Our Ref: 22DEV02

02 November 2022

Nimble Estates Pty Ltd
151 Federal Drive,
EUREKA NSW 2480

Attention: **Nimble Estates**

Re: Bushfire Constraints and Opportunities Advice at 1055 Bruxner Highway, Goonellabah

Travers bushfire & ecology has been engaged to undertake a bushfire constraints assessment for land within Lot 3142 DP 262886 & Lot 1 DP957677, at 1055 Bruxner Highway, Goonellabah within the Lismore City Council local government area (LGA).

This constraints assessment has been undertaken to guide the availability of land for future residential and commercial / industrial use in accordance with *Planning for Bushfire Protection 2019*.

Advice has also been provided in terms of access design, landscaping and asset protection zones, building construction standards and utilities such as water and gas supply to guide future development design.

1. SITE DETAILS

Table 1-1 Site details

Location	Lot 3142 DP 262886 & Lot 1 DP957677, at 1055 Bruxner Highway, Goonellabah
Area	75.97 ha
Local government area	Lismore Shire Council
Zoning	RU1 Primary Production
Topography	Undulating terrain with numerous aspects and rolling hills. Total elevation change of up to 36m across the entire site
Existing land use	Primary production & dwelling house

Figure 1-1 Study area and lot boundary
(Source: NearMaps 2022)

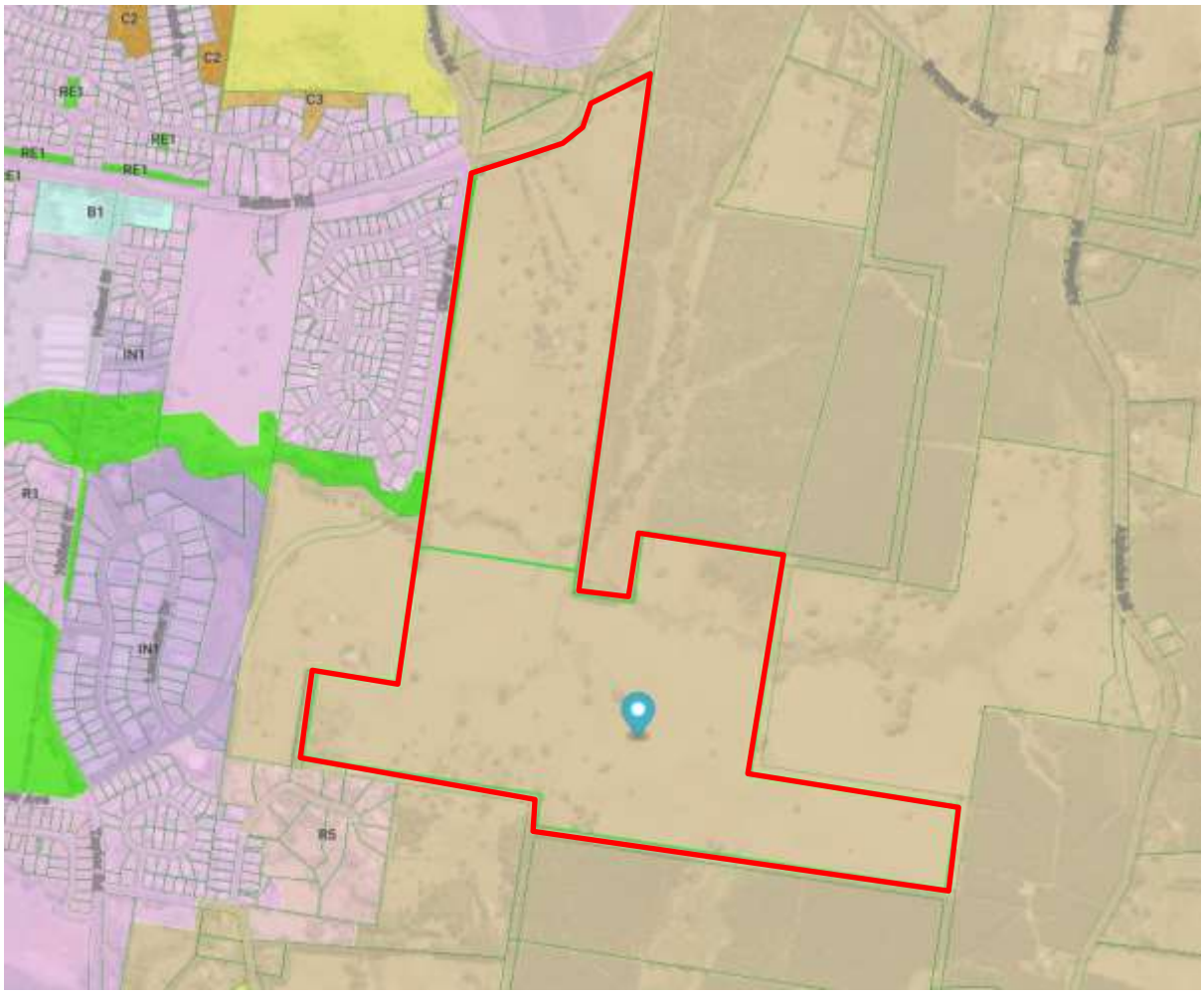

Figure 1-2 Land Use Zoning – RU1 Primary Production

(Source: Mecone Mosaic, 2022)

2. PLANNING FOR BUSHFIRE PROTECTION

Bush fire prone land maps provide the trigger for various development assessment provisions. It does not provide a detailed measure of risk and it does not form part of the site assessment process. *Travers bushfire & ecology* can confirm that the property is located on land mapped by Lismore City Council as being bushfire prone (refer

Figure 2-1). In accordance with clause 4.14 of the *Environmental Planning and Assessment Act 1979*, development consent cannot be granted for development on bush fire prone land unless the consent authority;

- is satisfied that the development conforms with the specifications and requirements of *Planning for Bush Fire Protection 2019* (PBP), or
- has been provided with a certificate by a qualified consultant stating that the development conforms to the relevant specifications and requirements, or
- is satisfied that the development DOES NOT conform to the specifications and requirements and has consulted with NSW RFS in regard to measures to be taken to protect persons, property and the environment from bushfire.

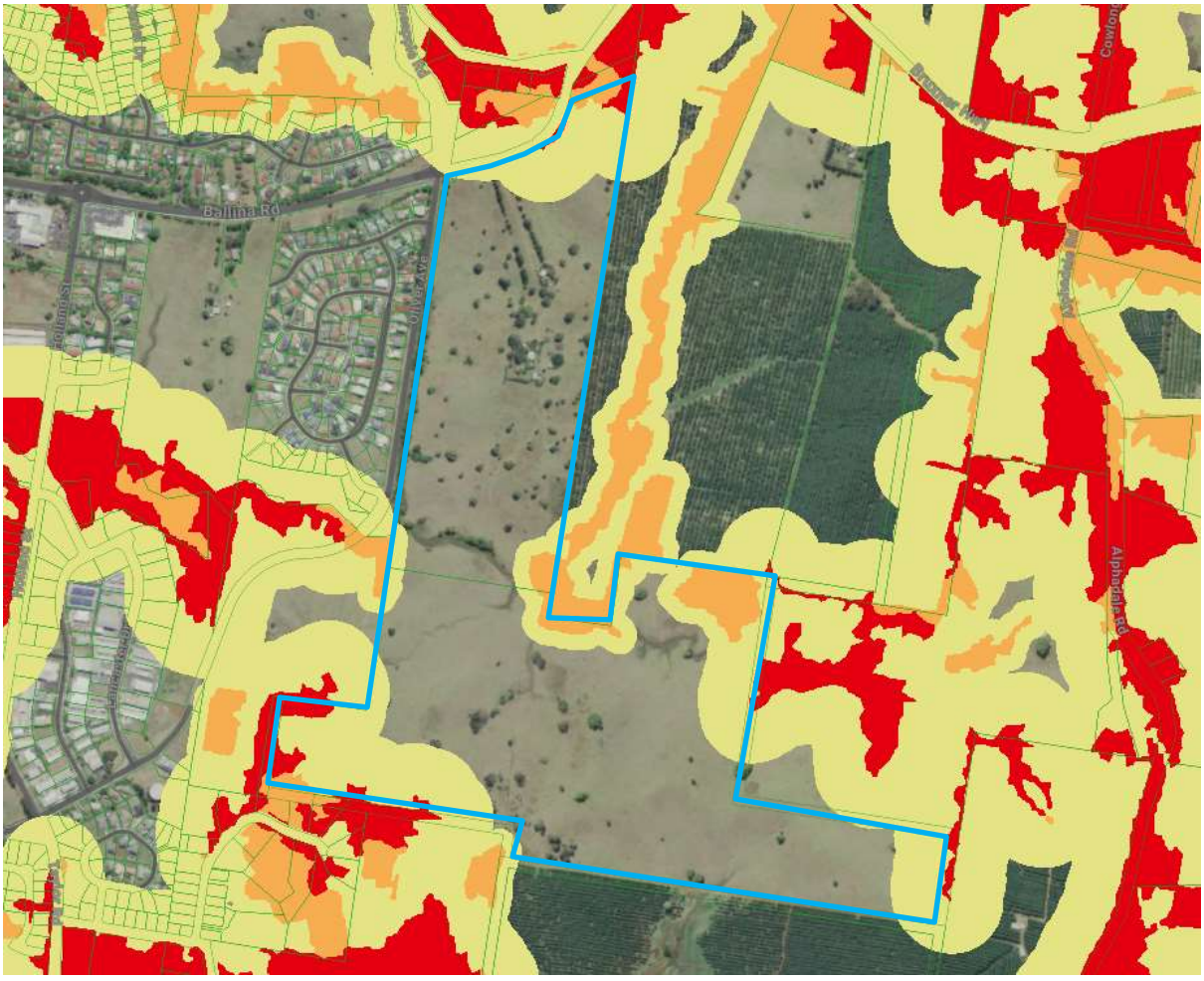

Figure 2-1 Bush Fire Prone Land Map
(source: Mecone Mosaic, 2022)

Planning for Bush Fire Protection 2019 outlines the following general objectives that must be achieved for all development.

- Afford buildings and their occupants protection from exposure to a bush fire;
- Provide a defendable space to be located around the building;
- 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.

Additionally, for buildings identified as Class 5 to 8 (commercial/ industrial) under the National Construction Code (NCC) the following objectives will be applied in relation to access, water supply and services, and emergency and evacuation planning:

- to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- provide for the storage of hazardous materials away from the hazard wherever possible.

The general fire safety construction provisions of the NCC are taken as acceptable solutions for compliance with PBP, however construction requirements for bush fire protection will need to be considered on a case-by-case basis. The NCC does not provide for any bushfire specific performance requirements for commercial and industrial buildings and, as such, the Australian Standard *Construction of buildings in bushfire-prone areas 2009 (AS3959)* and *NASH Standard - Steel Framed Construction in Bushfire Areas* do not apply as a set of deemed to satisfy provisions. However, compliance with AS3959 and the NASH Standard must be considered when meeting the aims and objectives of *PBP*.

In accordance with section 8.3.10 of *PBP* a suitable package of bushfire protection measures should be proposed commensurate with the level of risk to the development. The provisions of Chapter 7 of *PBP* (residential infill development) should be used as a base for the development of this package of measures.

2.1 Environmental Constraints

The Water Management Act of 2000, requires additional consideration for controlled activities undertaken on waterfront land. The proposed development lot has several streams and stream beds running through it. Special provisions need to be considered when proposing development near riparian corridors as outlined within the WM Act, these are outlined within *Guidelines for riparian corridors on waterfront land* and *RFS – Bushfire Environmental Assessment Code.*

Riparian setbacks are defined using the Strahler System of stream ordering. Using the guide the site has 1st order streams, 2nd order streams and 3rd order streams as defined in Figure 2 and Table 1 of Table 5 of *Guidelines for riparian corridors on waterfront land.* The riparian corridor requirements for the corresponding stream orders are provided below in Table 2-1. The proposed plans appear to have already addressed this requirement, although it will need to be considered as APZs cannot be placed within this zone.

Note. The guideline includes the condition– 'where a watercourse does not exhibit the features of a defined channel with bed and banks, the Office of Water may determine that the watercourse is not waterfront land for the purposes of the WM Act'.

Watercourse type	**VRZ width** (each side of watercourse)	**Total RC width**
1st order	10 metres	20 m + channel width
2nd order	20 metres	40 m + channel width
3rd order	30 metres	60 m + channel width
4th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 metres	80 m + channel width

Table 2-1- Recommended riparian corridor widths

(Source: Department of Primary Industries – Office of Water, 2022)

URBIS

OLIVER AVE, LISMORE GOONELLABAH
ILLUSTRATIVE CONCEPT PLAN

DISCLAIMER:
This plan is conceptual and is for discussion purposes only and is subject to further detail study, Council approval, engineering input, and survey. Cadastral boundaries, areas and dimensions are approximate only. Written figured dimensions shall take preference to scaled dimensions.

1:7,500 @ A3

DATE: 28 SEP 2022
JOB NO: P0040564

Figure 2-2 – Indicative site layout

3. BUSHFIRE ATTACK ASSESSMENT

The intent of bushfire protection measures for residential subdivision and commercial development is to minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities. A key component is the provision of an appropriate separation between assets and the bush fire hazard by way of an asset protection zone (APZ) the width of which is determined based on vegetation type and effective slope.

Vegetation formations and effective slope have been assessed in accordance with the methodology detailed in Appendix 1 of *PBP 2019.* For residential development lots Table A1.12.3 and A1.12.6 of PBP 2019 have been used to determine minimum APZ width associated with the acceptable solution.

There are no minimum APZ widths specified for commercial/industrial development under *PBP* so using the provisions of Chapter 7 (residential infill development) as a base, minimum APZs have been calculated to ensure that potential building footprints will not be exposed to a BAL FZ as a minimum (refer Column 4 in Table 3-1) or alternatively to ensure Table 3-1 radiant heat levels do not exceed 29kW/m^2 (refer Column 5 in Table 3-1 and Schedule 1 attached).

A fire danger index (FDI) of 80 has been used to calculate bushfire behaviour on the site based on its location within the Far North Coast region. Table 3-1 provides a summary of the bushfire attack assessment.

Table 3-1 Bushfire attack assessment summary – Residential Subdivision

Aspect	*Vegetation Formation*	*Effective Slope*	*Minimum APZ (avoid Flame Zone)*	*APZ recommended (BAL-29)*	*BAL*
North	Grassland	10-15° Downslope	14m	20m	14-<21m (BAL-29) 21-<30m (BAL-19) 30-<50m (BAL-12.5)
East	Low-threat vegetation* Orchard	N/A	N/A	N/A	N/A
	Grassland	0-5° Downslope	11m	15m	11-<16m (BAL-29) 16-<23m (BAL-19) 23-<50m (BAL-12.5)
Riparian Corridors	Remnant vegetation	0-5° Downslope	12m	18m	12-<17m (BAL-29) 17-<25m (BAL-19) 25-<100m (BAL-12.5)

Table 3-2 Bushfire attack assessment summary – Commercial Subdivision

Aspect	*Vegetation Formation*	*Effective Slope*	*Minimum APZ (avoid Flame Zone)*	*APZ recommended (BAL-29)*	*BAL*
South	Low-threat vegetation* Orchard	0-5° Downslope	N/A	N/A	N/A
South east	Grassland	0-5° Downslope	9m	20m	8-<11m (BAL-40) 11-<16m (BAL-29) 16-<23m (BAL-19) 23-<50m (BAL-12.5)
	Low-threat vegetation* Orchard	0-5° Downslope	N/A	N/A	N/A
South west	Grassland	5-10° Downslope	9m	20m	9-<12m (BAL-40) 12-<18m (BAL-29) 18-<26m (BAL-19) 26-<50m (BAL-12.5)
	Remnant vegetation	5-10° Downslope	N/A	N/A	N/A
Riparian Corridors	Remnant vegetation	0-5° Downslope	9m	9m	9-<12m (BAL-40) 12-<17m (BAL-29) 17-<25m (BAL-19) 25-<100m (BAL-12.5)

Note 1: Adopting a performance-based solution can result in a further reduction of the APZ.

Note 2: Section A1.10 of Planning for Bushfire Protection 2019, Low threat vegetation – exclusions, identifies vegetation types that are deemed to cause no threat and therefore do not stipulate APZ setbacks. Vineyards, orchards and market gardens are among the vegetation types outlined as low threat vegetation.

Figure 3-1 – Riparian Corridor parallel with Oliver Avenue

Figure 3-2 – Riparian Corridor between the Lots

Figure 3-3 – Mature Gum windrow south west

Figure 3-4 – Managed grassland under powerline easement to the south of subject Lot

Figure 3-5 – Macadamia Plantation South of Lot

Figure 3-6 – Macadamia & Plantations to the East of the Subject Lot

Figure 3-7 - Lot Fragment North of Bruxner Highway

4. BUSHFIRE PROTECTION REQUIREMENTS – Residential Subdivision

This section outlines the provisions of Chapter 5 of PBP (residential / rural residential subdivisions) that must be considered when developing the necessary package of bushfire protection measures. The intent of measures is to minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.

The provisions for commercial/ industrial development are to comply with chapter 7 of *PBP* (residential infill development) and are outlined in section 5.

4.1 Asset Protection Zones (APZs)

Generally, any future development on the site is required to comply with the aims and objectives of PBP (i.e. ensure that appropriate operational access and egress for emergency service personnel and occupants is available). In this regard it is required that all future residential development provides a perimeter road between the proposed buildings and the hazard vegetation to allow firefighting access to the buildings and the bushfire hazard.

As the APZ is based on the existing cleared area and comprises mainly grassed areas, an Outer Protection Area is not feasible. The entire APZ area should be maintained as an Inner Protection Area.

Table 4-1outlines the performance requirements and acceptable solutions in relation to APZs.

Table 4-1– Performance criteria for asset protection zones (PBP 2019)

	Performance criteria	Acceptable solutions	Comment
ASSET PROTECTION ZONES	Potential building footprints must not be exposed to radiant heat levels exceeding 29kw/m^2 on each proposed lot	APZs are provided in accordance with tables A1.12.2 and A1.12.3 based on the FFDI	Can Comply
	APZs are managed and maintained to prevent the spread of a fire to the building.	APZs to be managed in accordance with the requirements of Appendix 4 of PBP.	Can Comply

	Performance criteria	Acceptable solutions	Comment
	The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site	Can Comply
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	APZs are located on lands with a slope less than 18 degrees.	Can Comply
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind driven embers to cause ignitions.	Landscaping is in accordance with appendix 4 and fencing is constructed in accordance with section 7.7	Can Comply

4.2 Access for Firefighting Operations

Generally any future development on the site is required to comply with the aims and objectives of PBP (i.e. ensure that appropriate operational access and egress for emergency service personnel and occupants is available).

Table 4-2 outlines the performance requirements and acceptable solutions in relation to access.

Table 4-2 – Performance criteria for access (PBP 2019)

	Performance criteria	Acceptable solution	Comments
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	- property access roads are two-wheel drive, all-weather roads; - perimeter roads are provided for residential subdivisions of three or more allotments; - subdivisions of three or more allotments have more than one access in and out of the development; - traffic management devices are constructed to not prohibit access by emergency services vehicles; - maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient; - all roads are through roads; - dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; - where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road; - where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and - one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	Perimeter road require around ‘all’ proposed residential allotments.
	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.	
	There is appropriate access to water supply.	-hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; -hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning* -there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	

Performance criteria		Acceptable solution	Comments
PERIMETER ROADS	access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	-are two-way sealed roads; -minimum 8m carriageway width kerb to kerb; -parking is provided outside of the carriageway width; -hydrants are located clear of parking areas; -are through roads, and these are linked to the internal road system at an interval of no greater than 500m; -curves of roads have a minimum inner radius of 6m; -the maximum grade road is 15 degrees and average grade of not more than 10 degrees; -the road crossfall does not exceed 3 degrees; -a minimum vertical clearance of 4m to any overhanging	
NON-PERIMETER ROADS	access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating	-minimum 5.5m carriageway width kerb to kerb; -parking is provided outside of the carriageway width; -hydrants are located clear of parking areas; -roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; -curves of roads have a minimum inner radius of 6m; -the road crossfall does not exceed 3 degrees; -a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	
PROPERTY ACCESS	firefighting vehicles can access the dwelling and exit the property safely.	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 - access 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; - provide a suitable turning area in accordance with Appendix 3; - curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	

Performance criteria	Acceptable solution	Comments
	-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; -a development comprising more than three dwellings has 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.	

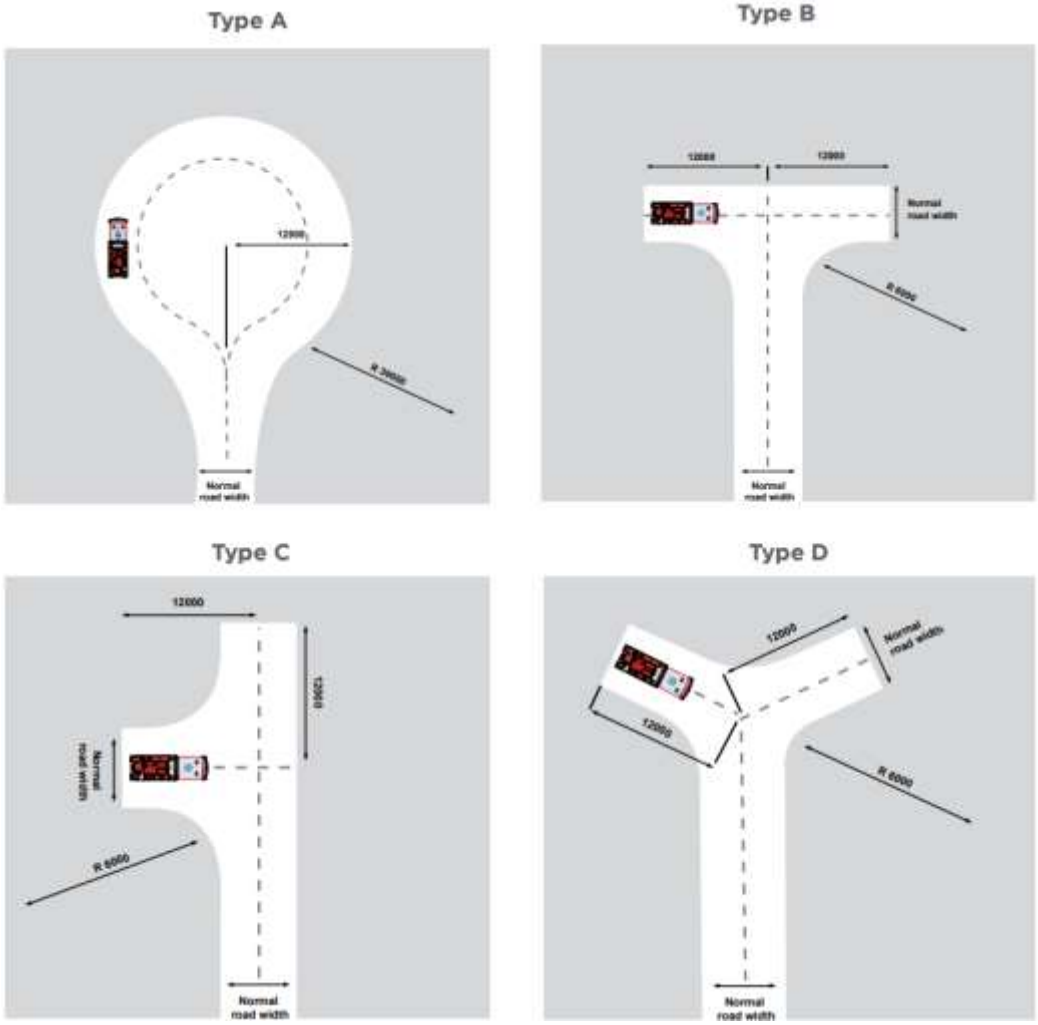

Figure 4-1 - required turning head dimensions for dead end roads

(Source: Planning for Bushfire Protection, 2019)

4.3 Services – Water, Electricity & Gas

Table 4-3 outlines the performance requirements and acceptable solutions in relation to services.

Table 4-3 Performance criteria for services (PBP 2019)

	Performance criteria	*Acceptable solution*
WATER SUPPLIES	Adequate water supply is provided for firefighting purposes.	-Reticulated water is to be provided to the development, where available. -a static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; -static water supplies shall comply with Table 5.3d
	Water supplies are located at regular intervals, and The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.
	Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2005.*
	The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps. Above ground water storage tank shall be of concrete or metal
	A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	
ELECTRICITY SERVICES	Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.
		Where overhead electrical transmission lines are proposed: • 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.
GAS SERVICES	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with *AS/NZS 1596 (2014)*, the requirements of relevant authorities and metal piping is to be used.
		All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side.
		Connections to and from gas cylinders are metal.

Performance criteria	Acceptable solution
	Polymer sheathed flexible gas supply lines are not used.
	Above ground gas service pipes are metal, including and up to any outlets.

4.4 Building protection

When applying the acceptable solutions outlined in *PBP* it can be expected that proposed buildings will be exposed to a maximum potential radiant heat flux of 29kW/m^2. The buildings should therefore be constructed to the standards for BAL-29 (maximum) as detailed in *AS3959* or the *NASH Standard* and modified by section 7.5 of *PBP*.

Building construction standards have been outlined within Table 3-1 Bushfire attack assessment summary and are depicted in SCHEDULE 1 attached.

5. BUSHFIRE PROTECTION REQUIREMENTS – 'OTHER DEVELOPMENT' – COMMERCIAL /INDUSTRIAL

The provisions for commercial/ industrial development are to comply with chapter 7 of *PBP* (residential infill development) as defined in section 8.3.10 of PBP 2019.

5.1 Asset Protection Zones (APZs)

Table 5-1 outlines the performance requirements and acceptable solutions in relation to APZs.

Table 5-1– Performance criteria for asset protection zones (PBP 2019 pg. 65)

	Performance criteria	Acceptable solutions	Comments
ASSET PROTECTION ZONES	APZs are provided commensurate with the construction of the building; and a defendable space is provided.	An APZ is provided in accordance with Table A1.12.2 in Appendix 1 of *PBP*. An APZ is proposed for all Class 5-8 buildings and any Class 10 buildings within 6m of a Class 5-8 building	Note: lots within a commercial/ industrial area must comply with BAL-FZ in areas where no setback from the riparian area can be provided. It is recommended in these areas to design lots with parking to the rear or incorporate building setbacks into design.
	APZs are managed and maintained to prevent the spread of a fire to the building.	APZs to be managed in accordance with the requirements of Appendix 4 of *PBP*.	
	The APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	APZs are wholly within the boundaries of the development site APZs are located on lands with a slope less than 18 degrees.	

SCHEDULE 1 shows the recommended minimum APZs (equivalent to BAL 40) in accordance with the acceptable solutions for future commercial/industrial development within the site, based on current surrounding vegetation.

5.2 Access for Firefighting Operations

Generally any future development on the site is required to comply with the aims and objectives of PBP (i.e. ensure that appropriate operational access and egress for emergency service personnel and occupants is available). In this regard it is recommended that future development provides a perimeter road between the proposed buildings and the hazard vegetation to allow firefighting access to the buildings and the bushfire hazard. Whilst not

impossible new large subdivision developments are much less likely to receive approval from a consent authority.

Table 5-2 outlines the performance requirements and acceptable solutions in relation to access.

Table 5-2– Performance criteria for access (PBP 2019 pg. 66)

	Performance criteria	Acceptable solution
ACCESS (GENERAL REQUIREMENTS)	Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all weather roads.
	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.
	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 supply where no reticulated supply is available.
	Firefighting vehicles can access the building/s 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; 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 building and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. 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 of PBP (see Figure 5-1); • 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.

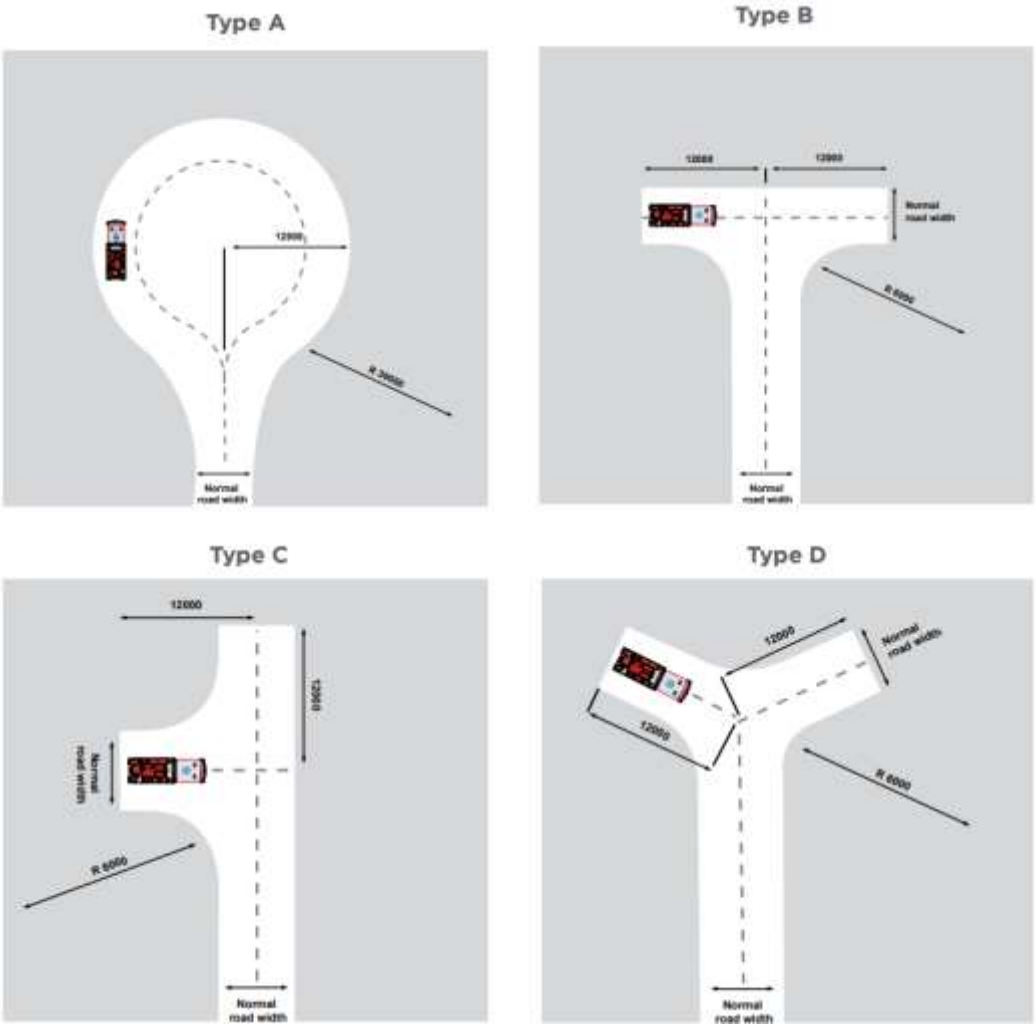

Figure 5-1 Required turning head dimensions for dead end roads
(source: Planning for Bushfire Protection, 2019)

5.3 Services – Water, Electricity & Gas

Table 5-3 outlines the performance requirements and acceptable solutions in relation to services.

Table 5-3 Performance criteria for services (PBP 2019 pg. 67-68)

	Performance criteria	*Acceptable solution*
WATER SUPPLIES	Adequate water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development, where available.
	Water supplies are located at regular intervals, and The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.

	Performance criteria	Acceptable solution
	Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of *AS 2419.1:2005.*
	The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps. Above ground water storage tank shall be of concrete or metal
	A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	N/A – reticulated water is provided
ELECTRICITY SERVICES	Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings.	Where practicable, electrical transmission lines are underground.
		Where overhead electrical transmission lines are proposed: • 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 ISSC3 Guideline for Managing Vegetation Near Power Lines.
GAS SERVICES	Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	Reticulated or bottled gas bottles are to be installed and maintained in accordance with *AS/NZS 1596 (2014)*, the requirements of relevant authorities and metal piping is to be used.
		All fixed gas cylinders are to be kept clear of 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.

5.4 Construction Standards

The *NCC* does not provide any bushfire specific requirements for buildings of Class 5-8 and as such *AS3959* and the *NASH Standard* are not considered as a set of Deemed to Satisfy provisions. Compliance with *AS3959* and the *NASH Standard* must, however, be considered when meeting the aims and objectives of *PBP.* Bushfire construction recommendations are dependent on the level of bushfire risk and the provision of adequate access opportunities.

When applying the acceptable solutions outlined in *PBP* it can be expected that proposed buildings will be exposed to a maximum potential radiant heat flux of 40kW/m^2. The buildings should therefore be constructed to the standards for BAL-40 as detailed in *AS3959* or the *NASH Standard* and modified by section 7.5 of *PBP*.

Table 5-4 outlines the proposed performance solution and compliance with the performance criteria for construction standards.

Table 5-4 - Performance criteria for construction standards (PBP Guidelines pg. 68)

	Performance criteria	***Acceptable solution***
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 of *PBP.*
	Proposed fences and gates are designed to minimise the spread of bush fire.	Fencing and gates are constructed in accordance with section 7.6.
	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.
	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 of *PBP.*

5.5 Landscaping

Table 5-5 outlines the proposed performance solution and compliance with the performance criteria for landscaping

Table 5-5 – Performance criteria for construction standards (PBP Guidelines pg. 68)

	Performance criteria	Acceptable solution
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 building/s; fencing is constructed in accordance with section 7.6 of *PBP*; 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.

6. CONCLUSION

The property is located on land mapped by Lismore Shire Council as being bushfire prone (refer

Figure 2-1). For this reason and in accordance with clause 4.14 of the Environmental Planning and Assessment Act 1979, development consent cannot be granted unless the consent authority;

- is satisfied that the development conforms with the specifications and requirements of Planning for Bush Fire Protection 2019 (PBP),
- has been provided with a certificate by a qualified consultant stating that the development conforms to the relevant specifications and requirements, or
- is satisfied that the development DOES NOT conform to the specifications and requirements and has consulted with NSW RFS in regard to measures to be taken to protect persons, property and the environment from bushfire.

Conformity with the specification and requirements of *PBP* requires that a suitable package of bushfire protection measures is proposed commensurate with the level of risk to the development. The provisions of Chapter 5 (residential and rural residential subdivisions) and chapter 8 (other development) of *PBP* should be used as a base for the development of this package of measures, which will include;

- Asset protection zones to ensure that potential building footprints will not be exposed to radiant heat levels exceeding 29kW/m^2 residential and 40kW/m^2 commercial/ industrial,
- Construction of buildings in compliance with the acceptable standards of PBP 2019 and *AS3959* or the *NASH Standard* and modified by section 7.5 of PBP, and
- Provision of access, water, electricity and gas supply in accordance with the acceptable solutions for residential infill development outlined in PBP.

SCHEDULE 1 shows the recommended minimum APZs (acceptable solutions) for future residential and commercial/industrial development within the site, based on current surrounding vegetation.

If you require any further information please do not hesitate to contact our office on 1300 896 998 or at info@traversecology.com.au.

Morgan Jeffery (B. Sc)
Bushfire Consultant

Tony Hawkins *(M. Bushfire prot. – BPAD – L3 - 48592)*
Manager, Bushfire Services

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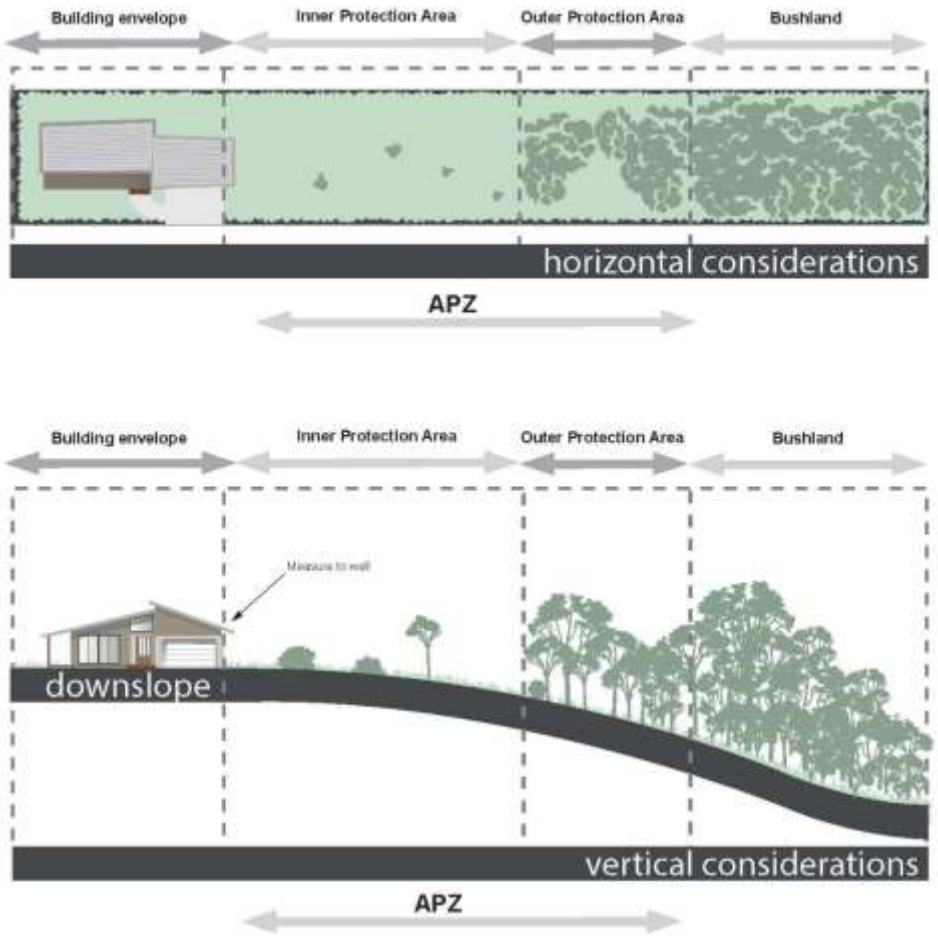
SCHEDULE 1. PLAN OF BUSHFIRE PROTECTION MEASURES

APPENDIX 1. MANAGEMENT OF ASSET PROTECTION ZONES

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 4 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The property is to be managed to IPA standards only. A typical APZ is graphically represented below.



APZs and progressive reduction in fuel loads

(Source: PBP, 2019)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought regarding vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following table adapted from *PBP 2019* provides maintenance advice for vegetation within the IPA and OPA. The APZ is to be maintained in perpetuity and maintenance should be undertaken regularly, particularly in advance of the bushfire season

	Inner Protection Area	Outer Protection Area
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 retaining smooth barked and evergreen trees.	Tree canopy cover should be **less than 30%;** and Canopies should be separated by **2 to 5m**.
Shrubs	Large discontinuities or gaps in the vegetation should be provided to slow down or break the progress of fire towards buildings; Shrubs should not be located under trees; Shrubs should form **less 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.	Shrubs should not form a continuous canopy; and Shrubs should **form less than 20%** of ground cover.
Grass and Leaf Litter	Grass should be kept mown to a height of **less than 100mm**; and Leaves and other debris should be removed	Grass should be kept mown to a height of **less than 100mm**; and Leaf and other debris should be removed.
	All Management Zones	
Weeds	All weeds should be removed in accordance with best practice guidelines, and measures taken to prevent their further spread	
Landscaping	Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways; Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come into contact with the building; When considering landscape species consideration needs to be given to estimated size of the plant at maturity; Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies; Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown; Avoid planting of deciduous species that may increase fuel at surface / ground level (i.e. leaf litter); Avoid climbing species to walls and pergolas; Locate combustible materials such as woodchips / mulch, flammable fuel stores away from the building; Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and Use of low flammability vegetation species.	