



BUSHFIRE ENGINEERING NSW

BUSHFIRE RISK ASSESSMENT REPORT

Proposed Infill Development

Multi-storey Residential Affordable Housing Project

Lot 32 in DP 9299

Lot 141-142 in DP 531051

1-5 Rainbow Road Mittagong NSW 2575.



BUSHFIRE HAZARD ASSESSMENT

THIS FORM IS TO BE COMPLETED BY A RECOGNISED CONSULTANT IN BUSHFIRE RISK ASSESSMENT IN ACCORDANCE WITH SECTION 4.14 1(b) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 NO 203

PROPERTY ADDRESS:	1-5 Rainbow Road Mittagong, NSW 2575 (Lot 32 in DP 9299, Lot 141-142 in DP 531051).	
PREPARED FOR:	Robsea Nominees Pty Ltd and Bilgola Beach Pty Ltd	
DESCRIPTION OF PROPOSAL:	Multi-storey Residential Infill – 49 Unit Residential Affordable Housing Project	
PLAN REFERENCE: (RELIED UPON IN REPORT PREPARATION)	Coble Stephens Architects sheets DD-01M to DD-10M (02/09/22)	
BAL RATING:	Residential Housing Unit Development	BAL-LOW
<i>(If the BAL rating is BAL 40 or BAL FZ the application is to be referred to NSW RFS for Assessment)</i>		
DOES THE PROPOSAL RELY ON ALTERNATE SOLUTIONS?	YES <input type="radio"/> NO <input checked="" type="radio"/>	(Circle the relevant response)
<i>(If YES the application is to be referred to NSW RFS for assessment.)</i>		

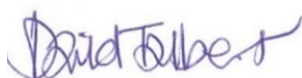
I David Talbert of Bushfire Engineering NSW have carried out a bushfire hazard assessment on the above-mentioned proposal and property. A detailed Bushfire Assessment Report is attached which includes the submission requirements set out in *Appendix 2 of Planning for Bushfire Protection 2019* together with recommendations as to how the relevant specifications and requirements are to be achieved.

REPORT REFERENCE:	BRA20211129	
REPORT DATE:	08/09/2022	Valid to: 08/09/2023
CERTIFICATION NO/ACCREDITED SCHEME:	BPAD Level 2 – (49773)	

I hereby certify, in accordance with *Section 4.14 of the Environmental Planning and Assessment Act 1979 No 203*:

- That I am a person recognised by the *NSW Rural Fire Service* as a qualified consultant in bushfire hazard assessment; and
- That subject to the recommendations contained in the attached Bushfire Hazard Assessment Report the proposed development conforms to the relevant specifications and requirements.

I am aware that the Bushfire Assessment Report, prepared for the above-mentioned site is to be submitted in support of a development application for this site and will be relied upon by Wingecarribee Shire Council as the basis for ensuring that the bushfire risk management aspects of the proposed development have been addressed in accordance with *Planning for Bushfire Protection 2019*.



David Talbert

BPAD Level 2 – (49773)

DATE: 08 September 2022



Document Control

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Disclaimer

This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Bushfire Engineering NSW and the client. To the best of the authors knowledge, this document has been prepared consistent with Planning for Bushfire Protection 2019, supported by available data and resource conditions, as determined by limited data acquisition during the assessment period, evident at Site at the time. Bushfire Engineering NSW accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter.

Unauthorised use of this report in any form is prohibited.

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Executive Summary

A Bushfire Hazard Assessment has been completed for the proposed multi-storey residential infill development at 1-5 Rainbow Road Mittagong NSW (Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051). The proposed development is on Bushfire Prone Land (BFPL) and the report has been prepared in support of the development application to demonstrate compliance in accordance with Planning for Bushfire Protection (2019).

The proposed multi-storey development includes the construction of forty-nine (49) residential affordable housing units across three (3) existing residential lots to be cleared and integrated as part of the development. The assessment has been completed in accordance with PBP (2019), specifically Chapter 7: Residential Infill Development and Chapter 5 of PBP Residential and Rural Subdivisions including the requirement for an APZ based on a radiant heat threshold of 29kW/m².

Provided the development satisfies the requirements of this report, it is considered that the proposed development **can comply** with the performance criteria for acceptable solutions of Planning for Bushfire Protection (2019) as required under section 4.14 of the Environmental Planning and Assessment Act 1979.

Based on the outcomes of the bushfire hazard assessment the proposed development **can comply** to the Deemed to Satisfy (DTS) provisions of AS3959-2018 - Construction of Buildings in Bushfire Prone Areas.

Issues specific to multi-storey developments as defined in PBP (2019) Table 8.2.2 include recommendations to develop a Bush Fire Emergency Management and Evacuation Plan to address the capacity of proposed development to allow evacuation in the event of a bushfire (refer sections 5.7 and 7.0). The location of exits and signage to direct residents to defined safe evacuation points and away from potential hazards such as car parks and the location and impact of warning and on evacuation.

The construction requirements of the proposed multi-storey development are to be minimum **BAL-LOW** in accordance with Section 4 of AS3959-2018 *Construction of Buildings in Bushfire Prone Areas*. BAL-LOW is predicated on low threat vegetation and non-vegetated areas and due to insufficient risk, there are no specific bushfire construction requirements.

A summary of the required bushfire protection measures relative to the proposed development are detailed in section 5 of this report and are summarised below.

The following minimum recommendations are made;

- Recommendation 1 (APZ's): At the commencement of building works and in perpetuity, the entire subject site incorporating Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051 is to continue to be managed as an Asset Protection Zone – Inner Protection Area (IPA). An IPA is to be maintained in accordance with PBP (2019) section A4.1.1. (refer Section 5.1 of this report).
- Recommendation 2 (Landscaping): Fences and Gates should be made of either hardwood or non-combustible material (refer Section 5.1.2 of this report).
- Recommendation 3 (Landscaping): Future landscaping is to be designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions (refer Section 5.1.3 of this report).
- Recommendation 4 (Water Supplies – Fire Systems): The proposed development will be required to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards (refer Section 5.3 of this report).
- Recommendation 5 (Water Supplies – General): required to comply with the Water Supply provisions in PBP (2019) Table 7.4a including;
 - all exposed water pipes external to the building are metal, including any fittings;
 - Fire hose reels are constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005

- Recommendation 6 (Gas Services): installation and maintenance of any new gas services to AS1596:2002 and to the requirements of relevant authorities (refer Section 5.5 of this report).
- Recommendation 6 (Construction Requirements): The construction requirements of the proposed multi-storey development is BAL-LOW in accordance with Section 4 of AS3959-2018 Construction of Buildings in Bushfire Prone Areas.
- Recommendation 7 (Emergency Management): A Bush Fire Emergency Management and Evacuation Plan is to be prepared by the operator consistent with the NSW RFS publication: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan, and the AS3745:2010.



David Talbert

BPAD Level 2 – (49773)

DATE: 08 September 2022.



1 Introduction

The following Bushfire Assessment Report has been prepared for Robsea Nominees Pty Ltd and Bilgola Beach Pty Ltd for the proposed multi-storey residential infill development at 1-5 Rainbow Road Mittagong NSW (Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051) (figure 1.1 and 1.2). The proposed development comprises the construction of forty-nine (49) residential affordable housing units across three (3) existing residential lots to be cleared as part of the development.

The proposed development is on Bushfire Prone Land (BFPL) and the report has been prepared in support of the development application to demonstrate compliance in accordance with Planning for Bushfire Protection (2019).



Figure 1.1: Site Location in red (Nearmaps 2021)

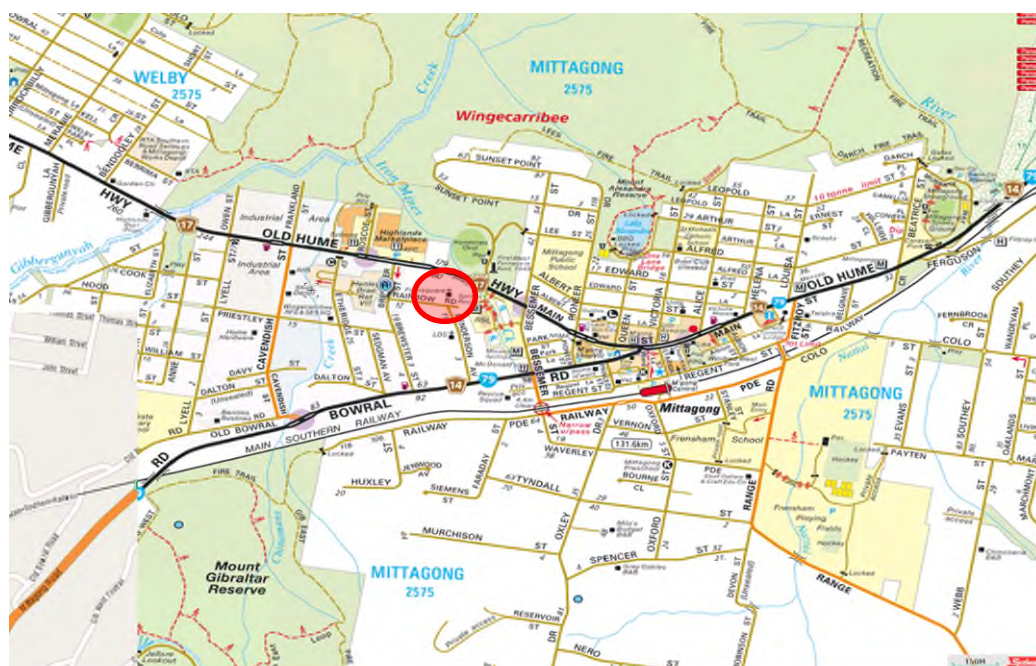


Figure 1.2: Street location of proposed development in red (Streetsdirectory.com.au 2022)

2 Scope and Objectives

2.1 Objectives

The objectives of Planning for Bushfire Protection (PBP 2019) are to;

- afford buildings and their occupants protection from exposure to a bushfire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of BPMs; and
- ensure that utility services are adequate to meet the needs of firefighters.

2.2 Multi-storey Residential Development

The proposed multi-storey development comprises the construction of forty-nine (49) residential affordable housing units across three (3) existing residential lots to be cleared as part of the development. Section 8.2.2 of Planning of PBP (2019) details issues and considerations for multi-storey developments.

2.2.1 Scope

The purpose of this report is to complete a bushfire assessment for the subject site to demonstrate (or otherwise) that the proposed multi-storey infill development satisfies the aims and objectives of PBP (2019). In order to comply with PBP the following conditions must be met:

- satisfy the aim and objectives of PBP as outlined above;
- consider any issues listed for the specific purpose for the development; and
- propose an appropriate combination of BPMs.

The proposed multi-storey development is required to comply with the performance criteria within Chapter 7: Residential Infill Development and Chapter 5 of PBP Residential and Rural Subdivisions including the requirement for an APZ based on a radiant heat threshold of 29kW/m². The report provides details of the review and recommendations for the owner and Council for consideration of approval of the development including;

- Assessment of bushfire hazards
- Assessment of issues and considerations specific to increased residential density development;
- Identification of Bushfire Protection Measures
- Determination of Asset Protection Zones (APZ's);
- Emergency management and access arrangements;
- Water Supplies and utilities;
- Determination of Constructions Standards (BAL) commensurate with bushfire risk and
- Landscaping.

Additional considerations specific to multistorey developments are defined in PBP (2019) Table 8.2.2 and include;

- a) Population - higher resident densities can pose issues for emergency management;
- b) Location – bush fire impacts can be increased where high rise buildings are located in higher
- c) elevations or on ridge tops;
- d) Egress - is more challenging and places an increased demand on road infrastructure during evacuation;

- e) Construction - there is a higher external façade surface area that may be exposed to bush fire attack and:
- f) car and storage facilities on the ground level can provide an additional fuel loading;
- g) balconies and external features can easily trap embers which can ignite combustible materials.
- h) Height -the height can result in increased exposure to convective heat.

2.3 Legislative Requirements

The legislation and appropriate statutory controls relative to the proposed development are as follows;

- Environmental Planning and Assessment Act 1979 (Section 4.14)
- Planning for Bush Fire Protection 2019 – Section 7 Residential Infill Development
- Rural Fire Services Act 1997
- Planning for Bushfire Protection 2019 (legislated).
- Australian Standard AS3959-2018 (incorporating Amendment No.2) - Construction of Buildings in Bushfire Prone Areas

3 Site Overview

3.1 Site Description

The subject site is located to the north of Rainbow Road Mittagong and includes three (3) existing rectangular shaped residential lots (1,3 and 5) with a combined area of the 5,151m². Each of the three lots has an existing dwelling with managed gardens which are to be removed to make way for the proposed affordable housing development.

The subject site is set amongst existing established residential development and the commercial development of the Mittagong RSL (east) and the Highlands Market place (north).

The land is relatively flat from Rainbow Road and then falls moderately away to the Old Hume Highway from the northeast corner of the site. The Wingerarabee Aboriginal Community Cultural Centre is located east of the subject site. The area to the east of the Cultural Centre contains isolated small areas of native trees with managed understorey, relatively board canopy spacing and other non-native planted vegetation surrounding a landscaped dam (refer figures 3.1 and 3.2 and the Appendices of this report).

Access to the site is available from Rainbow Road to the east and west.



Figure 3.1: Aerial view of subject site to east (white hashed line)

3.2 Proposed Development

Zoning is R3: Medium Density Residential as detailed in Wingericree LEP (2010) - figure 3.3.

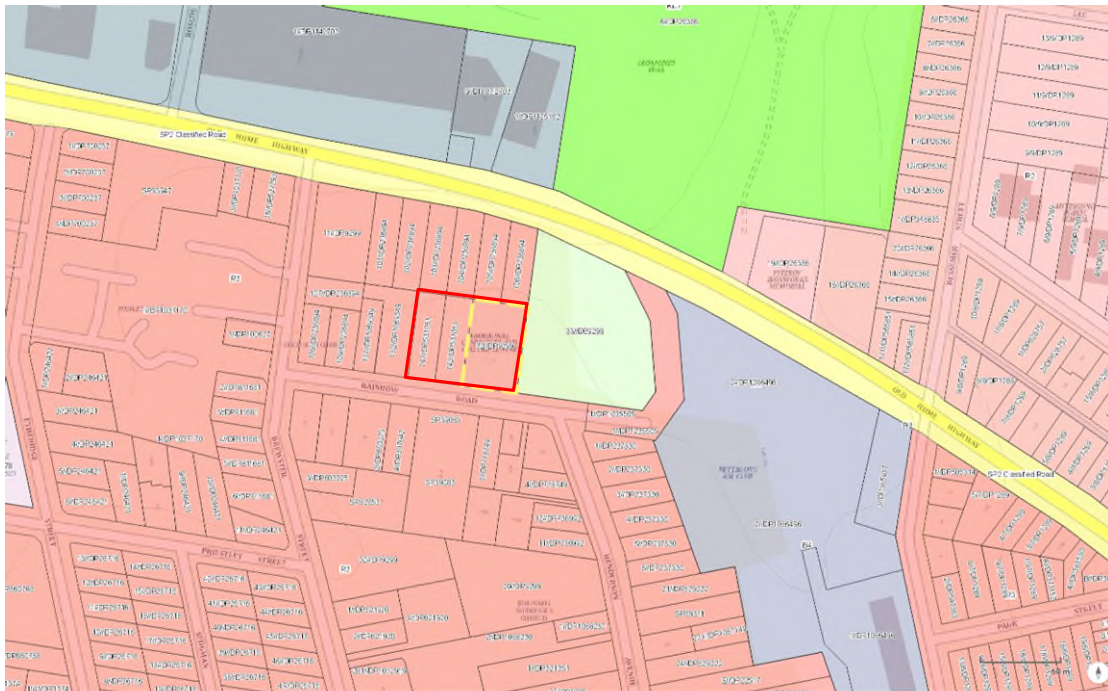


Figure 3.3: Zoning diagram subject site in yellow (WLEP 2010)

The proposed development comprises the construction of a three (3) storey affordable housing apartment complex comprising forty-nine (49) units distributed within two major structures across the 3 existing residential lots. The construction works include underground parking and paved and landscaped gardens (refer figure 3.4 below and Appendix B). Existing residential dwellings on Lots 1, 3 and 5 are to be demolished to make way for the proposed development.



Figure 3.4: Extract from Coble Stephens Architects Drawing DD-01M (02/09/22)

4 Bushfire Hazard Assessment

The assessment of bushfire hazard is carried out in accordance with *Appendix 1 Site Assessment Methodology* of PBP (2019).

4.1 Bushfire Prone Land

According to the Wingecarribee Shire Council Bushfire Prone Land (BFPL) map, the northern corner of the subject site is intersected by vegetation buffer (figure 4.1). The yellow shaded area represents a 100m buffer associated with category 1 vegetation (red). Under the EP&A Act s4.14 all development on BFPL must comply with Planning for Bushfire Protection (PBP 2019).



Figure 4.1 Bushfire Prone Land Mapping showing subject site in yellow (WLEP2010)

4.2 Vegetation Classification and Hazard Assessment

PBP (2019) requires identification of vegetation formations for each aspect of the development within 140m of the development site as per the Keith (2004) framework. Onsite inspection (17.04.21) confirmed that each of the three (3) lots associated with the subject site contain existing dwellings with managed gardens containing planted shrubs, ornamental trees and mown lawns. These dwellings and the surrounding gardens will be removed as part of the proposed development.

Well-spaced individual mature eucalypt trees are found along Rainbow Road with extensive residential development found to the west and south. Further development including residential housing and then the Mittagong Marketplace has been established to the north.

The Wingecarribee Aboriginal Community Cultural Centre is located east of the subject site. The area to the east of the Cultural Centre contains isolated small areas of native trees with managed understorey, relatively board canopy spacing and other non-native planted vegetation surrounding a landscaped dam. A further small area of native trees (<0.25ha) with overgrown vines, grasses and weeds is located northeast of the proposed development. This small strip of vegetation is >20m from the subject site and any other area of classified vegetation. In accordance with A1.10 of PBP (2019) this vegetation is excluded as low threat. Note there is no classified vegetation (SCIVI 2010) within 140m of the proposed development (refer figure 4.7).

Significant areas of native forest that join to the Nattai National Park are located approximately 400m to the north of the proposed development beyond the Highlands Marketplace. Prevailing conditions associated with a bushfire season in the Wingecarribee LGA usually coincide with strong south-west to north-west winds and influenced by drought and rainfall conditions (WBMP 2010a). In the event of a major bushfire, ember attack is likely to be the most significant bushfire risk.



Figure 4.2: Plot 3 - view to east showing isolated small areas of native trees with managed understorey, relatively board canopy spacing and other non-native planted vegetation (inset landscaped dam)



Figure 4.3: Aerial view to northwest showing low threat vegetation (inset Plot 2 typical vegetation)

Table 4.1 and Figures 4.2 to 4.6 summarise the assessable vegetation within 140m of the proposed development. The Fire Vegetation Hazard Summary and Bushfire Protection Measure considerations are shown in figure 4.7.

Table 4.1: Fire Vegetation Hazard Summary (Proposed)

Direction from Site	Effective Slope	Description of Vegetation (assessed within 140m of the Development)	Vegetation Class (Keith 2004)
North (Plot 1)	N/A	Managed lands	-
Northeast (Plot 2)	N/A	Low Threat Vegetation - small strip of native trees (<0.25ha) with overgrown vines, grasses and weeds located >20m from the subject site and other areas of classified vegetation.	-
East (Plot 3)	N/A	Managed lands	-
South (Plot 4)	N/A	Managed land of subject site then scattered native trees forming narrow corridor along and beyond southern boundary.	-
West (Plot 5)	N/A	Managed lands	-

Photo ID:	4.2	Plot:	1
Vegetation Classification	Managed land (north)		
Location/Description			
View to north showing managed land of subject site (lots 1-5 white dash) and surrounding residential and commercial development.			



Photo ID:	4.3	Plot:	3
Vegetation Classification	Managed land (east)		
Location/Description			
View to east showing managed land of Wingercarabee Aboriginal Community Cultural Centre.			



Photo ID:	4.5	Plot:	4
Vegetation Classification		Managed land (south)	
Location/Description			
View to south showing extensive residential development.			



Photo ID:	4.6	Plot:	5
Vegetation Classification		Managed land (west)	
Location/Description			
View to west over lots 1-5 showing managed land of existing residential properties and surrounding development.			



4.3 Assessment of Slope and FFDI

An assessment of slope in all directions over 100m from the building envelope(s) has been completed during site inspection (17/04/22) and using topographic mapping (sixmaps 2021). The effective bushfire slope for the dominate bushfire threats are summarised in tables 4.1 and 4.2.

The Forest Fire Danger Index (FFDI) measures the degree of danger of fire in Australian vegetation and is based on local government boundaries.

- For the Illawarra/Shoalhaven region (NSW RFS) the FFDI for residential developments is 100.

4.4 Determination of Bushfire Attack Level (BAL) and APZ's

Table 4.2a and 4.2b detail the appropriate Bushfire Protection Level for the proposed development. The appropriate BAL rating is determined in accordance with PBP (2019) section A1.7 utilising Table A1.2.5.

Minimum APZ distance where applicable is determined from Table A1.12.2 – Minimum distances for APZ's – residential; development.

Note: APZ based on a radiant heat threshold of 29kW/m².

Table 4.2a: BAL and APZ's (Proposed Development)

Vegetation Formation (Keith 2004)	Effective Slope	Distance to Hazard (m)	Bushfire Attack Level (BAL)	Minimum Distances for APZ's (m)
New Dwelling				
Managed Land (North)	n/a	>100m	BAL LOW	n/a
Managed Land (East)	n/a	>100m	BAL LOW	n/a
Managed Land (South)	n/a	>100m	BAL LOW	n/a
Managed Land (West)	n/a	>100m	BAL LOW	n/a

The highest BAL rating determined for the proposed development is **BAL-LOW** in accordance with Section 4 of AS3959-2018 *Construction of Buildings in Bushfire Prone Areas*. BAL-LOW is predicated on low threat vegetation and non-vegetated areas and due to insufficient risk, there are no specific bushfire construction requirements.

Based on the above the proposed development **can comply** to the Deemed to Satisfy (DTS) provisions of AS3959-2018 - Construction of Buildings in Bushfire Prone Areas.

A summary of the construction requirements for the assessed Bushfire Attack Level (BAL) relative to the proposed development are summarised below.

Bushfire Attack Level (BAL)	Description	AS 3959 Construction Requirements
BAL-LOW	Minimal attack from radiant heat and flame due to the distance of the building from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	Section 4

Adapted from PBP (2019).

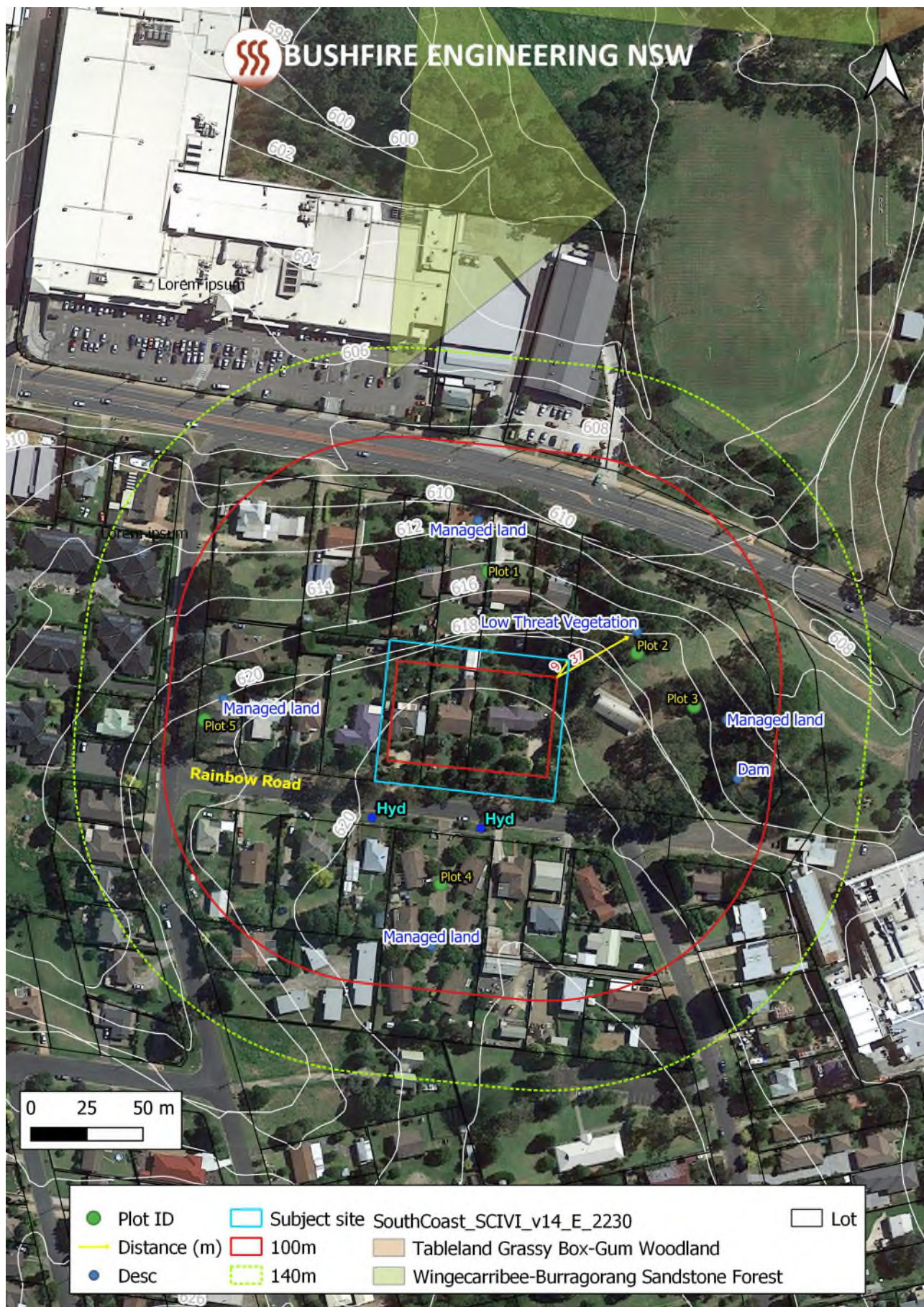


Figure 4.7: Fire Vegetation Hazard Summary to 140m of proposed development.

5 Bushfire Protection Measures

The following bushfire protection measures apply to the development.

5.1 Asset Protection Zones and Landscaping

The proposed development is to be located across three (3) existing residential lots that are to be completely cleared to allow the construction of the housing unit complex. Defendable space will be available from maintained gardens to be established within the subject site, from Rainbow Road and from other maintained gardens within the surrounding residential properties (Refer figure 4.7).

5.1.1 Recommendation 1 (APZ's)

At the commencement of building works and in perpetuity, the entire subject site incorporating Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051 is to continue to be managed as an Asset Protection Zone – **Inner Protection Area (IPA)**.

An IPA is to be maintained in accordance with PBP (2019) section A4.1.1.

When establishing and maintaining an IPA the following minimum requirements apply;

- tree canopy cover should be less than 15% at maturity
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.
- Shrubs should have large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation
- 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

Further information regarding maintenance of APZ can be found in *Standards for Asset Protection Zones (NSW RFS)*.

5.1.2 Recommendation 2 (Landscaping – fences and gates)

- (a) Fences and Gates should be made of either hardwood or non-combustible material.

5.1.3 Recommendation 3 (Landscaping – general)

- (b) Future landscaping is to be designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions. Key design principles to consider include;
- creating a defendable space;
 - do not plant or position flammable plants or objects against the house;
 - establish gardens that break up fuel continuity;
 - carefully selecting and maintaining trees to not increase potential fire fuel loads.

Refer Landscape Plan as detailed in Space Landscape Designs drawing L-100 (Rev B 08.07.22).

5.2 Access

Rainbow Road is located adjacent the southern elevation of the proposed development and provides safe operational access for emergency services and for residents seeking relocation in advance of a bushfire. Rainbow road can be accessed to the west form Brewster Street and from the east via Henderson Avenue (refer also comments in section 5.7 emergency management).

A concrete driveway suitable for passenger vehicles only, loops within the complex from the western corner into the basement carpark and exits in the eastern corner onto Rainbow Road.



Figure 5.1 Access Options

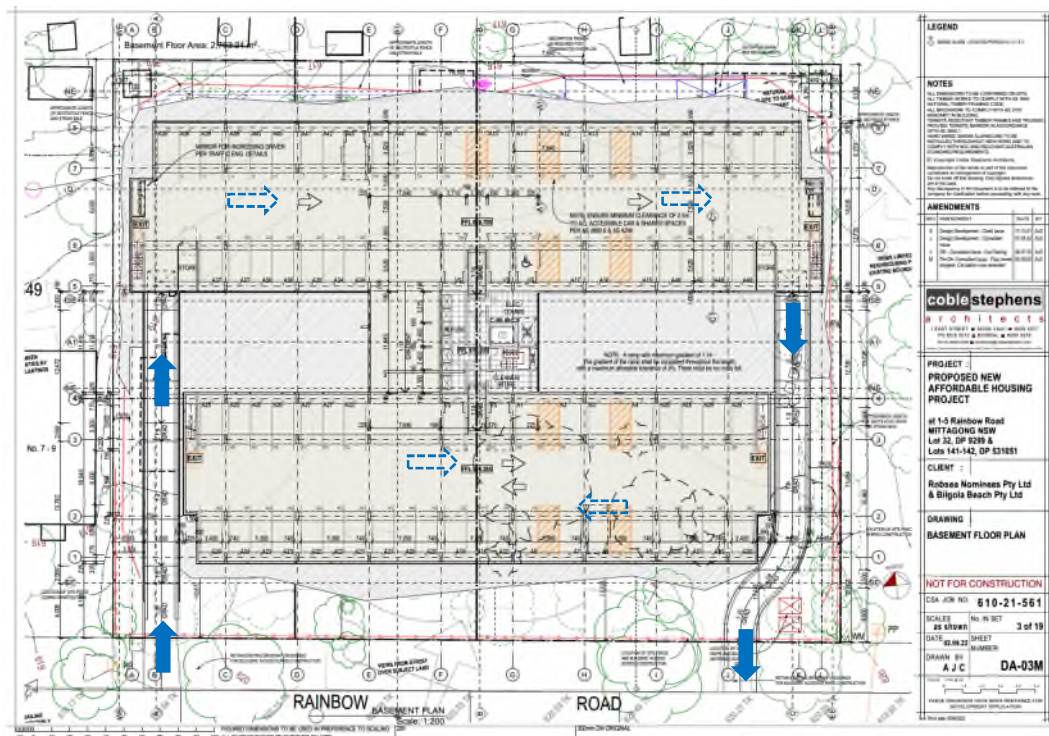


Figure 5.2: Resident access (coblestephens architects sheet DA-03M - 02.09.22).

Reticulated water is available to the site and fire hydrants are within 70m of the proposed development (refer section 5.3).

5.3 Water Supplies for Firefighting

Reticulated water supplies are available to the proposed development. Site inspection and Wingerbarribee Council plans (SEQ21397888) confirm fire hydrants are located along Rainbow Road (figure 5.3.1) and given the existing residential development, are assumed to be in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations.

The proposed development includes a comprehensive Fire Management system designed by CobleStephens Architects (2022) with additional onsite fire hydrants and fire hoses (refer drawings HDA01-HDA07 and HDA100-HDA104 in appendices). Assessment of the suitability of this system is outside the scope of this report however design is required to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards.



Figure 5.3.1: Location of hydrant adjacent No.1 Rainbow Road.

5.3.1 Recommendation 4 (Water Supplies - Fire Systems)

The proposed development will be required to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards.

5.3.2 Recommendation 5 (Water Supplies - General)

The proposed development is required to comply with the *Water Supply provisions* in PBP (2019) Table 7.4a including;

- all exposed water pipes external to the building are metal, including any fittings;
- Fire hose reels are constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005

5.4 Electrical Services

Underground power is available to the proposed development.

5.5 Gas Services

5.5.1 Recommendation 6 (Gas Services)

Location design of gas services require the following;

- (a) Installation and maintenance of any new gas services to AS1596:2002 and to the requirements of relevant authorities;
- (b) Any proposed gas services external to building are to be metal including and up to any taps;
- (c) 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 (i. e. using non-combustible shielding material);
- (d) Connections to and from gas cylinders are metal;
- (e) Polymer-sheathed flexible gas supply lines are not used; and
- (f) Above-ground gas service pipes are metal, including and up to any outlets.

5.6 Construction Requirements

5.6.1 Recommendation 7 (Construction Requirements)

The construction requirements of the proposed multi-storey development is **BAL-LOW** in accordance with Section 4 of AS3959-2018 Construction of Buildings in Bushfire Prone Areas. BAL-LOW is predicated on low threat vegetation and non-vegetated areas and due to insufficient risk, there are no specific bushfire construction requirements.

Note: Changes to available information, legislation and standards are made on an ongoing basis and readers should obtain up to date prior to construction accordingly.

5.7 Emergency Management

As the proposed development will result in increased resident densities, there is a need to consider evacuation of proposed residents in the event of a bushfire. The evacuation plan considerations are to include;

- Capacity of proposed development to allow evacuation in the event of a bushfire
- location of exits and signage to direct residents to defined safe evacuation points and away from potential hazards such as car parks.
- Location of bushfire vegetation
- Location and type of fire warning systems
- Impact of warning and suppression systems on evacuation.

5.7.1 Recommendation 8 (Emergency Management)

A Bush Fire Emergency Management and Evacuation Plan is to be prepared by the operator consistent with the NSW RFS publication: A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan, and the AS3745:2010.

6 Assessment of Compliance

Assessment of compliance to Performance Criteria and Acceptable Solutions for PBP 2019 *Chapter 5: Residential and Rural Subdivisions* including integration of Chapter 7: *Residential Infill Development* is summarised in Tables 6.1 (a) to (c), which has been adapted from tables in PBP 2019 section 5.3 and 7.4.

6.1.1 APZ's

Intent of measure is to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.

Table 6.1(a): APZ and Landscaping assessment of compliance.

	Performance Criteria	Acceptable Solutions	Assessment of Compliance
	The intent may be achieved where:		
ASSET PROTECTION ZONES	Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m ² on each proposed lot. A defensible space is provided.	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	<i>Can Comply*</i> <i>The proposed development is located across 3 residential lots with defensible space available. At the commencement of building works and in perpetuity the entire site is to continue to be managed as an Asset Protection Zone – Inner Protection Area (IPA). An IPA is to be maintained in accordance with PBP (2019) section A4.1.1. APZ's meet the requirements of a radiant heat threshold of 29kW/m² Refer section 5.1</i>
	APZs are managed and maintained to prevent the spread of a fire towards the building.	APZs are managed in accordance with the requirements of Appendix 4 of PBP.	<i>Can Comply*</i>
	the APZs is provided in perpetuity.	APZs are wholly within the boundaries of the development site	<i>Can Comply*</i>
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are located on lands with a slope less than 18 degrees.	<i>Complies</i>
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.	landscaping is in accordance with Appendix 4; and	<i>Can Comply*</i> <i>Landscaping plan to be prepared.</i>
		fencing is constructed in accordance with section 7.6.	<i>Can Comply*</i> <i>Fences and gates to be hardwood or non-combustible material only.</i>

6.1.2 Access

Intent of measures is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Table 6.1(b): Access assessment of compliance.

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
ACCESS (General Requirements)	Firefighting vehicles are provided with safe, all-weather access to structures.	property access roads are two-wheel drive, all-weather roads; perimeter roads are provided for residential subdivisions of three or more allotments;	<i>Complies</i>
		subdivisions of three or more allotments have more than one access in and out of the development;	<i>N/A</i>
		traffic management devices are constructed to not prohibit access by emergency services vehicles;	<i>N/A</i>
		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;	<i>Complies</i>
		all roads are through roads;	<i>N/A</i>
		dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead	<i>N/A</i>
		where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	<i>N/A</i>
		where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	<i>N/A</i>

Table 6.1(b): Access assessment of compliance (cont)

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
		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.	<i>Can Comply*</i> <i>Hydrants are located adjacent the proposed development on Rainbow Road.</i> <i>The proposed development is to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards.</i>
Perimeter Roads	The capacity of access roads is adequate for firefighting vehicles.	the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/ causeways are to clearly indicate load rating.	<i>Complies</i> <i>Rainbow Road is sufficient to carry fully loaded firefighting vehicles.</i>
	There is appropriate access to water supply.	hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	<i>Can Comply*</i> <i>Reticulated water is available</i> <i>Additional onsite fire hydrants and fire hoses are to be installed (refer section 5.3)</i>
		hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and	<i>Can Comply*</i> <i>Wingercarribee Council plans (SEQ21397888) confirm fire hydrants are located along Rainbow Road are assumed to be in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations.</i>
		there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	<i>N/A</i>
	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	are two-way sealed roads;	<i>N/A</i>
		minimum 8m carriageway width kerb to kerb; parking is provided outside of the carriageway width; hydrants are located clear of parking areas;	
		are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	<i>N/A</i>
		curves of roads have a minimum inner radius of 6m;	<i>N/A</i>
		the maximum grade road is 15 degrees and average grade of not more than 10 degrees;	<i>N/A</i>

	the road crossfall does not exceed 3 degrees; and	N/A
	a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	N/A

Table 6.1(b): Access assessment of compliance (cont)

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
Non-Perimeter Roads	Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	minimum 5.5m carriageway width kerb to kerb;	N/A
		parking is provided outside of the carriageway width;	N/A
		hydrants are located clear of parking areas;	N/A
		roads are through roads, and these are linked to the internal road system at an interval of no greater than	N/A
		curves of roads have a minimum inner radius of 6m;	N/A
		the road crossfall does not exceed 3 degrees; and	N/A
		a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	N/A
Property Access	Firefighting vehicles can access the dwelling and exit the property safely	<p>There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.</p> <p><i>In circumstances where this cannot occur, the following requirements apply:</i></p>	N/A

6.1.3 Service (water, electricity and gas)

Intent of measures is to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Table 6.1(c): Services assessment of compliance.

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
Water Supplies	Adequate water supplies is provided for firefighting purposes.	reticulated water is to be provided to the development where available;	<i>Can Comply*</i> <i>Reticulated water supplies are available. Additional onsite fire hydrants and fire hoses are to be installed (refer section 5.3)</i>
		a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	<i>N/A</i>
		static water supplies shall comply with Table 5.3d.	<i>N/A</i>
	Water supplies are located at regular intervals; and the water supply is accessible and reliable for firefighting operations.	fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;	<i>Can Comply*</i> <i>Wingercarribee Council plans (SEQ21397888) confirm fire hydrants are located along Rainbow Road are assumed to be in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations.</i>
		hydrants are not located within any road carriageway; and	<i>Can Comply*</i>
		reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	<i>Can Comply*</i> <i>The proposed development is to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards.</i>
	Flows and pressure are appropriate.	fire hydrant flows and pressures comply with the relevant clauses of AS2419.1:2005.	<i>Can Comply*</i> <i>Flows to be as per AS2419.</i>
	The integrity of the water supply is maintained.	all above-ground water service pipes are metal, including and up to any taps; and above-ground water storage tanks shall be of concrete or metal.	<i>Can comply*</i>

Table 6.1(c): Services assessment of compliance (cont).

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
Electrical Services	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	where practicable, electrical transmission lines are underground;	<i>Can Comply*</i> <i>Underground electrical services are available.</i> <i>Refer Section 5.4.</i>
		where overhead, electrical transmission lines are proposed as follows:	
		lines are installed with short pole spacing of 30m, 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.	<i>N/A</i>
Gas Services	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	no part of a tree is closer to a power line than the distance set out in ISSC3 Guideline for Managing Vegetation Near Power Lines.	<i>Can comply*</i>
		Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used;	<i>Can Comply*</i> <i>Installation and maintenance of any new gas services to AS1596:2014 and to the requirements of relevant authorities</i> <i>Refer Section 5.5</i>
		All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;	<i>Can comply*</i>
		connections to and from gas cylinders are metal;	<i>Can comply*</i>
		polymer-sheathed flexible gas supply lines are not used; and	<i>Can comply*</i>
		above-ground gas service pipes are metal, including and up to any outlets.	<i>Can comply*</i>

6.1.4 Construction Standards

Intent of measures is to provide suitable building design, construction and sufficient space to ensure that radiant heat levels do not exceed critical limits for firefighters and other emergency services personnel undertaking operations, including supporting or evacuating occupants.

Table 6.1(d): Construction Standards.

Performance Criteria		Acceptable Solutions	Assessment of Compliance
The intent may be achieved where:			
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 NCC and as modified by section 7.5	<i>Can Comply*</i> <i>The construction requirements of the new dwelling are to be BAL-LOW</i> <i>Refer Section 5.6.</i>
		Fencing and gates are constructed in accordance with section 7.6.	<i>Can Comply*</i>
		Class 10a buildings are constructed in accordance with section 8.3.2.	<i>N/A.</i>

**Subject final Inspection by Principal Consent Authority*

7 Issues and Considerations for Multi-storey Residential Development

The following section provides comment regarding consideration of issues relevant to multi-storey residential development as detailed in PBP (2019) Table 8.2.2.

Table 7.1: Issues and considerations specific to multi-storey residential development.

ISSUE	SPECIFIC CONCERNS AND CONSIDERATIONS	COMMENT
Population	Impact on existing community and infrastructure – capacity of proposed development to allow evacuation of existing and proposed residents in the event of a bush fire.	<i>Requires inclusion in the Bush Fire Emergency Management and Evacuation Plan to be prepared by the Operator.</i>
Location of Building	Locating on ridge tops emphasizes the risk of convective plume interaction and wind related impacts.	<i>N/A.</i>
Design Fire	Different elements of the flame could have different impacts on different levels of the building; and the whole building could be impacted by ember attack and multiple floors could be alight simultaneously.	<i>N/A – construction requirements are BAL-LOW.</i>
Egress	Elevations exposed to bush fire risk.	<i>Requires consideration in the Bush Fire Emergency Management and Evacuation Plan to be prepared by the Operator.</i>
Building Construction	Performance of the building facade in a bush fire scenario.	<i>N/A – construction requirements are BAL-LOW.</i>
Car Parking	Lower storey car park could be subject to ember attack and high radiant heat loads - is the warning and suppression system designed to take account of bush fire impact? Where are exits located? Are they guiding occupants away from the car park?	<i>The proposed development is to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards. Requires consideration in the Bush Fire Emergency Management and Evacuation Plan to be prepared by the Operator.</i>
Other Considerations	Access for fire fighters may be restricted or challenging; and risk implications of floor to floor fire spread - fire suppression, warning and suppression. Impact on evacuation.	<i>The proposed development is to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards. Requires consideration in the Bush Fire Emergency Management and Evacuation Plan to be prepared by the Operator.</i>

8 Assessment Environmental Features or Other Site Constraints

The subject site (including Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051) is highly disturbed and is surrounded by existing residential development. It is assumed the DA processes for the original subdivision addressed significant environmental and heritage issues.

A heritage Impact statement (Rosen 2022) details that proposed multi-storey residential development is located next to the Chalybeate Springs, which is a heritage item listed in schedule 5 of the Wingecarribee LEP.

The proposed bushfire protection measures are unlikely to have any impact on the Chalybeate Springs heritage site. Site inspection and desktop assessment of other current publicly available planning information indicates no significant environmental features or other site constraints on or adjoining the subject site that may be impacted by the proposed bushfire protection measures.

9 Adequacy of Sprinkle Systems and Other Fire Protection Measures

From a bushfire compliance perspective this is no requirement for external sprinkler systems or other fire protection measures.

The proposed development will be required to satisfy the Fire Safety Regulations of the National Construction Code NCC for Class 2 residential buildings and the applicable Australian Standards. Draft fire safety systems for the proposed development are detailed in Appendices.

10 Fire Trails

Not applicable. The proposed development is surrounded by residential development and public roads suitable for access for emergency vehicles.

11 Conclusion

A Bushfire Hazard Assessment has been completed for the proposed multistorey residential infill development at 1-5 Rainbow Road Mittagong NSW (Lot 32 in DP 9299, Lot 142 in DP 531051 and Lot 141 in DP 531051). The proposed development is on Bushfire Prone Land (BFPL) and the report has been prepared in support of the development application to demonstrate compliance in accordance with Planning for Bushfire Protection (2019).

The proposed multi-storey development includes the construction of forty-nine (49) residential affordable housing units across three (3) existing residential lots to be cleared and integrated as part of the development. The assessment has been completed in accordance with PBP (2019), specifically Chapter 7: Residential Infill Development and Chapter 5 of PBP Residential and Rural Subdivisions including the requirement for an APZ based on a radiant heat threshold of 29kW/m².

Provided the development satisfies the requirements of this report, it is considered that the proposed development **can comply** with the performance criteria for acceptable solutions of Planning for Bushfire Protection (2019) as required under section 4.14 of the Environmental Planning and Assessment Act 1979.

Based on the outcomes of the bushfire hazard assessment the proposed development **can comply** to the Deemed to Satisfy (DTS) provisions of AS3959-2018 - Construction of Buildings in Bushfire Prone Areas.

The construction requirements of the proposed multi-storey development are to be minimum **BAL-LOW**. BAL-LOW is predicated on low threat vegetation and non-vegetated areas and due to insufficient risk, there are no specific bushfire construction requirements.

Issues specific to multistorey developments as defined in PBP (2019) Table 8.2.2 include recommendations to develop a Bush Fire Emergency Management and Evacuation Plan to address the capacity of proposed development to allow evacuation in the event of a bushfire (refer sections 5.7 and 7.0). The location of exits and signage to direct residents to defined safe evacuation points and away from potential hazards such as car parks and the location and impact of warning and on evacuation.

If further information is required, please contact David Talbert on 0414 905 565.

12 References

AS3959, 2018, Australian Standard AS3959-2018 (incorporating Amendment No.2) - Construction of Buildings in Bushfire Prone Areas, Standards Australia, Sydney.

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Standard Instrument LEP 2006, Principal Local Environmental Plan (2006 EPI 155a), NSW Legislation, version 09/03/22, viewed 05/08/22; <https://legislation.nsw.gov.au/view/html/inforce/current/epi-2006-155a>

WLEP 2010, Wingercarribee Local Environmental Plan 2010, NSW Legislation, NSW Government 2020.

13 APPENDIX A - Site Photos



Photo 13.1: View to north toward No.1 Rainbow Road showing managed gardens and existing dwelling to be demolished.



Photo 13.2: View to east showing rear boundary of No.1 Rainbow Road.



Photo 13.3: Aboriginal Community Centre – managed lands (view to north).



Photo 13.4: Aboriginal Community Centre – managed lands (view to south).

14 APPENDIX B – Proposed Development

