# BUSHFIRE ASSESSMENT
# PERFORMANCE-BASED SOLUTION

## PROPOSED FARMSTAY TOURIST ACCOMMODATION
## SPECIAL FIRE PROTECTION PURPOSE DEVELOPMENT

## LOT 102 DP 1295450
## 438 Bingleburra Road, Sugarloaf

Date: **31/03/2025**

Prepared for: **Melinda Mak and Paul Bradbury**

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I hereby declare that I am a BPAD accredited bushfire practitioner.

Accreditation No. BPAD16132

Signature

Date 31/03/2025

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**Document Status**

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## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES



## LIST OF PHOTOGRAPHS

## 1.0 EXECUTIVE SUMMARY AND COMPLIANCE TABLES

This report has assessed the proposed farmstay tourist accommodation against the requirements of Section 4.14 of the Environmental Planning and Assessment Act 1979, AS3959 (2018) Construction of buildings in bushfire-prone areas and Planning for Bush Fire Protection (2019).

This report establishes that the farmstay tourist accommodation does not comply with the acceptable solutions of Planning for Bush Fire Protection (2019) and offers a Performance Based Solution to achieve the performance criteria.

TABLE 1 – PROPERTY DETAILS AND TYPE OF PROPOSAL

| | | | |
|---|---|---|---|
| **Applicant Name** | Melinda Mak and Paul Bradbury | | |
| **Site Address** | 438 Bingleburra Road, Sugarloaf | **Lot/Sec/DP** | Lot 102 DP 1295450 |
| **Local Government Area** | Dungog | **FDI** | 100 |
| **Bushfire Prone Land** | Yes, mapped bushfire prone land | | |
| **Type of development** | Farmstay Tourist Accommodation | **Type of Area** | Isolated Rural |
| **Special Fire Protection Purpose** | Yes | **Flame Temperature** | 1090K |
| **Application Complies with Acceptable Solutions** | No. Performance Based Solution reviewing detailed fire modelling | **Referral to NSW Rural Fire Service (NSW RFS) required** | Council determination on referral |

TABLE 2 – BUSHFIRE THREAT ASSESSMENT

| | **Northwest and Northeast** | **Southeast** | **Southeast** | **Southwest** |
|---|---|---|---|---|
| **Vegetation Structure** | Grassland | Grassland | Rainforest | Grassland |
| **Distance to Vegetation** | 25 metres | 13 metres | 80 metres | 25 metres |
| **Accurate Slope Measure** | 16 degrees downslope | 10 degrees downslope | 30 degrees downslope | Level/Cross-slope |
| **Slope Range** | >15 to 20 degrees downslope | >5 to 10 degrees downslope | 30 degrees downslope | Level/Upslope |
| **AS3959 (2018) Bushfire Attack Level (BAL)** | BAL-29 | BAL-29 | BAL-19 | BAL-12.5 |

The highest BAL, being BAL-29 applies to the entire building.

TABLE 3 – PLANNING FOR BUSH FIRE PROTECTION (2019) COMPLIANCE

| Performance Criteria | Proposed Development Determinations | Method of Assessment |
|---|---|---|
| **Asset Protection Zone** | Asset protection zones have been determined in accordance with Planning for Bush Fire Protection (2019).<br>The asset protection zone will be maintained for the life of development and defendable space is provided onsite.<br>The dry rainforest to the south of the site is on a slope exceeding 30 degrees downslope and a performance solution has been proposed. | Performance Based Solution |
| **Siting and Design** | Buildings have been designed to minimise the risk of bushfire attack. | Acceptable Solution |
| **Construction Standards**<br>**AS3959 (2018)** | Bushfire Attack Levels have been determined in accordance with Planning for Bush Fire Protection (2019) and AS3959 (2018).<br>The highest BAL, being BAL-29 applies to the entire building. | Performance Based Solution |
| **Private and or Public Road Infrastructure** | The public road system is not affected or changed as part of this application. | Acceptable Solution |
| **Property Access** | The property access shall comply with Planning for Bush Fire Protection (2019) Section 7.0. | Acceptable Solution |
| **Water and Utility Services** | Water, electricity and gas services offer compliance with Planning for Bush Fire Protection (2019) Section 7. | Acceptable Solution |
| **Landscaping** | Landscaping to comply with Planning for Bush Fire Protection (2019) Appendix 4. | Acceptable Solution |

# 2.0 INTRODUCTION

## 2.1 PURPOSE OF REPORT

The purpose of this report is to establish suitable bushfire mitigation measures for the proposed farmstay tourist accommodation to be constructed at Lot 102 DP 1295450, 438 Bingleburra Road, Sugarloaf, in order for the Council to make determination of the proposed development pursuant to the requirements of Section 4.14 of the Environmental Planning and Assessment Act 1979.

Features on or adjoining the site that may mitigate the impact of a bushfire on the proposed development
The vegetation surrounding the building is grazing pasture which will provide reduced fire intensity whilst grazed.

Likely environmental impact of any proposed bush fire protection measures
No native vegetation removal is required for the development.

The recommendations within this report address the aims and objectives of Planning for Bush Fire Protection (2019) to reduce the risk of ignition of the farmstay tourist accommodation in a bushfire event.

## 2.2 PROPOSED DEVELOPMENT

The proposed development includes the construction of a farmstay tourist accommodation building.

## 2.3 SIGNIFICANT ENVIRONMENTAL FEATURES

The only known significant environmental features affecting the site are mapped waterways.

## 2.4 ENVIRONMENTAL ASSETS

There are no known environmental assets on the subject site.

## 2.5 ABORIGINAL HERITAGE

Searches of NSW National Parks and Wildlife Service's database identify no known aboriginal relics or aboriginal places, as defined by National Parks and Wildlife Act 1974, to exist on the site.

# 3.0 BUSHFIRE ATTACK ASSESSMENT

## 3.1 VEGETATION CLASSIFICATION

Potential bushfire hazards were identified from Dungog Council's Bushfire Prone Mapping as occurring within the investigation area. Aerial mapping and inspection of the site reveals that the bushfire prone land map is reasonably accurate in respect to the current bushfire hazard.

The major vegetative threats have been determined using Keith (2004) to derive vegetation structures listed in Planning for Bush Fire Protection (2019).

Primary vegetation structures have been identified in Figure 1 – Site Constraints Map and separation distances shown in Table 2 – Bushfire Attack Assessment.

## 3.2 EFFECTIVE SLOPE

Effective slope was measured using 2-metre contour data obtained from The Department of Lands and verified by a laser hypsometer on site. The laser hypsometer verified slope within the vegetation, calculating effective fire run slope from 5 separate measurements in each dominant direction.

Effective slopes have been identified in Figure 1 – Site Constraints Map and slope ranges are shown in Table 2 – Bushfire Threat Assessment.

## 3.3 MINIMUM SETBACKS AND ASSET PROTECTION ZONES

Minimum setbacks have been determined in accordance with Planning for Bush Fire Protection (2019) Table A1.12.2 due to farmstay concessions being applied to the building for Special Fire Protection Purposes specific development. The minimum Asset Protection Zone for subdivision has been demonstrated in Section 1.0 Executive Summary and Compliance Tables.

The required Asset Protection Zone is available within the subject site. All buildings will be exposed to less than 29 kw/m2 of radiant heat.

## 3.4 BUSHFIRE ATTACK LEVELS

BALs and relevant construction levels in accordance with Planning for Bush Fire Protection (2019) have been demonstrated in Section 1.0 Executive Summary and Compliance Tables, Table 2 Bushfire Threat Assessment.

PHOTO 1 - SITE PHOTO LOOKING NORTH

View of the subject site looking north. Grassland extends northwest of the proposed farmstay tourist building. The pasture is more heavily grazed to the north and northeast.

PHOTO 2 - NORTHEASTERN GRAZING PASTURE

View of grazing pasture located northeast of the site. The grass offers limited ember threat to the proposed building.

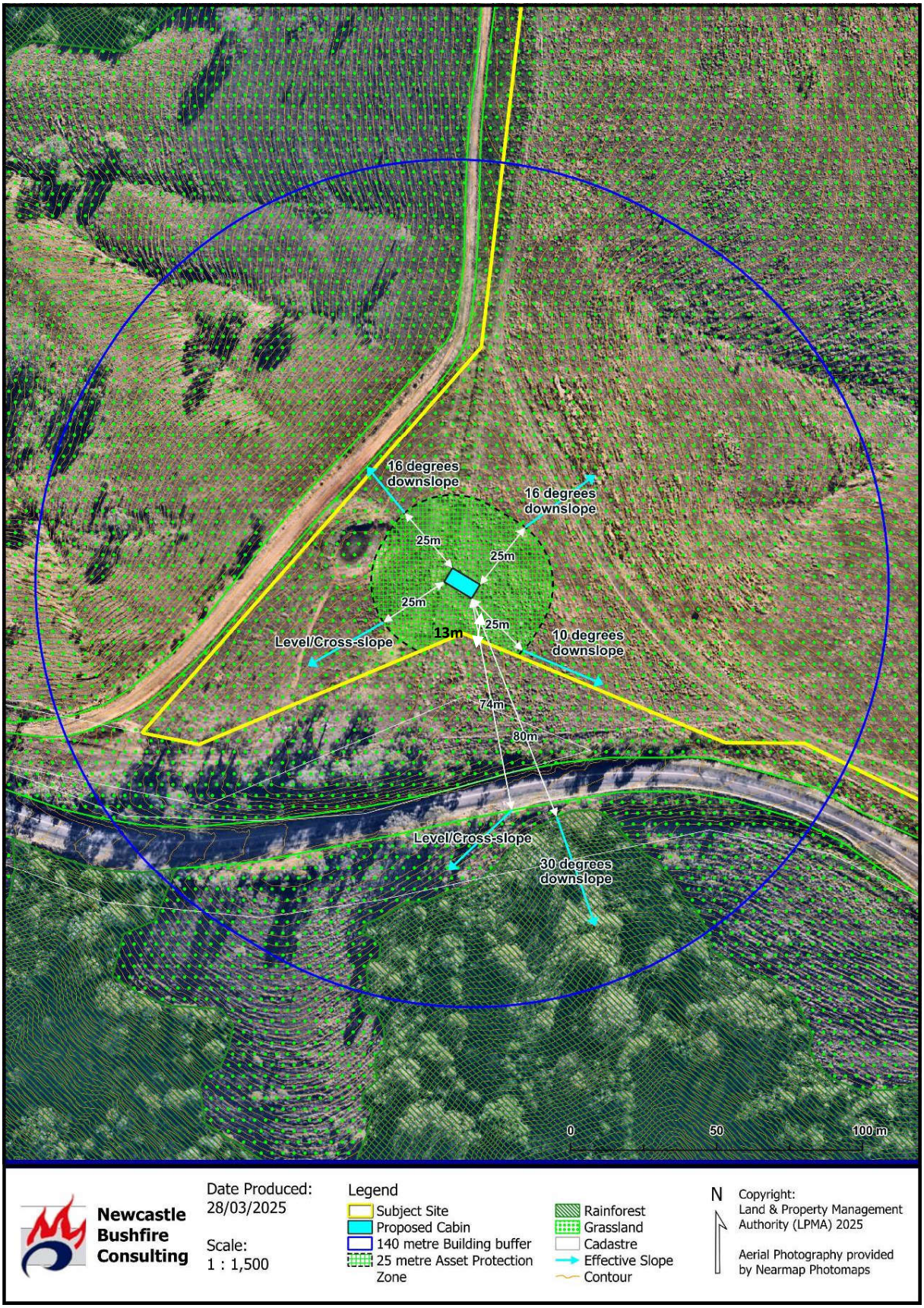



FIGURE 1 – SITE CONSTRAINTS MAP

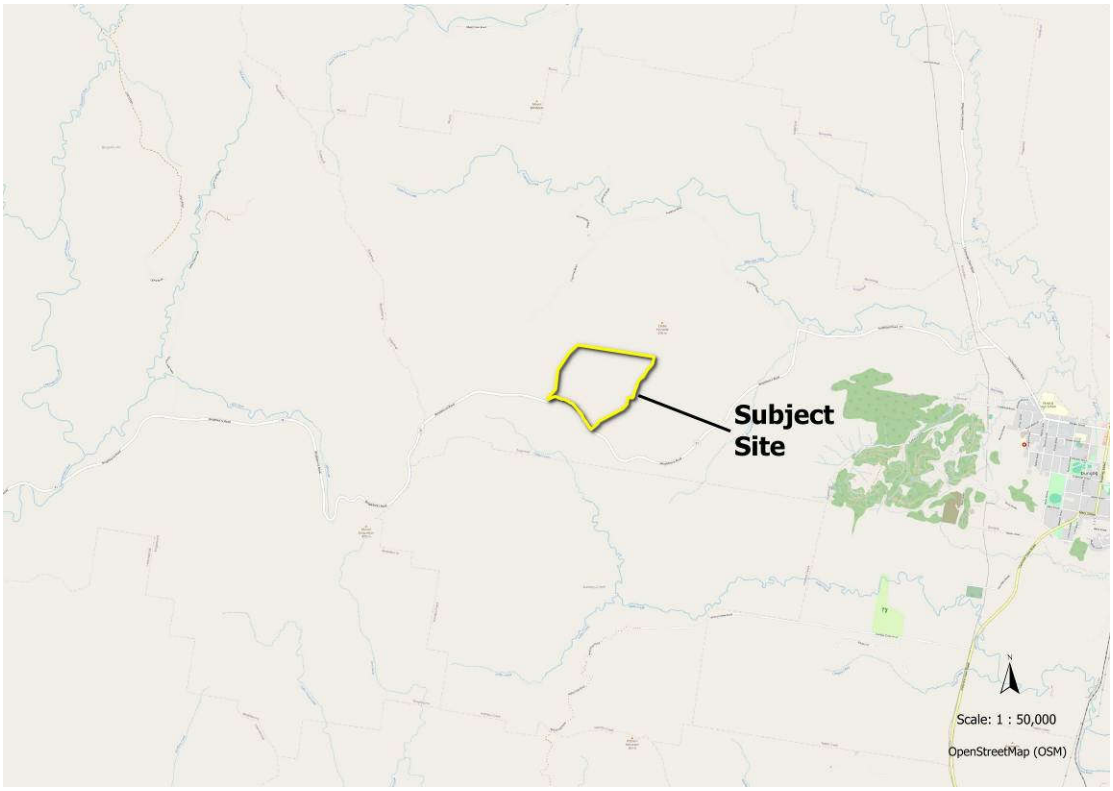



FIGURE 2 – LOCALITY MAP
Courtesy of OpenStreetMap

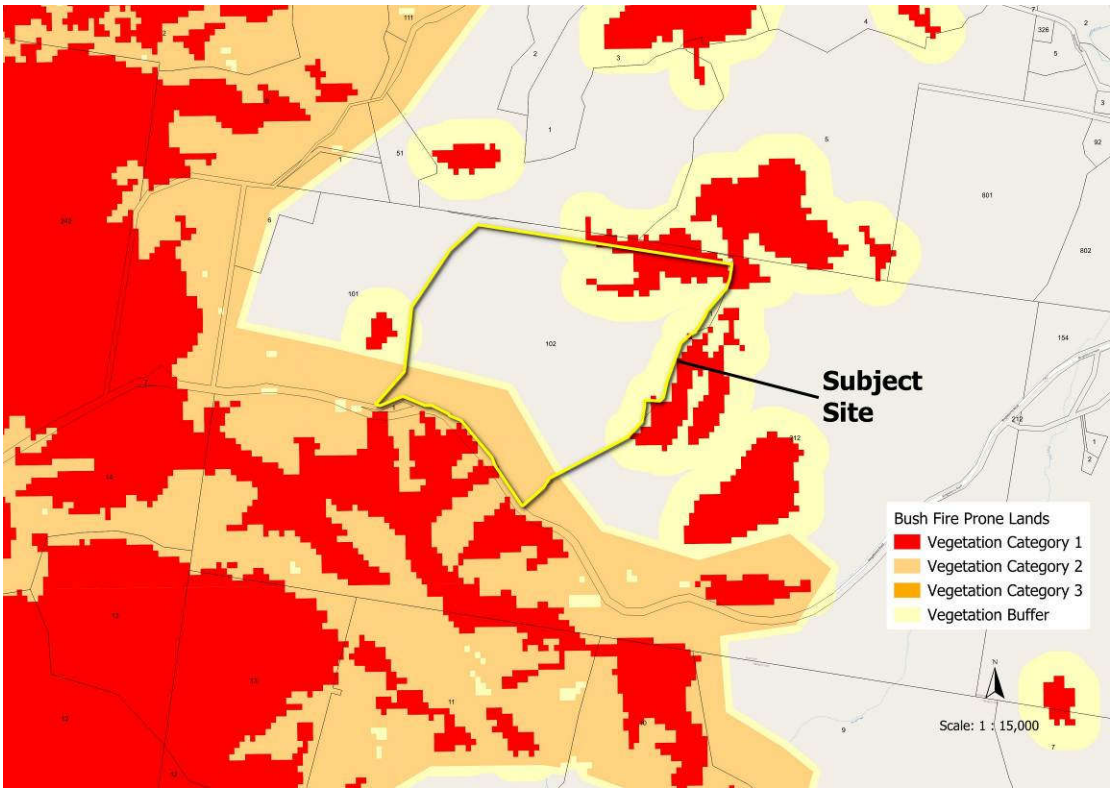



FIGURE 3 – COUNCIL'S BUSHFIRE PRONE LAND MAP

# 4.0 UTILITY SERVICES AND INFRASTRUCTURE

## 4.1 WATER SERVICES

The site is greater than a hectare in size with no hydrant access. A static water supply, with provision for a minimum 20,000 litres, should be provided. The 20,000-litre water supply may be either a tank or pool, providing that the 20,000 litres is available for firefighting purposes. The following requirements should be adhered to for the water supply:

a) a connection for firefighting purposes is located within the Inner Protection Area (IPA) or non-hazard side and away from the structure; 65 millimetres Storz outlet with a ball valve is fitted to the outlet;
b) ball valve and pipes are adequate for water flow and are metal;
c) supply pipes from tank to ball valve have the same bore size to ensure flow volume;
d) underground tanks have an access hole of 200 millimetres to allow tankers to refill directly from the tank;
e) a hardened ground surface for truck access is supplied within 4 metres;
f) above-ground tanks are manufactured from concrete or metal;
g) raised tanks have their stands constructed from non combustible material or bushfire resisting timber (AS3959 (2018) Appendix F );
h) unobstructed access can be provided at all times;
i) underground tanks are clearly marked;
j) tanks on the hazard side of the building are provided with adequate shielding for the protection of firefighters;
k) all exposed water pipes external to the building are metal, including any fittings.

## 4.2 ELECTRICITY SERVICES

The existing electrical supply to the local area is via overhead electrical transmission lines. No part of a tree shall be closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

## 4.3 GAS SERVICES

- Reticulated or bottled gas to be installed and maintained in accordance with AS1596 (2002) and the requirements of the relevant authorities. Metal piping is to be used.
- Fixed gas cylinders to be kept clear of flammable material by a distance of 10 metres and shielded on the hazard side of the installation.
- Gas cylinders close to the dwelling are to have the release valves directed away from the building and be at least 2 metres from flammable material with connections to and from the gas cylinder being of metal.
- Polymer-sheathed, flexible gas supply lines to gas meters adjacent to the buildings are not to be used.

PHOTO 3 - SOUTHERN GRASSLAND AND DRY RAINFOREST

View of grassland and dry rainforest located south of Bingleburra Road.


FIGURE 4 – SITE PLAN

## 5.0 PROPERTY ACCESS

**Public Road Access**
The subject site is located on Bingleburra Road, being a two-lane bitumen road managed by the council. Emergency Services are expected to have good access to the area at most times. The existing public road network will remain unchanged.

**Fire Trails**
Fire trails do not intersect the vegetation in the immediate area. No new fire trails are proposed for this development.

**Property Access**
Property access is provided by way of Bingleburra Road providing access from the public road system directly to the private land, giving firefighters access to the building. The property access is less than 200 metres in length.

Property access roads shall comply with Planning for Bush Fire Protection (2019) Section 6.8b.

The Property Access Road should comply with the following conditions (Access – General):

- Special Fire Protection Purpose access roads are two-wheel drive, all-weather roads;
- access is provided to all structures;
- traffic management devices are constructed so as not to prohibit access by emergency services vehicles;
- access roads must provide suitable turning areas in accordance with Appendix 3; and
- one-way-only public access roads are no less than 3.5 metres wide and have designated parking bays, with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.
- the capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
- there is suitable access for Category 1 fire appliances to within 4m of the static water supply where no reticulated supply is available.

**Access General – Compliance**
The property access will comply with the acceptable solutions. A compliant turning area shall be added to the building plans.

**Property Access – Perimeter Roads**
No perimeter roads are provided. The site is moderate risk surrounded by grazing pasture.

**Property Access – Non-Perimeter Roads**

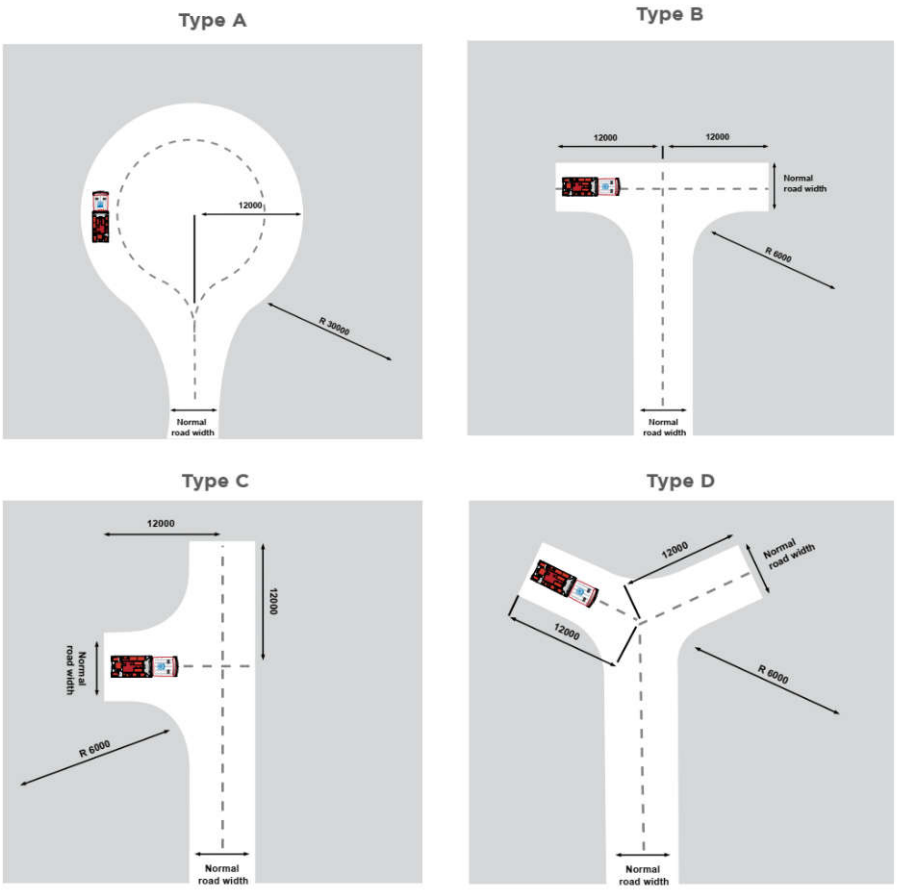
The Property Access Road should comply with the following conditions (Access – Non-Perimeter Roads):

- Minimum 5.5m carriageway width kerb to kerb.
- Parking is provided outside of the carriageway width.
- Hydrants are located clear of parking areas.
- Roads are through-roads, and these are linked to the internal road system at an interval of no greater than 500m.
- Curves of roads have a minimum inner radius of 6m.
- The maximum grade road is 15 degrees and average grade of not more than 10 degrees.
- The road crossfall does not exceed 3 degrees; and
- A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.

**Property Access – Non-Perimeter Road Compliance**

The property access shall have a minimum 4 metres in width and include a turning bay in front of the buildings. The crossfall and slopes of roads shall comply. The widths of the property access are based on the general requirements and are deemed suitable given the moderate risk to the site.

Multipoint turning options.



## 6.0 LANDSCAPING MAINTENANCE

It is recommended that landscaping is undertaken in accordance with Planning for Bush Fire Protection (2019) Appendix 4 and be maintained for the life of the development.

Trees should be located greater than 2 metres from any part of the roofline of a building. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2 metres above the ground.

The landscaped area should be maintained free of leaf litter and debris. The gutter and roof should be maintained free of leaf litter and debris.

Landscaping should be managed so that flammable vegetation is not located directly under windows.

Ground fuels such as fallen leaves, twigs (less than 6 millimetres in diameter) and branches should be removed on a regular basis, and grass needs to be kept closely mown and, where possible, green.

## 7.0 PERFORMANCE BASED SOLUTION

At the request of the client, I have been asked to provide an unbiased safety model for the proposed development. The proposed Performance Based Solution offers compliance with National Construction Code 2019 performance measure of reducing the chance of ignition to the building from the firefront and the objectives of Planning for Bush Fire Protection (2019).

**Proposed Performance Based Solution**
The proposed Performance Based Solution determines the Bushfire Attack Level (BAL) using an AS3959 (2018) Method 2 Detailed Fire Model for dry rainforest vegetation located south of the site on a 30 degree downslope. The grassland vegetation has been assessed using a simplified fire model.

**Methodology of Assessment**
Pursuant to Section A2.4(c) of Appendix 2 in Planning for Bush Fire Protection (2019), the assessment method used by the performance solution to demonstrate compliance with the nominated performance criteria, is a comparative analysis with the acceptable solutions of Planning for Bush Fire Protection (2019) relating to property access and construction.

The assessment will be consistent with Planning for Bush Fire Protection (2019) which provides bushfire protection measures to resist three forms of impact to the building emanating from a bushfire event being –

- Direct flame contact
- Radiant heat
- Ember attack

Planning for Bush Fire Protection (2019) does not take maintenance mechanisms into consideration for Class 1a building and does not factor the potential impact on a dwelling via windborne objects during a bushfire event.

The ABCB Bushfire Verification Method Section 6.7 Simple Method has been applied to existing legislation to determine the BAL. Fire weather based on 1-in-50-year annual exceedance probability has been applied to the detailed fire model.

The asset protection zone performance criteria for Bed and Breakfast and Farmstay is: "the building will not be exposed to radiant heat levels exceeding 29kW/m² (1090K)."

**Quantitative Analysis**

**Vegetation Structure Assessment**

Planning for Bush Fire Protection (2019) identifies that rainforest has a surface and elevated fuel loading of 10 tonnes per hectare. This vegetation classification of rainforest is identified within the NSW vegetation formations version 3.0 mapping and SEED PCT Mapping.

**Fire Weather Parameters**

Douglas et al. (2014) define forest fire dangers using Extreme Value Analysis in Determining Annual Probability of Exceedance for Bushfire Protection Design. The FFDI for a 1-in-50-year event based upon Williamtown weather station is FFDI 106, with this having been used in all fire models.

**Design Fire Modelling Inputs**

Surface Fuel Load: 10 tonnes per hectare
Overall Fuel Load: 13.2 tonnes per hectare
Elevation of receiver: 3 metres
Site Slope: 15 degrees downslope
Vegetation Slope: 30 degrees downslope
FDI: 106 (1in-50-year fire event)

**Construction Standard Performance Criteria**

It is demonstrated that the proposed building can withstand bushfire attacks in the form of wind, smoke, embers, radiant heat and flame contact.

**Design Fire Outputs**
Flame Length: 67.11 m
Radiant Heat Flux: 15 kw/m2 (BAL-19)

**Qualitative Analysis**
AS3959 (2018) Construction of buildings in bushfire-prone areas and Planning for Bush Fire Protection (2019) detail the calculations required for detailed fire modelling and Newcastle Bushfire Consulting's proprietary modelling tool uses these. The detailed fire models have been provided in Appendix 2.0 of this report.

The outputs of the fire model grossly overestimate fire behaviour with a flame length of 67.11 metres unlikely to occur within the rainforest. The grassland yields BAL-29 and it is the more conservative construction level and BAL for the site.

Despite the overestimation of fire behaviour from the dry rainforest, the farmstay accommodation building will be exposed to less than 29 kw/m2 of radiant heat and the building will be outside of the flame contact zone.

Redundancies are included in the design fire for rate of spread and flame length and a conservative measure of bushfire attack is provided to the building.

# 8.0 EMERGENCY AND MAINTENANCE PLANS

## 8.1 BUSHFIRE MAINTENANCE PLANS

There is no known Bushfire Maintenance Plan for the site. A condition of development is to maintain a minimum 25-metre asset protection zone as an Inner Protection Area around the buildings where onsite, which shall be monitored by the farm manager.

## 8.2 FIRE EMERGENCY PROCEDURES

Arrangements for emergency and evacuation are to comply with Planning for Bush Fire Protection (2019) table 6.8d.

The development is farmstay tourist accommodation which is allowed in both the Local Environment Plan and the Development Control Plans. There is an assumption that a manager will be located onsite who will assist guests in the event of fire.

A Bush Fire Emergency Management and Evacuation Plan shall be prepared consistent with the NSW RFS document: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan.
The Bush Fire Emergency Management and Evacuation Plan should include planning for the early relocation of occupants.

## 9.0 RECOMMENDATIONS

Based upon an assessment of the plans and information received for the proposal, it is recommended that development consent be granted subject to the following conditions:

1. The proposed building works shall comply with Sections 3 and 7 (BAL-29) in accordance with AS3959 (2018) Construction of buildings in bushfire-prone areas or NASH Standard (1.7.14 updated) National Standard Steel Framed Construction in Bushfire Areas - 2014 as appropriate and the additional construction requirements of Planning for Bush Fire Protection (2019) Section 7.5.2.
2. At the commencement of building works and in perpetuity, the property around the building to a distance of 25 metres to the north, east and west and to the southern property boundary, shall be maintained as an inner protection area (IPA) as outlined within Appendix 4 of Planning for Bush Fire Protection (2019) and the NSW Rural Fire Service's document Standards for Asset Protection Zones.
3. Water, electricity and gas are to comply with Section 7 of Planning for Bush Fire Protection (2019).
   Water Services
   a. A 20,000-litre static water supply with firefighting fittings is required.
4. Landscaping is to be undertaken in accordance with Planning for Bush Fire Protection (2019) Appendix 4 and managed and maintained in perpetuity.
5. The property access shall comply with Planning for Bush Fire Protection (2019) Section 6.8b.
6. A Bushfire Emergency Management and Evacuation Plan shall be prepared in accordance with Planning for Bush Fire Protection (2019) Section 6.8d and incorporate existing development onsite.

## 10.0 CONCLUSION

The final recommendation is that the proposed development offers compliance with Planning for Bush Fire Protection (2019). There is potential for bushfire attack at this site and a list of recommendations has been included in the above assessment to reduce that risk.

## 11.0 APPENDIX 1.0 – ASSET PROTECTION ZONES SUMMARY

Below is a summary of Asset Protection Zones outlined in appendix 4 of Planning for Bush Fire Protection (2019) and the NSW Rural Fire Service's "Standards for Asset Protection Zones". The property owner(s) should obtain these two documents and familiarise themselves with their content.

**Generally**
Asset Protection Zones (APZ) refer to the area between the bushfire threat and the asset (i.e. building). The APZ may contain two areas; the Inner Protection Area (IPA) and the Outer Protection Area (OPA). Some areas should be managed entirely as an Inner Protection Area (IPA). Refer to the plans for locations of APZ and distances from Assets.

**Inner Protection Area (IPA)**
The inner protection area is located adjacent to the asset and is identified as a fuel-free zone.

**A. Shrubs** (consisting of plants that are not considered to be trees)

1. Large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be created;
2. Shrubs should not be located under trees;
3. Shrubs should not form more than 10% ground cover; and
4. Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

**B. Trees:** Maintain a minimum 2-5 metre canopy separation.

1. Tree canopy cover should be less than 15% at maturity;
2. Trees at maturity should not touch or overhang the building;
3. Lower limbs should be removed up to a height of 2m above the ground;
4. Tree canopies should be separated by 2 to 5m; and
5. Preference should be given to smooth barked and evergreen trees.

**Outer Protection Area (OPA)**
The Outer Protection Area (OPA) is located adjoining the vegetation. The OPA should be maintained as a fuel-reduced area. This assumes trees may remain but with a significantly reduced shrub, grass, and leaf litter layer. In many situations leaf litter and the shrub layer may not require maintenance at all.

**A. Shrubs**:

1. Shrubs should not form a continuous canopy;
2. Shrubs should form no more than 20% of ground cover.

**B. Trees:**

1. Existing trees can be retained.
2. Tree canopy cover should be less than 30%; and
3. Canopies should be separated by 2 to 5m.

**Grass (throughout the entire asset protection zone)**
Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and leaves and vegetation debris should be removed.

## 12.0 APPENDIX 2.0 DETAILED FIRE MODEL

### NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

**Print Date:** 31/03/2025 **Assessment Date:** 31/03/2025

**Site Street Address:** 438 Bingleburra Road, Sugarloaf

**Assessor:** Phillip Couch; Newcastle Bushfire Consulting

**Local Government Area:** Dungog **Alpine Area:** No

**Equations Used**

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

**Run Description:** Southern Forest

**Vegetation Information**

| | | | |
|---|---|---|---|
| **Vegetation Type:** | Rainforest | | |
| **Vegetation Group:** | Forest and Woodland | | |
| **Vegetation Slope:** | 30 Degrees | **Vegetation Slope Type:** | Downslope |
| **Surface Fuel Load(t/ha):** | 10 | **Overall Fuel Load(t/ha):** | 13.2 |
| **Vegetation Height(m):** | 2 | Only Applicable to Shrub/Scrub and Vesta | |

**Site Information**

| | | | |
|---|---|---|---|
| **Site Slope:** | 15 Degrees | **Site Slope Type:** | Downslope |
| **Elevation of Receiver(m):** | 3 | **APZ/Separation(m):** | 80 |

**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:** | 106 |

**Program Outputs**

| | | | |
|---|---|---|---|
| **Level of Construction:** | BAL 19 | **Peak Elevation of Receiver(m):** | 9.45 |
| **Radiant Heat(kW/m2):** | 15 | **Flame Angle (degrees):** | 66 |
| **Flame Length(m):** | 67.11 | **Maximum View Factor:** | 0.264 |
| **Rate Of Spread (km/h):** | 10.08 | **Inner Protection Area(m):** | 80 |
| **Transmissivity:** | 0.748 | **Outer Protection Area(m):** | 0 |
| **Fire Intensity(kW/m):** | 68748 | | |

## 13.0 REFERENCES AND DISCLAIMER

**References**

Standards Australia AS3959 (2018) Construction of buildings in bushfire-prone areas.

Douglas G. He Y. Yang X. and Morris E.C. (2014) Use of Extreme Value Analysis in Determining Annual Probability of Exceedance for Bushfire Protection Design. Proceedings of the 11th International Association of Fire Science, Christchurch, New Zealand.

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

Environmental Planning and Assessment Act 1979.

New South Wales Rural Fire Service Planning for Bush Fire Protection (2019).

Watson, P. (2012) Fuel Load Dynamics in NSW Vegetation

**Disclaimer**

Despite the recommendations in this report, it is impossible to remove the risk of fire damage to the building entirely. This report assesses and provides recommendations to reduce that risk to a manageable level. It is of paramount importance that the recommendations are adhered to for the life of the structure and that all maintenance is performed to ensure a level of protection is provided to the building, occupants and firefighters.

Planning for Bush Fire Protection (2019) states that notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains.

AS3959 (2018) Construction of buildings in bushfire-prone areas states that the standard is designed to lessen the risk of damage to buildings occurring in the event of the onslaught of bushfire. There can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion. External combustible cladding is not recommended.