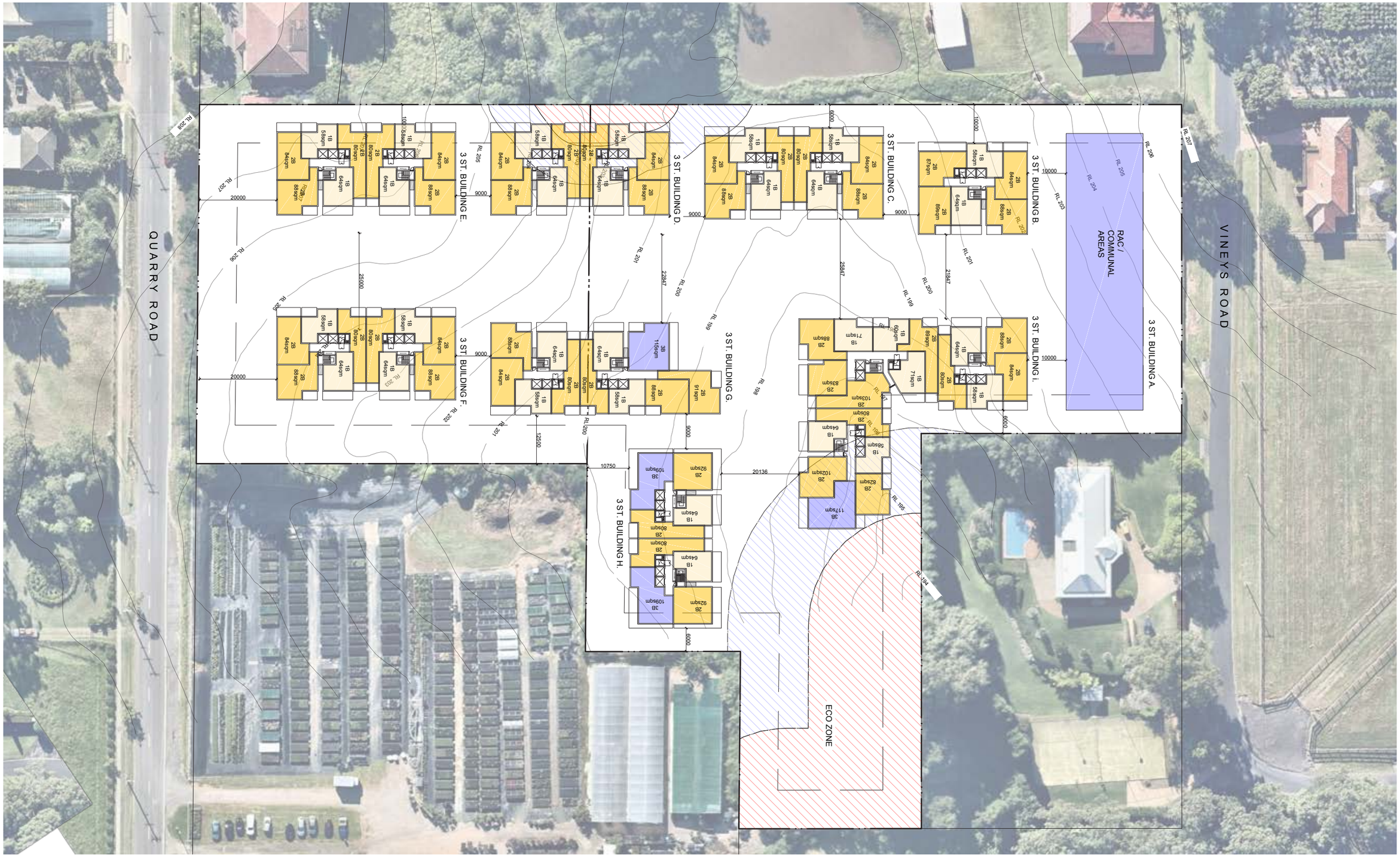
Standards Australia (2009). *AS 3959 – 2009: Construction of Buildings in Bushfire-prone Areas.*

Appendix 1

Concept Plan

Ground Floor

Level 1



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Level 1 Floor Plan
3 Quarry Road, Dural

012

Level 2


QUARRY ROAD
VINEYS ROAD
3 ST. BUILDING E.
3 ST. BUILDING D.
3 ST. BUILDING C.
3 ST. BUILDING B.
3 ST. BUILDING A.
3 ST. BUILDING F.
3 ST. BUILDING G.
3 ST. BUILDING H.
3 ST. BUILDING I.
RAC / COMMUNAL AREAS
ECO ZONE
RL 208
RL 207
RL 206
RL 205
RL 204
RL 203
RL 202
RL 201
RL 200
RL 199
RL 198
RL 197
RL 196
RL 195
RL 194
20000
25000
9000
10000
12500
10750
20136
22947
21947
25947

Roof


QUARRY ROAD
VINEYS ROAD
3 ST. BUILDING E.
3 ST. BUILDING D.
3 ST. BUILDING C.
3 ST. BUILDING B.
3 ST. BUILDING A.
3 ST. BUILDING F.
3 ST. BUILDING G.
3 ST. BUILDING H.
3 ST. BUILDING I.
ROOF TOP GREENERY
ECO ZONE
RL 208
RL 207
RL 206
RL 205
RL 204
RL 203
RL 202
RL 201
RL 200
RL 199
RL 198
RL 196
RL 194
20000
25000
22847
25847
21847
20136
10750
12500
10000
9000
6000

Appendix 2

AHIMS Report

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR12424

Client Service ID : 223670

RPS Australia East Pty Ltd -Hamilton

Date: 03 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

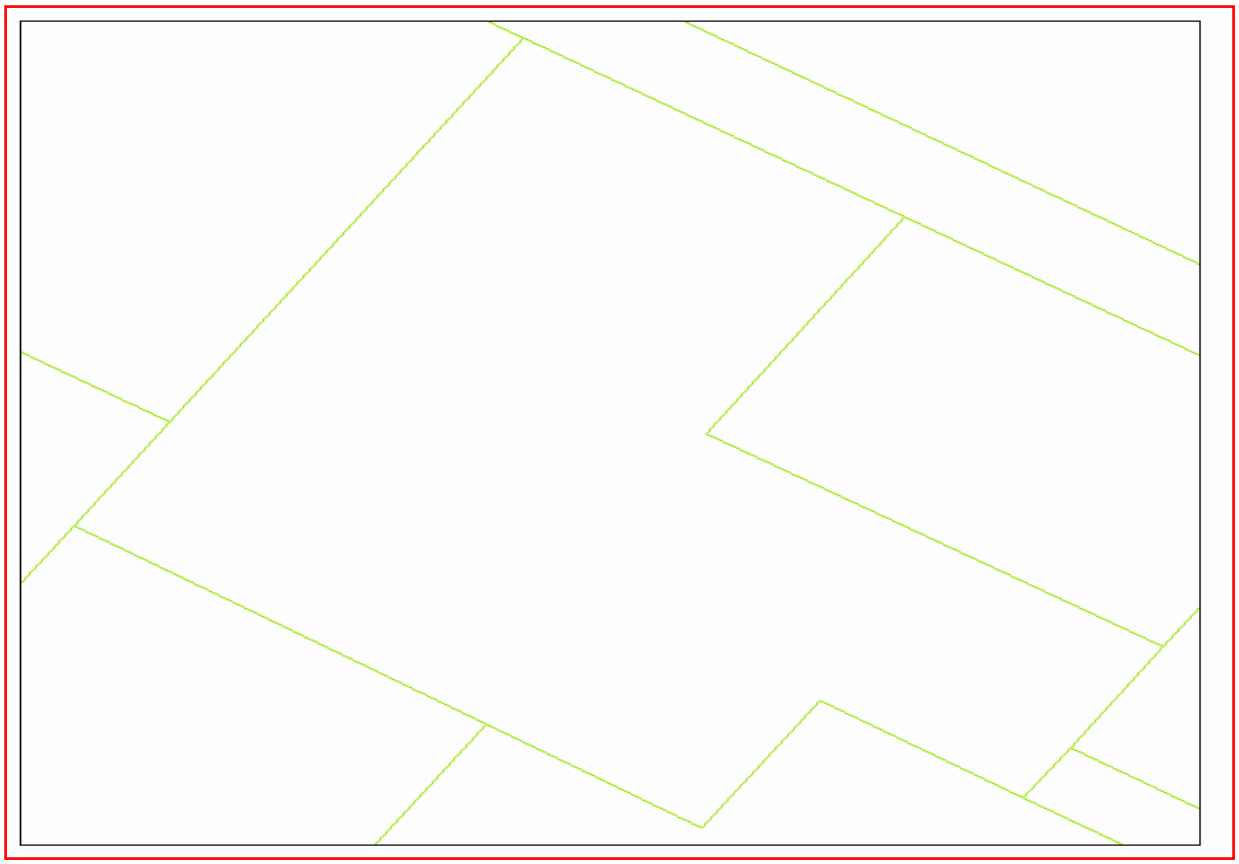
Attention: Cheng-Yen Loo

Email: chengyen.loo@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP230172 with a Buffer of 0 meters, conducted by Cheng-Yen Loo on 03 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix 3

Bushfire Attack Assessor Report

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 29/06/2016 **Assessment Date:** 5/05/2016

Site Street Address: PR131350 Dural Aged Care, Dural

Assessor: Mr Admin; admin

Local Government Area: Hornsby **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: East

Vegetation Information

Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	4.5 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	20	**Overall Fuel Load(t/ha):**	25

Site Information

Site Slope	3 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	49

Fire Inputs

Veg./Flame Width(m):	35	**Flame Temp(K)**	1200

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):**	8.61
Level of Construction:	BAL 12.5	**Fire Intensity(kW/m):**	42287
Radiant Heat(kW/m2):	9.56	**Flame Angle (degrees):**	67
Flame Length(m):	24.28	**Maximum View Factor:**	0.109
Rate Of Spread (km/h):	3.27	**Inner Protection Area(m):**	49
Transmissivity:	0.787	**Outer Protection Area(m):**	0

Run Description:	West - Pine plantation		
Vegetation Information			
Vegetation Type:	Rainforest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	4.5 Degrees	**Vegetation Slope Type:**	Upslope
Surface Fuel Load(t/ha):	8	**Overall Fuel Load(t/ha):**	10
Site Information			
Site Slope	2 Degrees	**Site Slope Type:**	Upslope
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	19
Fire Inputs			
Veg./Flame Width(m):	25	**Flame Temp(K)**	1200
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):**	3.44
Level of Construction:	BAL 12.5	**Fire Intensity(kW/m):**	3636
Radiant Heat(kW/m2):	9.74	**Flame Angle (degrees):**	74
Flame Length(m):	5.77	**Maximum View Factor:**	0.103
Rate Of Spread (km/h):	0.7	**Inner Protection Area(m):**	19
Transmissivity:	0.844	**Outer Protection Area(m):**	0