BUSHFIRE RISK PTY LTD
assess · report · certify
ABN: 16 611 625 551

PO Box 685, Lismore NSW 2480
Mobile: 0447 211 375
mj@bushfirerisk.com.au
www.bushfirerisk.com.au

Bushfire Risk Assessment

Infill development

Proposed Development: Convert an existing building into a 'Class 1a' dwelling

Location: Lot 6 DP258075
1931 Coolamon Scenic Drive
Mullumbimby NSW

Client: Jace O'Connor

Our Ref: 2208OCO1913

Date of Issue: 20 September 2023

Report prepared by **Melanie Jackson**

Grad Dip (Bushfire Protection); B.A.Sc. (EnvResMgt)
BPAD-Level 3 Accredited Practitioner & Member of the FPA Australia

‘Prepare—Act—Survive’

In the Event of an Emergency Call:

‘000’

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EXPIRY

The bushfire risk assessment and resulting BAL rating contained in this report should not be relied upon for a period extending 3 months from date of issue. If this report was issued more than 3 months ago, it is recommended that the validity of the determination be confirmed with the Accredited Practitioner and where required an updated report should be issued.

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DISCLAIMER

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EXECUTIVE SUMMARY

This Bushfire Risk Assessment relates to a proposed development located at:	Lot 6 DP258075 1931 Coolamon Scenic Drive Mullumbimby NSW
Client:	Jace O'Connor
Site inspection:	A site assessment was carried out on 28 September 2022 and desktop assessment (review) on 31 July 2023.
Proposed development:	Convert an existing building into a 'Class 1a' dwelling
Site Plans by:	Provided by the client; Revision E; August 2022 (Ref. Appendix A) A full set of plans shall be provided by the applicant to accompany the DA. All design and site plans must ensure compliance with the minimum building setbacks in relation to this development as proposed and the recommendations contained herein.
What is the Bushfire Attack Level (BAL) as per AS3959–2018?	BAL-29 – entire dwelling
Does this development satisfy the Aims and Objectives of PBP?	YES
Are performance solutions presented herein?	YES – Method 2, complex procedure using the Bushfire Attack Assessor Calculator, as per the methodology described in Appendix B of AS3959-2018, was used to determine the BAL rating (east APZ). The calculations results are presented in Appendix B herein.
Does this development require referral to the NSW Rural Fire Service?	YES – The consent authority should refer this report to the RFS as performance solutions are proposed. Council should be satisfied the development conforms to the relevant specifications and requirements prior to granting of consent. If not satisfied, the consent authority should consult with the Commissioner of the NSW Rural Fire Service under s.4.14 EP&A Act.
This assessment has been prepared and certified by Melanie Jackson BPAD-Level 3 Certified Practitioner; FPAA Cert. No: 21977	

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ABBREVIATIONS

Abbreviation	Description
APZ	Asset protection zone
AS3959	Australian Standard – Construction of Buildings in Bushfire Prone Areas
BAL	Bush fire attack level
BCA	Building Code of Australia
BE	Building envelope
BFPL	Bush fire prone land
BFPL Map	Bush fire prone land map
BFSA	Bush fire safety authority
BPM	Bush fire protection measure
DA	Development application
DCP	Development control plan
EP&A Act	*Environmental Planning & Assessment Act 1979*
FFDI	Forest fire danger index
GFDI	Grass fire danger index
IPA	Inner protection area
kW/m^2	Kilowatts per metre squared
LEP	Local environmental protection plan
NSW RFS	NSW Rural Fire Service
OPA	Outer protection area
PBDB	Performance based design brief
PBP	Planning for Bushfire Protection
RF Act	*Rural Fires Act 1997*
RF Reg	*Rural Fires Regulation 2022*
SEPP	*State Environmental Planning Policy*
SFPP	Special fire protection purpose
SFR	Short fire run

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1 INTRODUCTION

Bushfire Risk Pty Ltd was engaged by the client/s to conduct a Bushfire Risk Assessment in support of a Development Application (DA). The purpose of the assessment is to determine category of bushfire attack and construction level for the proposed development on behalf of the client/s.

The development shall be carried out on the lot/s referred to as the 'Subject Site' (Figure 1) and dwelling sites shall be sited within a Building Envelope which shall be referred to as a 'BE' throughout this document.

1.1 Subject Site

Address: Lot 6 DP258075
1931 Coolamon Scenic Drive Mullumbimby NSW
LGA: Byron Shire

1.2 Proposed Development

Convert an existing building into a 'Class 1a' dwelling.

Figure 1: Aerial image of the subject site (Source: Nearmap 2023)

1.3 Legislation

1.3.1 Building on Bushfire Prone Land

The National Construction Code (NCC) contains Performance Requirements and Deemed-to-Satisfy provisions relating building on Bushfire Prone Land (BFPL). Construction on BFPL must comply with AS3959-2018 – Construction of buildings in bushfire prone areas (AS3959) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas (NASH Standard) as varied in NSW. These requirements are considered Deemed-to-Satisfy solutions, however, do not extend to BAL-FZ or where modified by specific conditions of the relevant development consent.

1.3.2 Bushfire Prone Land

The subject site is mapped as 'Bush Fire Prone Land' (BFPL) under s.10.3 Environmental Planning and Assessment Act 1979 (EPA Act), triggering the legislative requirements for building on bushfire prone land is applicable (Figure 2).

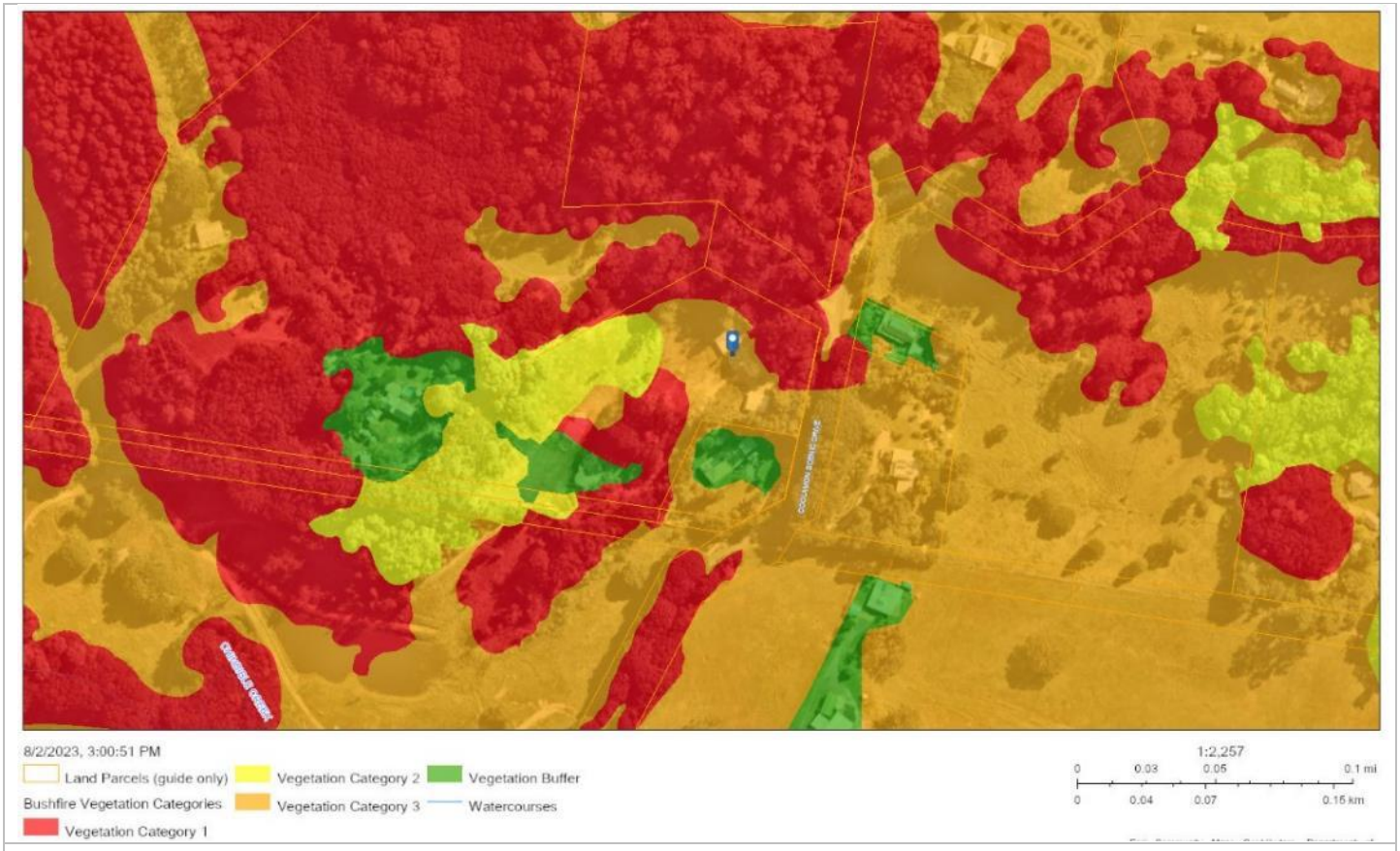

Figure 2: BFPL Map (Source: Byron Shire Council; 2023)

1.3.3 Infill Development

The proposed development is classified as 'infill' development, which refers to the development of land by the erection of, or alteration or addition to, a dwelling which does not require the spatial extension of services including public roads, electricity, water and sewerage and is within an existing lot. Infill development requires an assessment under s.4.14 EPA Act 1979.

An assessment of the bushfire risk was undertaken against section 7 – *Residential Infill Development* PBP 2019.

1.4 Aim & Objectives

1.4.1 Aim and Objectives of PBP 2019

All development on BFPL must satisfy the aim and objectives of Planning for Bush Fire Protection (PBP 2019). This report demonstrates how the requirements can be met by ensuring suitable Bushfire Protection Measures (BPM) are put in place commensurate with the level of risk and characteristics of the occupants.

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- Afford buildings and their occupants protection from exposure to a bush fire.
- 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.

1.4.2 Objectives for Infill Development (s.7 PBP 2019)

- Provide a defendable space to enable unimpeded access for firefighting around the building.
- Provide better bushfire outcomes on a redevelopment site than currently exists.
- Design and construct buildings commensurate with the bushfire risk.
- Provide access, services, and landscaping to aid firefighting operations.
- Not impose an increased bushfire management and maintenance responsibility on adjoining landowners; and
- Increase the level of bushfire protection to existing dwellings based on the scale of the proposed work and level of bushfire risk.

2 BUSHFIRE RISK ASSESSMENT

This Bushfire Risk Assessment includes an analysis of the hazard, threat and subsequent risk to the development as proposed and provides recommendations that the proposal satisfies the aim and objectives of PBP, Specific Objectives for Infill Development and Intent of Measures. by demonstrating compliance against the performance criteria or acceptable solutions, thereby providing adequate bushfire protection measures (BPM) to the proposed development commensurate with the level of risk and characteristics of the occupants.

The assessment shall incorporate provisions to ensure appropriate separation distances between the BE and the hazard and associated BAL rating pursuant to the site assessment methodology described in PBP 2019. Deviations from the acceptable solutions shall be addressed by providing performance solutions to demonstrate compliance.

The results and recommendations herein, aim to satisfy the requirements of PBP by incorporating the suite of BPM in combination, commensurate with the level of bushfire risk, occupant, and site characteristics for the proposed development to be deemed acceptable.

2.1 Methodology

2.1.1 PBP 2019

The bushfire risk assessment was carried out pursuant to the requirements set out in s.7 – Residential Infill Development PBP 2019.

2.1.2 Site Analysis

A desktop and onsite assessment were carried out pursuant to the methodology described in PBP 2019 as follows:

- As per the acceptable solutions, the minimum distance for APZs was determined pursuant to Table A1.12.3 Appendix 1 PBP.
- The acceptable solution as per the methodology described in Appendix 1 – Site Assessment Methodology using table A1.12.6 – Determination of BAL, FFDI 80 – residential development (PBP 2019) was used to determine the BAL rating and appropriate APZ/setbacks for the proposed development.
- Method 2 – Complex Procedure as per the methodology described in '*Appendix B – Detailed Method for Determining the Bushfire Attack Level (BAL) Method 2*' (AS3959) was used to determine the radiant heat flux to the receiver (proposed building/s) and associated BAL rating for construction.
- The complex calculations were carried out using the Newcastle Bushfire Consultants (NBC) Bushfire Attack Assessor Calculator (BFAA) (Couch, P. 2021), the results of which are presented in Appendix B herein.

2.1.3 Vegetation & Environmental Features

The assessment and classification of the predominant vegetation types on and surrounding the subject site (out to a minimum distance of 140m from the boundaries of the property) was undertaken, using Keith (2006) vegetation classification system as described in PBP (Table 1).

2.1.4 Slope & Aspect

An assessment of the aspect and effective slope, being the land under the classified vegetation most likely to have the greatest effect on bushfire behaviour within 100m of the site was undertaken and the results presented in the assessment table/s herein (Table 1; Table 2).

Slope analysis was undertaken using the following assessment methodology:

- A desktop assessment of 2, 5 & 10m contours available via the Fire Protection Association (FPAA) *FireMaps NSW* platform (FPAA 2022)
- On-site ground truthing was undertaken, assessing the slope using a Leopold Laser Range Finder and comparison with the desktop assessment to determine the effective slope of the hazard; tabulated in the results table/s herein (Ref. Table 2).

2.1.5 Bushfire Protection Measures (BPM)

The BPMs are a set of measures to be satisfied which aim to reduce risk from bushfires and enhance occupant survival, property protection and community resilience to bushfire attack. Analysis of the BPMs shall be undertaken commensurate to the level of risk to occupants and the subject site. Recommendations provided are based on the results. BPMs to be satisfied include the following:

- APZ
- Access
- Construction
- Siting and design
- Landscaping
- Services
- Emergency and evacuation planning

3 ANALYSIS & RESULTS

The following sections describe in detail, the vegetation type, slope, access, availability of water supplies and environmental considerations for the subject site and surrounds as referenced in the following figures and tables.

3.1 Site Inspection Details

A site assessment of the subject site was undertaken by Melanie Jackson (BPAD-Level 3 Accredited Practitioner No. 21977) on 28 September 2022.

Table 1: Vegetation Analysis

Vegetation Classification, Direction, Plot, Description & Photos
North, Northeast and Northwest – Rainforest Vegetation consists of Camphor-derived rainforest and riparian vegetation along the creek banks.
North – Forest Rainforest transitions to forest vegetation at least 50m from the proposed BE, therefore both the rainforest and forest vegetation types shall be assessed to determine the worst-case hazard scenario.
East – Rainforest This area consists of Coolamon Scenic Drive traversing in a north-south direction upslope. Connection of the roadside vegetation gives way to a rural-residential dwelling on the other side of Coolamon Scenic Drive and low threat vegetation surrounds the dwelling. Further east, opposite Coolamon Scenic Drive, a patch of rainforest dominated by Brushbox traverses to the southeast and a small patch of vegetation is planted is in the centre of the driveway turning area.
South – Managed Land A well-managed rural-residential neighbours developed lot abuts the south boundary of the subject site and is considered low threat vegetation.
West – Managed land and Rainforest The lower slopes of the subject site consist of a creek traversing via managed and/or planted riparian vegetation upslope form the proposed BE, then managed grassland upslope, followed by an area of brush box forest which traverses the upper slope of the subject site. The forest transitions to a managed area around the curtilage of the associated dwelling on the neighbour's lot. The vegetation in this direction is considered low threat vegetation to Rainforest classified vegetation.

Vegetation Classification, Direction, Plot, Description & Photos

Photo 1: Coolamon Scenic Drive – roadside & neighbouring lots with rainforest/remnant veg (east).

Photo 2: Driveway and existing turning area onsite

Photo 3: Rainforest north transitions to forest more than 50m from the BE.

Photo 4: Riparian vegetation along the creek bank

Photo 5: Rainforest (Brushbox forest) west, upslope and a residence offsite

Photo 6: BE & rainforest upslope east (left side)

Vegetation Classification, Direction, Plot, Description & Photos

Photo 7: Compliant east APZ (image facing south boundary/residence

Photo 8: Non-compliant South APZ

Figure 3: Bushfire hazard analysis (Source: FireMaps 2023; Nearmap 2023)

3.2 Bushfire Protection Measures

3.2.1 APZ & Construction Level (Simple Performance Solution)

Minimum setbacks (APZ) as presented in Table 2 herein, relate to the separation distance between the BLE and the hazard. The APZ is to be managed within the bounds of the subject site in perpetuity pursuant to Appendix 4 – Asset Protection Zone Requirements (PBP).

The vegetation traversing an upslope in excess of 10 degrees (east), was assessed using the complex methodology (Method 2) of AS3959-2018, as a result the methodology used to calculate the associated BAL rating provides a performance solution as the APZ and associated BAL rating presented herein deviate from the acceptable solutions of s.7 PBP (2019).

The Newcastle Bushfire Attack Assessment Calculator was used to determine the BAL rating based on a 6m APZ (east), the results of which are presented in Appendix B herein.

For an APZ of 6m to the east of the proposed BE with a BAL-29 construction rating, these results deviate from the following acceptable solutions:

- BAL is determined in accordance with Tables A1.12.5 to A1.12.7.

The following performance criteria shall be met:

- APZs are provided commensurate with the construction of the building; and
- A defendable space is provided.
- The proposed building can withstand bush fire attack in the form of embers, radiant heat, and flame contact.

The APZ of 6m was calculated with a radiant heat flux of less than 29kW/m^2 is demonstrated in the BFAA (Appendix B). Therefore, the building shall be constructed with appropriate setbacks that shall be constructed to withstand bushfire attack from embers, radiant heat flux and where direct flame contact is negated pursuant to the methodology used.

A defendable space around the entire building of 1.5m minimum in addition to a managed APZ. The defendable space shall be managed to reduce combustible elements free from constructed impediments shall be maintained in perpetuity.

3.2.2 BAL Rating

The recommended BAL rating for the proposed development is as follows:

BAL-29 – entire dwelling;

The entire building shall be upgraded to ensure BAL-29 construction level as per AS3959-2019 and the NSW variations to AS3959 are required; Refer to BPM Compliance Table presented herein.

3.2.3 Access

Access to the proposed building is via sealed 4m wide driveway off Coolamon Scenic Drive. The existing turning area shall be upgraded to ensure compliance for turning fire fighting vehicles pursuant to s.A3 of PBP 2019.

3.2.4 Water Supplies for Fire Fighting Purposes

Minimum 20,000L static water supply in non-combustible water tank or swimming pool, shall be provided for firefighting purposes on site as a reticulated water system is not available. The static water supply shall be installed pursuant to the acceptable solutions as per Section 7.4 and Table 7.4a of *Planning for Bushfire Protection 2019*.

3.2.5 Electricity & Gas Services

Any modifications to the existing services shall be conducted in accordance with the acceptable solutions. Refer to the recommendations contained herein.

3.2.6 Landscaping

Comply with the acceptable solutions by undertaking landscaping and APZ management as per the NSW Appendix 4 (PBP 2019; Ref. Appendix C herein) and the RFS document '*Standards for Asset Protection Zones*' (RFS 2005).

3.2.7 Emergency Planning

It is recommended occupants of the site prepare a bushfire survival plan and practice it annually. A guide to preparing a 'Bushfire Survival Plan' is available for download on the NSW RFS website: www.rfs.nsw.gov.au (RFS 2019).

3.2.8 Likely Environmental Impacts

The scope of this report does not include an environmental assessment and should be read in conjunction with the Statement of Environmental Effects (SEE) and any supporting assessments and reports submitted in support of the DA.

The following was considered during the assessment process:

- The APZ requires modification to ensure appropriate setbacks, canopy separation and clearances etc. are maintained in perpetuity as per the requirements for IPAs as per Appendix 4 PBP (2019), i.e. min. 2-5m canopy separation, tree clearances from the dwelling.
- The trees and shrubs in the south APZ require modification to comply with IPA requirements i.e. remove and/or prune trees and shrubs.
- The patch of vegetation in the centre of the driveway (turning area) and any overhanging tree branches require pruning i.e. 4m vertical clearance.
- Where modification of native vegetation including pruning, lopping and/or tree removal etc. is proposed, the client must seek further advice from Council prior to undertaking any such work.
- The proposed APZ shall be managed in perpetuity as an Inner Protection Area (IPA).

3.3 APZ & BAL Analysis & Results Summary

A summary of the findings of the onsite bushfire risk assessment is presented in the following figures & table/s (Table 2; Figure 3; Figure 4).

Table 2: APZ & BAL Analysis & Results Summary

Vegetation / Hazard Analysis				APZ & BAL Results	
Direction/Plot	**Vegetation Class / Formation**	**Veg Slope (°)**	**Hazard Setback (m)**	**APZ (m)**	**Highest BAL rating**
North 1	Rainforest	10 upslope	9	9	BAL-29
North 2	Forest	10 upslope	50	N/A	
East	Rainforest (Brushbox)	0	6	6^	
South	Managed land	N/A	N/A	To boundary	
West	Managed land	N/A	N/A	9	

^ *Method 2 (AS3959-2018) was used to calculate the APZ & associated BAL rating, thus meeting the performance criteria for APZ setbacks and associated BAL rating. The results of which are presented in the BFAA (Appendix B).*

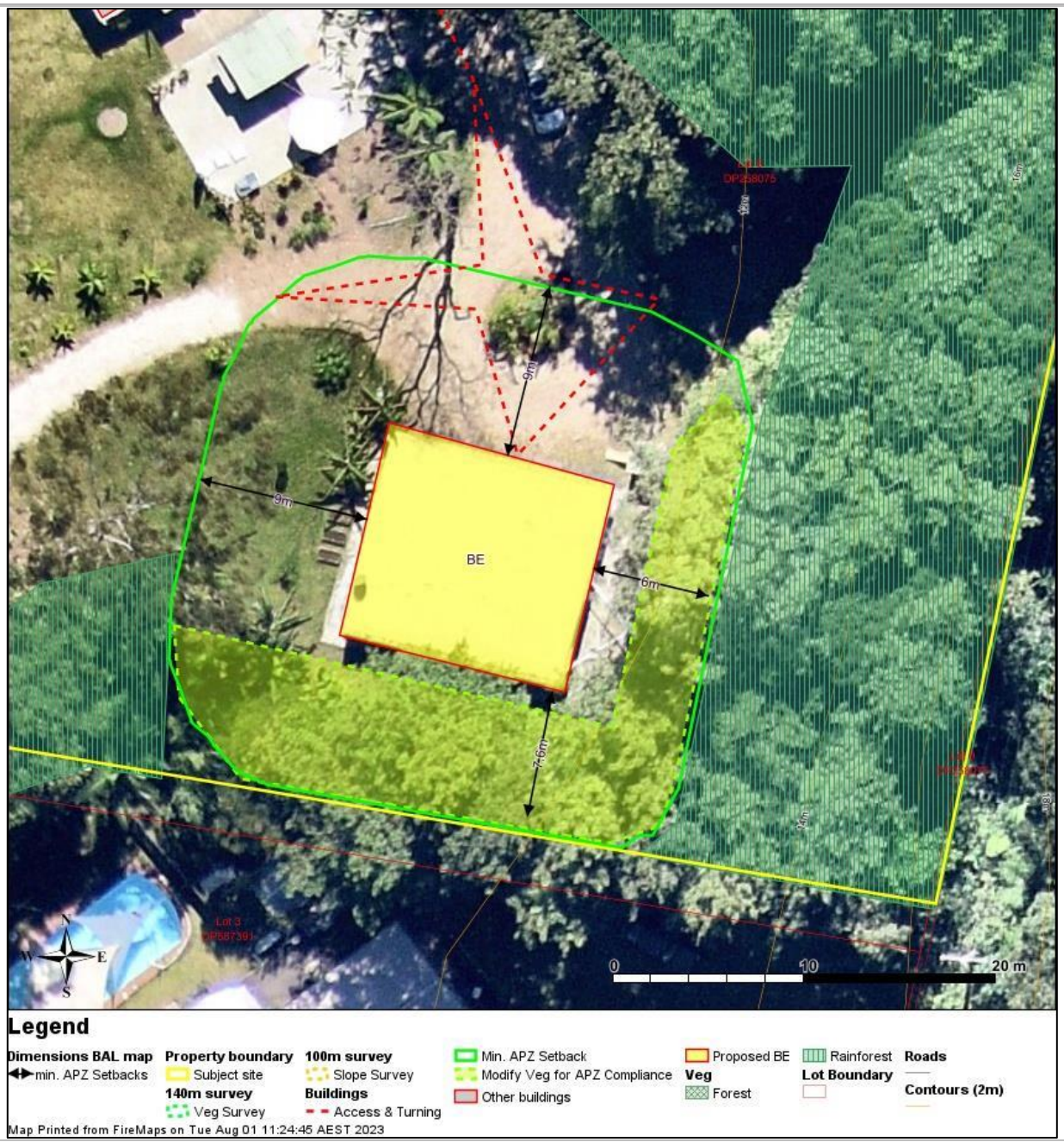

Figure 4: APZ plan (Source: FireMaps 2023; Nearmap 2023)

4 RECOMMENDATIONS & COMPLIANCE

The following table/s indicate the extent to which the proposed development conforms with or deviates from the standards, specific objectives, performance criteria and acceptable solutions set out in *s.7 – Residential Infill Development* (PBP).

The results and recommendations herein are commensurate with the level of bushfire risk and characteristics of the occupants for the proposed development, by applying the suite of BPM in combination, being the site-specific requirements that must be satisfied in order to comply. The table below specifies the method used to demonstrate compliance i.e. acceptable solution or performance-based solution, against the BPMs and provides recommendations to ensure the intent of each BPM shall be met (Table 3).

NB: the following indicate level of compliance:

- **Acceptable Solution** – complies with the Acceptable Solution/s; some works may be required to meet the requirements.
- **Performance Solution** – complies with the Performance Criteria.
- **Assumed (previous approval/s)** – it is assumed this requirement has been met under existing approval/s i.e. existing infrastructure/DA approval/s.
- **N/A** – not applicable; this solution is not relevant to this proposal.

Table 3: BPM compliance against the performance criteria & acceptable solutions – *s.7 Residential Infill Development* (PBP)

<table>
<tr><th>BPM</th><th>Performance Criteria</th><th>Acceptable Solutions</th><th>Compliance & Recommendations</th></tr>
<tr><td colspan="4">s.7.4 Intent of measures: To minimise the risk of bushfire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.</td></tr>
<tr><td colspan="4">The intent may be achieved where:</td></tr>
<tr><td>APZ</td><td>• APZs are provided commensurate with the construction of the building; and
• A defendable space is provided.</td><td>• An APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.6</td><td>Performance Solution – Complies with the Performance Criteria
• A simple performance solution is presented in s.3.1.2 herein demonstrating compliance against the performance criteria.
• The APZ has been provided commensurate with the BAL rating for construction of the building/s and setbacks provided when using the complex methodology (Method 2 AS3959-2018).
• A defendable space around the entire building of 1.5m minimum shall be provided. This area shall be managed to reduce combustible elements, obstructions, and constructed impediments in perpetuity.
• The APZ shall be managed as an IPA in perpetuity for the following distances (Ref. Table 2).
<table>
<tr><th>Aspect</th><th>Minimum APZ Distance</th></tr>
<tr><td>North</td><td>9m</td></tr>
<tr><td>East</td><td>6m</td></tr>
<tr><td>South</td><td>7.6m (to boundary)</td></tr>
<tr><td>West</td><td>9m</td></tr>
</table></td></tr>
<tr><td>APZ</td><td>• APZs are managed and maintained to prevent</td><td>• APZs are managed in accordance with the requirements of Appendix 4 of PBP.</td><td>Acceptable Solution
The APZ shall be:</td></tr>
</table>

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
	the spread of a fire to the building.		• Managed in perpetuity as an IPA. • Vegetation modification is required specifically to achieve a compliant south APZ towards the south boundary. • Trees shall be removed and/or pruned to ensure they do not contact or overhang the dwelling (min. 2m) etc. as per the requirements of Appendix 4 PBP.
APZ	• 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. • APZ are located on lands with a slope less than 18 degrees.	**Complies with the Acceptable Solution**
Access	• Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	• Property access roads are two-wheel drive, all- weather roads.	**Complies with the Acceptable Solution**
Access	• The capacity of access roads is adequate for firefighting vehicles.	• 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.	**Assumed to Comply with the Acceptable Solution** • Being an infill situation, the existing driveway appears satisfactory based on the acceptable solutions commensurate with the level of bushfire risk for the subject site.
Access	• There is appropriate access to water supply.	• Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005. • There is suitable access for a Category 1 fire appliance to within 4m of the static water	**Comply with the Acceptable Solution** • Access to within 4m of the nominated water supply shall be provided.

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
		supply where no reticulated supply is available.	
Access	• Firefighting vehicles can access the dwelling and exit the property safely.	• At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road. Note: 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. In circumstances where this cannot occur, the following requirements apply: • Minimum 4m carriageway width. • In forest, woodland and heath situations, rural property roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m, at the passing bay. • A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches. • Property access must provide a suitable turning area in accordance with Appendix 3.	**Comply with the Acceptable Solution** As an existing infill site, the 4m wide road appears satisfactory, however ensure a suitable turning area for firefighting vehicles is provided as per the acceptable solutions: • Provide a turning area suitable for firefighting vehicles to manoeuvre/exit the site pursuant to Appendix 3 (PBP).

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
		• Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress. • The minimum distance between inner and outer curves is 6m. • The crossfall is not more than 10 degrees. • Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and • A development comprising more than three dwellings has formalised access by dedication of a road and not by right of way. Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.	
Water Supplies	• An adequate water supply is provided for firefighting purposes.	• Reticulated water is to be provided to the development where available. • A static water supply is provided where no reticulated water supply is available.	**Comply with the Acceptable Solution** • A static water supply with min 20,000L shall be provided for firefighting purposes.
Water Supplies	• 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.	**Comply with the Acceptable Solution**

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
Water Supplies	• A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	• Where no reticulated water supply is available, water for firefighting purposes is provided in accordance with Table 5.3d. • A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm Storz outlet with a ball valve is fitted to the outlet. • Ball valve and pipes are adequate for water flow and are metal. • Supply pipes from tank to ball valve have the same bore size to ensure flow volume. • Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. • A hardened ground surface for truck access is supplied within 4m. • Above-ground tanks are manufactured from concrete or metal. • Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959). • Unobstructed access can be provided at all times; underground tanks are clearly marked. • Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters.	**Comply with the Acceptable Solution (non-reticulated water supplies)** • Ensure a min. 20,000 litre water supply is always made available for firefighting purposes. • The water source shall be made available or located within the APZ and away from the structure (e.g. within 20m of the dwelling). • Provide suitable access up to the water source as per the acceptable solutions.

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
		• All exposed water pipes external to the building are metal, including any fittings. • Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump and are shielded against bush fire attack. • Any hose and reel for firefighting connected to the pump shall be 19mm internal diameter; and • Fire hose reels are constructed in accordance with AS/NZS 1221:1997 and installed in accordance with the relevant clauses of AS 2441:2005.	

Electricity 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; and
		• 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*.
			Acceptable Solution
			• Any upgrades to the electricity supply services shall be conducted in accordance with the acceptable solution.

Gas Services	• Location and design of gas services will not lead to ignition of surrounding	• Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP	**Acceptable Solution** • Comply with the acceptable solutions where installed.

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
	Bushland or the fabric of buildings.	Gas, 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 10m 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.	
Construction Standards	• The proposed building can withstand bush fire 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 (please see advice on construction in the flame zone).	**Performance Solution – Complies with the Performance Criteria** Performance Solution (Ref. s.3.2.1 herein): • The BAL with the associated separation distance from the hazard (APZ), was determined in accordance with the complex methodology (Method 2 as per AS3959-2018), the results of which are presented in Appendix B herein. The entire existing building must be modified/upgraded to ensure compliance with the following construction level: • The min. recommended BAL rating is: • BAL-29 – entire dwelling Construction shall be carried out pursuant to the following sections of AS3959-2018: • Section 3 – Construction General; and • Section 7 – Construction for BAL-29; and

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations

			The following NSW variations for construction must be applied:
			• Clause 3.10 of AS3959 is deleted and any sarking used for BAL-12.5, BAL-19, BAL-29 or BAL-40 shall:
			  • Be non-combustible; or
			  • Comply with AS/NZS 4200.1, be installed on the outside of the frame, and have a flammability index of not more than 5 as determined by AS1530.2; and
			• Clause 5.2 ad 6.2 of AS3959 is replaced by Clause 7.2 of AS3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL; and
			• Clause 5.7 and 6.7 of AS3959 is replaced by clause 7.7 of AS3959, except that any wall enclosing the subfloor space need only comply with the wall requirements for the respective BAL.

Construction Standards	• Proposed fences and gates are designed to minimise the spread of bush fire.	• Fencing and gates are constructed in accordance with section 7.6.	**Comply with the Acceptable Solution** • All fences in bushfire prone areas should be made of either hardwood or non-combustible material. • In circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.
Construction Standards	• Proposed Class 10a buildings are designed to minimise the spread of bush fire.	• Class 10a buildings are constructed in accordance with section 8.3.2.	**Comply with the Acceptable Solution** The NCC defines a class 10 building as a non-habitable building or structure such as a: • Class 10a – a non-habitable building being a private garage, carport, shed or the like; or

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
			• Class 10b – a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool, or the like; or • Class 10c – a private bushfire shelter. There are no bushfire protection requirements for Class 10a buildings located more than 6m from a dwelling in bushfire prone areas. Where a Class 10a building is located within 6m of a dwelling it must be constructed in accordance with the NCC.

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 '*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.
			Comply with the Acceptable Solution
			• Landscaping is to be managed in accordance with Appendix 4 (PBP) (Ref. Appendix C herein) and the NSW RFS document '*Guidelines for Asset Protection Zones*'.
			• Where required, fences shall be constructed as follows:
			  • All fences in bush fire prone areas should be made of either hardwood or non-combustible material.
			  • In circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.
			When creating and maintaining gardens within an APZ, key landscaping features may include the following (list not exhaustive):
			• Ensure that vegetation does not provide a continuous path to the house.
			• Plant vegetation in clumps rather than continuous rows.
			• Tree canopy cover should be less than 15% at maturity.
			• Trees at maturity do not overhang or touch the building.

BPM	Performance Criteria	Acceptable Solutions	Compliance & Recommendations
			• Tree canopies should be separated by 2-5m. • Prune low branches min. two metres above the ground. • Shrubs should not be planted under trees. • Locate vegetation far enough away from the asset so that plants to reduce ignition of the asset. • Plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling. • Clumps of shrubs and other plants should be separated from the dwelling and plant away from windows and doors by a distance of at least twice the height of the vegetation. • Use low-flammability plant species i.e. rainforest species, succulents etc. • Use non-flammable ground cover/mulch such as pebbles or crush tile etc.
Emergency Management	• It is recommended the occupants formulate a bushfire survival plan and practice it on a regular basis. • A guide to preparing a 'Bushfire Survival Plan' is available for download on the NSW RFS website: www.rfs.nsw.gov.au (RFS 2019).		

5 CONCLUSION

The combination of BPM's and recommendations contained within this document, aim to reduce the impacts of a bushfire attack to the occupants, firefighters, building/s, and environment. With the aim to reduce consequences of ember attack and direct flame contact with building/s able to be constructed within the proposed BLE. Acceptable and/or performance solutions in relation the bushfire protection measures in combination were used to demonstrate compliance against the requirements set out in PBP.

This report makes the determination through a detailed Bushfire Risk Assessment that the proposed development does not appear to negatively affect the proposed development, having been sited where radiant heat levels are unlikely to exceed critical limits and direct flame contact negated.

The consent authority must be satisfied the development conforms to the relevant specifications and requirements prior to granting of consent. If it is not satisfied the proposed development meets the specifications and requirements the consent authority should consult with the Commissioner of the NSW Rural Fire Service under s.4.14 EP&A Act.

As a BPAD Level 3 accredited practitioner, recognised by the NSW Rural Fire Service, all elements of bushfire attack and BPMs in combination have been considered commensurate with the level or risk in relation to the proposed development.

In conclusion and provided the proposed development is carried out in accordance with the recommendations contained herein, the development, in my professional opinion, shall satisfy the objectives and performance criteria set out in s.7 *Residential Infill Development* (PBP).

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APPENDIX A – SITE & BAL PLANS

Plans by: Provided by the client; Revision E; August 2022.

The following figure indicates the proposed BLE referred to herein. Relocating the proposed BLE will render these results invalid and a reassessment and/or rewrite of this report may be required as a result.

A full set of plans shall be provided by the applicant to accompany the DA. All design and site plans must ensure compliance with the minimum building setbacks in relation to this development as proposed and the recommendations contained herein.

ARCHITECTURAL DRAWINGS

DA0.00	Cover Sheet	E
DA1.01	Existing site plan	C
DA1.02	Proposed site plan	D
DA2.01	Existing primary house & farm shed - floor plan	D
DA2.10	Proposed primary house & farm shed - floor plan	D
DA2.50	Existing primary house & farm shed - Roof plan	B
DA2.51	Proposed primary house & farm shed - Roof plan	C
DA3.01	Existing elevations	D
DA3.10	Proposed elevations	D
DA5.01	Window and door schedule 01	C

CONSULTANT DRAWINGS

22069-tA	Survey by MACRO Consulting Surveyors dated 17.08.2022
2208OCO1913	Bushfire Risk Assessment by Bushfire Risk Pty Ltd dated 12.12.2022
2022.1099	On-site Sewage Management Assessment by HMC environmental consulting Pty Ltd dated September 2022

Change of use at 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482

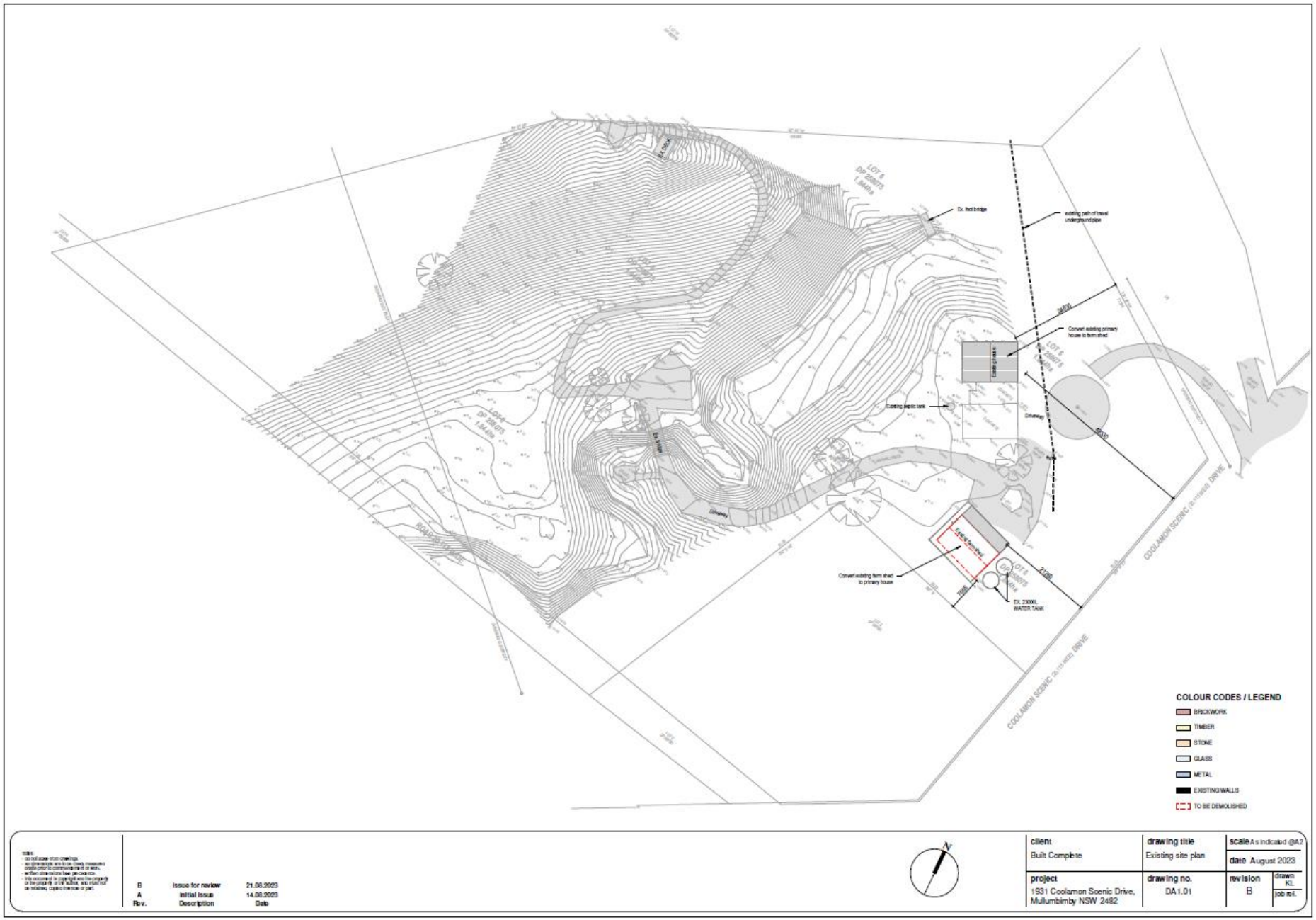
COLOUR CODES / LEGEND

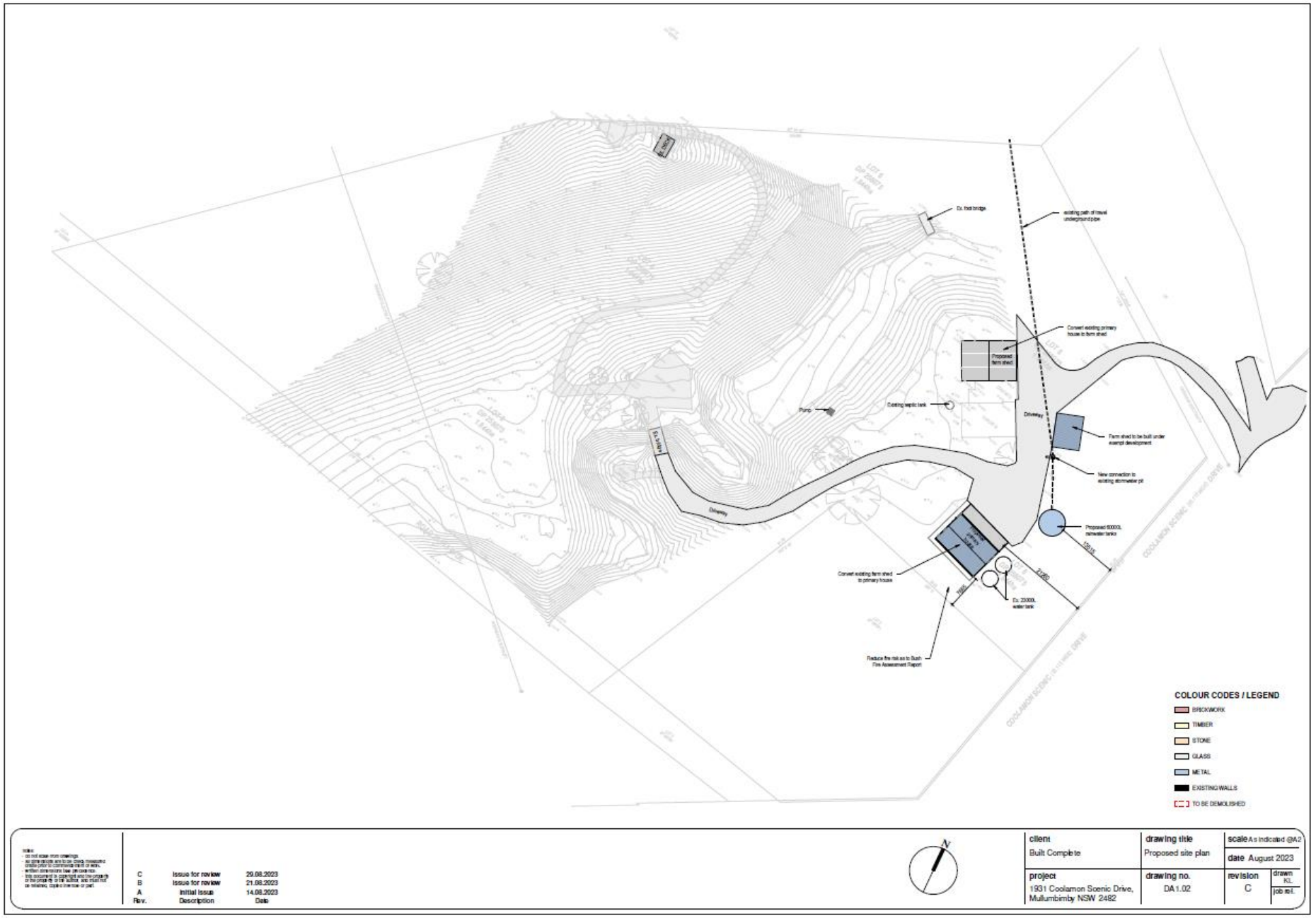
- BRICKWORK
- TIMBER
- STONE
- GLASS
- METAL
- WEATHERBOARD
- EXISTING WALLS
- TO BE DEMOLISHED

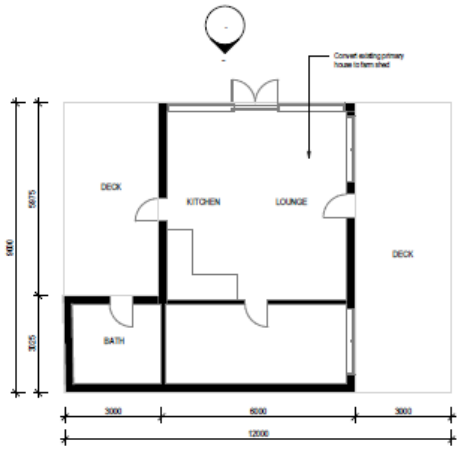
notes:
- do not scale from drawings
- all site details are to be check, measured onsite prior to commencing work or works.
- written dimensions take precedence.
- this document is copyright and the property of the property of the author, and must not be retained, copied in whole or part.

Rev.	Description	Date
E	Issue for approval	04.09.2023
D	Issue for review	31.08.2023
C	Issue for review	29.08.2023
B	Issue for review	21.08.2023
A	Initial issue	14.08.2023

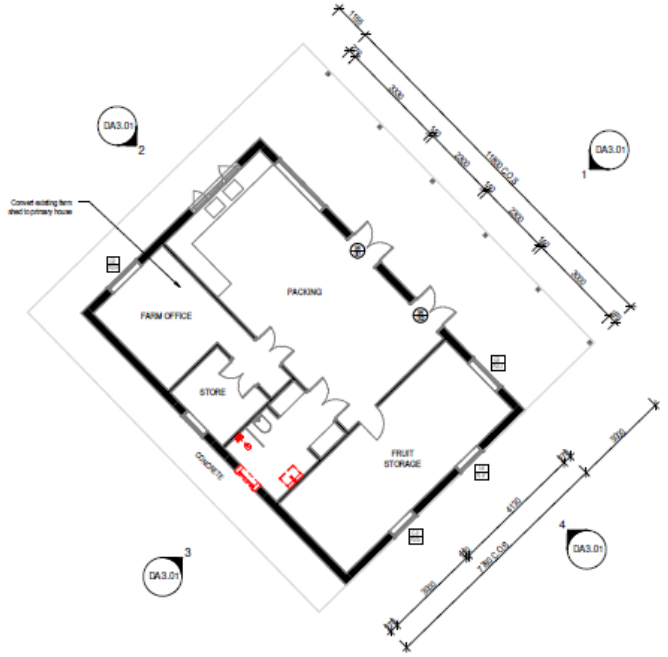
client: Built Complete	drawing title: Cover Sheet	scale: As indicated @A2	
		date: August 2023	
project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482	drawing no.: DA0.00	revision: E	drawn: KL
			job no.:


Ex. foot bridge
existing path of travel underground pipe
24000
Convert existing primary house to farm shed
Existing septic tank
Driveway
9000
Existing farm shed
Convert existing farm shed to primary house
7000
21000
Ex. 23000L WATER TANK
COOLAMON SCENIC DRIVE
COLOUR CODES / LEGEND
BRICKWORK
TIMBER
STONE
GLASS
METAL
EXISTING WALLS
TO BE DEMOLISHED
B Issue for review 21.08.2023
A Initial issue 14.08.2023
Rev. Description Date
client Built Complete
drawing title Existing site plan
scale As indicated @A2
date August 2023
project 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482
drawing no. DA1.01
revision B
drawn KL
job ref.


Ex. foot bridge
existing path of travel underground pipe
Convert existing primary house to farm shed
Proposed farm shed
Pump
Existing septic tank
Driveway
Farm shed to be built under exempt development
New connection to existing stormwater pit
Proposed 60000L rainwater tanks
Convert existing farm shed to primary house
Ex. 23000L water tank
Reduce the risk as to Bush Fire Assessment Report
COLOUR CODES / LEGEND
BRICKWORK
TIMBER
STONE
GLASS
METAL
EXISTING WALLS
TO BE DEMOLISHED
C Issue for review 29.08.2023
B Issue for review 21.08.2023
A Initial issue 14.08.2023
Rev. Description Date
client Built Complete
drawing title Proposed site plan
scale As indicated @A3
date August 2023
project 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482
drawing no. DA1.02
revision C
drawn KL
job no.



1 EXISTING FLOOR PLAN - PRIMARY HOUSE
1 : 100



2 EXISTING FLOOR PLAN - FARM SHED
1 : 100

COLOUR CODES / LEGEND

- BRICKWORK
- TIMBER
- STONE
- GLASS
- METAL
- WEATHERBOARD
- EXISTING WALLS
- TO BE DEMOLISHED

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D	Issue for approval	04.09.2023
C	Issue for review	29.08.2023
B	Issue for review	21.08.2023
A	Initial issue	14.08.2023

client: Built Complete

project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482

drawing title: Existing primary house & farm shed - floor plan

drawing no.: DA2.01

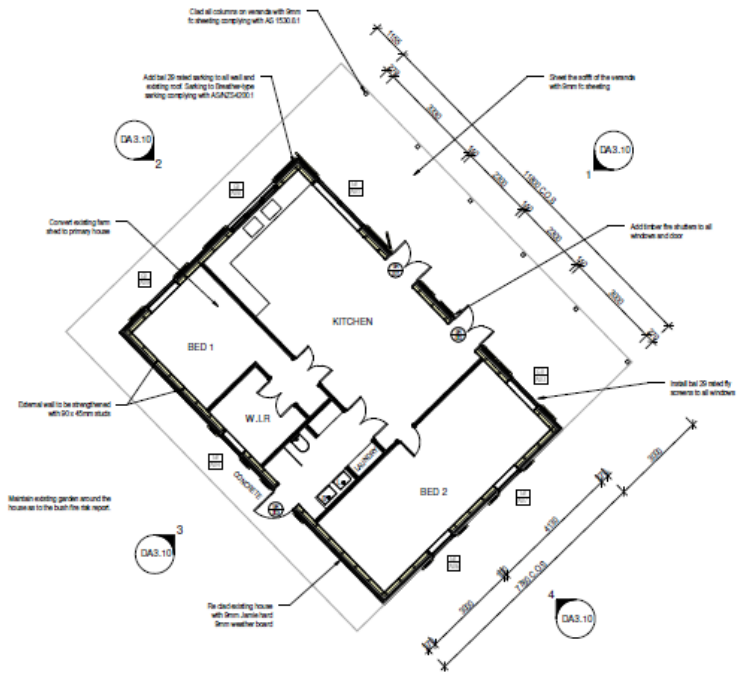
scale: 1 : 100 @A2

date: August 2023

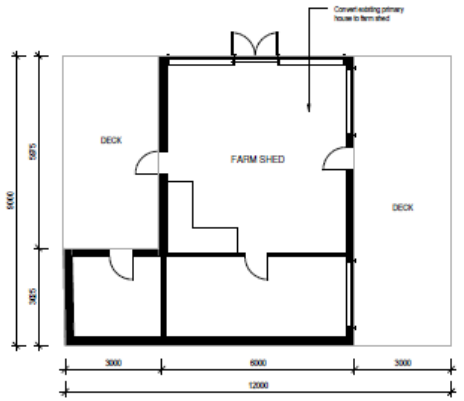
revision: D

drawn: KL

job no.:



1 PROPOSED FLOOR PLAN - CONVERTED PRIMARY HOUSE
1 : 100



2 PROPOSED FLOOR PLAN - CONVERTED FARM SHED
1 : 100

COLOUR CODES / LEGEND

- BRICKWORK
- TIMBER
- STONE
- GLASS
- METAL
- WEATHERBOARD
- EXISTING WALLS
- TO BE DEMOLISHED

Rev.	Description	Date
D	Issue for approval	04.09.2023
C	Issue for review	31.08.2023
B	Issue for review	29.08.2023
A	Issue for review	21.08.2023

client: Built Complete

project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482

drawing title: Proposed primary house & farm shed - floor plans

drawing no.: DA2.10

scale: 1 : 100 @A2

date: August 2023

revision: D

drawn: KL

job no.:

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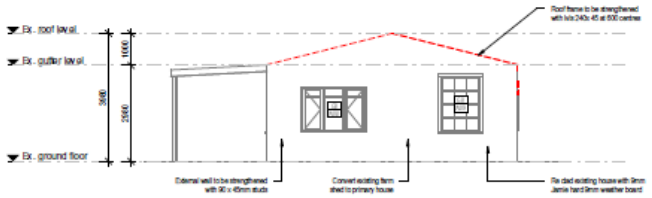

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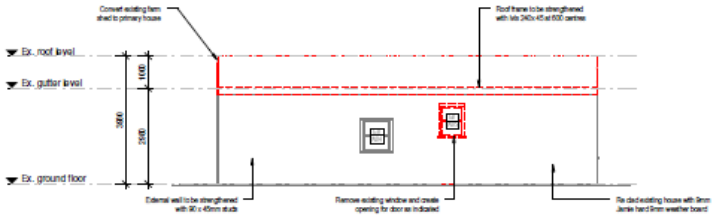
1 : 100



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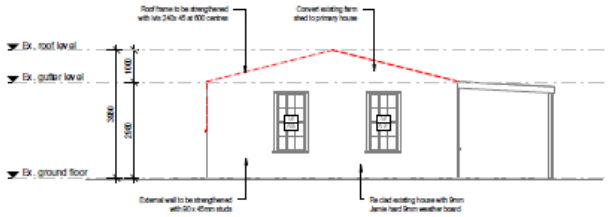
1 : 100



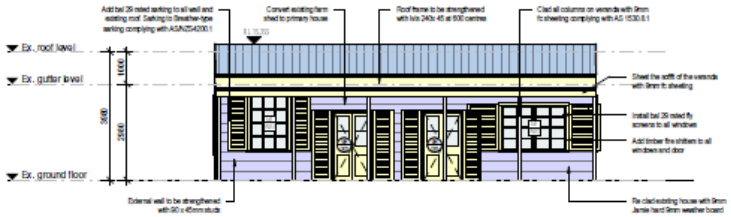
4 **Existing east elevation**
1 : 100

COLOUR CODES / LEGEND

- BRICKWORK
- TIMBER
- STONE
- GLASS
- METAL
- WEATHERBOARD
- EXISTING WALLS
- TO BE DEMOLISHED

Rev.	Description	Date
D	Issue for approval	04.09.2023
C	Issue for review	29.08.2023
B	Issue for review	21.08.2023
A	Initial issue	14.08.2023

client: Built Complete	drawing title: Existing elevations	scale: 1 : 100 @A2
		date: August 2023
project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482	drawing no.: DA3.01	revision: D
		drawn: KL
		job no.:



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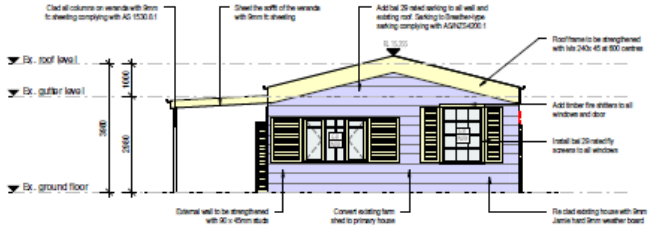
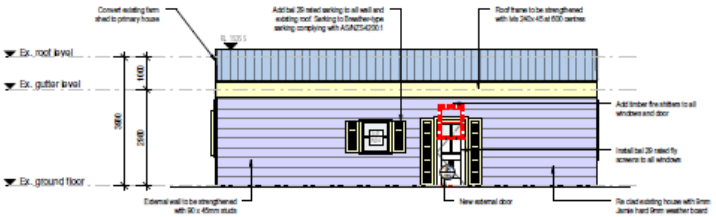


2 **Proposed west elevation**
1 : 100



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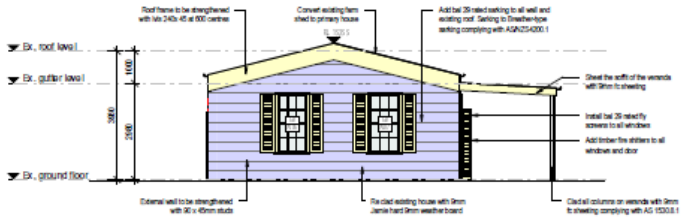
1 : 100



4 **Proposed east elevation**
1 : 100

COLOUR CODES / LEGEND

- BRICKWORK
- TIMBER
- STONE
- GLASS
- METAL
- WEATHERBOARD
- EXISTING WALLS
- TO BE DEMOLISHED

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B	Issue for review	29.08.2023
A	Issue for review	21.08.2023

client: Built Complete	drawing title: Proposed elevations	scale: 1 : 100 @A2	
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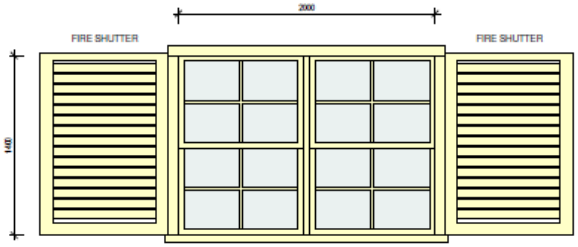
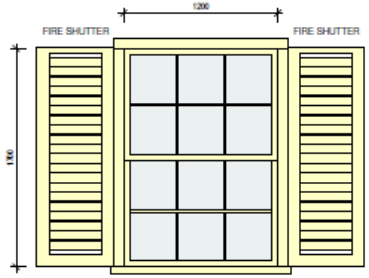
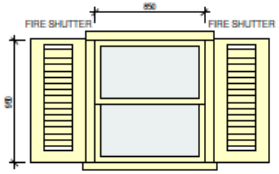
project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482	drawing no.: DA3.10	revision: D	drawn: KL
			job no.:



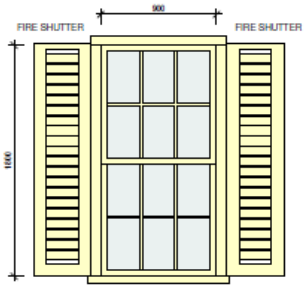
W01
1400MM (H) X 2000MM (W)
DOUBLE HUNG WINDOW
TWIN UNITS



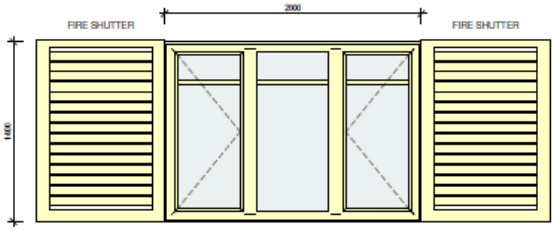
W03 & W09
1700MM (H) X 1200MM (W)
DOUBLE HUNG WINDOW
SINGLE UNITS



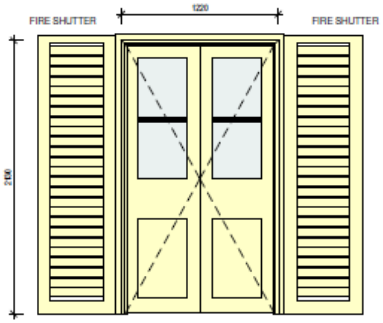
W04
950MM (H) X 850MM (W)
DOUBLE HUNG WINDOW
SINGLE UNITS



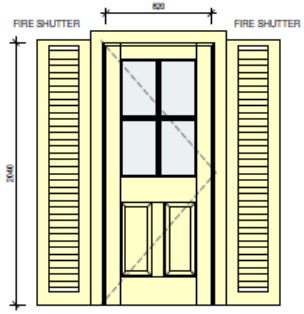
W05 & W07
1800MM (H) X 900MM (W)
DOUBLE HUNG WINDOW
SINGLE UNITS



W08
1400MM (H) X 2000MM (W)
3 SASH CASEMENT WINDOWS



D01 & D02
2130MM (H) X 1220MM (W)
10 LIGHT FRENCH DOOR



D03
2040MM (H) X 820MM (W)
EXTERNAL DOOR

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Rev.	Description	Date
C	Issue for approval	04.09.2023
B	Issue for review	31.08.2023
A	Issue for review	29.08.2023

client: Built Complete

project: 1931 Coolamon Scenic Drive, Mullumbimby NSW 2482

drawing title: Window and door schedule 01

drawing no.: DA5.01

scale: 1 : 25 @A2

date: August 2023

revision: C

drawn: KL

job no.:

APPENDIX B – BFAA – METHOD 2 RESULTS

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 1/08/2023 **Assessment Date:** 1/08/2023

Site Street Address: 1931 Coolamon Scenic Dv, Mullumbimby

Assessor: Melanie Jackson; Bushfire Risk Pty Ltd

Local Government Area: Byron **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: East

Vegetation Information

Vegetation Type:	Rainforest		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	10 Degrees	**Vegetation Slope Type:**	Upslope
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:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	6

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:**	80

Program Outputs

Level of Construction:	BAL 29	**Peak Elevation of Receiver(m):**	2.17
Radiant Heat(kW/m2):	26.36	**Flame Angle (degrees):**	67
Flame Length(m):	4.71	**Maximum View Factor:**	0.393
Rate Of Spread (km/h):	0.48	**Inner Protection Area(m):**	6
Transmissivity:	0.883	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	3284		

APPENDIX C – RFS GUIDELINES & FAST FACTS

APPENDIX 3

ACCESS

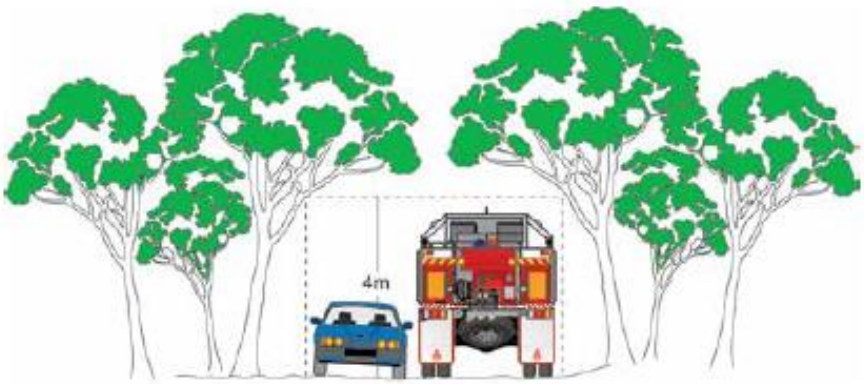
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

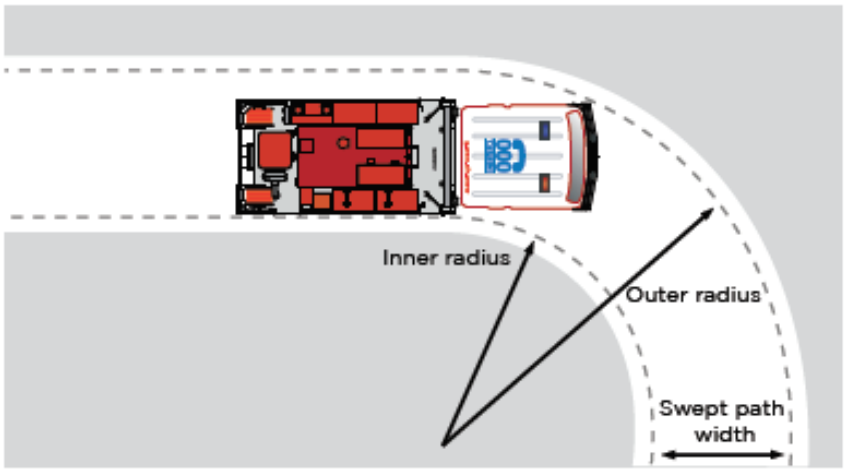
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.

Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

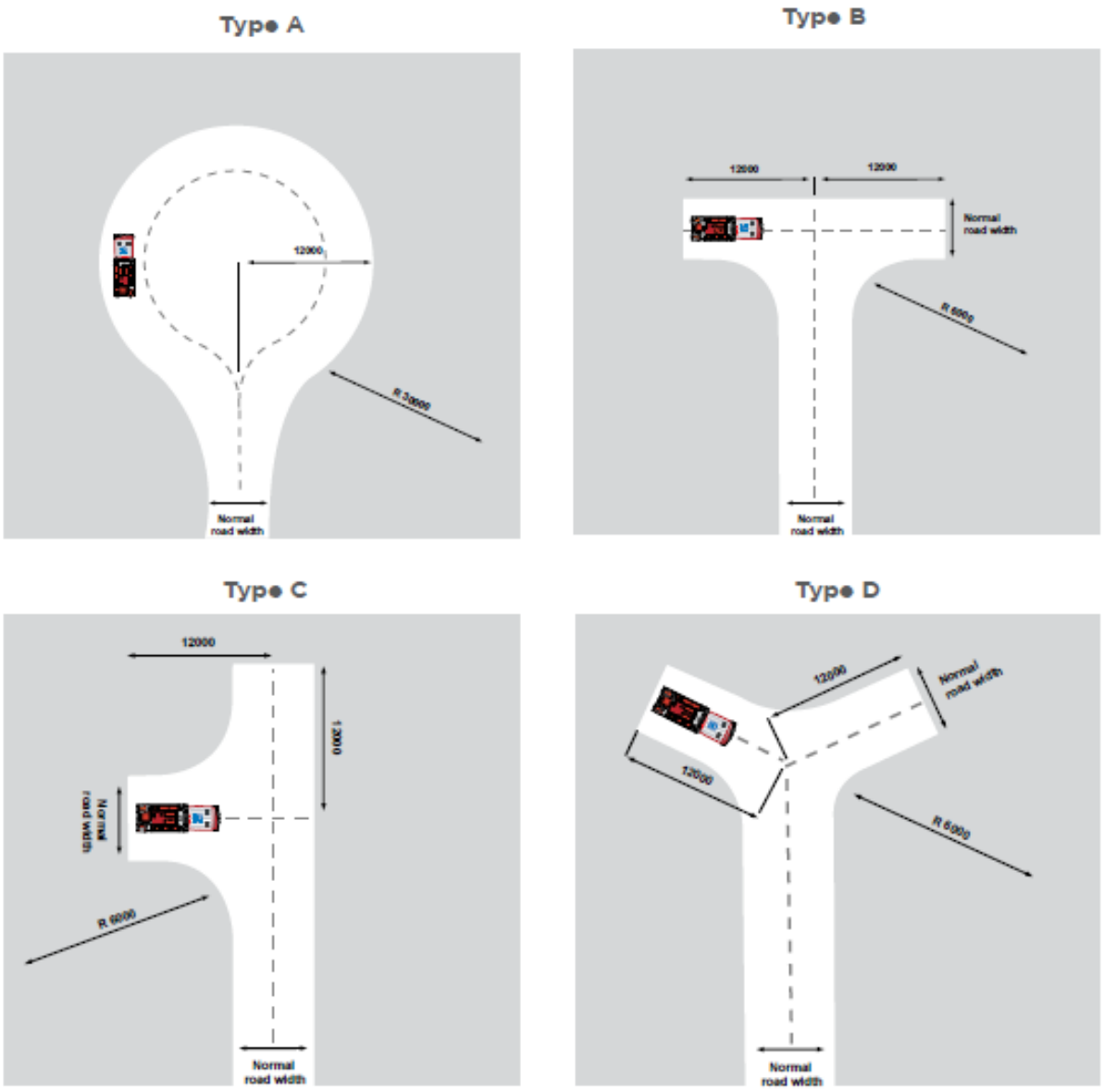
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

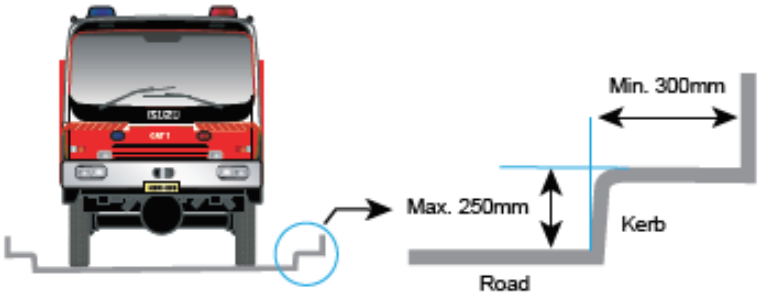
Hydrants and parking bays.

A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

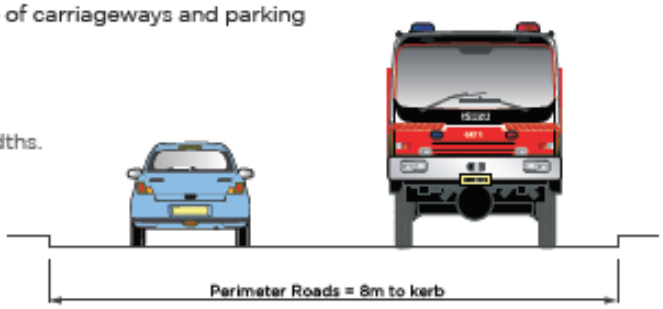
A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

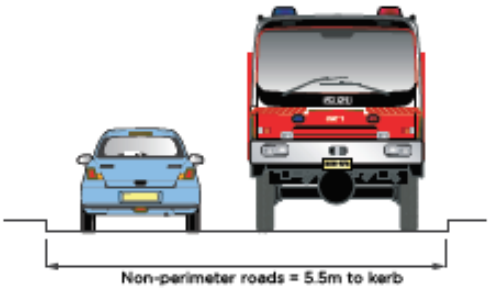


A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.

APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- 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

- create 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

- 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.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.