



**BUSHFIRE ASSESSMENT REPORT
PERFORMANCE BASED SOLUTION
PROPOSED NEW COMMUNITY HALL**

**LOT 720 DP 1210544
Heritage Drive, Chisholm**

Date: **31/08/2023**

Prepared for: **Maitland City Council**

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

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1.0 EXECUTIVE SUMMARY AND COMPLIANCE TABLES

This report has assessed the proposed new community hall 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 development does not comply with the acceptable solutions of Planning for Bush Fire Protection (2019) and offers a Performance Based Solution to more accurately measure the Bushfire Attack Level (BAL).

TABLE 1 – PROPERTY DETAILS AND TYPE OF PROPOSAL

Applicant Name	Maitland City Council		
Site Address	Heritage Drive, Chisholm	Lot/Sec/DP	Lot 720 DP 1210544
Local Government Area	Maitland	FDI	100
Bushfire Prone Land	Yes, mapped bushfire prone land		
Type of development	New Community Hall	Type of Area	Urban
Special Fire Protection Purpose	No	Flame Temperature	1200K
Application Complies with Acceptable Solutions	No. Performance Based Solution with detailed fire model	Referral to NSW Rural Fire Service (NSW RFS) required	Council Determination on Referral

TABLE 2 – BUSHFIRE THREAT ASSESSMENT

	North	East	South	West
Vegetation Structure	Maintained Lands	Grassland	Maintained Lands	Low-threat vegetation < 1 hectare in size and > 100 metres from category 1 or 2 threat
Distance to Vegetation	140 metres	33 metres	140 metres	13 metres
Accurate Slope Measure	N/A	3 degrees downslope	N/A	N/A
Slope Range	N/A	Level/Upslope	N/A	N/A
AS3959 (2018) Bushfire Attack Level (BAL)	BAL-LOW	BAL-12.5	BAL-LOW	BAL-LOW

The highest BAL, being **BAL-12.5** 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	<p>Asset Protection Zones have been derived in accordance with AS3959-2018 Method 2 Detailed Procedure and Planning for Bush Fire Protection (2019). Refer to Appendix 2.0 for Detailed Fire Models and Section 7.0 Performance Based Solution.</p>	<u>Performance Based Solution</u>
Siting and Design	Buildings have been designed to minimise the risk of bushfire attack.	Acceptable Solution
Construction Standards AS3959 (2018)	<p>BALs have been determined in accordance with AS3959-2018 Method 2 Detailed Procedure and Planning for Bush Fire Protection (2019).</p> <p>The highest BAL to the proposed building was determined to be BAL-12.5.</p> <p>The community hall is a public assembly building exceeding 500 square metres in floor area and has been assessed in the manner of a Special Fire Protection Purpose Development.</p>	<u>Performance Based Solution</u>
Private and or Public Road Infrastructure	The public road system is not affected or changed as part of this application.	Acceptable Solution
Property Access	Property access to comply with Planning for Bushfire Protection (2019) Section 7.	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 new community hall to be constructed at Lot 720 DP 1210544, Heritage Drive, Chisholm, 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 grassland to the east of the site will be cleared when the shopping centre development commences with the site no longer being on bushfire prone land.

Likely environmental impact of any proposed bush fire protection measures

No clearing of native vegetation is required for the proposed 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 new community hall in a bushfire event.

2.2 PROPOSED DEVELOPMENT

The proposed development includes the construction of a new freestanding community hall. The hall is a public assembly building exceeding 500 square metres in floor area and has been assessed in accordance with Planning for Bush Fire Protection (2019) section 8.3.11.

3.0 BUSHFIRE ATTACK ASSESSMENT

3.1 VEGETATION CLASSIFICATION

Potential bushfire hazards were identified from Maitland 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 somewhat inaccurate 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.



PHOTO 1 - SITE PHOTO LOOKING SOUTHWEST

View of the proposed community hall location looking southwest. The site is a managed park with low-threat wetland located west of the building.



PHOTO 2 - EASTERN GRASSLAND

View of grassland located east of the site. The site has development application approval for a shopping centre complex and is expected to be cleared and managed in the future.

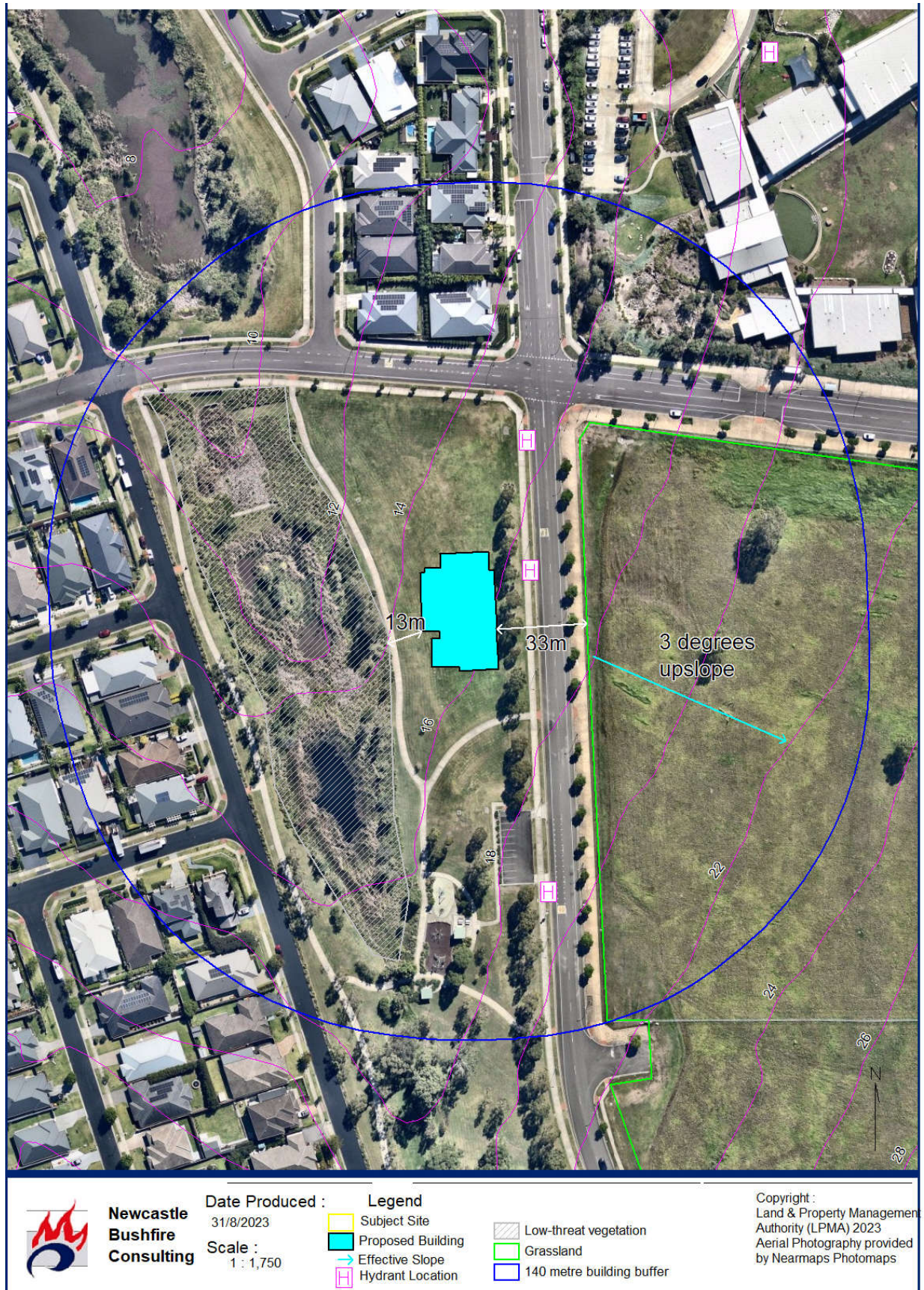


FIGURE 1 – SITE CONSTRAINTS MAP

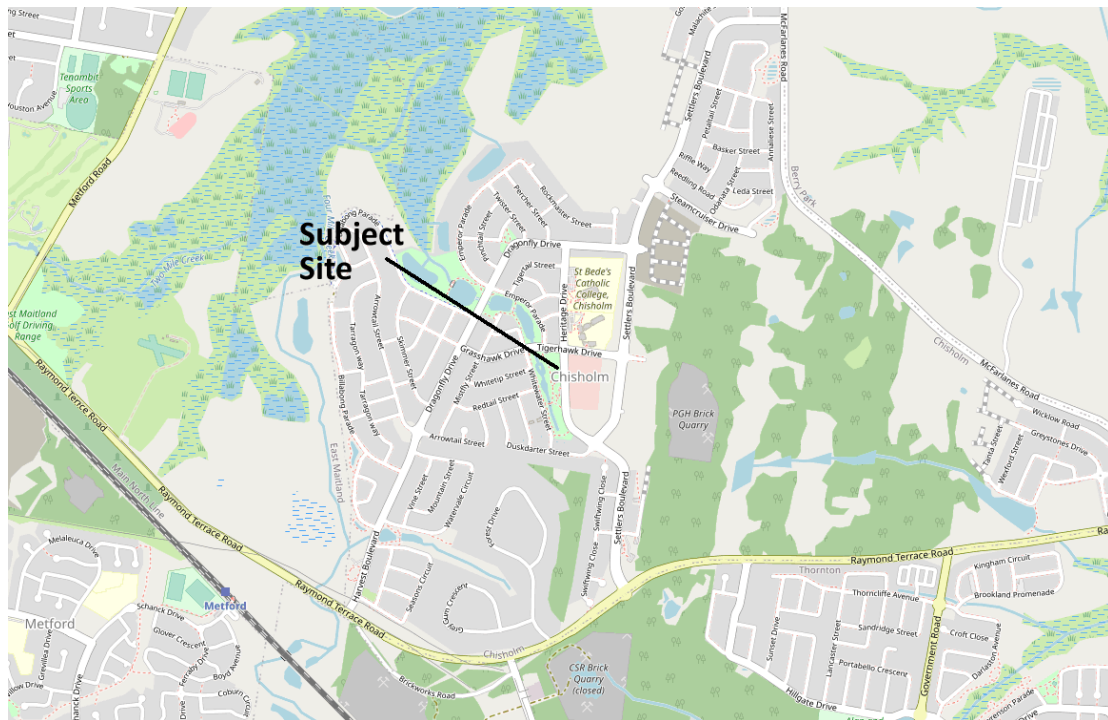


FIGURE 2 – LOCALITY MAP
Courtesy of OpenStreetMap

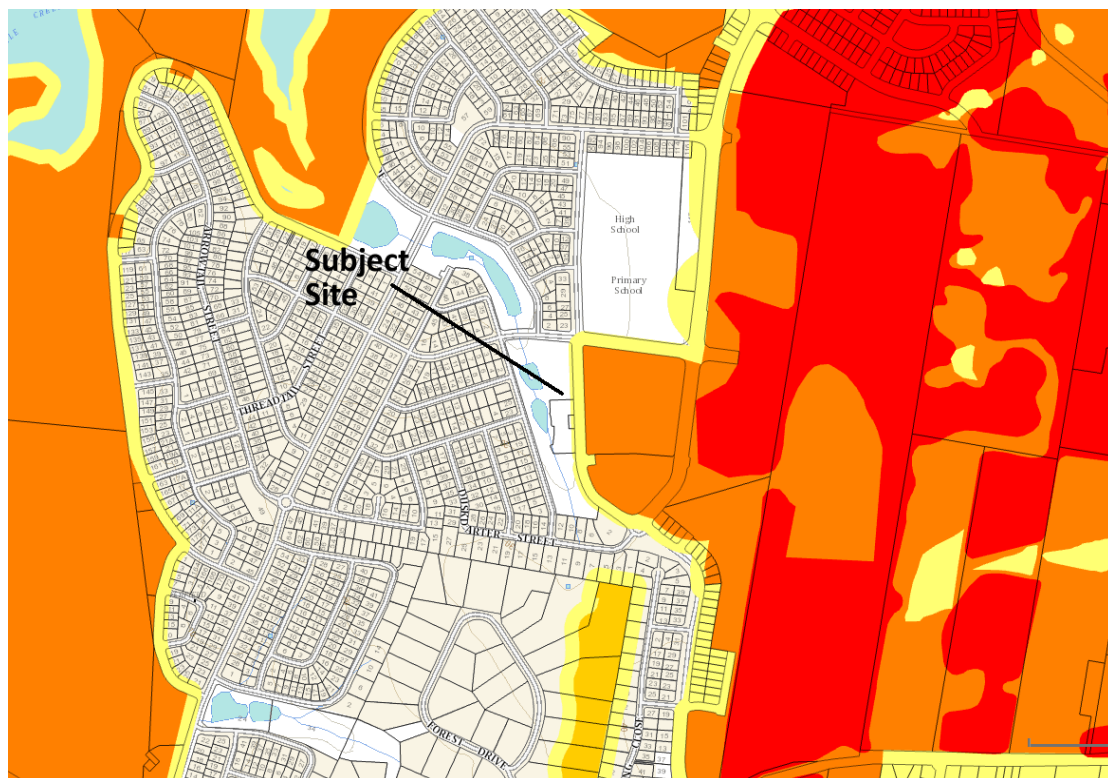


FIGURE 3 – COUNCIL'S BUSHFIRE PRONE LAND MAP

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 BUSHFIRE ATTACK LEVELS

BALs and relevant construction levels in accordance with Planning for Bush Fire Protection (2019) have been demonstrated in Section 1 Executive Summary and Compliance Tables.

Planning for Bush Fire Protection (2019) Table A1.12.1 is unable to be achieved with a performance based solution prepared to achieve no more than 10 kw/m² of radiant heat at the building face.



PHOTO 3 - WESTERN LOW-THREAT FRESHWATER WETLAND

View of freshwater wetland located west of the site. The vegetation is less than a hectare in size and located more than 100 metres from a category 1 or 2 threat.



FIGURE 4 – SITE PLAN



 LOCAL COUNCIL
 COUNCIL OF THE SHIRE OF ANTARCTIC
 100 TULLAGH STREET
 ANTARCTIC TASMANIA 7246
 PH: 081 333 3333
 WWW.ANTARCTIC.TAS.GOV.AU

CLIENT
 SHIRE OF ANTARCTIC



 MOTT MACDONALD
 100 TULLAGH STREET
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 PH: 081 333 3333
 WWW.MOTTMACDONALD.COM.AU

PROJECT
 BUSHFIRE RISK ASSESSMENT
 OF THE PROPOSED SHOPPING CENTRE
 AND PARKING LOT 71 DP 1210545

DRAWING NO.
 CH_DA1001_4

SHEET NO.
 4 OF 4

PROJECT NO.
 1210544

4.0 UTILITY SERVICES AND INFRASTRUCTURE

4.1 WATER SERVICES

A reticulated water supply and street hydrant access is available providing coverage of the development in accordance with AS 2419.1.

4.2 ELECTRICITY SERVICES

The existing electrical transmission lines are located underground and require no additional protection measures.

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.

5.0 PROPERTY ACCESS

Property access is by way of Heritage Drive providing access from the public road system directly to the private land, giving firefighters access to the building.

Property access roads shall comply with Section 7 of Planning for Bush Fire Protection (2019).

Planning for Bush Fire Protection (2019) requires no specific access requirements where a 70-metre, unobstructed path can be demonstrated between the most distant external part of the proposed building and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply). There are no formal requirements for property access.

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 fire front 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 the eastern grassland. There is a 3 degree upslope within the grass and this has been modelled.

Assessment Method

Pursuant to Planning for Bush Fire Protection (2019) Section A2.4(c) of Appendix 2, 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 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.

Evaluation of Alternate Solutions

Quantitative Analysis

Vegetation Structure Assessment

The default fuel loads defined in Planning for Bush Fire Protection (2019) for grassland have been used. These are deemed to be significantly overestimated for the grass present.

Design Fire Modelling Inputs

Surface Fuel Load: 6 tonnes per hectare

Overall Fuel Load: 6 tonnes per hectare

Default elevation of receiver: as a design redundancy

Site Slope: 3 degrees upslope

Vegetation Slope: 3 degrees upslope

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

Eastern Grassland

Flame Length: 7.78 m

Radiant Heat Flux: 9.92 kw/m² (BAL-12.5)

Qualitative Analysis - Evaluation of Performance Based Solutions

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.

Significant redundancies are included in the design fire due to overestimated fuel loads defined in Planning for Bush Fire Protection (2019) and the grassland is expected to be cleared in the future.

8.0 COMPLIANCE WITH PERFORMANCE REQUIREMENTS OF PLANNING FOR BUSH FIRE PROTECTION (2019)

The compliance with performance requirements of Planning for Bush Fire Protection is listed below.

Performance Criteria	Acceptable Solution	Performance Based Solution
In relation to APZ:		
APZs are provided commensurate with the construction of the building; A defensible space is provided.	An APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.	The site has defensible space. The building manager will be able to prepare the community hall for fire and extinguish small spot fires and the firefighters will be able to shelter within the property if fire impacts.
APZs are managed and maintained to prevent the spread of a fire to the building.	APZs are managed in accordance with the requirements of Planning for Bush Fire Protection (2019) Appendix 4.	Complies with acceptable solution.
The APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are wholly within the boundaries of the development site. APZs are located on lands with a slope less than 18 degrees.	Complies with acceptable solution.
In relation to construction standards:		
The proposed building can withstand bushfire attack in the form of embers, radiant heat and flame contact.	BAL is determined in accordance with Tables A1.12.5 to A1.12.7; and construction provided in accordance with the National Construction Code 2019 and as modified by Section 7.5.	Construction complies with Table A1.12.5.
Proposed fences and gates are designed to minimise the spread of bushfire.	Fencing and gates are constructed in accordance with Section 7.6.	Can comply with acceptable solution.
Proposed Class 10a buildings are designed to minimise the spread of bushfire.	Class 10a buildings are constructed in accordance with Section 8.3.2.	Complies with acceptable solution.
In relation to access requirements:		
Safe, operational access is provided (and maintained) for emergency service personnel in suppressing a bushfire while residents are seeking to relocate in advance of a	Compliance with Section 7 for property access roads.	Complies with acceptable solution.

bushfire (satisfying the intent and performance criteria for access roads in Section 7).		
In relation to water supplies:		
An adequate water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.	Complies with acceptable solution.
Water supplies are located at regular intervals; and The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS2419.1:2005; Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	Complies with acceptable solution.
The integrity of the water supply is maintained.	All above-ground water service pipes external to the building are metal, including and up to any taps.	Can comply with acceptable solution.
In relation to electrical services:		
Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.	Complies with acceptable solution.
In relation to gas services:		
Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used; All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side; Connections to and from gas cylinders are metal; Polymer-sheathed, flexible gas supply lines are not used; and Above-ground gas service pipes are metal, including and up to any outlets.	Can comply with acceptable solution.

In relation to landscaping:		
Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Compliance with the NSW RFS's Asset Protection Zone Standards (see Appendix 4); A clear area of low-cut lawn or pavement is maintained adjacent to the house; Fencing is constructed in accordance with Section 7.6; and Trees and shrubs are located so that: the branches will not overhang the roof; the tree canopy is not continuous; and any proposed windbreak is located on the elevation from which fires are likely to approach.	Can comply with acceptable solution.

9.0 EMERGENCY AND MAINTENANCE PLANS

9.1 BUSHFIRE MAINTENANCE PLANS

A plan of management shall be prepared for the park guaranteeing management until the shopping centre development commences.

9.2 FIRE EMERGENCY PROCEDURES

An Emergency /Evacuation Plan is to be prepared consistent with the NSW Rural Fire Service document, Guidelines for the Preparation of Emergency/Evacuation Plan.

Planning for Bush Fire Protection (2019) Section 8.3.11 Public Assembly Buildings cites "Due to the variation in risk associated with the occupants of assembly buildings, a variety of bush fire safety solutions may apply based on the merits of the situation."

The risk to the community hall is seen as low/moderate and is expected to be reduced further when the shopping centre development commences.

10.0 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 BAL-12.5 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. A plan of management shall be prepared for the park guaranteeing management until the shopping centre development commences. The current extent of park maintenance shall continue to ensure the wetland does not exceed 1 hectare in size. The park (excepting the freshwater wetland) shall be managed 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).
4. Landscaping is to be undertaken in accordance with Planning for Bush Fire Protection (2019) Appendix 4 and managed and maintained in perpetuity.
5. An Emergency /Evacuation Plan is to be prepared consistent with the NSW Rural Fire Service document Guidelines for the Preparation of Emergency/Evacuation Plan.

11.0 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.

12.0 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 Services “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. Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
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.

13.0 APPENDIX 2.0 – AS 3959 2018 METHOD 2 DETAILED FIRE MODEL



NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 31/08/2023

Assessment Date: 29/05/2023

Site Street Address: Corner of Heritage Drive and Tigerhawk Drive, Chisholm
Assessor: Phillip Couch; Newcastle Bushfire Consulting
Local Government Area: Maitland **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: Eastern Grassland

Vegetation Information

Vegetation Type: Grassland
Vegetation Group: Grassland
Vegetation Slope: 3 Degrees **Vegetation Slope Type:** Upslope
Surface Fuel Load(t/ha): 6 **Overall Fuel Load(t/ha):** 6
Vegetation Height(m): 0 Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 3 Degrees **Site Slope Type:** Upslope
Elevation of Receiver(m): Default **APZ/Separation(m):** 33

Fire Inputs

Veg./Flame Width(m): 100 **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:** 130

Program Outputs

Level of Construction: BAL 12.5 **Peak Elevation of Receiver(m):** 5.55
Radiant Heat(kW/m2): 9.92 **Flame Angle (degrees):** 79
Flame Length(m): 7.78 **Maximum View Factor:** 0.11
Rate Of Spread (km/h): 13.74 **Inner Protection Area(m):** 33
Transmissivity: 0.809 **Outer Protection Area(m):** 0
Fire Intensity(kW/m): 42594

14.0 REFERENCES AND DISCLAIMER

References

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

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).

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.