N

LOT BOUNDARY
10m APZ
13m APZ
17m APZ
LEVEL 1 CONSTRUCTION STANDARDS
LEVEL 2 CONSTRUCTION STANDARDS
NO REQUIREMENT

SOURCE: LANDPARTNERS (AERIAL 2007)
PMM BRISBANE PTY LTD (SUBDIVISION DESIGN 2007)

NOTE: AREAS & DISTANCES ARE APPROXIMATE ONLY. DESIGN SUBJECT TO COUNCIL APPROVAL, FINAL SURVEY & PLAN REGISTRATION

0 50 100 150
METRES

Issue	Description	Des	Drw	Date	Appd
B	LAYOUT AMENDED + APZ ADJ		PH	19.12.07	
A	INITIAL ISSUE		PH	10.08.07	

DRAWING STATUS: Unless there is an approved signature in the space provided, this plan is not verified.
CAUTION: The information shown on this plan may be insufficient for some types of detailed design. LandPartners Limited should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on this plan.

RAYSHIELD PTY LTD

'RIVEROAKS ESTATE'
PACIFIC HIGHWAY. BALLINA

BUSHFIRE PRESCRIPTIONS

Scale: 1:2500 at A3 CAD file: LM070113-EV14B.dwg

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Sheet No.
1 of 1

Dwg. No. **LM070114-EV14** Issue **B**

Figure 6. Proposed APZs, construction standards and general bushfire hazard prevention prescriptions

4 Access

4.1 Residential Subdivision

4.1.1 Public Roads

A public road is proposed for this development, which will link to the Pacific Highway (refer Figs. 4 & 6). PBP (RFS 2006) identifies performance criteria and acceptable solutions with regard to public roads as shown below. Acceptances of solution or proposed alternative have been made as applicable.

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources).	Public roads are two-wheel drive, all weather roads	**Will comply as required.**
Public road widths and design that allow safe access for firefighters while residents are evacuating an area.	Urban perimeter roads are two-way, that is, at least two traffic lane widths (Carriageway 8 m minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with PBP Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle).	**A perimeter road system as shown on Fig. 6 is proposed for the development.**
	The perimeter road is linked to the internal road system at an interval of no greater then 500 metres in urban areas.	**Comply as required.**
	Traffic management devices are constructed to facilitate access emergency services vehicles.	**Will comply as required.**
	Public roads have a cross fall not exceeding 3 degrees.	**Will comply as required.**
	All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 m outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard.	**No dead end roads are proposed. Other measures (turning radius, signage) will comply as required.**
	Curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress.	**Will comply as required.**

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
	The minimum distance between inner and outer curves is six metres.	**Will comply as required.**
	Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.	**Will comply as required.**
	There is a minimum vertical clearance of four metres above the road at all times.	**Will comply as required.**
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.	The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 8 tonnes per axle for all other areas). Bridges clearly indicate load rating.	**Road surface capacity will comply as required. There are no bridges existing or proposed as part of the proposed development.**
Roads that are clearly sign-posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression.	**Will comply as required.**
	Public roads between 6.5 and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.	**Will comply as required.**
There is clear access to reticulated water supply.		**Will comply as required.**
Parking does not obstruct the minimum paved width		**Will comply as required.**

4.1.2 Property Access

Property access roads (i.e. driveways) are proposed for this development. Any property access road will comply with acceptable solutions to address performance criteria of PBP (RFS 2006) where possible, as shown below. Acceptances of solution or proposed alternative have been made as applicable.

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
Access to properties is provided in recognition of the risk to firefighters and/or evacuating occupants.	At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road.	**More then 50% of the dwellings occur within 200m of the Pacific Hwy. All of the allotments can be accessed from more than one direction. A secondary emergency access form the highway to the subdivision is proposed (refer to Fig. 6).**
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. All weather access is provided.	Bridges clearly indicates load rating and pavement and bridges are capable of carrying a load of 15 tonnes	**N/A**
	Roads do not traverse a wetland or other land potentially subject to periodic inundation (other then flood or storm surge)	**The site will be filled to eliminate areas prone to inundation.**
Road width and design enable safe access for vehicles	A minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint).	**Hydrant points will be by the access roads and spaced according to fire regulations and will be easily accessible to fire tankers**
	In forest, woodland and heath situation, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay.	**The proposed subdivision is considered residential rather than rural, therefore this does not apply. In any case, the internal public road network ranges from 16m to 22m in width.**
	A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches.	**A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches will be provided.**
	Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle within a minimum 12 metre outer radius.	**N/A**

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
	Curves have a minimum inner radius of six metres and are minimal in number to allow for raid access and egress.	**Curves if applicable will comply with standard.**
	The minimum distance between inner and outer curves is six metres.	**Will comply with standard.**
	The crossfall is not more than 10 degrees.	**Will comply with standard.**
	Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degree for unsealed roads	**Will comply with standard.**
	Access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.	**Comply with standard.**

4.1.3 Fire Trails

No fire trail is proposed.

4.2 Special Fire Protection Purposes

4.2.1 Internal Roads

An internal road network is proposed for the childcare centre, which will link to the Pacific Highway (refer Fig. 4). PBP (RFS 2006) identifies performance criteria and acceptable solutions with regard to public roads as shown below. Acceptances of solution or proposed alternative have been made as applicable.

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
The intent may be achieved where		
Internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle.	Internal roads are two-wheel drive, sealed, all weather roads;	**Comply as required.**
	Internal perimeter roads are provided with at least two traffic lane widths (Carriageway 8 m minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions;	**Comply as required. The internal public road network ranges from 16m to 22m in width.**
	Roads are **through** roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 m outer radius turning circle, and are clearly sign posted as a dead end	**No dead end roads are proposed.**
	Traffic management devices are constructed to facilitate access emergency services vehicles.	**Will comply as required.**
Internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle	A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.	**Will comply as required.**
	Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.	**Will comply as required.**
	The minimum distance between inner and outer curves is six metres.	**Will comply as required.**

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
The intent may be achieved where		
	Maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.	**Will comply as required.**
	Crossfall of the pavement is not more than 10 degrees.	**Will comply as required.**
	Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).	**The Subdivision Site will be filled to eliminate areas prone to inundation.**
	Roads are clearly sign-posted and bridges clearly indicate load ratings.	**Will comply as required.**
	The internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).	**Will comply as required.**

5 Water, Electricity and Gas

Provision of services to this development will comply with acceptable solutions to address performance criteria of PBP (NSW Rural Fires Service, 2006) as shown below.

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
Reticulated water supplies Water supplies are easily accessible and located at regular intervals	• Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. • Fire hydrant spacing, sizing and pressures comply with AS2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. 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. • The provisions of parking on public roads are met.	**Will comply to standards (where applicable)**
Non-reticulated water supply areas	• The minimum dedicated water supply required for firefighting purposes for each occupied building excluding drenching systems, is provided in Table 4.2. • A suitable connection for firefighting purposes is made available and located within the IPA and away from the structure. A 65mm Storz outlet with a Gate or Ball valve is provided. • Gate or Ball valve and pipes are adequate for water flow and are metal rather than plastic. • Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole. • Above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks are not used. Tanks on the hazard side of the building are provided with adequate shielding for the protection of fire fighters. • All above ground water pipes external to the	**N/A**

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
	building are metal including up to and any taps. Pumps are shielded.	
Electricity Services Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings. Regular inspection of lines is undertaken to ensure they are not fouled by branches.	• 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 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).	**Will comply to standards (where applicable)**
Gas Services Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	• Reticulated or bottled is installed and maintained in accordance with AS1596 and the requirements of relevant authorities. Metal piping is to be used. • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. • If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. • Polymer sheathed flexible gas supply lines to gas metres adjacent to buildings are not used.	**Will comply to standards (where applicable)**

6 Emergency and Evacuation Planning

One of the objectives of Special Fire Protection Purposes developments is to provide suitable emergency and evacuation (and relocation) arrangements. A number of acceptable solutions to address performance criteria have been recommended under PBP (2006) and are shown below.

Performance Criteria	Acceptable Solutions	Compliance or Alternative Solution
The intent may be achieved where:		
An Emergency and Evacuation Management Plan is approved by the relevant fire authority for the area.	• An emergency/evacuation plan is consistent with the RFS Guidelines for the *Preparation of Emergency/Evacuation Plan*. • Compliance with AS 3745-2002 'Emergency control organisation and procedures for buildings, structures and workplaces' for residential accommodation'. • Compliance with AS 4083-1997 'Planning for emergencies – for health care facilities'.	**An Emergency and Evacuation Management Plan is to be prepared which complies with the acceptable solutions requirements and, once approved, is submitted to the Local Bush Fire Management Committee**
Suitable management arrangements are established for consultation and implementation of the emergency and evacuation plan.	• An Emergency Planning Committee is established to consult with residents (and their families in the case of aged care and schools) and staff in developing and implementing an Emergency Procedures Manual. • Detailed plans of all Emergency Assembly Areas including "onsite" and "offsite" arrangements as stated in AS 3745-2002 are clearly displayed, and an annual (as a minimum) trial emergency evacuation is conducted.	**Will comply with Acceptable Solutions**

7 Landscaping and Property Maintenance

7.1 Landscaping

The following principles, from PBP, will be incorporated into future landscaping design for any development of the site:

- *Prevent flame impingement on dwellings;*
- *Provide a defendable space for property protection;*
- *Reduce fire spread;*
- *Deflect and filter embers;*
- *Provide shelter from radiant heat; and*
- *Reduce wind speed.*

The above can be achieved via appropriate species selection, plant location, plating density and ongoing maintenance.

7.2 Vegetation Management

Vegetation management is the responsibility if individual landowners and should, as per PBP, include:

- *Maintaining a low cut lawn;*
- *Keeping areas around the garden free of fuel;*
- *Utilising non-combustible fencing materials;*
- *Breaking up tree and shrub canopies by defining garden beds;*
- *Using non-flammable mulch;*
- *Ensuring tree branches do not overhang roofs;*
- *Ensuring tree canopies are not continuous; and*
- *Installing windbreaks in the direction from which fires are likely to approach.*

7.3 Property Maintenance

Property maintenance should, as per PBP, include:

- *Removal of material such as litter from the roof and gutters;*
- *Ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;*
- *Check pumps and water supplies are available and in working order;*
- *Driveways are in good condition with trees not being too close and forming an obstacle during smoky conditions;*

- *Check tiles and roof lines for broken tiles or dislodged roofing materials;*
- *Screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;*
- *Drenching or spray systems are regularly tested before the commencement of the fire season;*
- *Hoses and hose reels are not perished and fittings are tight and in good order;*
- *Doors are fitted with draught seals and well maintained;*
- *Mats are of non combustible material or in areas of low potential exposure; Woodpiles, garden sheds and other combustible materials are located downslope and well away from the house; and*
- *Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (NS179, April 2002).*

8 Construction Standards

Table A3.4 (Appendix 3 of PBP) determines the category of bushfire attack according to the vegetation formation of the hazard and the distance from the hazard. Level 1, 2 or 3 of Australian Standard 3959-1999 Construction of Buildings in Bush Fire Prone Areas is prescribed. Table A3.4 does not assign a Construction Standard to construction in the Flame Zone. Construction within the Flame Zone must comply with the Performance Requirements of the Building Code of Australia and the Specific Objectives of PBP before proceeding.

The APZs recommended in Section 3 of this report for the residential subdivision assume a Construction Standard of Level 3. However, Construction Standard levels decrease with increased separation from hazard. Therefore, the Construction Standard prescriptions that apply for the proposed subdivision for any new dwellings are outlined on Table 5 and are shown on Fig. 6.

In summary, nil construction standards are required for the majority of the proposed dwellings. However, Level 1 Construction Standards will apply to lots 1, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 27, 28, 29, 30, 214 & part of lots 215, 216, 31, 39 & 26 provided the dwellings are built within the distances from the hazard outlined in Table 5 and shown in Fig. 6. It must be noted that if greater distances can be provided from the hazard for lots 215, 216, 31, 39 & 26, then no construction standards will apply.

In regard to the proposed SFPP (i.e. the childcare centre), it is noted that PBP states that for SFPP occurring in proximity of grassland no Construction Standard are required.

The Bushfire Attack Assessment Reports[1] are provided as Appendix 11.2.

[1] The Bushfire Attack Assessment Report on the web site appears to replicate the mistake in Table A3.4 on PBP in regard to the 'nil' Construction Standard threshold for Forested Wetlands in FDI 80. In fact, instead of switching to the No Requirements at a distance separation of >50m as it should, it still sets it at >100m. Therefore, the latter report has not been printed as it contradicts the PBP requirements.

Table 5. Residential Subdivision Required Construction Standards

Location of Hazard	Vegetation	Dwelling Location (m from Hazard)	Construction Standards Level	Implementation (see Fig. 6)
North	Forested Wetland	13 - <19	Level 3	No allotments are located less then 50m from the hazard
		19 - <28	Level 2	
		28 - 50	Level 1	
		>50	No Requirement	
Northeast	Industrial development & reduced vegetation	Any distance	No Requirement	
East- northeast	Grassland	Any distance	No Requirement	
South	Grassland	Any distance	No Requirement	
West	Grassland	Any distance	No Requirement	
East -southeast	Dry Sclerophyll Forest	17 - <25	Level 3	No allotments are located less than 25m from the hazard
		25 - <35	Level 2	Lots 16, 17, 18 & 19, but only if dwelling is located to eastern side of allotments, otherwise Level 1 will apply
		35 - 100	Level 1	Lots 1, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 27, 28, 29, 30 & part of lots 39, 31, 26 & 11
		>100	No Requirement	
SouthWest	Forested Wetland	13 - <19	Level 3	No allotments are located less then 28m from the hazard (apart for a small portion of Lots 214)
		19 - <28	Level 2	
		28 - 50	Level 1	214 & part of 215, 216
		>50	No Requirement	

9 Compliance

The Specific Objectives of PBP with respect to residential subdivision are to:

- *Minimise perimeters of the subdivision exposed to the bush fire hazard. hourglass shapes, which maximise perimeters and create bottlenecks, should be avoided;*
- *Minimise bushland corridors that permit the passage of bush fire;*
- *Provide for the siting of future dwellings away from ridge-tops and steep slopes - particularly up-slopes, within saddles and narrow ridge crests;*
- *Ensure that separation distances (APZ) between a bush fire hazard and future dwellings enable conformity with the deemed- to-satisfy requirements of the BCA. In a staged development, the APZ may be absorbed by future stages;*
- *Provide and locate, where the scale of development permits, open space and public recreation areas as accessible public refuge areas or buffers (APZs);*
- *Ensure the ongoing maintenance of asset protection zones;*
- *Provide clear and ready access from all properties to the public road system for residents and emergency services; and*
- *Ensure the provision of and adequate supply of water and other services to facilitate effective firefighting.*

The Specific Objectives of PBP with respect to Special Fire Protection Purposes are to:

- *Provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and firefighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated.*
- *Provide for safe emergency evacuation procedures. SFPP Developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bush fire threats. During emergencies, the risk to fire fighters and other emergency services personnel can be high through prolonged exposure, where door-to-door warnings are being given and exposure to the bush fire is imminent.*

This report demonstrates that development of the Subject Site, if implementing the protection measures and provisions addressed in this Assessment, complies with the above Specific Objectives, therefore the requirements of PBP (RFS 2006) have been addressed according to the Director General's requirements (issued 2/01/08, item 6.3) made under part 3A of the *Environmental Planning and Assessment Act 1979*.

10 References

Keith, D., 2004, *Ocean Shores to Desert Dunes*, Department of Environment and Conservation, Sydney.

Rural Fire Service (RFS), 2006, *Planning for Bushfire Protection*, Produced by NSW Rural Fire Service in cooperation with the Department of Planning.

11 Appendices

11.1 Asset Protection Zone Modelling Report

ASSET PROTECTION ZONE MODELLING REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **RFS APZ Calculator**

1. User's Inputs

Development Purposes: **Residential Subdivision**

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forested wetlands**

Effective Slope (degree): **0** (level)

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **63** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **15**

Overall Fuel Load (t/ha): **20**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **5.24** (determined by the built-in algorithm)

3. Program Outputs

Asset Protection Zone (m): **13** (IPA=13m, OPA=0m)

Rate of Fire Spread (km/h): **1.44** (Noble et al., 1980)

Fire Intensity (kW/m): **14880**

Transmissivity: **0.862** (Fuss and Hammins, 2002)

Flame Length (m): **11.76** (RFS PBP, 2001)

Expected Radiant Heat Exposure (kW/m^2): **29**

Assessment Date: **19/12/2007** Modelled By: **Paola Rickard**

ASSET PROTECTION ZONE MODELLING REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **RFS APZ Calculator**

1. User's Inputs

Development Purposes: **Residential Subdivision**

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forests**

Effective Slope (degree): **0** (level)

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **62** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **20**

Overall Fuel Load (t/ha): **25**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **6.83** (determined by the built-in algorithm)

3. Program Outputs

Asset Protection Zone (m): **17** (IPA=9m, OPA=8m)

Rate of Fire Spread (km/h): **1.92** (Noble et al., 1980)

Fire Intensity (kW/m): **24800**

Transmissivity: **0.852** (Fuss and Hammins, 2002)

Flame Length (m): **15.48** (RFS PBP, 2001)

Expected Radiant Heat Exposure (kW/m^2): **29**

Assessment Date: **19/12/2007** Modelled By: **Paola Rickard**

11.2 Bushfire Attack Assessment Report

BUSHFIRE ATTACK ASSESSMENT REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **Web-based Bushfire Attack Assessor Version 2.0**

1. User's Inputs

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forests**

Effective Slope (degree): **0** (level)

Separation Distance (m): **25**

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **70** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **20**

Overall Fuel Load (t/ha): **25**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **7.27** (determined by the built-in algorithm)

3. Program Outputs

Category of Attack: **High**

Level of Construction Required: **Level 2**

Rate of Fire Spread (km/h): **1.92** (Noble et al., 1980)

Fire Intensity (kW/m): **24800**

Transmissivity: **0.824** (Fuss and Hammins, 2002)

Flame Length (m): **15.48** (RFS PBP, 2001)

Radiant Heat Flux (kW/m^2): **18.78**

Assessment Date: **19/12/2007** Assessed By: **Paola Rickard**

BUSHFIRE ATTACK ASSESSMENT REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **Web-based Bushfire Attack Assessor Version 2.0**

1. User's Inputs

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forests**

Effective Slope (degree): **0** (level)

Separation Distance (m): **35**

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **75** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **20**

Overall Fuel Load (t/ha): **25**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **7.48** (determined by the built-in algorithm)

3. Program Outputs

Category of Attack: **Medium**

Level of Construction Required: **Level 1**

Rate of Fire Spread (km/h): **1.92** (Noble et al., 1980)

Fire Intensity (kW/m): **24800**

Transmissivity: **0.798** (Fuss and Hammins, 2002)

Flame Length (m): **15.48** (RFS PBP, 2001)

Radiant Heat Flux (kW/m^2): **12.33**

Assessment Date: **19/12/2007** Assessed By: **Paola Rickard**

BUSHFIRE ATTACK ASSESSMENT REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **Web-based Bushfire Attack Assessor Version 2.0**

1. User's Inputs

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forests**

Effective Slope (degree): **0** (level)

Separation Distance (m): **101**

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **82** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **20**

Overall Fuel Load (t/ha): **25**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **7.66** (determined by the built-in algorithm)

3. Program Outputs

Category of Attack: **Low**

Level of Construction Required: **No Requirement**

Rate of Fire Spread (km/h): **1.92** (Noble et al., 1980)

Fire Intensity (kW/m): **24800**

Transmissivity: **0.723** (Fuss and Hammins, 2002)

Flame Length (m): **15.48** (RFS PBP, 2001)

Radiant Heat Flux (kW/m^2): **2.31**

Assessment Date: **19/12/2007** Assessed By: **Paola Rickard**

BUSHFIRE ATTACK ASSESSMENT REPORT

For Site Located At: **Pacific Highway, Ballina**
Created By: **Web-based Bushfire Attack Assessor Version 2.0**

1. User's Inputs

Local Government Area: **Ballina**

In Alpine Areas: **No**

Vegetation: **Forested wetlands**

Effective Slope (degree): **0** (level)

Separation Distance (m): **28**

2. Program's Settings

Flame Width (m) : **100**

Flame Angle (degree): **76** (determined by the built-in algorithm)

Flame Temperature (K) : **1090**

Flame Emissivity: **0.95**

Surface Available Fuel Load (t/ha): **15**

Overall Fuel Load (t/ha): **20**

Fire Danger Index: **80** (Fire Weather Area: Far North Coast)

Relative Humidity (%): **25**

Ambient Temperature (K): **308**

Heat of Combustion (kJ/kg): **18600**

Elevation of Receiver (m): **5.71** (determined by the built-in algorithm)

3. Program Outputs

Category of Attack: **Medium**

Level of Construction Required: **Level 1**

Rate of Fire Spread (km/h): **1.44** (Noble et al., 1980)

Fire Intensity (kW/m): **14880**

Transmissivity: **0.813** (Fuss and Hammins, 2002)

Flame Length (m): **11.76** (RFS PBP, 2001)

Radiant Heat Flux (kW/m^2): **12.35**

Assessment Date: **19/12/2007** Assessed By: **Paola Rickard**