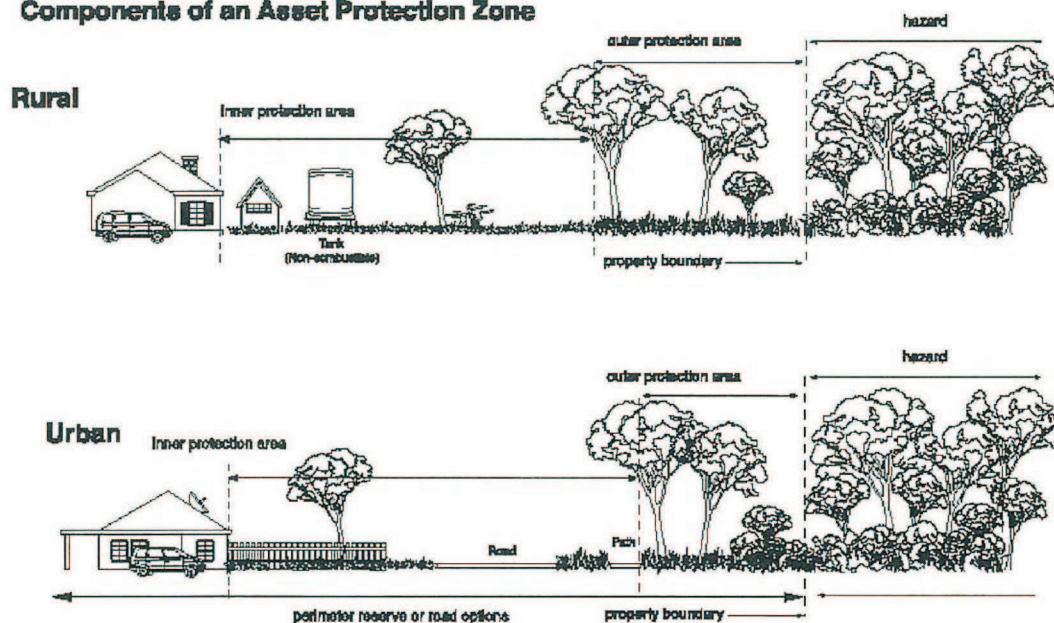


3 SPECIFIC PROTECTION ISSUES

3.1 Asset protection zones (APZs)

APZs are areas of defensible space separating hazardous vegetation from buildings. The APZ generally consists of two subordinate areas, an *inner protection area* (IPA) and an *outer protection area* (OPA). The OPA is closest to the bush and the IPA is closest to the building. The APZ's recommended within this report relate to inner protection area only. An OPA can be incorporated for future development applications. A typical APZ and therefore defensible space is graphically represented below:

Components of an Asset Protection Zone



Source: RFS, 2006

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

PBP, 2006 dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of 29 kW/m^2 for rural residential subdivisions and 10 kW/m^2 for Special Fire Protection Purpose (SFPP) developments.

These ratings assist in determining the size of the APZ in compliance with PBP (2006) to provide the necessary *defensible space* between hazardous vegetation and a building.

The recommended APZs provided in Table 4 & 5 and as generally depicted within Schedule 1 provide an indication of the minimum APZs required for future rural residential

development. These APZ's have been depicted from the outer edge of the property boundary towards the building to depict the developable area within the subdivision and each lot. Once final building positions are achieved these APZ's will be recalculated to extend from the building towards the hazardous vegetation.

Please note that the APZ's recommended for the tourist accommodation (SFPP) are substantially larger than those required for residential development (as stipulated within PBP) due to the vulnerable nature of tourists and visitors who are unfamiliar with the site. As any proposed accommodation buildings must be relocated to provide an APZ of 100 metres from the forest vegetation adjoining the eastern boundary of the site.

In addition it is evident that the design of Lots A10, A11 & A01 will have to be revised at detail design stage to allow for the minimum asset protection zones. In addition buildings within Lots D80, D89 & D87 will also require slight adjustment at detail design stage to provide for the appropriate APZ's for subdivision.

3.2 Building protection

The construction of buildings in bushfire prone areas is subject to stringent rules pertinent to the building envelope being located on the non-hazardous side of the APZ. The role of the APZ is to provide a safe space to separate the hazard from the building. In terms of subdivision approval the minimum asset protection zone must be provided in accordance with Appendix 2 of PBP. The asset protection zones provided in Section 2.2 of this report comply with these requirements.

Following on from the subdivision stage, any future construction / development application is subject to Section 79BA of the *Environmental Planning and Assessment Act*. Building construction standards (in accordance with AS3959, 2009) are not applied until building construction stage.

The NSW RFS have released an interim amendment to PBP 2006 in the form of Appendix 3. This amendment follows the adoption on 1 May 2010 of AS3959 (2009) through the Building Code of Australia (BCA) 2010. This appendix, in conjunction with Table 2.4.2 of AS3959 (2009), is used to determine construction considerations when building on bushfire prone land.

The construction classification system is based on five (5) bushfire attack levels (BAL). These are BAL – Flame Zone (FZ), BAL 40, BAL 29, BAL 19 and BAL 12.5 (AS3959 (2009) - *Construction of buildings in bushfire-prone areas*). The lowest level, BAL 12.5, has the longest APZ distance while BAL – FZ has the shortest APZ distance. These allow for varying levels of building design and use of appropriate materials.

The minimum APZs provided within Table 4 will allow building construction in accordance BAL 40 or BAL 29 standards in most cases, depending on the slope and vegetation type. Please note that there are some exceptions. For instance the 60 metre APZ can be reduced to a minimum 50 metres (but only with a 79B application). These construction standards can be reduced to a lower level prior to building construction if larger APZ's can be provided

The proposed conference centre and restaurant / bar is classified as a Class 6 building and as such does not require compliance with AS3959 (2009). This facility however will attract significant numbers of people at varying times of the year for conferences / weddings and the like. As a result it is recommended that this facility is constructed in accordance with a maximum exposure of BAL 40 (AS3959) and preferably at BAL 29 or less.

3.3 Hazard management

Should the development be approved, the owner or occupier will be required to manage the APZ to the specifications of Council's approval.

In terms of implementing and / or maintaining APZs, there is no physical reason that could constrain hazard management from being successfully carried out by normal means (e.g. mowing / slashing) for the majority of the property. However protection of the conference centre will rely upon the management of the escarpment vegetation and until that final site determination is provided it is not possible to advise further. Design options for managing the bushland could involve walking paths and look out points which lessen vegetation.

Guidelines for managing APZs are available from the RFS website (*Standards for Asset Protection Zones*).

3.4 Access for evacuation and or fire fighting operations

The main access to the site is via River Road which extends from the north western boundary of the property to provide direct access to the township of Tahmoor approximately 1 km to the north west of the site.

The proposed internal road network as depicted within the concept plan in Schedule 1 shows a public road system which provides a loop road within the northern and southern portions of the site. An alternate site access road is provided adjacent to the south western boundary onto River Road.

These access roads traverse through existing rural residential and rural landscapes onto the proposed internal road system for the subdivision. These entry points are unlikely to be impacted by bushfire, hence additional emergency access / egress for emergency services is not required.

The *intent of measures* required by the RFS for public roads involves "*providing safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area*". The *acceptable solutions* to the RFS include:

Table 5: Public Road Access

Acceptable Solutions	Compliant or not
Public roads are two wheel drive, all weather roads.	Compliant
Perimeter roads are two way (carriageway 8 metres minimum kerb to kerb). Non perimeter roads comply with Table 4.1.	Road reservation widths are 20 metres. All internal public roads are to comply with Table 6 below.
Perimeter road is linked with the internal road system at an interval of no greater than 500 metres in urban areas.	Compliant
Traffic management devices are constructed to facilitate access by emergency services.	Compliant - can be made a condition of consent
Public roads have a cross fall not exceeding 3 degrees.	Compliant

Acceptable Solutions	Compliant or not
All roads are through roads. If unavoidable, dead end roads are not more than 200 metres in length, incorporate a minimum 12 metre outer radius turning circle, sign posted dead end and direct traffic away from the hazard.	Compliant - one dead end road exists which is 140 metres in length. This road is to incorporate a turning circle.
Curves of roads (other than perimeter) have a minimum inner radius of 6 metres and are minimal in number.	Compliant
The minimum distance between inner and outer curves is 6 metres.	Compliant
Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees.	Compliant
Minimum vertical clearance of 4 metres above the road.	Compliant
The capacity of road surfaces and bridges is sufficient.	Compliant
To carry fully loaded fire fighting vehicles (15 tonnes for reticulated water and 28 tonnes for all other areas). Bridges clearly indicate load rating.	Compliant
Public roads > 6.5metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water. Public roads 6.5 - 8 metres wide are No Parking on one side with the hydrant located on this side to ensure accessibility to reticulated water. Public roads < 6.5 metres wide provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water. One way only public access are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water.	Compliant - can be made a condition of consent.
Parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within parking bays. Public roads interfacing the bushfire hazard are to provide roll top kerbing to the hazard side of the road.	Compliant - can be made a condition of consent.

Table 6 – Minimum widths for Public Roads

Curve radius (inside edge) (metres)	Swept path (metres width)	Single lane (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40 – 69	3.0	3.9	7.5
70 – 100	2.7	3.6	6.9
>100	2.5	3.5	6.5

Property Access

Although property access roads have not been stipulated on the plans, the following *acceptable solutions* must be applied for future building construction.

The *performance criteria* for property access roads required by the RFS involves “*providing safe access to / from the public road system for fire fighters providing property protection during a bushfire and for occupants faced with evacuation*”.

Table 7: Property Access Roads

Acceptable Solutions	Compliant or not
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.	N/A
Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes.	N/A
Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	N/A
A minimum carriageway width of four metres for dwellings with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building. Note: No specific access requirements apply in a urban area where a 70 metre unobstructed path can be demonstrated between the most distant external part of a dwelling and the nearest part of the public access road that supports the operational use of fire fighting vehicles (road speed limit <70kph).	Any dwelling with driveway access over 70 metres from the public road must have a carriageway width of 4 metres and are to comply with the acceptable solutions below.
In forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by 2 metres wide (min. width 6 metres).	N/A
A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches.	To be made a condition of consent

Acceptable Solutions	Compliant or not
Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum outer radius of 12 metres.	To be made a condition of consent
Curves have a minimum inner radius of 6 metres and are minimal in number to allow rapid access / egress.	To be made a condition of consent
The minimum distance between inner and outer curves is 6 metres.	To be made a condition of consent
The cross fall is not more than 10 degrees	Compliant
Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.	To be made a condition of consent

3.5 Water supplies

Onsite water in non combustible and structural stable water tanks is permissible by the RFS. Storage availability should be at least 10,000 litres per dwelling.

If reticulated water is to be made available it is assumed that this would be available in the form of an underground reticulated water system. Access points must incorporate a ring main system for all perimeter roads.

Fire hydrant spacing, sizing and pressures must adhere to AS2419.1 which recommends spacing of no greater than 120 metres (source: AS 2419.1, 2005, Appendix B, B2) for residential development and 90 metres for commercial development (Appendix B, B3). However, the RFS generally require that hydrants be spaced no greater than 90 metres. In addition all hydrant locations are to be marked with a blue 'cat's eye' in the centre of the road.

The performance criteria for reticulated water supply are that *'water supplies are easily accessible and located at regular intervals'*. The *acceptable solutions* are

- Reticulated water supply uses a ring main system for areas with perimeter roads.
- Fire hydrant spacing, sizing and pressures comply with AS2419.1 - 2005.
- Hydrants are not placed within any road carriageway.
- All above ground water and gas pipes external to the building are metal, including and up to taps.
- The provisions of parking on public roads are met.

3.6 Gas

PBP, 2006 outlines the following *performance criteria* for gas services:

- Location of gas services is not to lead to the ignition of surrounding bushland or the fabric of buildings
- Gas bottles are to be maintained in accordance with AS 1596 - 2002. Metal piping is to be used

- All fixed LPG tanks are to be kept clear of flammable materials and located on the non-hazard side of the building
- If gas cylinders are to be kept close to the building the release valves must be directed away from the building
- Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

3.7 Electricity

The electrical authority will determine the best approach in bushfire prone areas.

4 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

A bushfire protection assessment has been undertaken for the purposes of the Tahmoor Tourism and Recreation Precinct within Lots A & B DP 369710 and Lots 85 & 86 DP 751270 River Road, Tahmoor.

The assessment found that bushfire can potentially affect the landscape however the threat can be reduced to an acceptable risk if appropriate bushfire protection measures are adopted.

The

The following illustrates the proposals compliance with PBP, 2006.

Afford occupants of any building adequate protection from exposure to a bushfire

Response: There is adequate potential for APZs to be provided for the concept plan. This report however recommends the revision of the design of Lots A10, A11 & A01 at the detail design stage to ensure they can meet minimum APZ requirements. Similarly buildings within Lots D80, D89 & D87 will also need be revised at detail design stage requiring slight adjustment to provide for the appropriate APZ's for subdivision. This report also recommends the relocation of the tourist accommodation facility in accordance with PBP 2006.

Future buildings will be constructed in accordance with AS3959 and fuel management will be undertaken by future owners of each lot.

Provide for a defensible space to be located around buildings

Response: APZs have been recommended in accordance with Appendix 2 of PBP, 2006. Any future subdivision plan must accommodate these minimum APZ's as depicted within Schedule 1.

Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition

Response: APZs have been recommended in accordance with PBP (2006) and building construction will be applied in accordance with AS3959 (2009). Fuel management will occur in the APZ and will be managed in perpetuity.

Ensure that safe operational access and egress for emergency service personnel and residents is available

Response: There is adequate potential to provide appropriate egress arrangements in accordance with Section 4.1.3 of PBP, 2006.

Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ

Response: Fuel management can be undertaken by the land owners under the guide of NSW RFS publications such as *Standards for Asset Protection Zones* available from the RFS website at www.rfs.nsw.gov.au

Ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting).

Response: Water supply and access to roadside water hydrants and / or water tanks can be assured by a Council Condition of Consent for future development applications.

The following recommendations are provided to ensure that the possible development of the landscape would be in accord with the requirements of PBP (2006).

4.2 Recommendations

Recommendation 1 - APZs are to be provided for future development. The APZs, as recommended within Table 4 & 5 and as generally depicted within Schedule 1, provide guidance on the developable area within each lot. Once final building positions are determined at final design stage the APZ may be recalculated and measured from the external wall of any building towards the hazardous vegetation.

Recommendation 2 - Fuel management within the APZs will be maintained by regular maintenance of the landscaped areas, mowing of lawns and / or as generally advised by the RFS in their publications.

Notwithstanding specialist advice in those guidelines, the following general advice for maintaining an APZ is to be followed:

- *Mowing, slashing or grazing of grass:* Grass needs to be kept short (approximately 5 cm in height) and green where adequate water supplies are available.
- *Raking or manual removal of fine fuels:* Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.
- *Removal or pruning of trees, shrubs and understorey:* The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation. Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy is not to overhang a dwelling unless specifically approved by the RFS. Native trees and shrubs should be retained as clumps in landscape beds and should not exceed a covering of more than 20% of the IPA.
- Trees or tall shrubs may require pruning upon dwelling completion in line with PBP, 2006. Notwithstanding this, the presence of shrubs and trees close to a dwelling in a bushfire prone landscape requires specific attention to day to day management and owners and / or occupiers should be made aware that whilst landscaping can

contribute to a way of life and environmental amenity, the accumulated fuels must be regularly removed.

- Trees may remain within close proximity of a building where it can be demonstrated that the tree is not able to produce a build-up of fuel on the roof of a dwelling due to:
 1. A roof pitch which self sheds leaf litter.
 2. Ongoing roof maintenance by staff or contractors.
 3. Adequate ember protection has been installed.
- Trees that are likely to be structurally unstable such that they could cause a limb to fall would require removal for the RFS to agree to a dwelling in proximity to the trees.

In addition, the following general APZ planning advice is to be followed:

- Ensure that vegetation does not provide a continuous ignition path to the house.
- Plant or clear vegetation into clumps rather than continuous rows.
- Prune low branches two metres from the ground to prevent a ground fire from spreading into trees.
- Locate vegetation far enough away from the proposed buildings so that plants will not ignite the dwelling by direct flame contact or radiant heat emission.
- Ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low flammability plants and non-flammable ground cover such as pebbles and crushed tiles.
- The following RFS diagram depicts one version of an ideal situation. Divergence from this ideal should not be undertaken without expert advice.



Recommendation 3 - Building construction standards will be applied in accordance with AS3959 (2009) with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3 of PBP (2006).

Recommendation 4 – The proposed overnight tourist accommodation is to be relocated to provide a separation of 100 metres from any unmanaged vegetation associated with the Bargo and Nepean River in the east. This will potentially require relocation of the accommodation buildings a further 40 metres west of its current location. This needs to be addressed at the detail design stage.

Recommendation 5 - The redesign of Lots A10, A11 & A01 will need to be revised at the detail design stage to ensure they can meet minimum APZ requirements. Similarly buildings within Lots D80, D89 & D87 will also need be revised at detail design stage requiring slight adjustment to provide for the appropriate APZ's for subdivision.

Recommendation 6 - The proposed conference centre and restaurant / bar is classified as a Class 6 building and as such does not require compliance with AS3959 (2009). This facility however will attract significant numbers of people at varying times of the year for conferences / weddings and the like. As a result this facility must also address requirements in terms of evacuation procedures during bushfire events, provide a minimum defendable space (APZ) of at least 20 metres and be constructed in accordance with BAL 40 (AS3959) or preferably BAL 29 or lower.

Recommendation 7 - Access is to comply with Section 3.4 of this report; and or Section 4.1.3 (1 and 2) of PBP (2006).

Recommendation 8 – Water supply is to comply with Section 3.5 of this report or Section 4.3.1 Services of PBP (2006).

Recommendation 9 - The landowner / manager is to be made aware of their liability to manage the development lands for the ongoing protection of themselves and their neighbours (refer Section 63(2) *Rural Fires Act*).

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