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To be referred to NSW Rural Fire Service

Bush Fire Assessment Report – Planning Proposal

LGA:	Byron Shire Council
Lot & DP:	5//585928
Street Address:	55 Settlement Road Main Arm
Building Use:	Class 1a Residential (non-SFPP)
Development:	Existing Unauthorised Dwelling
Prepared For:	Planners North Pty Ltd

Prepared By:	Peter Thornton BPAD-L3 Accredited Practitioner No. 14867  
Report Reference:	23/117
Report Details:	Revision A: 23.07.2023

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DOCUMENT CONTROL

Revision No.	Date	Description	Prepared	Checked	Authorised
A	23.07.2023	Final Report	Peter Thornton	SJT	Peter Thornton

1.0 EXECUTIVE SUMMARY

Bushfire Certifiers have been engaged to prepare a bushfire assessment report for the purposes of the applicant obtaining a dwelling opportunity and to use the existing (unauthorised) dwelling at Lot 5 DP 585928, 55 Settlement Road Main Arm.

As requested, the study will be used to establish the existing dwelling is suitable for residential use as the proposed siting option for a dwelling opportunity for the subject property. This report is to be referred to the NSW Rural Fire Service as a means of demonstrating compliance with the *Environment Planning and Assessment Act 1979* Section 9.1, Ministerial Direction 4.3, and Planning for Bush Fire Protection 2019 (PBP2019).

The study has determined that the subject land supporting the existing dwelling is appropriate in the bushfire hazard context subject to the recommendations in this report. Bushfire mitigation and management measures for the development can be adequately addressed with the proposal having the ability within the subject property to comply with PBP2019. This is, however, contingent on the consent authority concurring with the public road assessment and upgrade Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023.

The report provides recommendations to demonstrate the land can meet the bushfire prevention measures of PBP2019 and Ministerial Direction 4.3, with the recommendations considering the following bushfire protection measure aspects -

- Bushfire Attack Level (BAL) construction standards
- Setbacks from bushfire hazard vegetation (Asset Protection Zones)
- Fuel management within APZs
- Access and egress from the proposed allotment via an appropriate well designed road system to support evacuation and fire fighting demands
- Underground electricity and gas services
- Compliant water supplies

The following table is provided as a summary of the recommendations and method of assessment for each consideration relating to Planning for Bushfire Protection 2019.

MEASURE	RECOMMENDATION	METHOD OF ASSESSMENT
Construction Standards	The dwelling is to be upgraded to meet the requirements of BAL 29 AS 3959-2018 + Section 7.5 Planning for Bushfire Protection 2019. Construction specification detailing compliance shall be shown on the plans submitted with the application for a construction certificate and certified by a registered building certifier. Fences and gates within the APZ are to be made of either hardwood or non-combustible material. Where a new fence or gate is constructed within 6m of the dwelling it is to be made of non-combustible material only.	Acceptable Solution

APZ Required	At the commencement of works and in perpetuity the following asset protection zones for the dwelling are to be managed and maintained as an Inner Protection Area (IPA) in accordance with Appendix 4 of Planning for Bushfire Protection 2019 and the requirements of 'Standards for Asset Protection Zones' (RFS 2005) (see ***attached*** Appendix C & Appendix D). • North for 12m • East for 12m • South for 9m • West for 10m	Acceptable Solution
Water Supply	A 30,000-litre water supply and RFS connection to a non-combustible water tank is to provide coverage of the dwelling. A fire fighter minimum 5hp or 3kW petrol or diesel-powered pump be provided within the recommended asset protection zones and shielded against bush fire attack (note – no electric pumps). An associated hose and reel for firefighting is to be connected to the pump and shall be 19mm internal diameter. A fire hose reel is to be constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005.	Acceptable Solution & Additional Measures due to access performance solution.
Electricity & Gas Supply	Electricity and gas for the dwelling are to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 & AS3959-2018.	Acceptable Solution
Landscape	Landscaping for the dwelling is to be undertaken in accordance with Appendix 4 of PBP2019.	Acceptable Solution
Access	The internal property access road is to be upgraded to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 except no alternative access road is required. The upgrading of Settlement Road recommended by the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023 is to be approved by Byron Shire Council. Any variations to the upgrade requirements or refusal of the report will require re-evaluation and an amended bushfire report for consideration if meritorious.	Performance Solution
Bushfire preparation planning	*It is recommended that the property owner and occupants familiarise themselves with the relevant bushfire preparation and survival information located on the NSW Rural Fire Service website. This website should be accessed periodically to ensure the property owner and occupants are aware of the latest information. The RFS website is www.rfs.nsw.gov.au*	*Advisory Note Only*

2.0 INTRODUCTION

2.1 GENERAL

The purpose of this report is to establish suitable bushfire mitigation measures for the existing (unauthorised) dwelling for the purposes of obtaining a dwelling entitlement at Lot 5 DP 585928, 55 Settlement Road Main Arm, demonstrating compliance with the Environment Planning and Assessment Act 1979 Section 9.1, Ministerial Direction 4.3, and Planning for Bush Fire Protection 2019 (PBP2019).

The recommendations within this report address the aims and objectives of Planning for Bushfire Protection 2019 to reduce the risk of ignition of the building in a bushfire event. It is noted however that bushfire is a natural phenomenon and there can never be any guarantee that a building or occupants will not be adversely affected by bushfire.

2.2 SIGNIFICANT ENVIRONMENTAL FEATURES

An assessment is to be undertaken, if applicable, regarding:

- SEPP (Biodiversity and Conservation) 2021
- SEPP (Resilience and Hazards) 2021
- Biodiversity Conservation Act 2016 (NSW)
- Local Land Services Act 2013 (NSW)
- Land Management (Native Vegetation) Code 2017 (NSW)
- National Parks and Wildlife Act 1974 (NSW)
- Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)

Note: This report does not consider the above legislation and in this regard this report should be read in conjunction with the Statement of Environmental Effects submitted with the development application.

2.3 PROPOSED DEVELOPMENT

The applicant has submitted a Planning Proposal for a dwelling entitlement at Lot 5 DP 585928, 55 Settlement Road Main Arm. The subject property currently supports an existing (unauthorised) dwelling as shown on the aerial in Figure 2. The dwelling is constructed of timber with a metal roof and bearer and joist construction.

This report assesses and provides recommendations required for the use of the existing dwelling to be used as the dwelling opportunity sought.

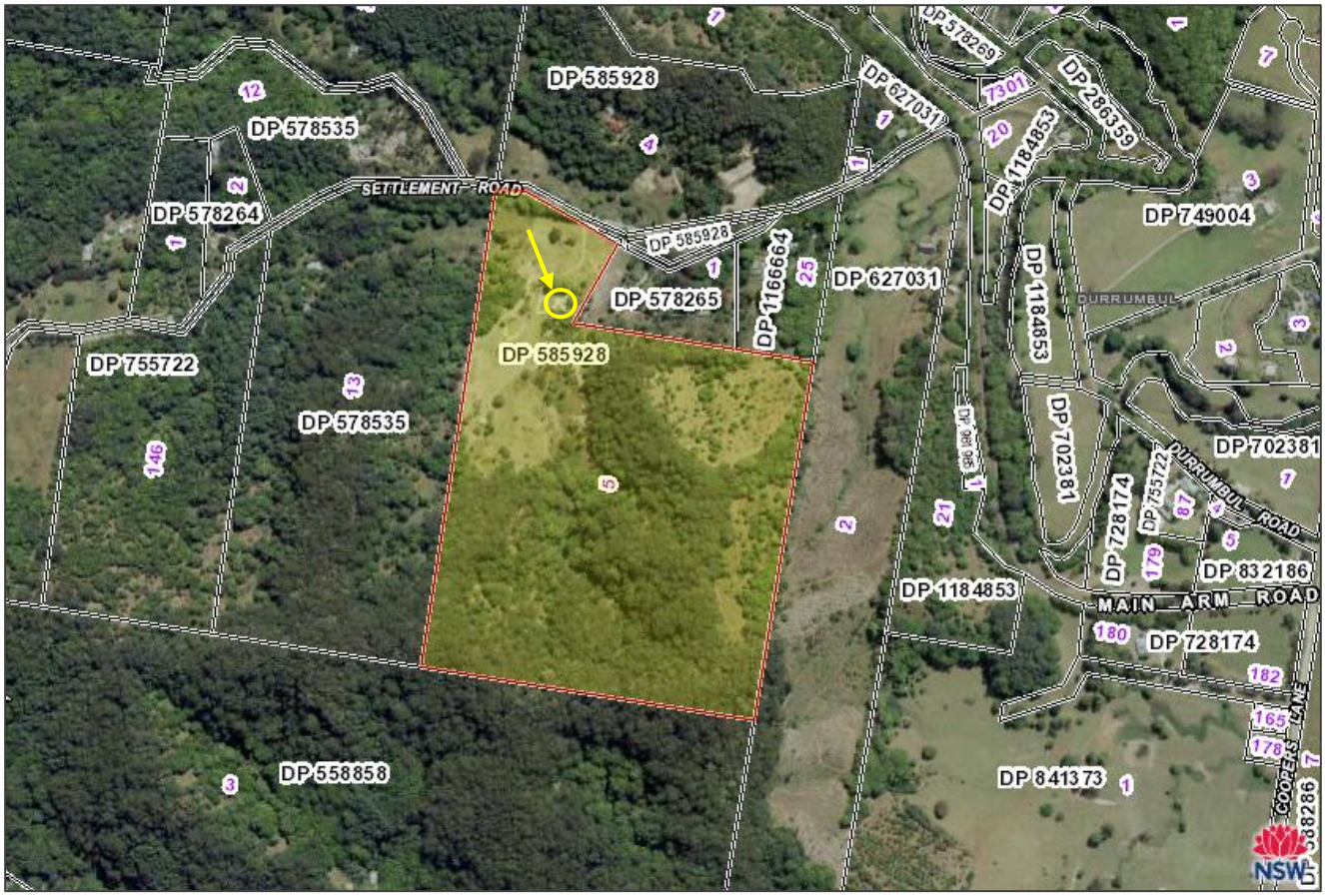


Figure 1: Location of subject property and dwelling *Source: NSW Govt. Six Maps*

Figure 2: Existing unauthorised dwelling *Source: Nearmap, 17.03.2023*

3.0 BUSHFIRE THREAT ASSESSMENT

3.1 BUSHFIRE PRONE LAND MAP

The bushfire prone mapping identifies the subject allotment as being bushfire prone (Figure 3). Aerial mapping and inspection of the site reveals that the bushfire prone land map is reasonably accurate with respect to the current bushfire hazard.

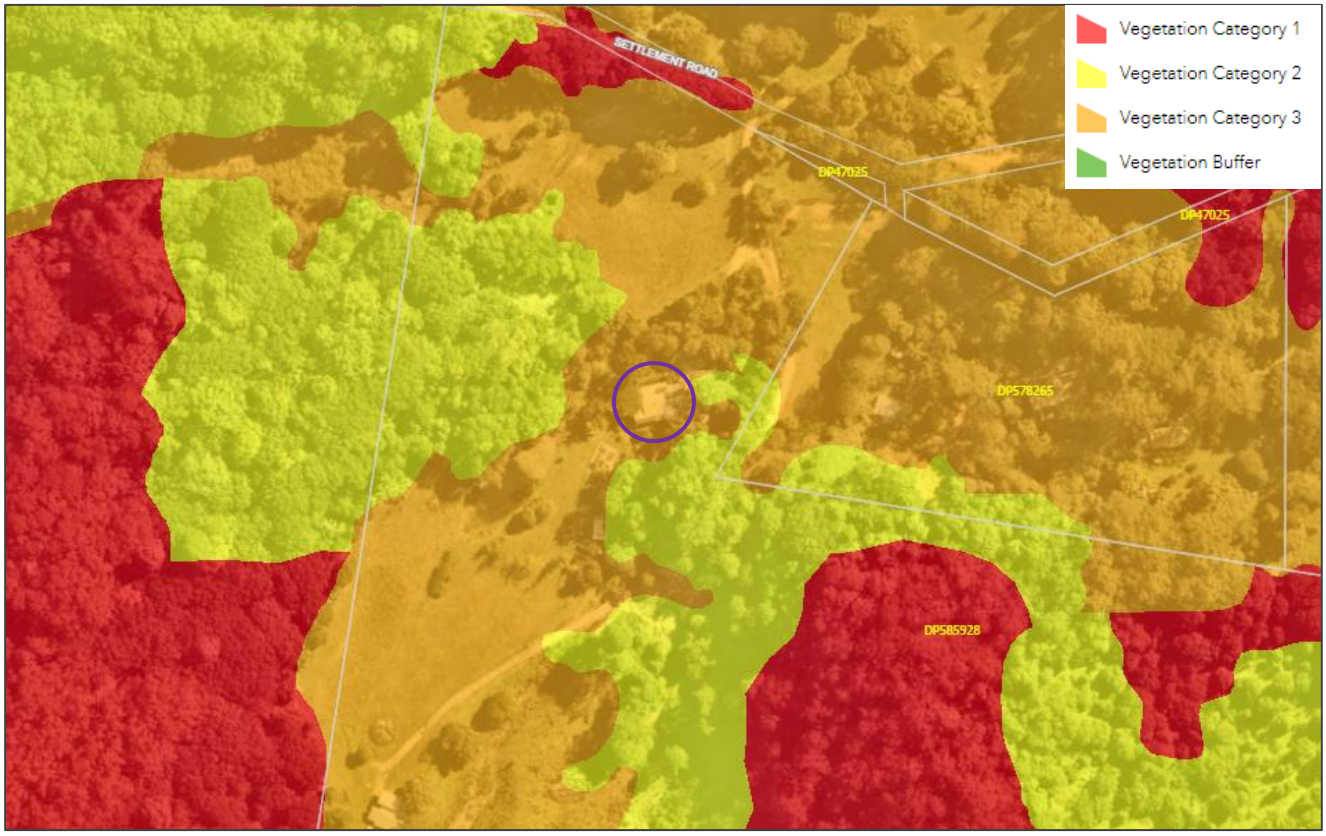


Figure 3: Bushfire prone land map *Source: BSC online mapping*

3.2 ASSESSMENT – ASSET PROTECTION ZONES & CONSTRUCTION STANDARDS

Identification of the vegetation formations for each aspect within 140 metres of the dwelling as per Keith (2004) classifications was undertaken and is detailed as follows. The slope was measured onsite with a 'Tru Pulse 3600 R' laser range finder and inclinometer with the assessment undertaken.

Asset Protection Zones are areas established and maintained to ensure that bushfire fuels are progressively reduced between the development and the bushfire hazard. The asset protection zone incorporates an Inner Protection Area (IPA) having reduced fuel loadings.

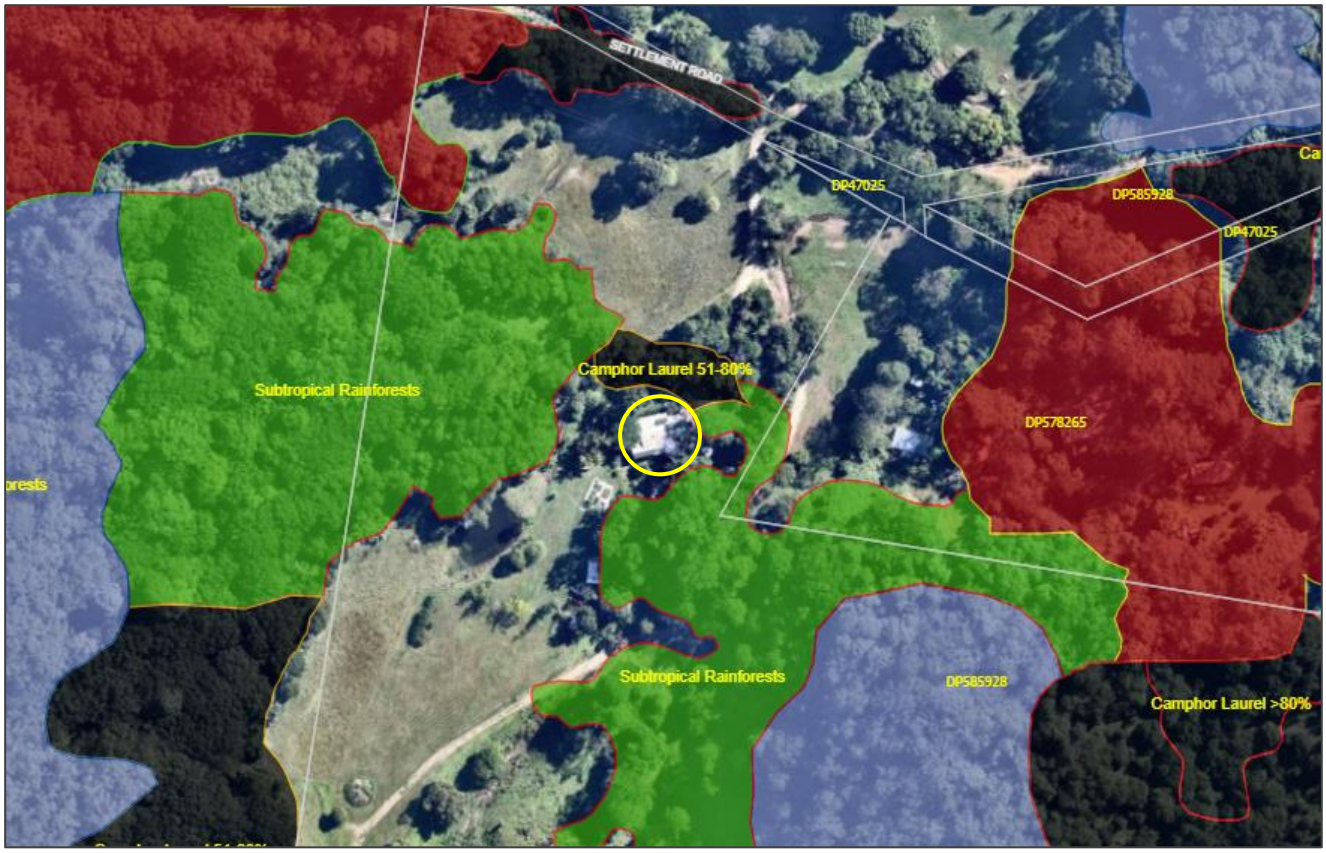


Figure 4: Vegetation communities 2023 *Source: BSC online mapping*

Figure 5: Bushfire threat analysis (subject dwelling yellow circled; neighbouring dwelling red circled)
Source: BSC online mapping

The following table summarises the category of bushfire attack pursuant to Planning for Bushfire Protection 2019.

Table 1: Summary Bushfire Threat Assessment, APZs & Construction Standards – Existing Dwelling					
ASPECT	**SLOPE**	**VEG. CLASS Figure A1.2 PBP2019**	**APZ REQUIRED Table A1.12.3 PBP2019**	**APZ RECOMMENDED**	**CONSTRUCTION AS 3959-2018**
Northeast	0-5$^{0\ d/s}$	Rainforest	12m	12m	To be upgraded to meet the construction standard requirements of BAL 29 + s.7.5 PBP 2019
East & Southeast	Upslope	Rainforest	9m	9m	
Southwest	Upslope	Grassland	10m	10m	
West & Northwest	Upslope	Rainforest	9m	9m	

Figure 6: Location of recommended asset protection zones to dwelling.

Source: Biodiversity Report dated 28th June 2023.

Figure 7: Close up of recommended APZ and location of rainforest hazard.

Source: Biodiversity Report dated 28th June 2023.

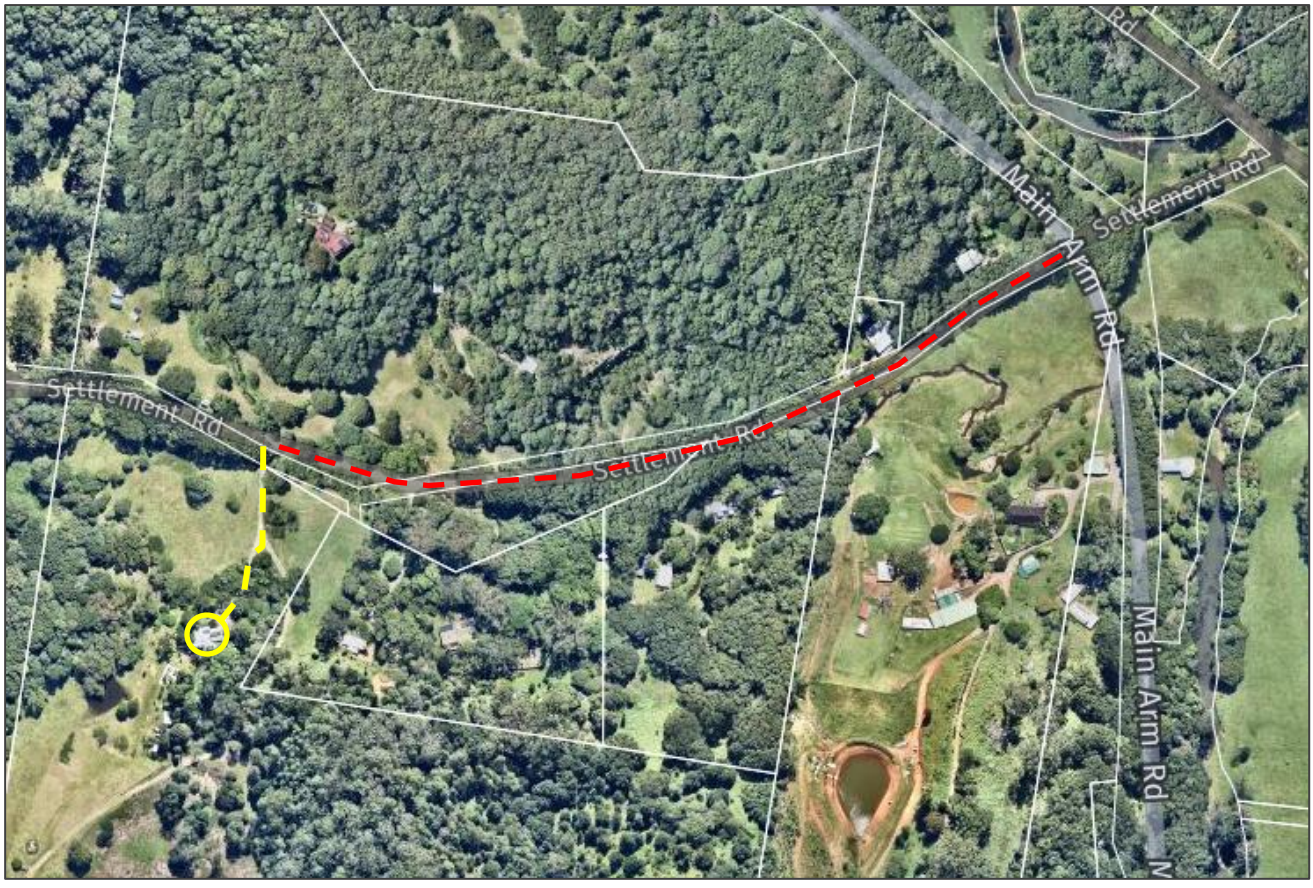


Figure 8: Public road ~500m from Main Arm Road (red dashed line); onsite access road ~110m (yellow dashed line) *Source: Nearmap, 17.03.2023*

4.0 MINISTERIAL DIRECTION 4.3 INCLUDING STRATEGIC BUSHFIRE STUDY (Table 4.2.1 PBP2019)

Ministerial Direction 4.3 contained within the NSW Department of Planning and Environment Local Planning Directions, states:

(1) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of clause 4, Schedule 1 to the EP&A Act, and take into account any comments so made.

(2) A planning proposal must:

(a) have regard to Planning for Bushfire Protection 2019

The report identifies the required Bushfire Protection Measures required for the proposed dwelling opportunity for the subject property in relation to the existing dwelling constructed without prior Council approval. The report provides recommendations for compliance with the performance criteria of Planning for Bushfire Protection 2019 however it does rely on the consent authority's concurrence with the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated 23rd July 2023 in relation to adequate public road access/egress during an emergency event, including non-bushfire events.

(b) introduce controls that avoid placing inappropriate developments in hazardous areas

<u>Location/siting</u>

The existing unauthorized dwelling is the location of the proposed dwelling opportunity. The dwelling is in a location that limits the impact from bushfire relating to all potential ignition sources i.e. convective heat, radiant heat, and ember attack.

The dwelling is located adjacent to a gully with the predominant rainforest bushfire hazard located on upslopes. The upslope location of the bushfire hazard will result in a reduced intensity of the fire front due to a reduced rate of spread as fuel availability from the seat of the fire is decreased.

The fire behaviour is more likely to have the fire front tilt closer to 90 degrees further limiting potential flame contact and radiant heat based on the APZ recommendations. Further, the location in some cases creates a lee-side eddy (Cheney 2008) with wind traversing back into the front of the fire lessening embers impact compared to downslopes.

(c) ensure that bushfire hazard reduction is not prohibited within the Asset Protection Zone (APZ).

The recommendation for the dwelling incorporates APZ setbacks for 29kW/m^2 in accordance with Tables A1.12.3 of Planning for Bushfire Protection 2019. The ecological assessment has confirmed the asset protection zones can be established as required without ecological impact.

(3) A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:

(a) provide an Asset Protection Zone (APZ) incorporating at a minimum:

i. an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

ii. an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,

Locations of asset protection zones have been identified in Section 3 of the report.

(b) for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the Rural Fires Act 1997), the APZ provisions must be complied with

Section 3 of this report provides the asset protection zone location and depths for both SFPP and non-SFPP development. The report identifies there is merit to provide performance solutions to further reduce the asset protection depths for non-SFPP development subject to a specific assessment in consultation with the NSW Rural Fire Service (NSW RFS) if required.

(c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks

The capacity of the internal access and wider public road network has been considered by a traffic consultant, regarding the performance criteria of PBP2019 which states –

The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; and

The location of key access routes and direction of travel; and

The potential for development to be isolated in the event of a bush fire.

The assessment of the existing public road network for emergency access and egress from the subject property has been assessed by SDS Civil Enterprises with the Traffic Safety Assessment report provided in Appendix A, which demonstrates -

i. *Compliance with AS2890.1 driveway sight lines can be achieved;*
ii. *Bushfire truck access can be achieved via localised upgrade of the driveway entrance as per the works identified in Figure 3.3.*
iii. *A net benefit is able to be provided to the wider community via implementing the passing bay works within Settlement Road as identified in Figure 4.*
iv. *By installing 3 x 600dia culverts, the internal driveway will achieve a 1yr flood immunity.*

(d) contain provisions for adequate water supply for firefighting purposes,

New water supply will be required to comply with Section 5.3.3 and Table 5.3c of Planning for Bushfire Protection 2019 and AS 3959-2018. In this regard the following recommendations are made for each consideration, consistent with the acceptance solutions.

Static Water Supply
30,000 litre non-combustible tank required within 4m of the hardstand. A SWS - Stored Water Supply sign is recommended to be attached to the front gate or in that proximity.

(e) minimise the perimeter of the area of land interfacing the hazard which may be developed,

The existing dwelling is in a location that limits the interface of the hazard.

(f) introduce controls on the placement of combustible materials in the Inner Protection Area.

As identified in Section 3 of this report, the asset protection zones are to be managed and maintained in accordance with Table 5.3a PBP2019. This requirement limits the placement of combustible material with the Inner Protection Area; however this can be reinforced with planning controls if deemed necessary.

Landscaping
Landscaping for the proposed dwelling is to be undertaken in accordance with Appendix 4 of PBP2019.

Table 1: Summary Strategic Bush Fire Study (Table 4.2.1 PBP 2019).

ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS	COMMENT
Bush fire landscape assessment	Considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	The bush fire hazard in the surrounding area, including vegetation, topography, and weather.	Addressed in bushfire report. Minimum required APZ setbacks capable of complying with PBP2019. Suitable for a dwelling opportunity.
		The potential fire behaviour that might be generated based on the above.	Addressed in bushfire report. Suitable for a dwelling opportunity.
		History of bush fire in the area.	The area has a history of bushfires although specific information was not available at the time of reporting. The bushfire hazard assessment has included recommendation based on a fire occurring in the locality.
		Potential fire runs into the site and the intensity of such fire runs.	The fire runs are limited in areas given the location of adjoining and existing development in the locality. The fire run intensity however is reduced due to the location of the dwelling being at the bottom of ridges to the west, southeast and south. Suitable for a dwelling opportunity.
		The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.	The fire run intensity however is reduced due to the location of the dwelling being at the bottom of ridges to the west, southeast and south. The fragmentation of Landscape in the locality identified in the following aerial, consists of areas of managed vegetation around existing development particularly to the north, east and northwest to a degree. This fragmentation will reduce fire intensity due to disrupted fuel loads.

			 Areas of managed land disrupts continuity of fuels and bushfire intensity. The property access is to be upgraded to fully comply with the acceptable solutions of Planning for Bushfire Protection 2019. The existing public road access is recommended for upgrading as outlined in the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023. Water supply will be provided for firefighting intervention and a pump and fire hose added to the recommendation to allow for occupant suppression if safe to do so.
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout	The risk profile of different areas of the development layout based on the above landscape study.	Dwelling opportunity is considered reasonable based on the location of the existing dwelling on site.
		The proposed land use zones and permitted uses.	Dwelling opportunity is considered reasonable based on the location of the existing dwelling on site.
		The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on	As previously outlined the dwelling is in the lower areas of the topography in the locality i.e. located away from ridge tops etc.

	for the proposed land uses.	ridge tops, SFPP development located in lower risk areas of the site).	
		The impact of the siting of these uses on APZ provision.	Consult ecologist report is provided confirming the recommended asset protection zones can be applied.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile.	(i) Compliance with AS2890.1 driveway sight lines can be achieved; (ii) Bushfire truck access can be achieved via localised upgrade of the driveway entrance as per the works identified in Figure 3.3. (iii) A net benefit is able to be provided to the wider community via implementing the passing bay works within Settlement Road as identified in Figure 4. (iv) By installing 3 x 600dia culverts, the internal driveway will achieve a 1yr flood immunity.
		The location of key access routes and direction of travel.	The first 350m of Settlement Road is of a 3m sealed width on 4m wide pavement. Refer Plate 2. The balance of Settlement Road is gravel pavement from the end of bitumen seal to the driveway access to this planning proposal site as shown in Plate 1. The length of this section of gravel pavement is 170m.
		The potential for development to be isolated in the event of a bush fire.	Settlement Road is considered a minor rural road within Byron Shire Council's road hierarchy classification. It services nominally 30+ dwellings. The intersection of Settlement Road with Main Arm Road has recently been upgraded in year 2020 via black spot funding.
Emergency services	An assessment of the future impact of new development on emergency services.	Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/brigades.	The increase of one dwelling will not have a significant impact on existing emergency services.
		Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.	Static water supply recommended with compliant property road access upgrade to comply with PBP2019.
Infra-structure	An assessment of the issues associated with	The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and	No reticulated supply available or proposed.

	infrastructure and utilities.	spacing of hydrants.	
		Life safety issues associated with fire and proximity to high voltage power lines, natural gas lines etc.	Nil known in the proximity.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.	The proposal will not increase pressure on Bushfire Protection Measures (BPMs) to adjoining properties. Conversersley, the approval of the dwelling use and bushfire recommendations will further reduce bushfire impact on adjoining properties. This is achieved by providing specific asset protection zones creating further disruption to fuel availability in a bushfire event, provides additional water source and access for NSW Rural Fire Service to attend for fuel reduction.

5.0 ACCESS

The property access to the proposed dwelling is to be provided directly from Settlement Road having a length of approximately 110m. Consideration has been given to Settlement Road being a dead-end road and the overall distance to the two-way road being Main Arm Road is approximately 600m with approximately 50% of this distance passing by unmanaged forest vegetation directly adjacent to the road.

While Chapter 5 would generally be considered for rezoning or subdivisions, the proposed dwelling entitlement relates to an existing unauthorized dwelling on site which will require assessment pursuant to Chapter 7 for the proposed use of the existing dwelling. In this regard, the performance solution of Section 7 – Table 7.4a for property access road has been given consideration must also be given to the dead-end public road in any case.

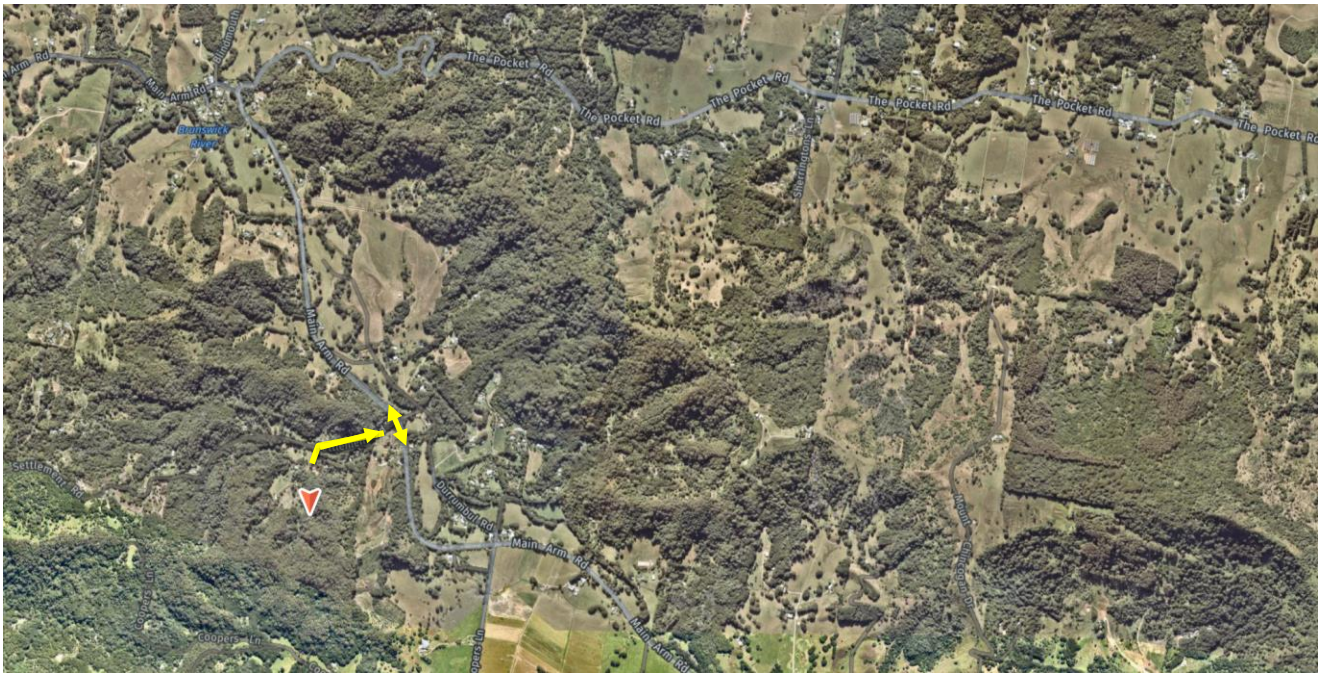


Figure 9: Overall public road network in relation to the subject property.

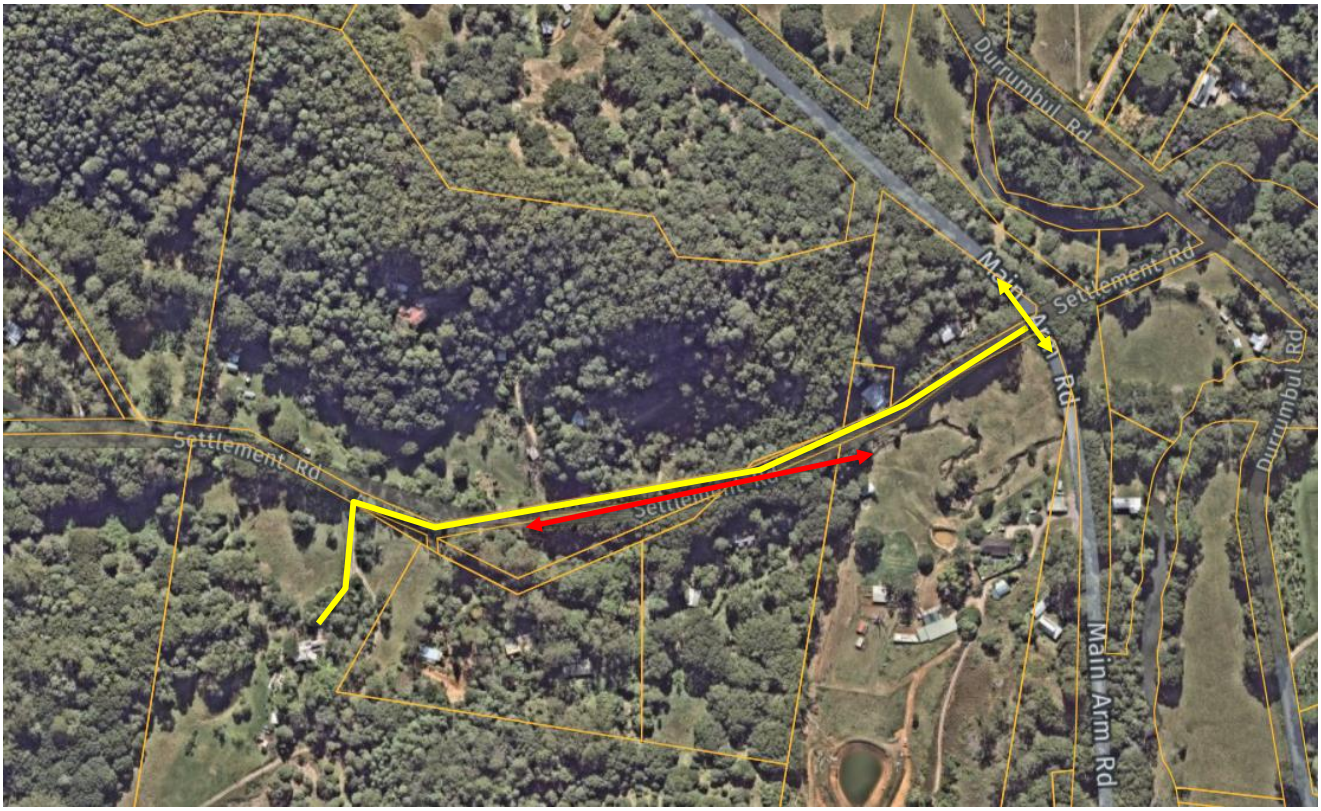


Figure 10: Distance is approximately 600m from the dwelling to the two way road with approximately 300m passing by unmanaged land, with the remainder having a level of forest management.

ACCEPTABLE SOLUTION RELATING TO ACCESS >200M FROM PUBLIC THROUGH ROAD

The application departs from the acceptable solutions relating to access specified in Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 which states:

'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'.

PERFORMANCE CRITERIA RELATING TO ACCESS

The relevant performance criteria in this regard is:

'firefighting vehicles can access the dwelling and exit the property safely' (Table 7.4a PBP2019).

ACCEPTANCE CRITERIA

Demonstration the proposed internal property access road will use the acceptable solutions as a guide to provide a reasonable outcome for infill development to aid firefighting operations.

'Provide access to aid firefighting operations.'

SCOPE

The scope of the performance solution is limited to the departure from the acceptable solution requirements identified in this report.

LIMITATIONS

The report provides recommendations that will reduce the risk of ignition to a future building while the fire front passes however as documented:

> *'The goal of absolute safety during a bush fire event is not attainable and despite best effort there is the ever-present risk of personal injury or damage to property. Ultimately, it is the responsibility of the owner/occupier to comply with conditions of consent and to maintain systems designed to mitigate the impacts of bush fire'.*

The report also acknowledges and reflects the limitations outlined in Section 1.3 of Planning for Bushfire Protection 2019 being -

'Due to a range of limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event. Limitations of this document include, but are not limited to uncertainties in the following areas: Fire Danger Index; fuel loads; existing developments; human behavior; and maintenance'.

The study relies on the owner/occupier to comply with the recommendations in this report and the consent conditions and to maintain in perpetuity systems designed to mitigate the impacts of bush fire. The report is not considered to be a compliance report for any other aspects other than that specified in the scope.

For the consideration of the adequacy of the Settlement Road in an emergency event, the report relies upon the expertise of the civil engineer and the adequacy and upgrade of Settlement Road outlined in the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023.

ASSUMPTIONS

The dwelling, once upgraded, is compliant with the acceptable solutions of Planning for Bushfire Protection 2019 and the recommendations within this report relating to the performance study. The building and asset protection zones, water, access, and landscaping will be managed and maintained in perpetuity in accordance with Planning for Bushfire Protection 2019.

STAKEHOLDERS

- BCA Check Pty Ltd t/a Bushfire Certifiers – Bushfire Consultants – Peter Thornton
- NSW Rural Fire Service – Advice agency for referral and comment
- Byron Shire Council – Consent Authority
- Consultant Town Planner – Planners North – Kate Singleton
- Consultant Civil Engineer - SDS Civil Enterprises – Peter Williams
- Consultant Ecologist – Biodiversity Assessments and Solutions – Adam Gosling
- Owners – Caroline Kinsella and Glenn Wright.

TRIAL DESIGN

The trail design will be as follows -

1. The existing dwelling subject to this application is to be upgraded to comply with BAL 29 AS 3959-2018 + Section 7.5 Planning for Bushfire Protection 2019. Construction specifications detailing compliance shall be shown on the plans submitted with the application for a Building Certificate to the satisfaction of the consent authority.

2. New fences and gates within the APZ are to be made of either hardwood or non-combustible material. Where a fence or gate is constructed within 6m of the dwelling it is to be made of non-combustible material only.

3. At the commencement of works and in perpetuity the following asset protection zones are to be managed and maintained as an Inner Protection Area (IPA) in accordance with Appendix 4 of Planning for Bushfire Protection 2019 and the requirements of 'Standards for Asset Protection Zones' (RFS 2005) (see ***attached*** Appendix C & Appendix D).

    - North for 12m
    - East for 12m
    - South for 9m
    - West for 10m

4. Landscaping is to be modified and undertaken in accordance with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019.

5. A 30,000-litre water supply and RFS connection to a non-combustible water tank is to provide coverage of the dwelling. It is recommended that a fire fighter minimum 5hp or 3kW petrol or diesel-powered pump be provided within the recommended asset protection zones and shielded against bush fire attack (note – no electric pumps).

An associated hose and reel for firefighting is to be connected to the pump and shall be 19mm internal diameter. A fire hose reel is to be constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005.

6. New electricity and gas for the dwelling are to be upgraded to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019.

7. The internal property access road is to be upgraded to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 except no alternative access road is required.

8. The upgrading of Settlement Road recommended by the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023 and approved by Byron Shire Council. Any variations to the upgrade requirements or refusal of the report will require re-evaluation and an amended bushfire report for consideration if meritorious.

ANALYSIS OF PROPOSED ACCESS ROAD

The acceptable solutions of s7.4a of Planning for Bushfire Protection 2019 permits one internal property access where the dwelling is within 200m of a public through road.

Although a method of measurement is not provided in Planning for Bushfire Protection 2019, for the purpose of this report it is considered reasonable to deduce the intent is for the property access road to have a 200m limitation when measured along the property access road and including the portion of the public road to the point where alternate egress is available.

The analysis will provide qualification demonstrating in the following heads of consideration subject to the recommendation will be at least equivalent to the deemed-to-satisfy provisions (acceptable solutions).

Access road being cut by falling trees or stalled vehicle.
The portion of property access road within the subject property will be upgraded to comply with the acceptable solutions of PBP2019 which will include a compliant turning head providing access to a static water supply for firefighting purposes.

Consideration of the adequacy of Settlement Road has been considered by the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023. Upgrade measures have been included in the report recommending additional passing bays in conjunction with other considerations and measures. These have been deemed suitable by the civil engineer as being suitable for an emergency event whilst providing a better bushfire outcome for other properties currently accessed directly from Settlement Road.

Notwithstanding this, consideration has also been given to the length of Settlement Road directly impacted by unmanaged forest vegetation capable of supporting a fully intense forest fire. In this regard a proximately 50% of the total access distance to the subject dwelling traverses by land that has a reasonable degree of management sufficient to disrupt fuel load availability and lessening the bushfire impact on the road when compared to a compliant access road traversing through 200m of forest with no alternative egress. Whilst the distances exceed 200m, it is not considered unreasonable when consideration of the opportunity to create a better bushfire outcome for the locality.

Further, the intent of isolated subdivisions is commensurate to the bushfire risk and site conditions, allowing for increased asset protection zone depths when modelling of fire behaviour is provided and water supply aids for occupants, if it is safe to do so.

No passing opportunities within the 200m length of road.
Consideration of the adequacy of Settlement Road has been considered by the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023. Upgrade measures have been included in the report recommending additional passing bays in conjunction with other considerations and measures. This will create a better bushfire outcome for emergency services and other residents that require access directly from Settlement Road.

Exposure to bushfire hazard if stranded on the property access road and isolated subdivision.
Whilst in a rural area, the subject property is near other rural residential developments that have a reasonable degree of management. In this regard, the location is not considered 'isolated' to the degree of many rural properties where the public roads have significant distances through forests, increasing the risk of pinch points.

Consideration has been given to Main Arm Road, which traverses through large distances of managed land with managed development on each side of the road. Notwithstanding, consideration of the objectives for isolated subdivisions in s5.1.1 PBP2019 has resulted in the following increased bushfire measures –

- Asset Protection Zones have been provided to comply with Table A1.12.3 PBP2019. However as demonstrated with the following Method 2 modelling, the location of the dwelling in relation to the rainforest hazard located on an upslope demonstrates the added safety margin in relation to radiant heat received by the dwelling against the recommended Bushfire Attack Level (BAL) AS 3959.

  The sensitivity study as shown in Figure 11 establishes the rainforest vegetation located on an upslope of minimum 10 degrees will halve the rate of spread and reduce fire intensity. The forecast radiant heat received by the dwelling with the recommended APZs depth is 16.75kW/m^2. The recommended BAL construction of BAL 29 will provide additional resistance to the dwelling should firefighters and occupants be unable to evacuate early as recommended. This is consistent with the objectives of isolated subdivisions.

- Further measures are recommended with the increase of firefighting static water supply volume by 50% to minimum 30,000L in conjunction with a firefighting pump and fire hose reels to assist with site preparation and after the passing of the fire front if safe to do so.

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:	Sensitivity Study		
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:	10 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	9
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 19	**Peak Elevation of Receiver(m):**	0.76
Radiant Heat(kW/m2):	16.75	**Flame Angle (degrees):**	85
Flame Length(m):	4.71	**Maximum View Factor:**	0.254
Rate Of Spread (km/h):	0.48	**Inner Protection Area(m):**	9
Transmissivity:	0.868	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	3284		

Figure 11: Modelling 10 degrees upslope to the south, southeast and west.

CONCLUSION

The study demonstrates compliance with the Intent of Planning for Bushfire Protection 2019 via the proposed trial design.

6.0 WATER, ELECTRICTY AND GAS

6.1 WATER SUPPLY

A minimum 30,000L static water supply is to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 as follows:

- a connection for firefighting purposes is to be located within the IPA or non-hazard side and away from the structure;
- a 65mm Storz outlet with a ball valve is to be fitted to the outlet;
- ball valve and pipes are to be adequate for water flow and are to be metal;
- supply pipes from tank to ball valve are to have the same bore size to ensure flow volume;
- underground tanks to have an access hole of 200mm to allow tankers to refill direct from the tank;
- a hardened ground surface for truck access is to be supplied within 4m;
- above-ground tanks are to be manufactured from concrete or metal;
- raised tanks are to have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959);
- unobstructed access is to be provided at all times;
- underground tanks are to be clearly marked;
- tanks on the hazard side of a building are to be provided with adequate shielding for the protection of firefighters;
- all exposed water pipes external to the building are to be metal, including any fittings;
- A minimum 5hp or 3kW petrol or diesel-powered pump is to be provided and shielded against bush fire attack (note – no electric pumps);
- A hose and reel for firefighting connected to the pump shall be 19mm internal diameter;
- fire hose reels are to be constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005.

In addition, a SWS - Stored Water Supply sign is recommended to be attached to the front gate or in that proximity.

6.2 ELECTRICITY SERVICES

Electrical transmission lines, if required, are to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 as follows:

- where practicable, electrical transmission lines are underground; and
- where overhead, electrical transmission lines are proposed as follows:
  - lines are installed with short pole spacing (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 accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.

6.3 GAS SERVICES

The following aspects are to comply with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 should a gas service be applicable:

- reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used
- all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side
- connections to and from gas cylinders are metal
- polymer-sheathed flexible gas supply lines are not used
- above-ground gas service pipes are metal, including and up to any outlets.

7.0 LANDSCAPING

Most buildings adversely impacted upon in a bushfire event happen through ember attack and in this regard combustible material surrounding the building e.g. landscaping can play a significant part during the event. Adequate management of landscaping is critical to the survivability of an asset and for occupant safety during a bushfire.

It is recommended that landscaping is undertaken in accordance with Section 7.4 and Table 7.4a of Planning for Bushfire Protection 2019 as follows and managed and maintained for the life of the development.

- compliance with the NSW RFS 'Asset protection zone standards' (see Appendix 4 of PBP 2019);
- 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.

This office has not specifically assessed landscape plans. In this regard it is recommended the landscaping plans be accompanied by a design statement of compliance from the landscape designer, relevant to the recommendations in this report and to be assessed by the consent authority for compliance.

8.0 EMERGENCY AND EVACUATION PLANNING

It is recommended that the property owner and occupants familiarise themselves with the relevant bushfire preparation and survival information located on the NSW Rural Fire Service website. This website should be accessed periodically to ensure the property owner and occupants are aware of the latest information. The RFS website is www.rfs.nsw.gov.au

9.0 CONCLUSION

The report provides recommendations for compliance with the performance criteria of Planning for Bushfire Protection 2019 to provide a dwelling opportunity to the subject property and authorized the existing dwelling for occupation. The report provides a compliance demonstration with a combination of acceptable solutions and a performance solution for access.

Property access within the subject property is recommended to comply with the acceptable solutions of Table 7.4a PBP2019. The primary consideration for access is the adequacy of the portion of Settlement Road from the intersection of Main Arm Road to the entrance to the subject property.

In this regard, the upgrading of Settlement Road recommended by the Traffic Safety Assessment report prepared by SDS Civil Enterprises Pty Ltd dated July 2023 has provided recommendations to upgrade Settlement Road to account for emergency services intervention and to achieve a better access outcome for general access which includes bushfire.

This report relies on the recommendations being assessed and approved by Byron Shire Council. Any variations to the upgrade requirements or refusal of the report will require re-evaluation and an amended bushfire report for consideration if meritorious.

DISCLAIMER

This report was prepared for the purposes and exclusive use of the stated client specifically relating to the unauthorised Class 1a dwelling on the subject property, and is not to be used for any other purpose or by any other person or Corporation. BCA Check Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or Corporation who may use or rely on this report in contravention of the terms of this clause. This report is not intended for or to be used where aluminium composite panels or intumescent paints are proposed. The report is not to be construed as an assessment of the building materials or compliance with the recommended bushfire attack level/s.

As identified in Planning for Bushfire Protection 2019 and the Building Code of Australia the report is to provide recommendations to reduce the risk of ignition and does not guarantee the complete protection of the building in the event of bush fire or that the building will not be adversely impacted upon.

Reporting has been based on the relevant Council and Rural Fire Service Guidelines however recommendations or suggestions given in this report are based on our site investigation at the time of reporting. In some cases site conditions may change dramatically within a few years due to rapid vegetation re-growth and invading weed species.

REFERENCES

Keith, D.A. (2004). *'Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT'.* NSW Department of Environment and Conservation.

NSW Rural Fire Service (2019), *Planning for bushfire protection, A guide for councils, planners, fire authorities and developers'.* November 2019, NSW Government.

Standards Australia, (2018), AS3959 *Construction of buildings in bushfire prone areas,* Australian Standards, Sydney.

LEGISLATION

Environmental Planning and Assessment Act 1979 and Regulations 2000. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

Rural Fires Act 1997. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

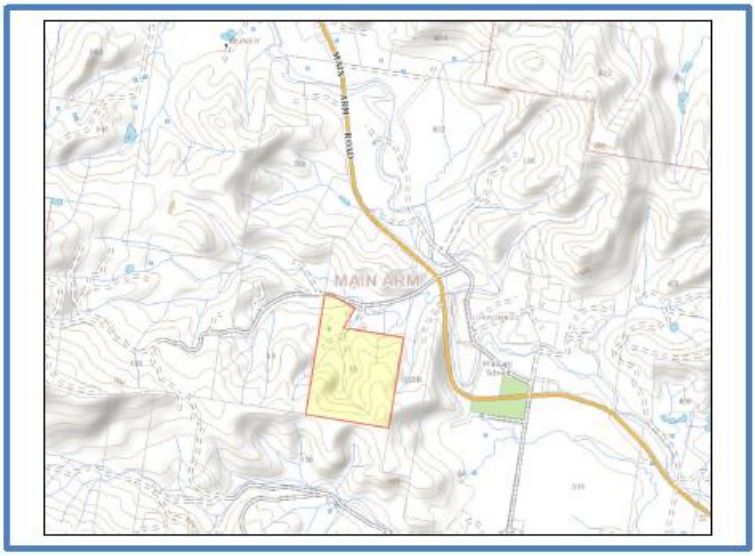
Rural Fires Regulation. *New South Wales.* Parliamentary Counsel's Office, NSW Government Information Service.

APPENDIX A: Traffic Safety Assessment - SDS Civil Enterprises, dated 07/2023

TRAFFIC SAFETY ASSESSMENT

For A

Low Impact Dwelling Entitlement Proposal



At
55 Settlement Road
MAIN ARM NSW 2482

Upon
Land Title
Lot 5 DP 585928

Date: JULY 2023

SDS CIVIL ENTERPRISES 461 Hinterland Way, NSW 2479
m 0438 725 414 **e** peterw@sdscivil.com.au

Table of Contents

1 INTRODUCTION

This Traffic Safety Assessment been prepared to address driveway and traffic access matters associated with the formalisation of a dwelling entitlement via a planning proposal for the existing holding.

The site is identified as Lot 5 DP 585928 and has a site area of 23.6ha and is located at Settlement Road, Main Arm. The allotment has an irregular frontage to Settlement Road with an overall frontage length of 177m. The Settlement Road site frontage is of a gravel construction, being 4m wide pavement including shoulders on a 5m earthen formation. Refer Plate 1.

Plate 1 – View To West (Car Located Within Existing Driveway Entry)

Settlement Road is considered a minor rural road within Byron Shire Council's road hierarchy classification. It services nominally 30+ dwellings. The intersection of Settlement Road with Main Arm Road was recently been upgraded in year 2020 via black spot funding. Refer to Figure 1.0 below.

Two notorious black spots removed on Main Arm Road

Published on 02 June 2020

Council is putting down line marking and the finishing touches on priority roadworks and safety improvements at two black spots on Main Arm Road thanks to two $300K grants – one from the Australian Government's Black Spot Program and the other $300K from the NSW Government's Safer Roads program.

The roadworks are expected to be finished within weeks – on time and on budget. The project has included road-widening and new high-friction surfacing for greater safety, pavement reconstruction and installation of guardrails, guide posts, markers and line marking.

Figure 1.0 – Byron Shire Council Press Release of Main Arm Road Black Spot Upgrade

The first 350m of Settlement Road is of a 3m sealed width on 4m wide pavement. Refer Plate 2.

The balance of Settlement Road is gravel pavement from the end of bitumen seal to the driveway access to this planning proposal site as shown in Plate 1. The length of this section of gravel pavement is 170m.

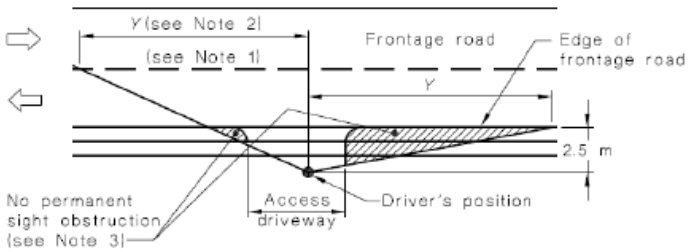
Plate 2 – 3m Sealed Section Settlement Road (view towards Main Arm Road Intersection)

2 SIGHTLINE ACCESS TO THE SITE

A site inspection was undertaken on 10th August 2020 to assess sight lines and access options for the proposal to which sight distances were assessed as compliant based upon the following:

- No sign posted speed was present on Settlement Road, thereby NSW State speed limit of technically 100kph applies.
- Notwithstanding the speed limit, road topography dictates a lessor travel speed. The actual travel speed (ie via multiple drive by's and visual timing assessment of vehicles) ranged between 60kph to 70kph.
- Sight distance to the east was measured at 90m (require 70m to AS2890.1)
- Sight distance to the west was measured at 80m (require 70m to AS2890.1)

AS/NZS 2890.1:2004 32



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70
80	111	105	95
90	125	130	Use values from 2nd and 3rd columns
100	139	160	
110	153	190	

Extract – *Figure 3.2 Sight Distance Requirements at Access Driveways (AS2890.1)*

3 DRIVEWAY ENTRANCE COMPLIANCE

The site inspection identified that the existing driveway access would require localised upgrade improvement works to facilitate bushfire truck entry/exit to the property. A bushfire truck (MRV size) template was used with AutoTURN PRO software to assess the extent of new pavement / fencing works necessary. The works required as shown in Figure 3.3 below are:

- Widen driveway to 11m width at Settlement Road
- Transition from 11m width to 5m width, over a 10m length.
- If a rural gate on boundary is to be installed, needs to have a 5m opening width.

Figure 3.3 Turning Template Assessment of Works Required

The existing internal driveway will require upgrade to provide a 4m gravel formation width. In addition, the internal driveway crosses a significant gully flow path which has a catchment area of 33Ha. Preliminary design assessment calculates that to provide a 1yr

flood immunity, culverts required on the internal private driveway need to be 3 x 600 dia pipes.

4 OTHER ROAD STANDARD MATTERS

The existing Settlement Road is less than the minimum public road geometric standard (ie 6m sealed pavement on 7m formation) that Byron Shire Council nominates for NEW SUBDIVISIONS as per the Northern Rivers Design Guideline. The ongoing management of existing roads of lessor geometric service standard is one to which Byron Shire Council manages in conjunction with the competing funding needs of the broader road network. To meet the incremental upgrade needs of the rural road network, Council has developed a Rural Roads Contribution Plan to which this development will be required to contribute.

The current rural roads contribution contribution levy is $16,700 per 3 bedroom dwelling as at end of year 2022.

Consideration has also been had as to the extent of localised upgrades of Settlement Road so as to improve passing bay opportunities between the planning proposal site and Main Arm Road. This is to accord with Planning for Bush Fire Protection (2019) which notes in Table 4.2.1 that '*consideration of the existing and proposed road networks*' to deal with evacuating residents and emergency services be had. It is thereby raised that by implementing passing bay opportunities (which would facilitate a compliance with the minimum bushfire standard of passing bays at 200m distances), a net beneficial road outcome is able to be provided for the use of the wider community. Refer to *Figure 4 – Existing Settlement Road and Passing Bay Options*.

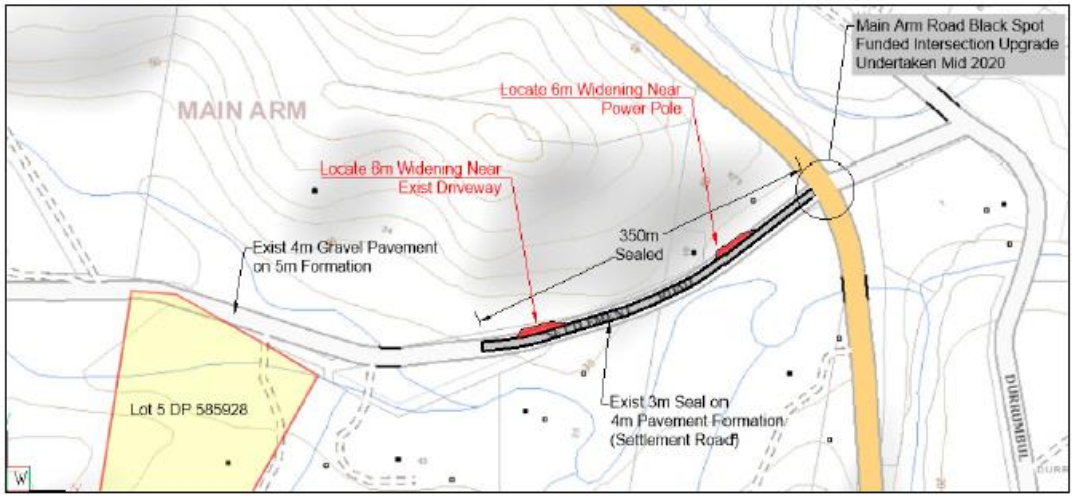


Figure 4 – Existing Settlement Road and Passing Bay Options

5 COMPLIANCE SUMMARY OF PROPOSAL

This Traffic Safety Assessment has had regard to assessing the existing driveway and the planning proposals emergency access to Main Arm Road and confirms that:

(i) Compliance with AS2890.1 driveway sight lines can be achieved;

(ii) Bushfire truck access can be achieved via localised upgrade of the driveway entrance as per the works identified in Figure 3.3.

(iii) A net benefit is able to be provided to the wider community via implementing the passing bay works within Settlement Road as identified in Figure 4.

(iv) By installing 3 x 600dia culverts, the internal driveway will achieve a 1yr flood immunity.

APPENDIX B: Turning Head Requirements

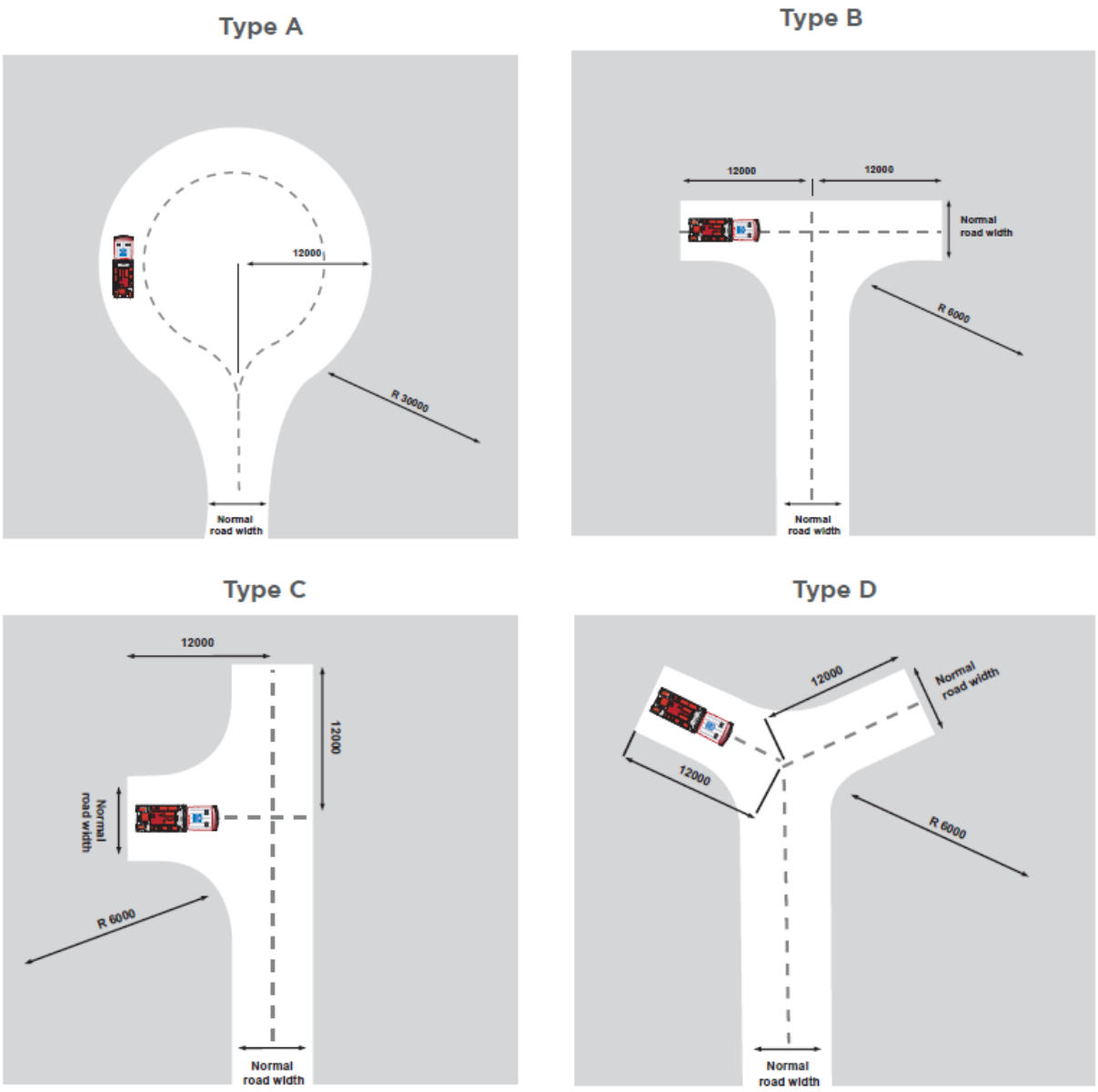
A3.3 Vehicle turning head requirements

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.



APPENDIX C: Asset Protection Zone Requirements - Appendix 4 PBP 2019

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.

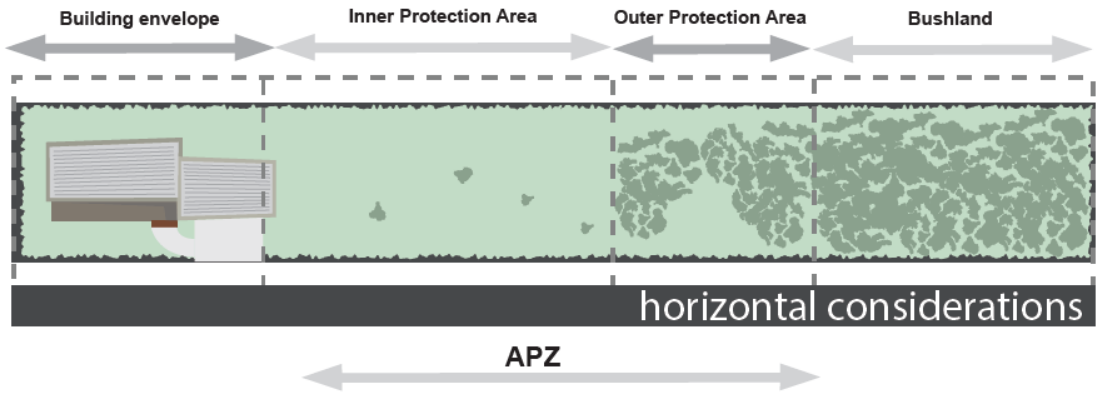
Grass

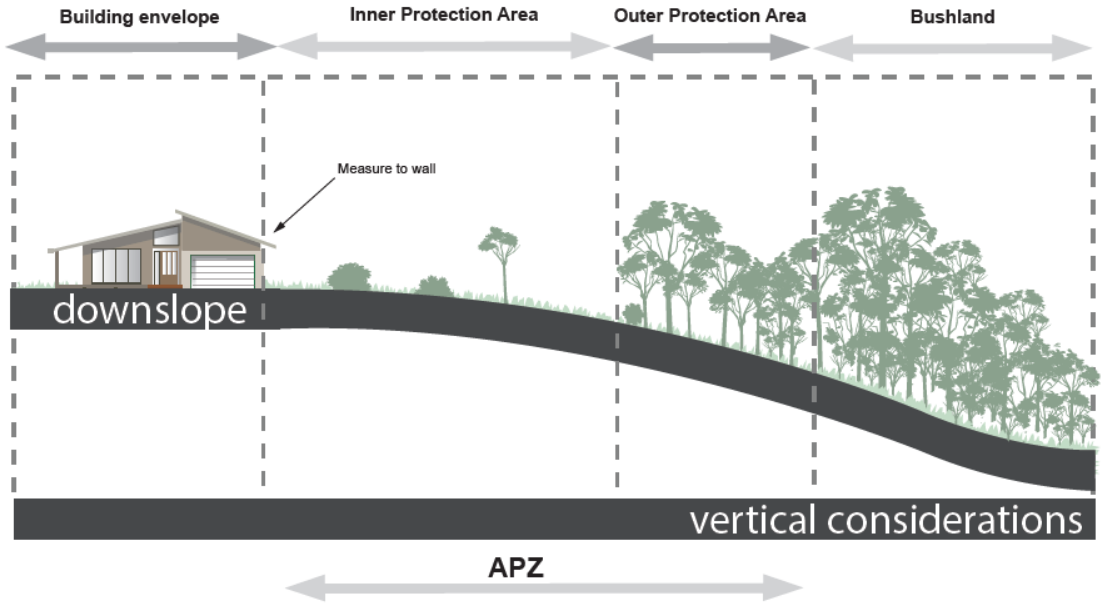
- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

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.





APPENDIX D: Standards for Asset Protection Zones (RFS 2005)

standards

for asset protection zones

protection

NSW RURAL FIRE SERVICE

STANDARDS FOR ASSET PROTECTION ZONES

INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may 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.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

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

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

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

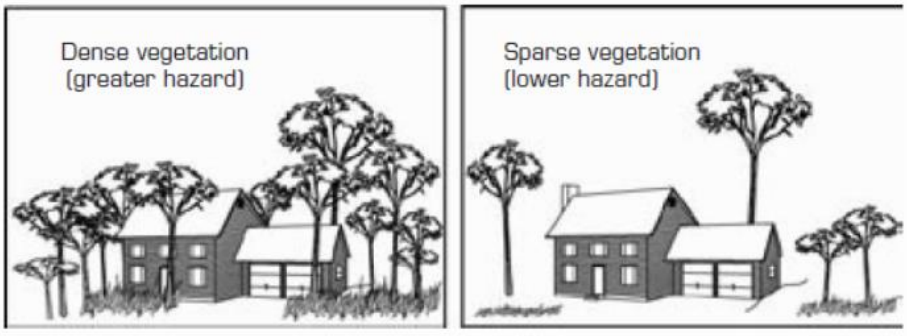
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling
If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset
If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

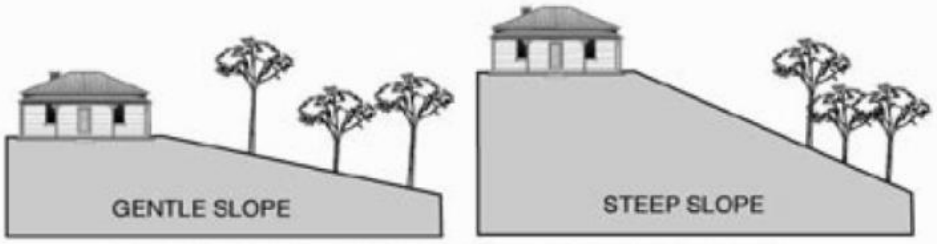
If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

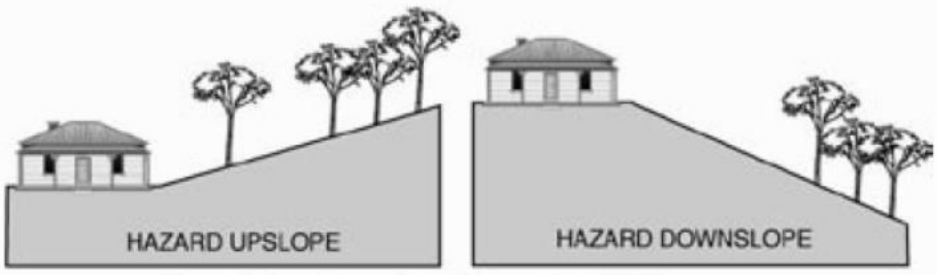
STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.



Gentle slopes require a smaller APZ distance than steep slopes



A hazard downslope will require a greater APZ distance then a hazard upslope of the asset

Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling
If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset
If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels
Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass
Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey
The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

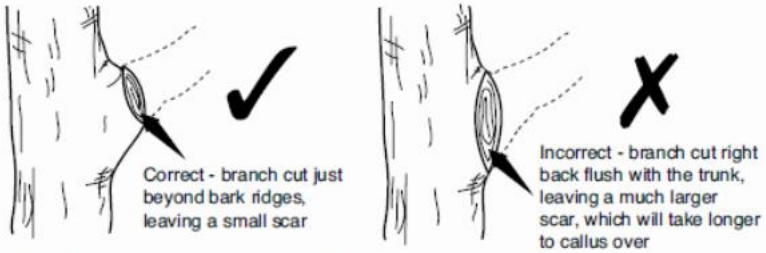
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at **www.agric.nsw.gov.au/noxweed/;**
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3 Remove or thin understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in acordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



Correct - branch cut just beyond bark ridges, leaving a small scar

Incorrect - branch cut right back flush with the trunk, leaving a much larger scar, which will take longer to callus over

There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)
Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning
Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning
Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees)* for more information on tree pruning.

4. Slashing and trittering
Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

5. Ploughing and grading
Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)
Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning*, or contact your local RFS for advice.

7. Burning (pile burning)
In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning*.

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

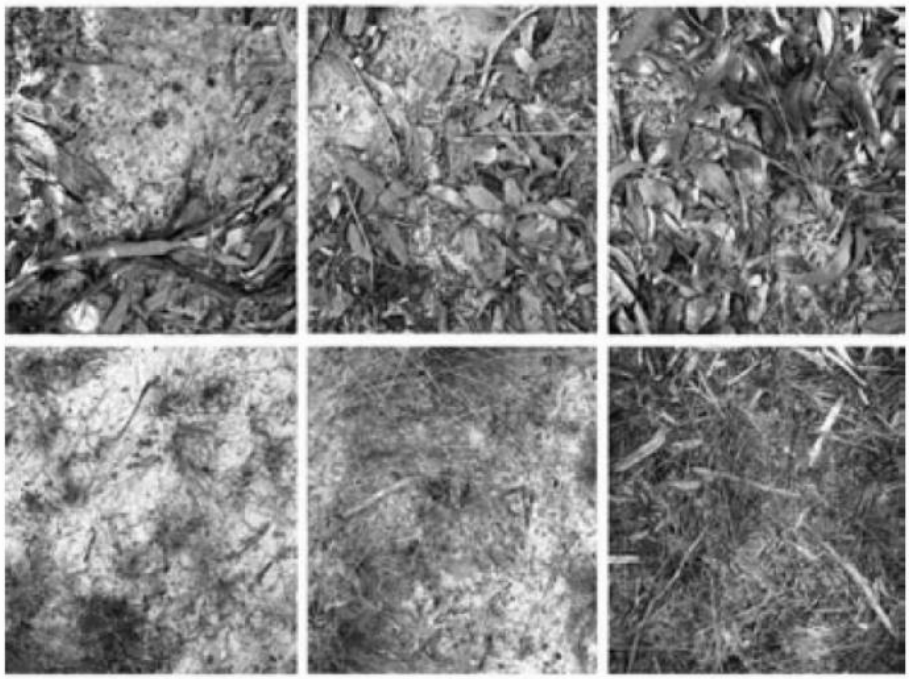
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

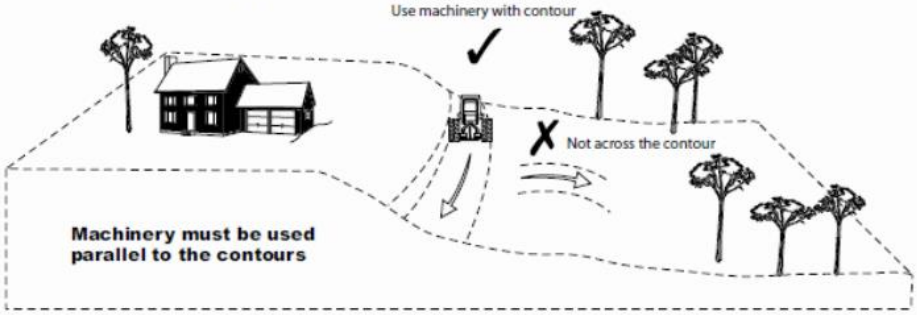
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



50% **75%** **100%**

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.

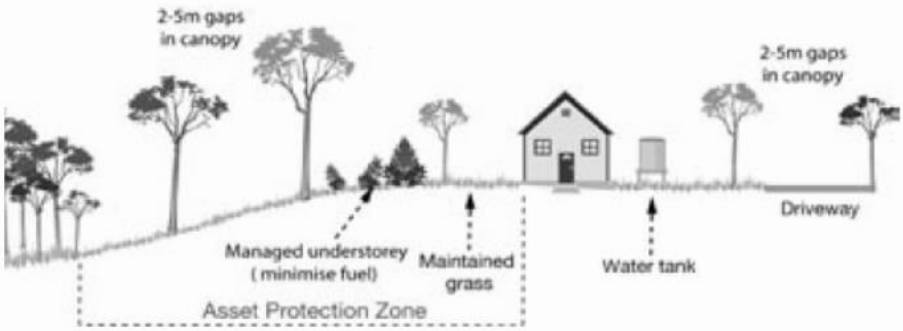


STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ
When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- 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;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable.



Removal of other materials
Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

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Other protective features
You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

Plants that are less flammable, have the following features:

- high moisture content
- high levels of salt
- low volatile oil content of leaves
- smooth barks without "ribbons" hanging from branches or trunks; and
- dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees*.

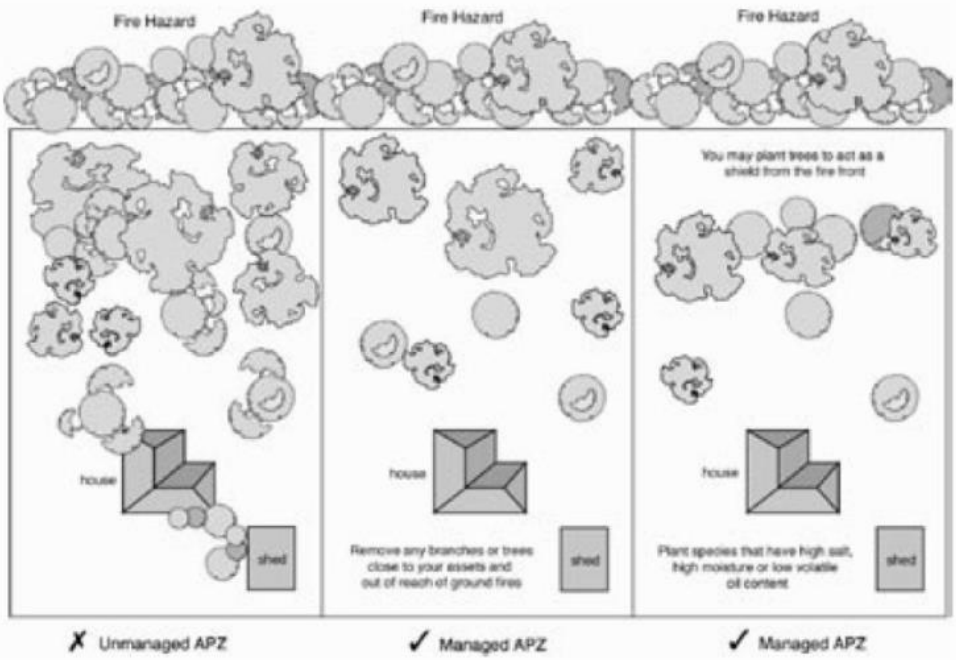
WIND BREAKS

Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.



HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at **www.rfs.nsw.gov.au.**

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at **www.rfs.nsw.gov.au.**

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