BUSHFIRE HAZARD ASSESSMENT

Rezoning of Various Lots in Frederickton

Kempsey Shire Council

August 2017

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1.0 INTRODUCTION

Kempsey Shire Council has requested a Bushfire Hazard Assessment be carried out for the proposed rezoning of various lots in Frederickton.

The report is based on a site assessment carried out on the 21st July 2017 and is based upon the relevant requirements of NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006 (PfBP,2006) and AS 3959-2009.

The site of the planning proposal is approximately 27 hectares in area and Council is investigating the rezoning to R1 General Residential.

The Study Area as identified can be seen in **Appendix 1**.

The report is being completed for the rezoning with the intention that this report can be utilized throughout the planning processes.

NOTE

The report has been prepared with all reasonable skill, care and diligence.

The information contained in this report has been gathered from field survey, experience and has been completed in consideration of the following legislation.

1. Rural Fires Act 1997.
2. Environmental Planning and Assessment Act 1979.
3. Building Code of Australia.
4. Council Local Environment Plans and Development Control Plans where applicable.
5. NSW Rural Fire Services, Planning for Bushfire Protection, 2006 (PfBP, 2006).
6. AS 3959-2009 Construction of Buildings in Bushfire Prone Areas.

The report recognizes the fact that no property and lives can be guaranteed to survive a bushfire attack.

The report examines ways the risk of bushfire attack can be reduced where the site falls within the scope of the legislation.

The report is confidential and the writer accepts no responsibility of whatsoever nature, to third parties whom use this report or part thereof is made known.

Any such party relies on this report at their own risk.

1.1 Objectives

The objectives of this report are to:

- Ensure that the proposed rezoning can meet the aims and objectives of NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006 and has measures sufficient to minimize the impact of bushfires; and
- Reduce the risk to property and the community from bushfire; and
- Comply where applicable with AS3959 – 2009.

1.2 Legislative Framework

In NSW, the bushfire protection provisions of the BCA are applied to Class 1, 2, 3, Class 4 parts of buildings, some Class 10 and Class 9 buildings that are Special Fire Protection Purposes (SFPPs).

The BCA references AS3959 – 2009 as the deemed-to-satisfy (DTS) solution for construction requirements in bushfire prone areas for NSW.

As per the Rural Fire Service's Fast Fact of 01/10 all development on bushfire prone land in NSW should comply with the requirements of Addendum Appendix 3 and other bushfire protection measures identified within NSW Rural Fire Service, ***Planning for Bushfire Protection***, 2006.

1.3 Location

The site is positioned in the Frederickton area between Great North Road to the south and Yarrabandini Road to the northeastern side.

Locality – Frederickton
Local Government Area – Kempsey Shire Council
Closest Rural Fire Service – Frederickton
Closest Fire Control Centre – Kempsey

The location can be seen in **Figure 1** below:

Figure 1: Topographical Map

Figure 2: Aerial View

1.4 Site History and Proposal

The site is currently rural landscape and public recreation areas.

The proposal is for a rezoning to allow for an increase in residential development.

As part of the development there has been ecological reporting completed and this has considered that there will be vegetation removed in the Study Area.

These areas will be identified further in the report.

2.0 BUSHFIRE HAZARD ASSESSMENT

2.1 Assessment Methodology

Several factors need to be considered in determining the bushfire hazard.

These factors are slope, vegetation type, and distance from hazard, access/egress and fire weather.

Each of these factors has been reviewed in determining the bushfire protection measures.

The assessment of slope and vegetation being carried out in accordance with Appendix 2 and Appendix 3 of NSW Rural Fire Service, PfBP,2006 and Section 2 of AS 3959 - 2009.

2.2 Slope Assessment

Slope is a major factor to consider when assessing the bushfire risk.

The slopes were measured using a Suunto PM-5/360 PC Clinometer.

The slopes were considered with respect to the hazards that are identified further in the report.

The following table shows the results:

Table 1 – Vegetation Slopes

Hazard Aspect	Slope	Upslope/Downslope or Flat
North East	5-10°	Downslope
North	0-5°	Downslope
East	0-5°	Downslope
West	0-5°	Downslope

2.3 Vegetation Assessment

The vegetation on and surrounding the subject site was assessed over a distance of 140m.

The vegetation formations were classified using the system adopted as per Keith (2004) initially and then converting Keith to AUSLIG using Table A3.5.1 of Appendix 3 (2010).

2.3.1 Vegetation

The Study Area is a mixture of unmanaged and managed vegetation.

It is noted that there is a playing field in the eastern corner of the lot and the Frederickton Golf Club borders the site in the northeast.

To the northwest of the site there is an area of low lying unmanaged vegetation, however because of the separation distance, this vegetation has limited bushfire impact on the site.

The majority vegetation surrounding the subject area is either managed or unmanaged grassland.

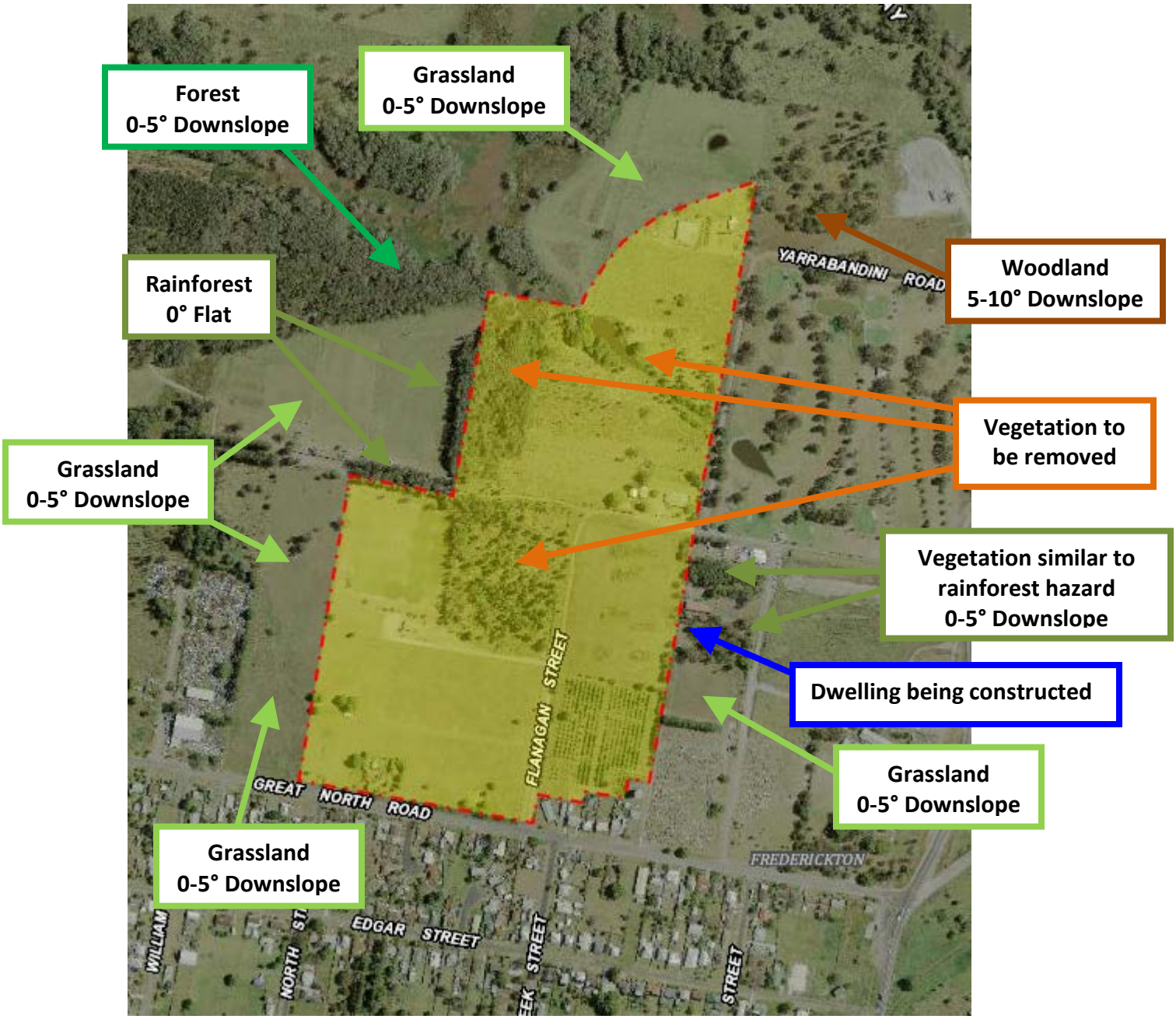
As previously mentioned in the report, an ecological study has been completed on the site and it is understood after discussions with Council that there are areas of unmanaged vegetation that will be removed from the site.

The hazard mapping shows the vegetation that is proposed to be removed.

2.4 Hazards

The hazards identified can be seen below:

Figure 3: Hazards



With respect to the hazard mapping the following should be noted:

a) Much of the grassland as nominated in the hazard mapping is managed, however for the purposes of the report has been considered unmanaged.

b) The forest vegetation to the south of the golf course has been considered similar to a rainforest hazard in accordance with Appendix 2 of Planning for Bushfire Protection, 2006.

c) After the removal of the vegetation on the western perimeter there maybe some remnant vegetation left adjacent to the Study Area for the purposes of the report this remnant vegetation has been considered similar to a rainforest hazard.

Photo 1 - Vegetation to the North of the Existing Church

Photo 2 - Vegetation to the south of the Existing Church (Note Dwelling being constructed close to the boundary)

Photo 3 - Remnant Vegetation considered as rainforest to the north of the playing fields

Photo 4 - Grassland vegetation on the Study Area

Photo 5 - Grassland Vegetation on the Study Area

Photo 6 - Grassland Vegetation to the west of the Study Area

Photo 7 - Woodland Vegetation to the North East of the Study Area

Photo 8 - Grassland Vegetation to the East of the Study Area

2.4.1 Hazard Vegetation

The hazard vegetation identified for determination of APZ is summarized as follows:

Table 2 – Summary of Hazard Characteristics

Hazard Aspect	Vegetation Classification – (Keith, 2004)	Slope
North East	Woodland	5-10° Downslope
North	Grassland	0-5° Downslope
East	Rainforest Grassland	0-5° Downslope 0-5° Downslope
West	Forest Rainforest Grassland	0-5° Downslope 0-5° Downslope 0-5° Downslope

2.5 Fire Danger Index

The fire weather for the site is assumed on the worst-case scenario.

In accordance with NSW Rural Fire Services, PfBP, 2006 and Table 2.1 of AS3959 - 2009, the fire weather for the site is based upon the 1:50 year fire weather scenario and has a Fire Danger Index (FDI) of 80.

3.0 BUSHFIRE THREAT REDUCTION MEASURES

3.1 NSW Rural Fire Services, Planning for Bushfire Protection, 2006

It is noted that the development is considered as infill development in accordance with PfBP, 2006.

The following provisions of PfBP, 2006 have been identified.

3.1.1 Defendable Space/Asset Protection Zone

To ensure that the aims and objectives of NSW Rural Fire Services, PfBP, 2006, are achieved a defendable space between the asset and the hazard should be provided.

The defendable space provides for, minimal separation for safe firefighting, reduced radiant heat, reduced influence of convection driven winds, reduced ember viability and dispersal of smoke.

It is recommended that the defendable space be based upon the minimum requirements for Asset Protection Zones as set out in NSW Rural Fire Services, PfBP, 2006.

Table 3 - Asset Protection Zone Requirements (PfBP 2006)

Hazard Aspect	Vegetation Type	Slope	IPA	OPA	Total APZ Required (IPA + OPA)
North East	Woodland	5-10° Downslope			22m
North	Grassland	0-5° Downslope			9m
East	Rainforest Grassland	0-5° Downslope 0-5° Downslope			11m 9m
West	Forest Rainforest Grassland	0-5° Downslope 0-5° Downslope 0-5° Downslope			27m 11m 9m

The Bushfire Attack Level Contour lines (which indicate Minimum Asset Protection Zones) can be seen in **Appendix 2**.

It should be noted that with respect to the minimum Asset Protection setbacks that:

1. The setbacks will have minimum impact when considering the use of perimeter roads systems.

2. It is likely to be possible to locate Special Fire Protection Purpose buildings within the some areas of the Study Area.

3.1.2 Operational Access and Egress

Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.		***Comment***
The intent may be achieved where:		
Performance Criteria	**Acceptable Solutions**	
Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)	• Public roads are two-wheel drive, all weather roads.	To Comply
Public road widths and design that allow safe access for firefighters while residents are evacuating an area.	• Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). • The perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. • Traffic management devices are constructed to facilitate access by emergency services vehicles. • Public roads have a cross fall not exceeding 3 degrees. • All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends 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 and direct traffic away from the hazard.	Internal road to comply with requirements for Perimeter Roads Perimeter roads applicable in Urban Areas To comply To comply. It is noted that the shape of the Study Area could lead to the limited road access into some areas therefore in the road design process consideration should be given to alternate egress for all areas

	• Curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. • The minimum distance between inner and outer curves is six metres. • 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. • There is a minimum vertical clearance to a height of four metres above the road at all times.	To comply To comply To comply To comply
The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles.	• The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.	To comply
Roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	• Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. • Public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.	To comply To comply
There is clear access to reticulated water supply	• Public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • One way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.	N/A N/A
Parking does not obstruct the minimum paved width	• Parking bays are a minimum of 2.6 metres wide from the kerb edge to road pavement. No services or hydrants are located within the parking bays. • Public roads directly interfacing the bushfire hazard vegetation provide roll top kerbing to the hazard side of the road.	To comply To comply

3.1.3 Services - Water, Gas and Electricity

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building		
Performance Criteria	**Acceptable Solutions**	**Compliance Comment**
The intent may be achieved where:		
Reticulated water supplies • water supplies are easily accessible and located at regular intervals	• Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. • fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. • hydrants are not located within any road carriageway • all above ground water and gas service pipes external to the building are metal, including and up to any taps. • the provisions of parking on public roads are met.	To Comply To Comply To Comply To Comply To Comply
Electricity Services • location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings • regular inspection of lines is undertaken to ensure they are not fouled by branches.	• where practicable, electrical transmission lines are underground. • where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).	To Comply To Comply
Gas services • location of gas services will not lead to ignition of surrounding bush land or the fabric of buildings	• reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used. • all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation.	To Comply at DA/CC stage for dwelling To Comply at DA/CC stage for dwelling

	• if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.	To Comply at DA/CC stage for dwelling
	• polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	To Comply at DA/CC stage for dwelling

As set out in Section 4.1.3 of NSW Rural Fire Services, PfBP, 2006, developments in bushfire prone areas must maintain a water supply for firefighting purposes.

Reticulated water will be connected to the site and if Council cannot guarantee a water supply then a Water Supply for Fire Fighting of 5,000 litres in accordance with Fast Fact 3/08 and Planning for Bushfire Protection, 2006 is to be provided (See **Appendix 3).**

Any tanks will require the following at a minimum.

- A suitable connection for firefighting purposes is made available and located within the IPA and away from the structure. A 65mm Storz outlet with a Gate or Ball valve is provided.
- Gate or Ball valve and pipes are adequate for water flow and are metal rather than plastic.
- Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole.
- Above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks are not used. Tanks on the hazard side of a building are provided with adequate shielding for the protection of fire fighters.
- All above ground water pipes external to the building are metal including and up to any taps.
- Pumps are shielded.

Electricity supply is connected throughout the subject area.

Reticulated gas services are not available to the subject site, however any reticulated or bottled gas is to be installed and maintained in accordance with AS 1596 and the requirements of the relevant authorities. Metal piping is to be used. All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side of the installation.

If gas cylinders need to be kept close to a building, the release valves are to be directed away from the building and at least two (2) metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders need to be metal. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

It is considered that the relevant acceptable solutions as provided for by 4.3.5 and of NSW Rural Fire Services**,** PfBP, 2006 are capable of being complied with and as such the intent for the provision of services for the proposed boundary adjustment/subdivision can be achieved.

3.1.4 Landscaping

Landscaping is a major cause of fire spreading to buildings, and therefore any landscaping proposed in conjunction with the proposed boundary adjustment/subdivision will need consideration when planning, to produce gardens that do not contribute to the spread of a bushfire.

When planning any future landscaping consideration should be given to the following:

- The choice of vegetation – consideration should be given to the flammability of the plant and the relation of their location to their flammability and ongoing maintenance to remove flammable fuels.
- Trees as windbreaks/firebreaks – Trees in the landscaping can be used as windbreaks and also firebreaks by trapping embers and flying debris.
- Vegetation management – Maintain a garden that does not contribute to the spread of bushfire.
- Maintenance of property – Maintenance of the property is an important factor in the prevention of losses from bushfire.

Appendix 5 of NSW Rural Fire Services**,** PfBP, 2006, contains standards that are applicable to the provision and maintenance of landscaping. Any landscaping proposed to be undertaken in conjunction with the proposed boundary adjustment/subdivision is to comply with the principles contained in Appendix 5 of NSW Rural Fire Services, PfBP, 2006.

Compliance with Appendix 5 of NSW Rural Fire Services, PfBP, 2006, will satisfy the intent of the bush fire protection measures that are applicable to the provision of landscaping.

3.1.5 Emergency Management

It is recommended that the Rural Fire Service is consulted with respect to the Emergency Management requirements for the Study Area.

3.2 Construction of Buildings

3.2.1 General

The deemed-to-satisfy provisions for construction requirements are detailed in AS 3953-2009. The relevant Bushfire Attack Level and construction requirements have been determined in accordance with Appendix 3 (2010) of PfBP, 2006 and Section 2 of AS 3959-2009. The additional construction requirements with respect to A3.7 of Appendix 3 (2010) of PfBP, 2006 are required to be added to the standards for each Bushfire Attack Level.

3.2.2 Vegetation

To complete the assessment under AS 3959-2009 the vegetation, as originally assessed in accordance with Keith, has to be converted to AUSLIG.

The following table shows the conversion:

Table 5 – Summary of Vegetation Characteristics

Vegetation Classification – (Keith, 2004)	Vegetation Classification – (AUSLIG 1990)
Grassland	Grassland
Forest	Forest
Rainforest	Rainforest
Woodland	Woodland

3.2.3 AS3959 – 2009 Construction of Buildings in Bushfire Prone Areas

The following construction requirements in accordance with AS 3959 – 2009 Construction of Buildings in Bushfire Prone Areas is required for the bushfire attack categories.

Bushfire Attack Level (BAL)
BAL - LOW No construction requirements under AS 3959-2009
BAL - 12.5
BAL - 19
BAL - 29
BAL - 40
BAL - FZ

The following table indicates the Bushfire Attack Levels applicable once the recommended APZs have been established:

Table 6 – Categories of Attack/Construction for residential development

Hazard Aspect	Hazard Slope	Vegetation	Distance to Hazard once APZ Applied	AS 3959-2009 Bushfire Attack Level (BAL)
North East	5-10° Downslope	Woodland	22m	BAL – 29
North	0-5° Downslope	Grassland	9m	BAL – 29
East	0-5° Downslope 0-5° Downslope	Rainforest Grassland	11m 9m	BAL – 29 BAL – 29
West	0-5° Downslope 0-5° Downslope 0-5° Downslope	Forest Rainforest Grassland	27m 11m 9m	BAL – 29 BAL – 29 BAL – 29

Compliance with these requirements will ensure that the proposed rezoning complies with the requirements of AS 3959 - 2009 Construction of Buildings in Bushfire Prone Areas, for the siting, design and construction.

Bushfire Attack Level 29 Contour Lines (same as Minimum Asset Protection Zones) from the hazards can be seen in **Appendix 2**.

4.0 RECOMMENDATIONS

The following recommendations are made with respect to the bushfire prone areas:

1. An Asset Protection Zone as detailed in Section 3.1.1 of this report is considered.
2. Access and Egress is to be provided as detailed in Section 3.1.2 of this report is to be provided.
3. A water supply (including gas bottle supply) as detailed in Section 3.1.3 of this report is to be provided.
4. Adopt landscaping principals in accordance with Section 3.1.4 of this report.
5. The Bushfire Attack levels as detailed in the report are considered.
6. In addition to the requirements of this report it is recommended that a bushfire survival plan be developed and implemented for the subject site. In this regard your attention is drawn to the Rural Fire Service website.

5.0 CONCLUSION

It is suggested that with the implementation of this report, and its recommendations, that the bushfire risk for the proposed rezoning is manageable and will be consistent with the acceptable bushfire protection measure solutions, provided for in section 4.3.5 of NSW Rural Fire Services, PfBP, 2006.

The report provides that the required APZ's can be achieved and that the proposed rezoning can be completed so as to comply with the requirements of AS 3959-2009 and Appendix 3 of PfBP, 2006, Construction of Buildings in Bushfire Prone Areas.

This report is however contingent upon the following assumptions and limitations:

Assumptions

1. For a satisfactory level of bushfire safety to be achieved, regular inspection and testing of proposed measures, building elements and methods of construction, specifically nominated in this report, is essential and is assumed in the conclusion of this assessment.
2. There are no re-vegetation plans in respect to hazard vegetation and therefore the assumed fuel loading will not alter.
3. It is assumed that the building works will comply with the DTS provisions of the BCA including the relevant requirements of Australian Standard 3959 – 2009.
4. The proposed development is constructed and maintained in accordance with the risk reduction strategy in this report.
5. The vegetation characteristics of the subject site and surrounding land remains unchanged from that observed at the time of inspection.

Limitations

1. The data, methodologies, calculations and conclusions documented within this report specifically relate to the development and must not be used for any other purpose.
2. A reassessment will be required to verify consistency with this assessment if there is building alterations and/or additions, change in use, or changes to the risk reduction strategy contained in this report.

Regards

Tim Mecham
Midcoast Building and Environmental

6.0 REFERENCES

NSW Rural Fire Services, *Planning for Bushfire Protection*, 2001
NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006
AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas*
Keith David 2004, Ocean *Shores to Desert Dunes, The Native Vegetation of New South Wales and the ACT*, Department of Environment and Conservation
NSW State Government (1997) Rural Fires Act 1997
NSW Rural Fire Service – *Guideline for Bushfire Prone Land Mapping 2002*

APPENDIX 1- Plan Layout

As a result of the preliminary review it is proposed to revise the LEP as indicated below:

APPENDIX 2 – BAL 29 Contour Lines

BAL Contour Lines are indicative only

APPENDIX 3 – Water supply

NSW RURAL FIRE SERVICE

COMMUNITY RESILIENCE FAST FACTS 3/08

Water Supply for Fire Fighting Purposes

This Fast Fact clarifies the NSW Rural Fire Service (RFS) position on the requirement for water supplies for development in bush fire prone areas.

Adequate water supply is critical for effective fire fighting. Where a non reticulated water supply is provided or the reticulated water supply is deemed inadequate, an additional onsite stored supply of water for fire fighting will be required. Non reticulated water is a supply that is not piped by council or a water authority and includes rainwater, ground water or surface water.

In the past, additional water sources could take the form of a static water supply (SWS) or a dedicated water supply. The RFS has traditionally required that an alternate supply of water be 'dedicated' for fire fighting purposes in line with the provisions of *Planning for Bush Fire Protection* 2006 (PBP). Dedicated water implies that the supply shall be in the form of a tank of water and has traditionally not included swimming pools or dams. The term also implies that the supply must be isolated from other domestic water supplies and used solely for fire fighting purposes.

From a practical fire fighting point of view, any source of available water will be utilised during a bush fire event and dedicated tanks are not always the most practical option.

In light of the above and the increasing demand for sustainable and efficient use of our water resources, the RFS will no longer require water to be solely 'dedicated' for fire fighting purposes and will allow more flexibility in satisfying the water requirements of PBP. As such, water holding structures such as tanks, swimming pools and dams can be considered.

Therefore, the RFS conditions addressing water supply will no longer refer to a 'dedicated' water supply and will simply state that a supply of water shall be provided for 'fire fighting purposes'. This position will also apply to previously issued conditions referring to dedicated supplies. As such, the water source can be used for other purposes and allow for the circulation of fresh water. The onus will be on the property owner to provide suitable water supply arrangements for fire fighting that meet the RFS requirements and ensure that any water sources are maintained at the appropriate capacity (see Table 4. of PBP).

Water capacities, access (tanker or pedestrian) for fire fighters and the provision of appropriate connections should also be considered when determining if a proposed water source is suitable. Furthermore, the property owner is encouraged to place a 'SWS' sign in a visible location on the street front.

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