

Preliminary Bushfire Risk Assessment Falls Creek / Woollamia Deferred Rural Residential Areas Planning Proposal

Prepared by

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1 Aim and objectives

The aim of this report is to:

- Provide a strategic approach to bush fire planning for the Planning Proposal;
- Assess the proposal increased densities in the area in accordance with *Planning for Bush Fire Protection 2006 (PBP)* and Section 117 Direction 4.4 to ensure that future development is capable of complying with PBP;
- Provide recommendations in accordance with the *RFS Community Resilience Practice Note 2/12 Planning Instruments and Policies*; and,
- Identify measures necessary to achieve compliance with *Planning for Bushfire Protection* 2006 to facilitate NSW Rural Fire Service (RFS) support for the rezoning, including:
 - i) Recommended Asset Protection Zones (APZ) with minimal clearing in environmentally sensitive areas;
 - ii) Recommended development areas to ensure adequate separation to inappropriate radiant heat levels;
 - iii) Access requirements;
 - iv) Evacuation issues;
 - v) Water supply; and
 - vi) Recommendations to minimise the interface to the bushfire hazard through proposed dwelling locations.

2 Purpose

The purpose of this Bushfire Risk Assessment is to provide a strategic assessment of bushfire risk in the Falls Creek / Woollamia Deferred Rural Residential Areas Planning Proposal. Council received Gateway Approval from the NSW Department of Planning and Environment (P&E) on 29 August 2012. The Gateway Approval requires a number of additional assessments being undertaken and consultation with relevant Government Agencies and the community before the Planning Proposal can be submitted to P&E for final assessment.

This report enables consultation with the Commissioner of the NSW Rural Fire Service (RFS) in accordance with Section 117 Direction 4.4 Planning for Bushfire Protection as well as consultation with relevant Government Agencies in accordance with Section 56 (2)(d) of the *Environmental Planning & Assessment Act 1979*.

Section 117 Direction 4.4 Planning for Bushfire Protection

- 1) Have regard to *Planning for Bushfire Protection 2006;*
- 2) Introduce controls that avoid placing inappropriate developments in hazardous areas; and
- 3) Ensure that bushfire hazard reduction is not prohibited within the APZ.
 - (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,
 - (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,
 - (c) Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,
 - (d) Contain provisions for adequate water supply for firefighting purposes,
 - (e) Minimise the perimeter of the area of land interfacing the hazard which may be developed,
 - (f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

3 The Proposal

The Planning Proposal aims to investigate additional lot yield/subdivision potential for the subject land and amend the minimum lot size of these allotments where appropriate. The proposed subdivision potential will be determined based on the constraints and appropriate building envelopes for each lot.

This Planning Proposal seeks to fulfil the requirements specified within the Jervis Bay Regional Strategy and seeks to investigate the potential for additional subdivision potential to be located within this precinct.

The NSW Department of Planning & Environment (DP&E) (formerly Department of Planning &Infrastructure) issued 'gateway' approval for the planning proposal to proceed further on 29 August 2012. The determination is subject to a number of additional studies including bushfire assessment and consultation with the Commissioner of NSW Rural Service in accordance with Section 117 Direction 4.4 Planning for Bushfire Protection.

Council resolved on 3 December 2013 to:

Reduce the boundaries of the Falls Creek / Woollamia Deferred Planning Proposal investigation area to exclude areas currently zoned Rural 1(c2) and some adjoining Rural 1(c3) land where landowners did not wish to be included in the rezoning investigations. Proceed with the Falls Creek / Woollamia Deferred Rural Residential Areas Planning Proposal over the reduced area outlined in Attachment 'G' on the following basis:

- a) Undertake a strategic constraints assessment to identify areas at risk of bushfire, flooding, water quality and high conservation value land and remove highly constrained land from the Planning Proposal investigation area;
- b) Undertake a land capability assessment of the remaining land to determine the appropriate minimum lot sizes;
- c) Prepare a site specific Development Control Plan including standards for siting of buildings, effluent disposal, access roads, services, fencing, landscaping, flora, fauna and habitat, drainage and fire protection zones;
- d) Council pay the upfront costs using loan funds and recoup costs from benefitting landowners; and
- e) Delay detailed technical studies required by the Gateway Determination until subdivision application stage.



Figure 1: Falls Creek / Woollamia Planning Proposal Investigation Area

4 Bushfire Risk Management

The Jervis Bay Settlement Strategy (JBSS), Council's planning strategy for the subject land contains the following objective relating to Bushfire:

Objective: To ensure that settlements are protected from bushfire risk.

The JBSS seeks to achieve this objective by:

- The provision of appropriate Asset Protection Zones
- Asset Protection Zones associated with new development being contained within developable areas, and excluded from protected areas (wildlife corridors, riparian areas etc.)
- New settlement to be planned to include bushfire risk management measures that are relative to the associated risk of the locality
- Bushfire risk arrangement measures associated with new development will comply with relevant assessment and policy requirements.

The subject land is designated as Bushfire Prone Land under the Rural Fire and Environmental Assessment Legislation Amendment Act 2002 (Figure 2, below). Section 117 Direction 4.4 (Planning for Bushfire Protection) requires Council to consult the NSW Rural Fire Service (RFS) when preparing an amending LEP over, or in proximity to bushfire prone land.



Figure 2: Bushfire Prone Land

The nearby Woollamia residential settlement is identified in the Bush Fire Risk Management Plan (BFRMP) prepared by the Shoalhaven Bush Fire Management Committee as being a "medium" risk. The likelihood is classed as "unlikely" and the consequence is classed as "major". However, a major bushfire occurred in the area in 2000-2001 which impacted the majority of properties in the investigation area.

The current proposal has been prepared with preliminary consideration of Planning for Bush Fire Protection 2006 provisions to ensure that these requirements are available on each site. Any future residential development proposed in this area will be subject to detailed bush fire assessment and protections measures required at development application stage under 79BA of the EP&A Act.

5 Land Subject to this Assessment

The allotments for which this Planning Proposal applies are identified in Table 1 below. Some landholders have specifically not consented to their properties being assessed by Council for rezoning. These properties are indicated below. The bushfire hazard associated with these lands has been considered in this assessment.

Table 1 Property locations

Lot Details	Lot Address	Consent to investigation
Investigatio	n Area 1	
Lot 119 DP 15266	1 Seasongood Road	✓
Lot 120 DP 9289	2 Seasongood Road	✓
Lot 119A DP 15266	3 Seasongood Road	✓
Lot 118 DP 15266	5 Seasongood Road	✓
Lot 118A DP 15266	7 Seasongood Road	✓
Lot 116 DP 15266	9 Seasongood Road	✓
Lot 121 DP 9289	10 Seasongood Road	✓
Lot 116A DP 15266	11 Seasongood Road	✓
Lot 115 DP 15266	13 Seasongood Road	✓
Lot 115A DP 15266	15 Seasongood Road	X
Lot 122 DP 15266	16 Seasongood Road	✓
Lot 114 DP 15266	17 Seasongood Road	X
Lot 122A DP 15266	18 Seasongood Road	✓
Lot 114A DP 15266	19 Seasongood Road	X
Lot 123 DP 15266	20 Seasongood Road	✓
Lot 113 DP 15266	21 Seasongood Road	✓
Lot 113A DP 15266	23 Seasongood Road	✓
Lot 112 DP 15266	25 Seasongood Road	✓
Lot 112A DP 15266	27 Seasongood Road	✓
Investigation Area 2		\checkmark
Lot 155 DP 15266	49 Woollamia Road	✓
Lot 155A DP 15266	53 Woollamia Road	✓
Lot 157 DP 15266	59 Woollamia Road	✓
Lot 157A DP 15266	77 Woollamia Road	✓
Lot 158 DP 15266	89 Woollamia Road	✓
Lot 158A DP 15266	95 Woollamia Road	✓
Lot 159 DP 15266	101 Woollamia Road	✓
Lot 159A DP 15266	111 Woollamia Road	✓
Investigation Area 3		✓
Lot 170 DP 755965 (Por 170)	25 Barron Road	✓
Lot 721 DP 633867	25B Pepper Road	X
Lot 722 DP 633867	25A Pepper Road	✓
Lot 171 DP 755965 (Por 171)	63 Barron Road	✓
Lot 160 DP 755965 (Por 160)	D1289 Princes Hwy	✓
Lot 162 DP 755965 (Por 162)	5 Pepper Road	✓
Lot 161 DP 755965 (Por 161)	18 Pepper Road	✓
Investigation Area 4		✓
Lot 4 DP 608099	50 Mortimer Road	✓
Investigation Area 5		✓
Lot 3 DP 846470	Jervis Bay Road	✓ ×
Lot 2 DP 846470	80 Gorindah Road	 ✓

Investigation Area



Figure 3: Investigation Areas and Vegetated Lands

5.1 Ecological Constraints

An Environmental constraints assessment undertaken by Council (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) has resulted in the identification of highly constrained land within the investigation areas (Figure 4, below) which includes riparian corridors and high conservation value vegetation. This assessment has included consideration of these constraints and associated bushfire hazard.

5.1.1 Hollow Bearing Trees

Hollow bearing trees are scattered throughout the developable areas. Those with high conservation value have been mapped by the Environmental constraints assessment undertaken by Council (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) and are shown in Figure 4 (page 16) of this report.

The Environmental assessment applied a 20m buffer to all HBT within low-moderate conservation value areas. There are numerous HBT that occur amongst these areas as shown in Figure 4 below.

This assessment considers the retention of HBT is possible within the developable area provided that lots sizes are sufficient to accommodate them within a managed APZ and outside potential building envelopes. Building envelopes will need to be situated outside the 20m buffer to HBT such that no HBT would be removable under Councils 45 degree rule.

This assessment considers that the retention of HBT within the developable areas is unlikely to compromise bushfire protection as the APZ management specifications of PBP can be applied within the 20m buffer. Any bushfire hazard associated with the retention of HBT must be considered at the development application stage.



Figure 4: Ecological Constraints Assessment

6 Planning for Bushfire Protection Provisions

6.1 Rural Residential Development

The most applicable controls in the PBP 2006 for this proposal is Section 4.1 Planning Controls for Residential and Rural Residential Subdivisions. Section 4.1(b) Rural-Residential Developments recommends the following performance based controls:

(b) Rural-Residential Developments

Rural-residential developments include blocks often associated with lifestyle choices rather than focusing on some form of primary production. Where agricultural pursuits are undertaken they are considered secondary to the residential component of the use of the land.

Consideration should be given, where practical, to grouping of rural-residential buildings into clusters which allow for the establishment of APZs around a group of dwellings rather than having to ensure individual protection for a large number of scattered dwellings. The clustering of dwellings provides for better protection with reduced vegetation clearance and hence less environmental impact.

This assessment recommends bushfire protection measures in line with PBP 2006 controls for rural residential subdivision for low-moderately ecologically constrained areas (refer Section 5.1, above). As several allotments may be grouped within a developable area, this assessment provides bushfire protection measures across the collective group of allotments to facilitate clustering of future dwellings, reduced vegetation clearance and the objectives of PBP 2006 to be applied.

6.1.1 Isolated Rural Dwellings

Isolated rural developments pose a greater risk for the protection of firefighters and residents in less accessible areas. As a result greater emphasis is placed on:

- The provision of safe access/egress to the property so occupants leaving, and firefighters/rescuers accessing the property, can do so in relative safety;
- The provision of adequate APZs to create an area where occupants and firefighters remaining on site will have a good chance of survival; and
- Water supplies and fire protection systems such as spray systems.

In such cases, dedicated static water supplies may need to be extended beyond the specifications of PBP 2006. Specific requirements need to be determined based on the extent of the hazard faced and the isolation and access arrangements of the development.

Travel distances of 200 metres or more are particularly problematic in the event of a bushfire due to smoke, reduced vision and the increased chance of being isolated by fire. Where access is greater than 200 metres from a main road or refuge suitable for occupants and firefighters, a second access arrangement is required which provides alternative access in a different direction from the main access.

This planning proposal does not recommend the creation of single isolated lots within the investigation area that may create bottlenecks through bushland corridors or would maximise the perimeter exposed to the bushfire hazard. Lots that would be surrounded by highly constrained vegetated land (hazard) or would be greater than 200m from the public road system and require alternate property access/egress and additional creek crossings are considered to be highly constrained by PBP 2006 and would require further investigation to demonstrate the performance objectives of PBP can be satisfied.

6.2 Setbacks/Asset Protection Zones (APZs)

Asset Protection Zone (APZ) setbacks (i.e. the separation of buildings from unmanaged bushfire prone vegetation) are required at the interface between all bushfire-prone vegetation (the hazard) and built assets vulnerable to bushfire damage. Generally APZ's incorporate an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

6.2.1 Vegetation and Slope Assessment

The 'predominant vegetation' within 140m and the 'effective slope' within 100m from each potential building are calculated in all directions in accordance with PBP methodology for vegetation and slope assessment (Appendix 2.3).

The predominant vegetation is considered by PBP as that which provides the greater hazard: "where a mix of vegetation types exist the type providing the greater hazard is said to predominate" i.e. to be used in determining the minimum APZ setbacks from the hazard.

PBP (page 50) defines the effective slope as "that slope within the hazard which most significantly affects fire behaviour of the site having regard to the vegetation class found". Minimum APZ setbacks are determined in accordance PBP (Appendix 2, table A2.4) to ensure that any future dwellings adjacent to surrounding bushfire prone vegetation and/or internal bushland are not subject to direct flame attack.

Where an existing public road of 20m in width or existing development infrastructure provides separation from the hazard, this has been considered in the setback requirements for the developable areas.

6.3 Construction Standards AS3959

The setback from the hazard is used to determine the category of bushfire attack and bushfire construction standard or Bushfire Attack Level (BAL) for dwellings in accordance with Appendix 3 (Table 3.3) in PBP 2006. BAL's as per AS3959-2009 (*Construction of buildings in bushfire-prone areas*) for future dwellings would be determined at future development application stage. Minimum APZ setbacks would require that future dwellings could be required to be built to flame zone construction in accordance with Table 2.4.2 of Australian Standard 3959-2009 – *Construction of buildings in bushfire-prone areas based on proposed setbacks*.

6.4 Access

6.4.1 Rural residential Property Access Roads

Property access roads are required to meet the performance requirements of Section 4.1 of PBP 2006 to enable safe access to and from the public road system and defendable space for emergency services: Existing property access roads may require upgrade works to comply with the performance criteria (Figure 4.5 and acceptable solutions PBP 2006) as follows:

- 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;
- Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes;
- All weather access: roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge);
- A minimum carriageway width of four metres for rural- residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint);
- In forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay;
- A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches;
- Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius;
- Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress;
- The minimum distance between inner and outer curves is six metres;
- 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;

Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), 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.

• Access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way;

The provisions of Section 4.1 of PBP 2006 in relation to any internal roads will also apply at subdivision application stage.

6.4.2 Perimeter Access

Perimeter access to the rear of dwellings in rural residential development is required to separate dwellings from the bushfire hazard and may form part of the APZ.

6.4.3 Utilities/Services

Water supplies of 10,000 litres per rural residential lot (1,000-10,000m²) and 20,000 litres per large rural lot (>10,000m²) must be provided in accordance with PBP 2006.

The water supply requirements for future dwellings would be detailed at future development application stage.

6.5 Bushfire Threat Assessment Methodology

6.5.1 Predominant Vegetation

Council's vegetation mapping (NSW Biometric Vegetation mapping 2012) and field investigations were used to identify the predominant vegetation types or 'the hazard' (as classified by Table A2.1 of PBP 2006) within 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1.

6.5.2 Slope

Council's *LiDAR (light detection and ranging)* mapping and field investigation were used to determine the effective slope within the slope classes consistent with PBP classification: upslope, 0-5° downslope, 5-10° downslope and 10-15° downslope.

Note: Where steeper slopes were identified as confined to short runs of less than 5m within a creek channel, the effective slope was considered to be the slope that predominated outside of the creek channel, as that most likely to influence bushfire behaviour.

The results of the bushfire threat assessment for the identified developable areas are shown in the tables for each investigation area below.

7 Results

7.1 Seasongood Road: Investigation Area

The Seasongood Road investigation area comprises nineteen lots and is approximately 100 Ha. There are several water courses which run through a number of the blocks on both sides of the road, along which several dams and low lying areas subject to periodic inundation are associated. Bushfire protection requirements have been identified for lots outside the moderate-highly ecologically constrained land identified by the Environmental Constraints Report (SCC 2014) (Figure 4). This includes lots 119, 119A, 118, 118A 116, 116A, and 115 (Area A); lots 113, 113A, and 112 (Area B) and lots 122, 121 and 123 (Area C).

7.1.1 Vegetation

The predominant vegetation types have been determined for 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1 and are shown Table 2, below. The vegetation types present within the study area (NSW Biometric Vegetation mapping 2012) are shown in Figure 5. Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies and southern Sydney Basin and Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin were confirmed within the southern and eastern vegetated areas during field surveys. Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin and South East Corner was confirmed in northern vegetated areas west of lot 122. All of these vegetation types are classified as 'Forest' for the purposes of applying PBP 2006. Hollow bearing trees are scattered throughout the developable areas. Those with high conservation value have been mapped and are shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014).

7.1.2 Slope

Slope analysis mapping (Figure 6, below) shows that the slope of the land adjoining the developable areas predominantly does not exceed >5 degrees. There are minor >15 degree downslopes associated with the riparian corridor however these were identified as restricted to within the creek line. Where a greater slope was measured over a distance of greater than 10m, that slope was considered the effective slope. Although the effective slopes associated with the riparian corridor may be partially within existing cleared or managed areas, it is anticipated that with required protection of a 30m riparian protection zone there will be regeneration of forest vegetation (the hazard) on these slopes.

7.1.3 Asset Protection Zones

Setbacks and access requirements have been identified for the developable areas and are shown in Table 2 below. Lots with development potential have been grouped for the purpose of minimising clearing for APZ and facilitate safe access and egress, as discussed in Section 6.1 (p17). Figure 7 shows the results of the Bushfire Hazard Assessment.

The public road infrastructure provided by Seasongood Road has been considered in the setback requirements for developable areas as it will provide 20m of separation in perpetuity from the hazard.

Hollow bearing trees mapped as high conservation value as shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) have been considered by this assessment and may be retained within the Asset Protection Zone (refer Section 5.1.1 (p14).



Figure 5: Seasongood Road Vegetation

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Seasongood Road Slope Classes



Figure 6: Seasongood Road Slope



Figure 7: Setbacks and access requirements for Seasongood Road Developable areas

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 Table 2: Bushfire Hazard Assessment and minimum required Asset Protection Zones in accordance with Table A2.4 PBP 2006 (See Figure 7).

		Area A		Area B		Area C
Seasongood		Lots 119-118A, 115	Lot 116- 116A,	Lots 113, 113A, 112 (fronting Seasongood Road)	Lots 113, 113A (South portion)	Lots 122, 122A, 123
	Vegetation	Forest	Forest	Forest	Forest	Forest
North	Slope	Upslope/Flat	Across slope /flat	Upslope/Flat	5-10° down	upslope
ž	Minimum setback / APZ (m)	20 (exists as Public road)	20 (exists as Public road)	20 (exists as Public road)	35m	20m
East	Vegetation	Forest (within adjoining lots)	Forest	Forest	Forest	Forest
	Slope	Upslope/Flat	>0-5°Down	Across slope/flat	Across slope/flat	Across slope/flat
	Minimum APZ (m)	20 (on lot 115 adjoining hazard only)	(>25m APZ provided by lot 115)	20 (on lot 112 adjoining hazard only)	20 (on lot 113A adjoining hazard only)	20 (on lot 123 adjoining hazard only)

	Vegetation	Forest	Forest	Forested Wetland	Woodland	Forest
South	Slope	5-10° down	0-5°down	5-10° down	Up slope	0-5°down (lots 122, 122A) 5-10° down (lot 123)
	Minimum APZ (m)	35	25	35	20	25 (lots 122 122A) & 35 (lot 123)
	Vegetation	Forest	Managed land>140m on lost 119-118A	Forest	Forest	Forest
West	Slope	Upslope/Flat °	Upslope/Flat	Upslope/Flat	Upslope/Flat	0-5°down (lot 122) Upslope/flat (lot 122A)
	Minimum APZ (m)	20 (on lot 119 adjoining hazard only)	Nil required	20 (on lot 113 adjoining hazard only)	20 (on lot 113 adjoining hazard only)	25 (on lot 122 adjoining hazard) 20 on lot 122A only

7.1.4 Access

The existing access ways to the southernmost developable areas traverse the riparian corridor and creek crossings and would require upgrade works to comply with PBP 2006 (see Section 6.4 (p19). Additional road construction through riparian corridor sections is not recommended as it is not commensurate with the Jervis Bay Settlement Strategy (Section 4 (p11) and likely to be constrained by ecological values including the presence of Swamp Sclerophyll Forest EEC in low lying areas.

7.1.5 Property Access Roads

Upgrades would be required to meet the PBP 2006 performance criteria (refer Section 6.4.1 (p19) for all existing property access roads in the developable areas.

Existing creek crossings indicated in Figure 7 above should be utilised to avoid increased impacts to riparian habitats and upgraded in accordance with PBP Section 4.1 (refer Section 6.4.1 (p19).

Perimeter access is achievable for all developable areas as demonstrated in Figure 7 above.

Provision of access for fire fighting vehicles to the rear of dwellings in the subject area would need to be demonstrated by each development application and development approvals conditioned accordingly. Maintenance would be the responsibility of individual property owner.

7.1.6 Isolated areas

The rear portion of Lot 115, although predominantly cleared of vegetation, is considered at risk of isolation and increased bushfire risk due to adjoining land of high ecological constraint, distance from the public through road, and single access way. To develop this lot would require additional access through area of high ecological constraint and is considered to have limited opportunity to minimise hazard interface, cluster development and share the costs associated with provision of bushfire protection measures in a bushfire prone area. Increasing residential density in this area is not considered commensurate with the planning objectives of PBP 2006, for rural residential development.

7.2 Woollamia Road: Investigation Area

The Woollamia Road investigation area comprises 8 lots and is approximately 52 Ha. This investigation area varies from grazed paddocks to areas of high quality undisturbed native vegetation.

There is a water course traversing all of the allotments along which several dams and low lying areas subject to periodic inundation are associated. Bushfire protection requirements have been identified for lots outside the moderate-highly ecologically constrained land identified by the Environmental Constraints Report (SCC 2014) (Figure 4). This includes lots 155, 155A, 157, 158, 159, and 159A.

7.2.1 Vegetation

The predominant vegetation types have been determined for 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1 and are shown Figure 8 below. The vegetation types present within the study area shown in Figure 8 vary between Spotted gum, Scribbly gum Bloodwood Forest and Wet sclerophyll forest on sandy loams to Swamp Sclerophyll melaleuca forest on pale clay typical of the Jervis Bay area associated with the riparian and low lying areas. All of these vegetation types are classified as 'Forest' for the purposes of applying PBP 2006. Hollow bearing trees are scattered throughout the developable areas. Those with high conservation value have been mapped and are shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014).

7.2.2 Slope

Slope analysis mapping (Figure 9 below) shows that the slope of the land adjoining the developable areas predominantly does not exceed >5 degrees. There are minor >15 degree downslopes associated with the banks of the creekline however these were identified as less than 10m in run length. Where a slope was measured over a distance of greater than 10m, and comprised a hazard, that slope was considered the effective slope. Although the effective slopes associated with the riparian corridor may be partially within existing cleared or managed areas, it is anticipated that with required protection of a 30m riparian protection zone there will be regeneration of forest vegetation (the hazard) on these slopes.



SCC_Vegetation_Biometric2012

Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin and South East Corner Red Bloodwood - Hard-leaved Scribbly Gum - Silvertop Ash heathy open forest on sandstone plateaux of the lower Shoalhaven Valley, Sydney Basin

Figure 8: Vegetation Woollamia Road

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Woollamia Road Slope Classes

Figure 9: Slope Woollamia Road

7.2.3 Asset Protection Zones

Setbacks and access requirements have been identified for the developable areas and are shown in Table 3 below. Lots with development potential have been grouped for the purpose of minimising clearing for APZ and facilitate safe access and egress, as discussed in Section 6.1 (p17). Figure 10 below shows the assessment results, including setback and perimeter access requirements.

The public road infrastructure provided by Woollamia Road has been considered in the setback requirements for developable areas where it will provide 20m of separation in perpetuity from the hazard.

Hollow bearing trees mapped as high conservation value as shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) have been considered by this assessment and may be retained within the Asset Protection Zone (refer Section 5.1.1 p14).



Figure 10: Setbacks and access requirements for Woollamia Road Developable areas

Table 3: Bushfire Hazard Assessment and minimum required Asset Protection Zones inaccordance with Table A2.4 PBP 2006 (see Figure 10, above).

		Area A	Area B	Area C
Woollamia Road		Lots 155-157 Fronting Woollamia Road	Lots 155-157 northern portions	Lots 157A-159A
	Vegetation	Forest	Forest	Forest
North	Slope	0-5° down	5-10° down	5-10° down (lot 157A) 0-5° down (lot 158, 158A, 159 and 159A)
	Minimum setback/APZ (m)	25	35	35m (lot 157A) 25m (lot 158, 158A, 159 and 159A)
	Vegetation	Forest	Forest	Forest
ti	Slope	0-5° down	0-5° down	Across slope/flat
East	Minimum APZ (m)	25 (on lot 157 adjoining hazard only)	25 (on lot 157 adjoining hazard only)	20 (on lot 159A adjoining hazard only)
_	Vegetation	Managed >140m	Forested Wetland	Managed >140m
South	Slope	Upslope	5-10° down	Up slope
	Minimum APZ (m)	20 (Public Road)	35	20 (Public Road)
	Vegetation	Forest	Forest	Forest
Ŧ	Slope	5-10° down	Upslope/Flat	Upslope/Flat
West	Minimum APZ (m)	35 (on lot 155 adjoining hazard only)	20 (on lot 155 adjoining hazard only)	20 (on lot 158A adjoining hazard only)

7.2.4 Access

The existing access ways to the identified developable areas north of the riparian corridor (lots 155, 155A, 157) traverse creek crossings and would require upgrade works to comply with PBP 2006 (refer Section 6.4.1 p19). Additional road construction through riparian corridor sections is not recommended and likely to be constrained by ecological values including the presence of Swamp Sclerophyll Forest EEC in low lying areas.

7.2.5 Property Access Roads

Upgrades would be required to meet the PBP 2006 performance criteria (refer Section 6.4.1 p19) for all existing property access roads in the developable areas.

Existing creek crossings indicated in Figure 10, above should be utilised to avoid increased impacts to riparian habitats and must be upgraded in accordance with PBP Section 4.1 (refer Section 6.4.1 p19).

Perimeter access is achievable for all developable areas as demonstrated in Figure 10, above.

Provision of access for fire fighting vehicles to the rear of dwellings in the subject area would need to be demonstrated by each development application and development approvals conditioned accordingly. Maintenance would be the responsibility of individual property owner.

7.2.6 Isolated areas

The rear portions of Lot 158A, and 159A as highlighted in Figure 10 above, are considered at risk of isolation. Although partially cleared of vegetation, they are considered at increased bushfire risk due to surrounding land of high ecological constraint and distance from the public through road. These areas are considered to have less opportunity to minimise hazard interface, cluster development and share the costs associated with provision of bushfire protection measures in a bushfire prone area. To develop these areas may require creation of additional access roads through areas of high ecological constraint. Increasing residential density in this area is not considered commensurate with the planning objectives of PBP 2006, for rural residential development or the Jervis Bay Settlement Strategy (Section 4 p11).

7.3 Pepper and Barron Roads Investigation Area

This investigation area comprises 4 lots (refer Table 1 p13) on Pepper and Barron Road and D1287 Princes Highway with a total area of approximately 49 Ha. The landscape varies from heavily grazed paddocks to areas of undisturbed native vegetation.

Less disturbed vegetated areas are generally associated with steep slopes and drainage lines. The steep slopes are east facing with drainage lines containing exposed rocks of volcanic origin and wet sclerophyll forest vegetation with some rainforest elements.

7.3.1 Vegetation

The predominant vegetation types have been determined for 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1 and are shown Figure 11 below. The vegetation types present within the study area as shown in Figure 11 Figure 8vary between Blackbutt-Turpentine-Bangalay moist open Forest and Sydney Peppermint and Spotted Gum Lilly Pilly Wet Forest on sheltered steep east facing slopes to remnant Red Bloodwood Scribbly Gum dry Sclerophyll Forest on flatter areas. All of these vegetation types are classified as 'Forest' for the purposes of applying PBP 2006. Several high conservation value hollow bearing trees have been recorded within the developable areas (Figure 4 p16)

7.3.2 Slope

The Pepper and Barron Road investigation area is constrained by slope classes of over 18 degrees as shown in Figure 12 below.


Figure 11: Vegetation Pepper and Barron Roads

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Barron and Pepper Roads Road Slope

Figure 12: Pepper and Barron Road Slope

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7.3.3 Asset Protection Zones

Setbacks and access requirements have been identified for the developable areas and are shown in Table 4 below. Lots with development potential have been grouped for the purpose of minimising clearing for APZ and facilitate safe access and egress, as discussed in Section 6.1 (p17). Figure 13 below shows the assessment results, including setback and perimeter access requirements.

The public road infrastructure provided by Barron Road and the Princes Highway have been considered in the setback requirements for developable areas where they will provide 20m of separation in perpetuity from the hazard.

Hollow bearing trees mapped as high conservation value as shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) have been considered by this assessment and may be retained within the Asset Protection Zone (refer Section 5.1.1 p14).



Figure 13: Setbacks and access requirements for Barron and Pepper Road Developable areas

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Table 4: Bushfire Hazard Assessment and minimum required Asset Protection Zones in accordance with Table A2.4 PBP 2006 (see Figure above).

Pepper and Barron Road lots: 160, 161,162, 170, 171, 721, 722			Affected lots
	Vegetation	Forest	162 and 170 only
North	Slope	Across slope	
	Minimum setback/APZ (m)	20	162 and 170 northern boundary only
	Vegetation	Forest	170, 171, 721, 160
	Slope	10-15° down	170, 171
East	-	15-18° down	160
	Minimum APZ (m)	50	170 and 171
		60	160, 161 721
_	Vegetation	Forest	
South	Slope	15-18° down	160, 161, 721
	Minimum APZ (m)	60	160, 161 721
	Vegetation	Forest	
West	Slope	Across slope	
	Minimum APZ (m)	20	162

7.3.4 Access

The existing access ways to the identified developable areas may require upgrade works to comply with PBP 2006 (refer Section 6.4.1 p19). Additional road construction in highly constrained areas is not recommended due to slopes of greater than 15 degrees.

7.3.5 Property Access Roads

Property access roads would be required to meet the PBP 2006 performance criteria (refer Section 6.4.1 p19). Minimal works to existing property access roads would be required.

Perimeter access is achievable for all developable areas as demonstrated in Figure 13.

Provision of access for fire fighting vehicles to the rear of dwellings in the subject area would need to be demonstrated by each development application and development approvals conditioned accordingly. Maintenance would be the responsibility of individual property owners.

7.3.6 Isolated areas

An existing dwelling and several cleared areas exist within the highly ecologically constrained areas of lots 170, 171 and 721, as highlighted in Figure 13. These areas are considered at risk of isolation. Although partially cleared of vegetation they are at increased bushfire risk due to surrounding land of high ecological constraint and distance from the public through road. Increasing residential density in these areas would not be commensurate with the planning objectives of PBP 2006, for rural residential development.

7.4 Mortimer Road Investigation Area

This investigation area comprises one allotment on Mortimer Road (refer Table 1 p13) with an existing dwelling. Apart from minimal clearing around the existing dwelling the remainder of the lot is fully vegetated. The western half of the site has evidence of past logging activity. There is a ridgeline and rocky escarpment that runs north south through the allotment. The south east portion of the allotment contains wet swamp sclerophyll forest. The site has been assessed by the Environmental Constraints Report (SCC 2014) as having moderate development potential outside the rock escarpment and swamp sclerophyll areas.

7.4.1 Vegetation

The predominant vegetation types have been determined for 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1 and are shown Figure 14 below. The vegetation types present within the study area vary between Blackbutt Turpentine Bangalay Moist Open Forest and Spotted Gum Grey Ironbark Woollybutt. All of these vegetation types are classified as 'Forest' for the purposes of applying PBP 2006. Hollow bearing trees mapped as high conservation value as shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek/ Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) were recorded within the developable area.

7.4.2 Slope

The Mortimer Road investigation area is constrained by slope classes of over 18 degrees as shown in Figure 15, below.

7.4.3 Asset Protection Zones

Setbacks and access requirements have been identified for the developable areas. Figure 16 shows the assessment results, including setback and perimeter access requirements. High conservation value hollow bearing trees identifiable in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) have been considered by this assessment and may be retained within the Asset Protection Zone (refer Section 5.1.1 p14).



Figure 14: Vegetation Mortimer Road Investigation Area

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Mortimer Road Slope Classes

Figure 15: Slope Mortimer Road Investigation Area:



Figure 16: Setbacks and access requirements for Mortimer Road Developable area

 Table 5: Bushfire Hazard Assessment and minimum required Asset Protection Zones in accordance with Table A2.4 PBP 2006 (see Figure above)

Mortimer Road		
	Vegetation	Forest
North	Slope	Across slope
	Minimum setback/APZ (m)	20 (partially provided by existing property and property access roads
	Vegetation	Forest
East	Slope	10-15° down
	Minimum APZ (m)	50
	Vegetation	Forest
South	Slope	Across slope
	Minimum APZ (m)	20
	Vegetation	Forest
West	Slope	Across slope
	Minimum APZ (m)	20

7.4.4 Access

Property access roads will be required to be constructed off the existing public through road to comply with PBP 2006 (refer Section 6.4.1 p19). Additional road construction in highly constrained areas is not recommended due to slopes of greater than 15 degrees. Alternate access for properties located greater than 200m from the public road system may not be achievable and would require further investigation.

7.4.5 Property Access Roads

Property access roads would be required to meet the PBP 2006 performance criteria (refer Section 6.4.1 p19). Minimal works to existing property access roads would be required.

Perimeter access is achievable for all developable areas as demonstrated in Figure 16.

Provision of access for fire fighting vehicles to the rear of dwellings in the developable area would need to be demonstrated by each development application and development approvals conditioned accordingly. Maintenance would be the responsibility of individual property owners.

7.4.6 Isolated areas

Areas greater than 200m from the public road system highlighted in Figure 16 above are considered at potential risk of isolation. Future development within this area would be at increased bushfire risk due to surrounding land of high ecological constraint and distance from the public through road. Increasing residential density in these areas would not be commensurate with the planning objectives of PBP 2006, for rural residential development.

7.5 Jervis Bay and Gorindah Road Investigation Area

This investigation area comprises the eastern portion of Lot 2 Gorindah Road and Lot 3 Jervis Bay Road (refer Table 1 p13). The investigation area within lot 2 Gorindah Road is fully vegetated and identified as highly environmentally constrained by the Environmental Constraints Report (SCC 2014). Lot 3 Jervis Bay Road is partially cleared and has been assessed as having development potential outside the vegetated areas.

Bushfire protection requirements have been identified in consideration of the constrained land as shown in Figure 19 below.

7.5.1 Vegetation

The predominant vegetation types have been determined for 140m in all directions from the developable areas in accordance with PBP 2006 Table A2.1 and are shown Figure 17 below. The vegetation types present within the study area vary between Blackbutt-Turpentine-Bangalay moist open Forest and Spotted Gum Grey Ironbark Woollybutt Grassy Open Forest on Coastal Flats. All of these vegetation types are classified as 'Forest' for the purposes of applying PBP 2006. Hollow bearing trees mapped as high conservation value as shown in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek / Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) were recorded within the developable area.

7.5.2 Slope

The investigation area is not constrained by slope. The predominant slope classes as shown in Figure 18 below are between 0-5 degrees.

7.5.3 Asset Protection Zones

Setbacks and access requirements have been identified for the developable areas. Figure 19 shows the assessment results, including setback and perimeter access requirements.

The public road infrastructure provided by Jervis Bay Road has been considered in the setback requirements for developable areas where they will provide 20m of separation in perpetuity from the hazard.

High conservation value hollow bearing trees identifiable in Figure 4 (p16) of this report and Figure 5 of the Environmental Constraints Report (*Falls Creek/ Woollamia Deferred Rural Residential Areas Strategic Environmental Constraints Report*, Shoalhaven City Council, 2014) have been considered by this assessment and may be retained within the Asset Protection Zone (refer Section 5.1.1 p14).



Figure 17: Vegetation Jervis Bay-Gorindah Road Investigation Area

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Jervis Bay Road and Gorindah Road Slope Classes

Figure 18: Slope Jervis Bay and Gorindah Roads Investigation Area:



Figure 19: Setbacks and Access Requirements for Jervis Bay and Gorindah Roads Developable area

 Table 6: Bushfire Hazard Assessment and minimum required Asset Protection Zones in accordance with Table A2.4 PBP 2006 (see Figure above).

Lot 3 Jervis Bay Road		
	Vegetation	Forest
North	Slope	0-5 down
	Minimum setback/APZ (m)	25
	Vegetation	Forest
East	Slope	0-5° down
	Minimum APZ (m)	25 (provided by Jervis bay Road)
South	Vegetation	Forest
	Slope	Across slope
	Minimum APZ (m)	20
West	Vegetation	Forest
	Slope	Across slope
	Minimum APZ (m)	20

7.5.4 Access

Property access roads will be required to be constructed off the existing public road (Jervis Bay Road) to comply with PBP 2006 (refer Section 6.4.1 p19).

7.5.5 Property Access Roads

Property access roads would be required to meet the PBP 2006 performance criteria (refer Section 6.4.1 p19). Minimal works to existing property access roads would be required.

Perimeter access is achievable for all developable areas as demonstrated in Figure 19.

Provision of access for fire fighting vehicles to the rear of dwellings in the developable area would need to be demonstrated by each development application and development approvals conditioned accordingly. Maintenance would be the responsibility of individual property owners.

7.5.6 Isolated areas

There would be no isolated development in this development area.

8 Conclusion

8.1 **Development opportunities**

Planning for bushfire protection constraints to future development within the investigation areas are associated with areas of high conservation value, access and isolated rural residential development.

Areas that are considered isolated rural residential development (Section 6.1.1 p17) are greater than 200m from the public road system, surrounded by land of high ecological constraint and/or unable to meet the access requirements of PBP. Future development within areas identified as isolated would require performance measures and further investigation to demonstrate the planning objectives of PBP 2006, for rural residential development can be achieved.

There is some potential for future development compliant with the provisions of PBP 2006 within lots identified in

Table 1: Areas Identified as suitable for future development can achieve the minimum setback and property access including perimeter access requirements of PBP 2006.

Recommendations of assessment	Relevant PBP Objective met
Development is clustered within	Section 4.1 Planning controls for residential and
low- moderate environmentally	rural residential subdivisions. Section 4.1.(b)
constrained areas	Rural-Residential Developments
	Section 4.1.2 specific objectives for subdivisions
No development will be at	Section 4.1 Planning controls for residential and
increased bushfire risk due to	rural residential subdivisions. Section 4.1.(c)
isolation from the public road	Isolated Rural- Developments
system	Section 4.1.2 specific objectives for subdivisions
Minimum setbacks determined	Section 4.1.3 Standards for Bush fire Protection
using Table A2.4 PBP separate	Measures for Rural Residential Subdivision,
future dwellings from hazard	Asset Protection Zones

Table 7: Lots capable of development commensurate with PBP
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 No APZs will be on slopes >18 degrees 	Section 4.1.3 Standards for Bush fire Protection Measures for Rural Residential Subdivision, Asset Protection Zones
 Upgrades to existing property access roads will be required and undertaken in accordance with PBP requirements for property access. No property access roads will be located on gradients >10° Property access roads connect to the public through road system Perimeter access is afforded between future dwellings and the hazard. Alternate access/egress is achievable 	Section 4.1.3 Standards for Bush fire Protection Measures for Rural Residential Subdivision- Property Access Roads
Investigation Area:	Lots with development potential
Seasongood Road (refer Section 7.1 page 21)	Lots 119, 119A, 118, 118A 116, 116A, and 115 (Area A); lots 113, 113A, and 112 (Area B) and lots 122, 121 and 123 (Area C)
Woollamia Road (refer Section 7.2 page 29)	155, 155A, 157, 158, 159, and 159A
Barron and Pepper Roads (refer Section 7.3 page 36)	160, 161,162, 170, 171, 721, 722
Mortimer Road (Section 7.4 page 43)	Lot 4

8.2 Lot size considerations

Future lot sizes within the developable areas must be adequate to accommodate the following:

- Minimum APZ/setback requirements for each investigation area identified in Section 7.
- Building envelopes outside 20m buffers to hollow bearing trees (Section 55.1.1 p14 and Figure 4 p16),
- Perimeter access (Section 66.4.2).

8.3 Utilities/Services

Water supplies of 10,000 litres per rural residential lot (1,000-10,000m²) and 20,000 litres per large rural lot (>10,000 m2) must be provided in accordance with PBP 2006.

The water supply requirements for future dwellings would be detailed at future development application stage.

8.4 Construction Standards AS3959

In accordance with Appendix 3 (Table 3.3) in PBP 2006 BAL's as per AS3959-2009 (*Construction of buildings in bushfire-prone areas*) for future dwellings would be determined at future development application stage. Minimum APZ setbacks would require that future dwellings could be required to be built to flame zone construction in accordance with Table 2.4.2 of Australian Standard 3959-2009 – *Construction of buildings in bushfire-prone areas based on proposed setbacks*.

9 Appendix A – Section 117 Direction - Planning for Bushfire Protection

4.4 Planning for Bushfire Protection

Objectives

- (1) The objectives of this direction are:
 - (a) To protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas; and
 - (b) To encourage sound management of bush fire prone areas.

Where this direction applies

(2) This direction applies to all local government areas in which the responsible Council is required to prepare a bush fire prone land map under Section 146 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act), or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.

When this direction applies

(3) This direction applies when a relevant planning authority prepares a planning proposal that will affect, or is in proximity to land mapped as bushfire prone land.

What a relevant planning authority must do if this direction applies

- (4) 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 56 of the Act, and prior to undertaking community consultation in satisfaction of Section 57 of the Act, and take into account any comments so made;
- (5) A planning proposal must:
 - (a) Have regard to Planning for Bushfire Protection 2006,
 - (b) Introduce controls that avoid placing inappropriate developments in hazardous areas; and
 - (c) Ensure that bushfire hazard reduction is not prohibited within the APZ.
- (6) 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.

- (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;
- (c) Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks;
- (d) Contain provisions for adequate water supply for firefighting purposes;
- (e) Minimise the perimeter of the area of land interfacing the hazard which may be developed;
- (f) Introduce controls on the placement of combustible materials in the Inner Protection Area.

Consistency

(7) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the noncompliance, the NSW Rural Fire Service does not object to the progression of the planning proposal.