



Appendix E

Bushfire Hazard Assessment

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Bushfire Hazard Assessment

Riverside Tourist Cabins New Entrance Road, South West Rocks

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Table of Contents

Section	Page
1 Introduction	3
1.1 Scope and Purpose	3
1.2 Legislative Framework	3
2 Background	5
2.1 Location and Description	5
2.2 The Proposal	5
2.3 Significant Environment Features	6
3 Bushfire Hazard Assessment	6
3.1 Vegetation.....	6
3.2 Slope.....	7
3.3 Fire (Weather Area)	7
4 Planning for Bushfire Protection	8
4.1 Asset Protection Zones (APZ)	8
4.1.1 APZ Requirements.....	8
4.1.2 Compliance with APZ Performance Criteria for SFPP	8
4.1.3 General APZ Management	9
4.2 Bushfire Protection Measures	10
4.3 Construction Standards	12
5 Recommendations	13
6 Conclusion	13
7 References	14



Illustrations

Illustration 1.1	Bushfire Prone Land	4
Illustration 4.1	Asset Protection Zones.....	11

Tables

Table 3.1	Vegetation Formation.....	7
Table 3.2	Effective Slope	7
Table 4.1	APZ Requirements.....	8
Table 4.2	Demonstration of Compliance: APZs for SFPP	9
Table 4.3	Demonstration of Compliance: Internal Roads, Services and Emergency /Evacuation Planning for SFPP Developments	10

Plates

Plate 2.1	Oblique aerial photograph of the property (red) and area of proposed tourist cabins (orange)	5
Plate 2.2	Swamp Oak Floodplain Forest EEC adjacent to the proposed cabins	6
Plate 3.1	View of site looking north towards the tavern	6
Plate 3.2	View of the site looking south-east from New Entrance Road/ Macleay River ..	7



1 Introduction

1.1 Scope and Purpose

GeoLINK has been engaged by Shannon Pacific Pty Ltd to prepare a bushfire hazard assessment for the construction of nine tourist cabins, adjacent to the Riverside Tavern situated on New Entrance Road, South West Rocks, on the mid north coast of NSW.

Background data for the site has been reviewed and an inspection of the site has been completed. This report serves to:

- identify the site and proposed development;
- determine the bushfire threat; and
- identify precautions required to improve the chances of building survival in the event of a bushfire.

1.2 Legislative Framework

The Rural Fires Act 1997 and the Environmental Planning and Assessment Act 1979 (EP&A Act) institute a framework for environmental planning and assessment to consider bushfire hazard issues. The proposed tourist cabins development will be assessed under Part 3A of the EP&A Act therefore a Bushfire Safety Authority (required for 'Special Fire Protection Purpose' - SFPP developments) under Section 100B of the Rural Fires Act 1997 is not required. This report will accompany the Part 3A application. The NSW Department of Planning will determine the application in consultation with the NSW Rural Fire Service.

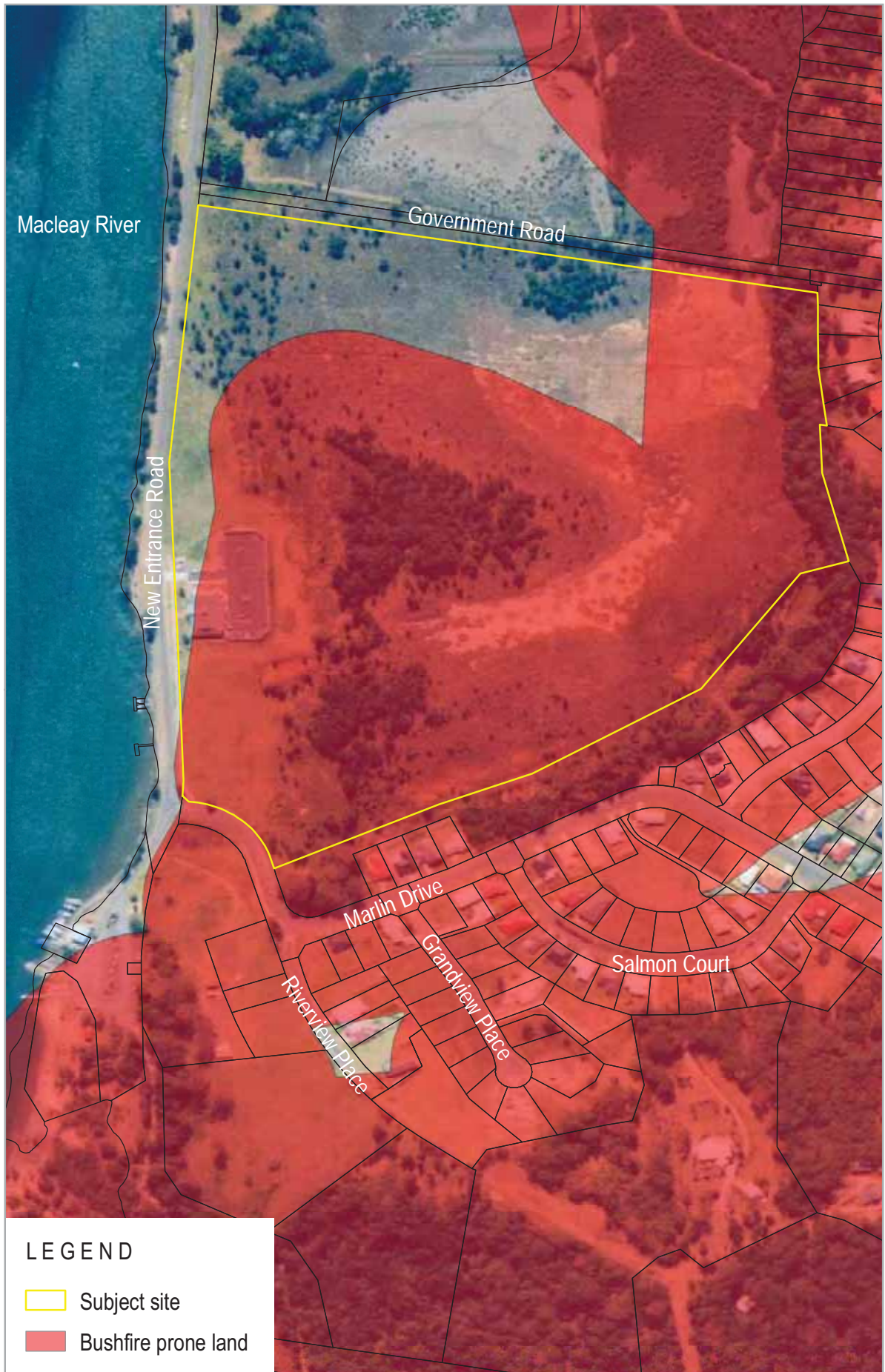
Kempsey Shire Council's (KSC) bushfire prone land mapping indicates that the site is located on bushfire prone land (refer to Illustration 1.1). Council's bushfire prone land mapping has been prepared as a requirement of Section 146 of the EP&A Act and in accordance with the NSW Rural Fire Services 'Guideline to Bushfire Prone Land Mapping'.

An assessment has therefore been undertaken (in accordance with the procedure set out in Appendix 2 Planning for Bushfire Protection 2006 - PBP) to determine appropriate bushfire hazard protection measures for the proposed development.

The land is currently zoned 7(d) Scenic Protection pursuant to the provisions of the Kempsey Local Environmental Plan 1987. The land is surrounded by existing residential development to the south and east, the Macleay River to the west, and vacant crown land to the north. The site contains an existing tavern, areas of cleared grassland and State Environmental Planning Policy 14 (SEPP 14) Coastal Wetland.

The assessment contained in this report has been prepared with regard to:

- Planning for Bushfire Protection (PBP) 2006
- Addendum: Appendix 3 Planning for Bushfire Protection (2010);
- Environmental Planning and Assessment Act 1979;
- Rural Fires Act 1997;
- Rural Fires and Environmental Assessment Legislation Amendment Act 2002; and
- Australian Standard 3959-2009 Construction of Buildings in Bushfire Prone Areas.



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2 Background

2.1 Location and Description

The proposed tourist cabins are to be located adjacent to the Riverside Tavern on New Entrance Road, South West Rocks, on the mid north coast of NSW. The site is described as Lot 4 DP 1022342 and is located adjacent to the eastern bank of the Macleay River, approximately 3 km west of the coastal township of South West Rocks.

To the west, the site fronts New Entrance Road, which separates it from the river. The south-western corner of the site fronts Marlin Drive, which services an adjoining residential estate. A small parcel of freehold land is located to the north of the site, which separates the site from a former crown road (Government Road), which is now vacant crown land. An existing residential estate is located to the east and to the south. The New Entrance Road boat ramp and associated community facilities are located on the south-western side of the Marlin Drive / New Entrance Road intersection.

The site is within the Macleay River floodplain, is flat to very gently sloping, with north and easterly aspects, and is 22.58 ha. Elevation on the site ranges from 0 m to 5 m AHD.

The site consists of a cleared and maintained grassed open area and a SEPP 14 Coastal Wetland, which contains a mix of mangrove forest, mudflats / scalds, swamp forest, swamp oak, salt marsh, and some former pasture.



Plate 2.1 Oblique aerial photograph of the property (red) and area of proposed tourist cabins (orange)

2.2 The Proposal

The proposal includes the construction and operation of nine fully self-contained tourist cabins (5 x 1 bedroom and 4 x 2 bedroom) and associated infrastructure. The proposed tourist cabins are to be located in the south-western corner of the site between the tavern and Salmon Court / Marlin Drive and will cover 0.73 ha. The proposed tourist cabins are classified as Special Fire Protection Purpose (SFPP).

2.3 Significant Environment Features

The property contains approximately 18 ha of SEPP 14 Coastal Wetlands located in the eastern portion of the lot. The site also contains an Endangered Ecological Community (EEC) Swamp Oak Floodplain Forest.



Plate 2.2 Swamp Oak Floodplain Forest EEC adjacent to the proposed cabins

3 Bushfire Hazard Assessment

3.1 Vegetation

The main bushfire hazards are the forested wetland vegetation located east of the proposed site (refer to Plates 2.1, 2.2, 3.1 and 3.2). Vegetation on the site of the proposed cabins consists of short, managed grassland. Vegetation within 140 m of the proposed cabins consists of managed land to the north, west and south, with discontinuous stands of Swamp Oak (*Casuarina glauca*), wet sedgeland and grassland east and north-east.



Plate 3.1 View of site looking north towards the tavern

Vegetation has been assessed in terms of potential fire hazard using the formation classes provided within Table A2.1 of PBP 2006. Dominant vegetation formations in each relevant direction are listed within Table 3.1.

Table 3.1 Vegetation Formation

Direction	Vegetation Formation
North	Managed Land / Grassland
South	Managed Land
East	Forested Wetlands / Grassland
West	Managed Land / Macleay River



Plate 3.2 View of the site looking south-east from New Entrance Road/ Macleay River

3.2 Slope

The effective slope is that part of the overall slope under the vegetation assessed as being a hazard that will have the greatest influence on the bushfire behaviour in relation to the development. The effective slope for the proposal is summarised in Table 3.2.

The effective slope was determined to be 0.5 degrees from site survey. This is within the >0-5° effective slope category.

Table 3.2 Effective Slope

Direction	Effective Slope Category (degrees)
North	Upslope / flat
South	Upslope / flat
East	>0-5°
West	>0-5°

3.3 Fire (Weather Area)

KSC local government area is located within the 'north coast' fire area, with a Fire Danger Index (FDI) rating of 80.

4 Planning for Bushfire Protection

4.1 Asset Protection Zones (APZ)

4.1.1 APZ Requirements

The APZ requirements have been calculated based on the effective slope, vegetation formations and FDI rating (refer to Table 4.1). Tourist accommodation is identified as SFPP in PBP 2006.

Table 4.1 APZ Requirements

Direction	Dominant Vegetation Formation	Slope Category	Total Asset Protection Zone (m) (Inner Protection Area)*
North	Grassland	Upslope/ flat	10
South	Managed Land	Upslope/ flat	-
East	Forested Wetlands	>0-5°	44*
West	Managed Land	>0-5°	-

* The NSW RFS APZ calculator was used to determine the APZ requirement, using an effective slope of 0.5 degrees (refer to Appendix A).

The APZs are shown on Illustration 4.1 and can be located wholly within the property boundary. APZs for the four northern most cabins cannot be achieved due to their separation distance from the SEPP 14 Coastal Wetland. This is discussed further in Section 4.1.2 of this report.

No items of Aboriginal heritage significance were recorded within the proposed development area. It is not expected that implementation and/or maintenance of APZs would result in significant adverse impacts to any items of cultural or environmental significance (including the Swamp Oak Floodplain Forest EEC or SEPP 14 Coastal Wetland).

4.1.2 Compliance with APZ Performance Criteria for SFPP

The 44 m APZ for the four northern most cabins would extend into the SEPP 14 Coastal Wetland boundary by 8 m - 13 m, and consequently cannot be achieved. The four northern most cabins would achieve reduced APZs of 31, 36, 32 and 34 m.

Demonstration of compliance with performance criteria and intent of the measures proposed is outlined in Table 4.2. The development is required to:

- provide for a defensible space;
- demonstrate that the intent and performance criteria for APZs for a SFPP will be satisfied; and
- demonstrate that other measures in combination, will meet the relevant radiant heat levels specified in the performance criteria for APZs and will achieve the aim and objectives of PBP are outlined in Table 4.2.

The intent of APZs for SFPP is to 'provide sufficient space for firefighters and other emergency services personnel, ensuring radiant heat levels permit operations under critical conditions of radiant heat, smoke and embers, while supporting or evacuating occupants.'

Table 4.2 Demonstration of Compliance: APZs for SFPP

Performance Criteria	Demonstration of Compliance
Radiant heat levels of greater than 10 kW/m ² will not be experienced by occupants or emergency services workers entering or exiting a building.	<ul style="list-style-type: none"> ▪ Using the RFS Bushfire Attack Assessor, with a slope of 0.5°, a separation distance of 33.2 m achieves a 9.97 kW/m² radiant heat level. The building footprints of Cabin 1 and Cabin 3 are within 33.2 m of the SEPP 14 Coastal Wetland. Cabins 2 and 4 - 9 achieve radiant heat levels of less than 10 kW/m² based on separation distances of 34 to 56 m from the SEPP 14 Coastal Wetland boundary; ▪ for all cabins, doors are located on the western façade, away from the hazard and onto a veranda. Exit from the veranda is via east-facing stairs on the northern façade; ▪ for Cabin 1 and Cabin 3, the separation distance from the foot of the stairs to the SEPP 14 Coastal Wetland is 40 m and 44 m respectively. The radiant heat levels at the entry or exit from the cabins is therefore less than 10 kW/m² (refer to Appendix B for RFS Bushfire Attack Assessor modelling results); and ▪ the proposal can therefore comply with this criteria.
Applicants demonstrate that issues relating to slope are addressed: maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	<ul style="list-style-type: none"> ▪ Slope is 0.5° therefore issues of maintenance and soil stability and potential crown fires relating to slope are considered to be negligible.
APZs are managed and maintained to prevent the spread of fire towards a building.	<ul style="list-style-type: none"> ▪ Landscaping and general property maintenance is to comply with Appendix 5 of PBP 2006; and ▪ the tourist cabins will be separated from the forested wetland by a constructed wetland for stormwater treatment, landscaping and an internal access road.
Vegetation is managed to prevent flame contact and reduce radiant heat to buildings, minimise the potential for wind driven embers to cause ignition and reduce the effect of smoke on residents and fire-fighters.	<ul style="list-style-type: none"> ▪ Landscaping and general property maintenance should comply with Appendix 5 of PBP 2006.

4.1.3 General APZ Management

APZs should be maintained to consist of open areas where there is minimal fuel at ground level that could be set alight by bushfire. Some trees and shrubs are appropriate within the APZ, provided that they do not provide a path for fire to transfer to the development (i.e. tree canopies must be discontinuous and not overhang the house). In addition, no combustible materials (e.g. wood piles, flammable building materials) should be kept in the APZ. To enhance the APZs, weed management activities should be undertaken regularly to control regenerating weeds.

Within the APZs the following measures should be undertaken:

- plant trees and shrubs that are fire retardant and do not form a continuous canopy;
- maintain the understorey in a mown state;

- trim dead branches from any existing trees and maintain the understorey with minimal leaf litter and combustible material; and
- trim limbs of trees and shrubs to ensure they do not touch or overhang buildings.

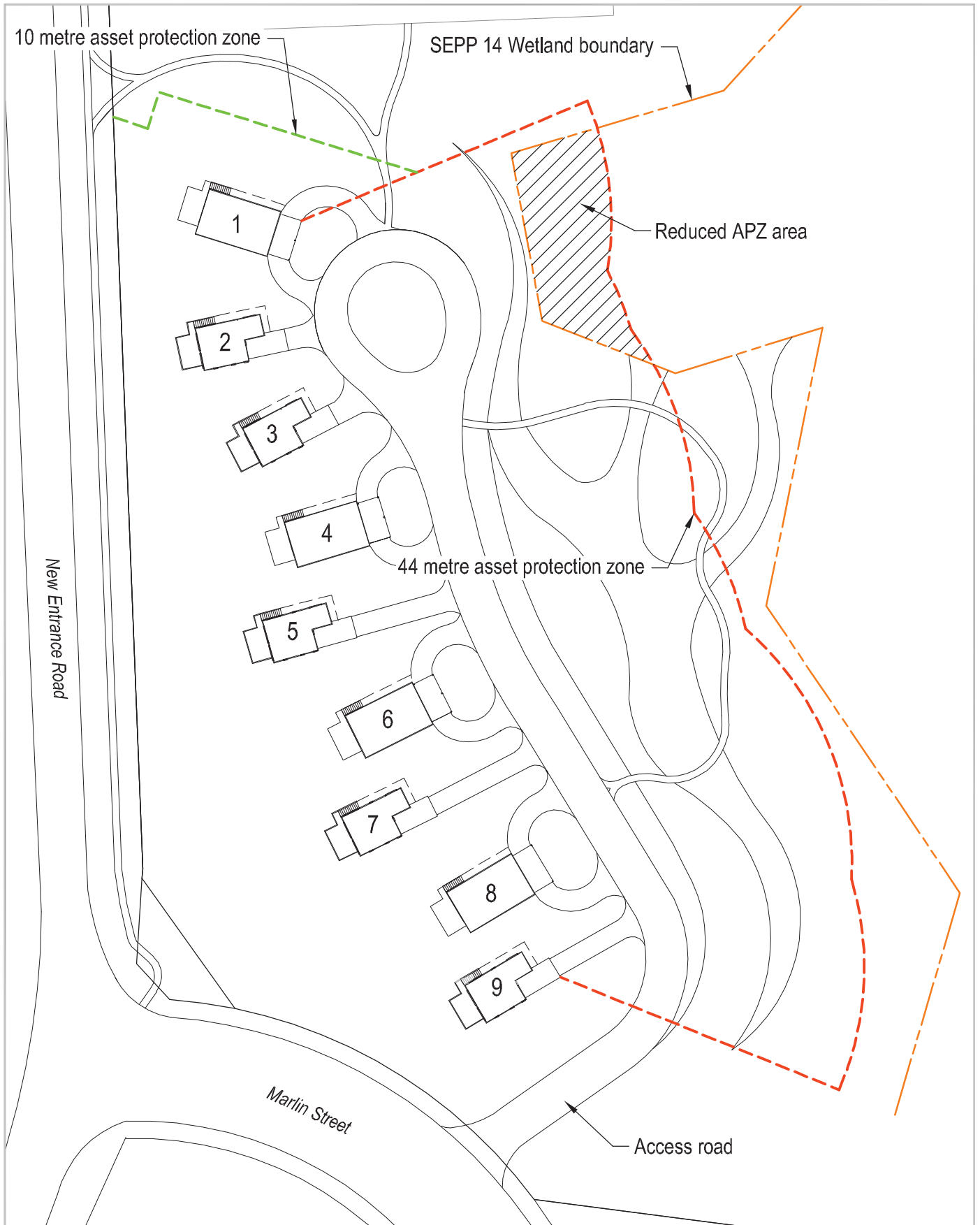
APZs consist of Inner Protection Areas (IPA) and Outer Protection Areas (OPA). An IPA should provide a tree canopy cover of less than 15% and should be located greater than 2 m from any part of the roofline of a dwelling. An OPZ should provide a tree canopy cover of less than 30% and should have an understorey managed (mowed) to treat all shrubs and grasses on an annual basis.

4.2 Bushfire Protection Measures

In accordance with Section 4.2.7 of PBP 2006, Table 4.3 demonstrates that the proposal can meet the deemed-to-satisfy criteria.

Table 4.3 Demonstration of Compliance: Internal Roads, Services and Emergency/Evacuation Planning for SFPP Developments

Performance Criteria	Demonstration of Compliance
Access – Internal Roads	<ul style="list-style-type: none"> ▪ As required by PBP, the proposed internal access road will be two-wheel drive, sealed all weather roads; ▪ traffic management devices will be constructed to facilitate access by emergency vehicles; ▪ maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees; ▪ New Entrance Road and Marlin Drive are major link roads with a width of 8 m; ▪ the proposed internal roads do not strictly meet PBP 2006 requirements as they will have a carriageway width of 6 m and a length of 152 m. Four semi-circular gravel access roads associated with the cabins will each be 3 m wide; ▪ they will however have additional gravel trailer parking areas parallel to the access road which provide additional width and will not have guttering and will be level with verge; and ▪ all roads will be constructed as contemporary urban roads, and will be able to be used by fire fighting vehicles.
Services – Water, Gas and Electricity	<ul style="list-style-type: none"> ▪ Reticulated water and electricity services will be provided; ▪ all electricity will be underground; ▪ no reticulated gas services are proposed; and ▪ fire hydrant spacing, sizing and pressures will comply with AS 2419.1 – 2005.
Emergency and Evacuation Planning	<ul style="list-style-type: none"> ▪ An emergency/evacuation plan will be prepared in accordance with RFS (2004) Guidelines for the Preparation of Emergency/ Evacuation Plan prior to occupation of the tourist cabins; and ▪ detailed plans of all emergency assembly areas including 'onsite' and 'offsite' arrangements as stated in AS 3745-2002 will be clearly displayed, and an annual trial emergency evacuation will be conducted.



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4.3 Construction Standards

The levels of bushfire attack have been calculated for the cabins in accordance with Addendum: Appendix 3 2010 of PBP, and Australian Standard AS2959-2009. Bushfire Attack Levels (BALs) are based on radiant heat flux exposure and are defined in Addendum: Appendix 3 2010 of PBP, and outlined in Table 4.4.

Table 4.4 Radiant Heat Flux Exposure and BALs

Heat Flux Exposure	Description	AS3959-2009 Construction Level
N/A	Minimal attack from radiant heat and flame due to the distance of the site from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	Low (BAL-LOW)
≤12.5	Attack by burning debris is significant with radiant heat (not greater than 12.5 kW/m ²). Radiant heat is unlikely to threaten building elements (eg. unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.	12.5 (BAL-12.5)
>12.5 ≤19	Attack by burning debris is significant with radiant heat flux (not greater than 19 kW/m ²) threatening some building elements (screened glass). Specific construction requirements for embers and radiant heat are warranted.	19 (BAL-19)
>19 ≤29	Attack by burning debris is significant and radiant heat flux (not greater than 29 kW/m ²) threaten building integrity. Specific construction requirements for ember and higher radiant heat are warranted. Some flame contact is possible.	29 (BAL-29)
>29 ≤40	Radiant heat flux and potential flame contact could threaten building integrity.	40 (BAL-40)
>40	Significant radiant heat and significant higher likelihood of flame contact from the fire front will threaten building integrity and result in significant risk to residents.	Flame Zone (BAL-FZ)

Source: Addendum: Appendix 3 2010 Planning for Bushfire Protection

The BALs for the cabins are outlined in Table 4.5 and summarised below:

- a specific bushfire construction level of BAL-29 is required for the eastern façade and BAL-19 for all other façades for cabins 1 to 4;
- a specific bushfire construction level of BAL-19 is required for the eastern façade and BAL-12.5 for all other façades of cabins 6 and 8; and
- a specific bushfire construction level of BAL-12.5 is required for all façades of cabins 5, 7 and 9.

Table 4.5 Bushfire Attack and Construction Standard

Aspect	Dominant Vegetation Formation	Slope Category	Separation Distance (m)	Bushfire Attack Level (BAL)
Cabins 1 to 4				
North	Grassland	Upslope / flat	>100	BAL-19 [#]
South	Managed Land	Upslope / flat	-	BAL-19 [#]
East	Forest	>0-5°	30.9 to 36.7 m	BAL-29
West	Managed Land	>0-5°	-	BAL-19 [#]

Aspect	Dominant Vegetation Formation	Slope Category	Separation Distance (m)	Bushfire Attack Level (BAL)
Cabins 6 and 8				
North	Grassland	Upslope / flat	>100	BAL-12.5#
South	Managed Land	Upslope / flat	-	BAL-12.5#
East	Forest	>0-5°	46.6 to 47.1 m	BAL-19
West	Managed Land	>0-5°	-	BAL-12.5#
Cabins 5, 7 and 9				
North	Grassland	Upslope / flat	>100	BAL-12.5*
South	Managed Land	Upslope / flat	-	BAL-12.5*
East	Forest	>0-5°	53.5 to 58.3 m	BAL-12.5
West	Managed Land	>0-5°	-	BAL-12.5*

A building with any façade identified as requiring a construction level must build all façades to at least BAL-12.5 construction. Where more than one façade is exposed to a hazard, then the façade with the highest construction requirement is used to determine the appropriate level of construction. All other façades may be reduced by one level of construction unless that façade is also subject to the same category of bushfire attack.

* The level of construction cannot fall to less than BAL-12.5 construction where any part of the building is closer than 100 m to the source of a bushfire attack.

5 Recommendations

It is recommended that the following conditions be adopted for the proposed development:

- APZs of 44 m to the east be established and maintained for the five southern most cabins, as outlined in Section 4.1 and Table 4.1, and according to PBP;
- APZs be established and maintained for the four northern most cabins to the SEPP 14 Coastal Wetland and according to PBP;
- APZs of 10 m to the north of the proposed cabins be established and maintained for the northern most cabin;
- landscaping and general property maintenance should comply with Appendix 5 of PBP 2006;
- a specific bushfire construction level of BAL-29 for the eastern façade and BAL-19 for all other façades for cabins 1 to 4;
- a specific bushfire construction level of BAL-19 for the eastern façade and BAL-12.5 for all other façades of cabins 6 and 8;
- a specific bushfire construction level of BAL-12.5 for all façades of cabins 5, 7 and 9; and
- an emergency and evacuation plan be prepared for the cabins for the purposes of bushfire protection in accordance with A guide to Developing a Bushfire Evacuation Plan (RFS 2004).

6 Conclusion

Based on consideration of the vegetation, effective slope and FDI, the assessment has identified that adequate and appropriate bushfire hazard protection measures are available, and can be implemented on the site to facilitate the proposed cabins. The proposal conforms to the standards, specific objectives and performance criteria set out in Planning for Bushfire Protection 2006.

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