
Appendix C

Bushfire Assessment by Travers Bushfire & Ecology



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Bushfire Protection Assessment

TAHMOOR TOURIST AND
RECREATION PRECINCT

Lot A & B DP 369710 and
Lots 85 & 86 DP 751270
RIVER ROAD
TAHMOOR

FEBRUARY 2011
(REF: A10074B3)



BUSHFIRE PROTECTION ASSESSMENT

TAHMOOR TOURIST AND RECREATION PRECINCT

**LOT A & B DP 369710, LOTS 85 & 86 DP 751270
RIVER ROAD, TAHMOOR**

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EXECUTIVE SUMMARY

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

The site is located on land that is mapped by Wollondilly Council as being bushfire prone. Consequently, to proceed, future development applications will require compliance with *Planning for bush fire protection, 2006* (PBP, 2006).

A proposed development concept has been incorporated within the submission and includes 92 rural residential lots, a range of recreational facilities and a new conference/function centre, restaurant and bar as well as tourist accommodation. This report provides advice on the recommended bushfire protection measures (e.g. asset protection zones) for any future residential / special fire protection purpose development within the site.

The development is categorised by the NSW Rural Fire Service (RFS) as being a *residential subdivision* as well as incorporating buildings intended for *Special Fire Protection Purpose* (tourist accommodation). These uses require the RFS to issue a *Bushfire Safety Authority* (BSA) in accordance with Section 100B of the Rural Fires Act.

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/m² for *residential subdivision* developments and
- 10kW/m² for *special fire protection purpose development*.

This rating assists in determining the size of the *asset protection zone* (APZ) 2006 to provide the necessary *defendable space* between hazardous vegetation and a building.

The assessment found that bushfire can potentially affect the site from the forest vegetation adjoining the Bargo River to the north and east. Large tracts of vegetation also adjoin the sites western and southern boundary resulting in possible ember attack, radiant heat and potentially flame attack.

The bushfire risk posed to the site however will be reduced to an acceptable risk if appropriate bushfire protection measures are adopted.

This report however recommends the relocation of any tourist accommodation to allow for a separation of 100 metres from the forest vegetation adjoining the eastern and northern boundaries. The design 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.

Notwithstanding these requirements the remainder of the concept plan provides:

- Defendable space in accordance with PBP, 2006.
- Compliance with access and egress with PBP, 2006.
- Construction capability with *AS3959 (2009) Construction of buildings in bushfire-prone areas*.

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GLOSSARY OF TERMS

APZ	asset protection zone
BCA	Building Code of Australia
BSA	Bushfire Safety Authority
EEC	endangered ecological communities
FDI	Fire Danger Index
IPA	inner protection area
OPA	outer protection area
PBP, 2006	<i>Planning for bushfire protection, 2006</i>
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose
AS3959 (2009)	Australian Standard – Construction of buildings in bushfire-prone areas.

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SCHEDULE 1 – Bushfire Protection Measures



Travers bushfire & ecology has been requested by *EG Property Group* to undertake a bushfire protection assessment of Lots A & B DP 369710 and Lots 85 & 86 DP 751270 River Road, Tahmoor for a possible Tourist and Recreation Precinct.

1.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- Review the bushfire threat to the landscape
- Undertake a bushfire attack assessment in accordance with PBP, 2006
- Provide advice on mitigation measures, including the provision of asset protection zones (APZs), construction standards and other specific fire management issues
- Review the potential to carry out hazard management over the landscape.

1.2 Project synopsis

A development concept plan has been developed which includes 92 rural residential lots, a range of recreational facilities associated with these dwellings as well as a conference/function centre, restaurant, bar and tourist accommodation - refer Figure 1 below.

The main access to the site is via River Road which provides 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.



Figure 1: Concept Plan

1.3 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Tahmoor Concept Plan prepared by *EG Property / Fitzpatrick + partners*.
- *Google* aerial photograph
- Topographical maps DLPI of NSW 1:25,000
- Australian Standard 3959 *Construction of buildings in bushfire-prone areas*
- *Planning for bush fire protection, 2006 (NSW RFS)*.

1.4 Site description

The planning and cadastral details of the subject site are provided in Table 1 while Table 2 summarises the geographical characteristics of the site. Past and present site disturbances are summarised in Table 3.

Table 1 - Site details

Location	Lot A & B DP 369710 and Lots 85 & 86 DP 751270, 165 - 185 River Road, Tahmoor.
Description of Location	The four (4) lots occur off the end of River Road at Tahmoor. Myrtle Creek occurs near the northern boundary and Nepean River near the eastern boundary. Rural holdings and rural-residential properties surround the subject site. The township of Picton occurs approximately 5.5-6km to the north and Bargo occurs 7.5-8km to the south.
Area	Approximately 115ha
Topographic Map	Picton 1:25,000
Grid Reference	280300E and 6210400N
Local Government Area	Wollondilly
Existing Land Use	Pastoral lands and rural residences

Table 2 - Site characteristics

Elevation	Approximately 80-240m AHD
Topography	The majority of the site is on undulating land with slopes of 0-5 degrees. Gully vegetation along Myrtle Creek may reach slopes of 15-35 degrees. Gully vegetation to the Nepean River is 15-35 degrees on the upper slopes then nears vertical (cliff like) down to the river base.
Aspect	Generally, east
Geology and Soils	Blacktown soil landscape occurs in the northern portion of the subject site which is on Wianamatta Group shale. Soils are usually moderately deep. Lucas Heights soil landscape occurs in the southern portion of the subject site which is on the Mittagong Formation. Soils are moderately deep. Hawkesbury soils landscape occurs in the valley / gully areas of the subject site, occurring on Hawkesbury Sandstone. There is usually a lot of rock outcropping and soils are typically shallow (under 50cm deep).
Catchment	Nepean River
Drainage	There is a drainage line which bisects the property running west to east across the centre of the site. There are a number of small ephemeral unnamed tributaries entering the edges of the site also off Myrtle Creek (north), Nepean River (east) and Bargo River (south and south-east).
Vegetation	Cleared paddocks with scattered trees - mostly <i>E. fibrosa</i> and <i>E. punctata</i> ; remnant patches of Shale Sandstone Transition Forest on the flat plateau area which changes to sandstone gully vegetation on the slopes.

The subject site has been affected by the following impacts:

Table 3 – Site disturbance

Clearing	Approximately 78% of the subject site is cleared vegetation for paddocks or has been under scrubbed and managed.
Agriculture / Pastoral	Some paddocks are currently grazed by cattle.
Earthworks	There has been cut and fill works for dams and tracks and possibly for some of the residences.
Introduced Weeds	The paddocks have a moderate to high proportion of exotic grasses. The edges of remnant vegetation may have a moderate influence of exotic grasses or annuals in the understorey and the gullies may be impacted by various annuals and a low incidence of African Olive shrubs.
Evidence of Feral, Introduced or Domestic fauna	Native fauna species present are likely to be impacted upon by exotic species such as Dogs, Cattle, Rabbits, Horses, Common Mynas, Common Starlings and Spotted Turtle-doves.

1.5 Legislation and Planning Instruments

1.5.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The identification of bushfire prone land is required under section 146 of the *Environmental Planning and Assessment Act*.

1.5.2 Bushfire prone land

Bushfire prone land maps provide a trigger for the development assessment provisions. The site is located on land that is mapped by Wollondilly Council as being bushfire prone. Consequently, future development applications will require compliance with *Planning for Bushfire Protection, 2006 (PBP, 2006)*.

1.5.3 Local Environmental Plan (LEP)

The Draft Wollondilly LEP 2009 identifies the site as RU2 – Rural Landscape.

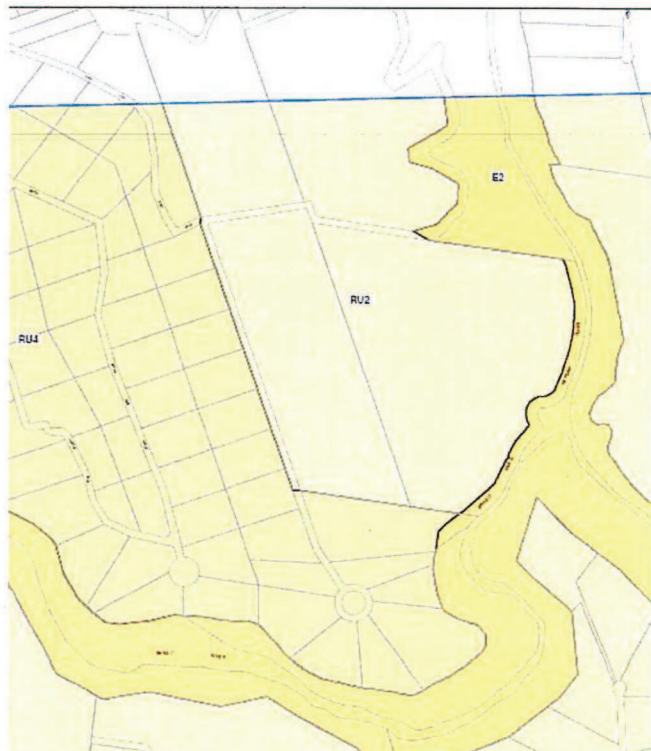


Figure 1: Zoning Map
(Wollondilly Council website)

The adjoining land associated with the Nepean and Bargo River is zoned E2 Environmental Conservation. Additionally a review of the LEP mapping on the Wollondilly Council website shows the requirement for a 100 metre buffer to the Nepean and Bargo Rivers. Myrtle Creek to the north shows a 30 metre buffer.

1.5.4 Building Code of Australia (BCA) and the Australian Standards AS3959 (2009)

The BCA is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls. The BCA outlines objectives, functional statements, performance requirements and *deemed to satisfy* provisions.

In NSW the construction of buildings in bushfire prone areas relates to Class 1, 2, 3, 4 & Class 9 buildings that are categorised by the Rural Fire Service a *special fire protection purpose* (SFPP) developments; or a Class 10a building or deck associated with aforementioned building Classes. The construction manual for the *deemed to satisfy* requirements is the *Australian Standard AS3959 Construction of buildings in bushfire-prone areas (2009)*.

Future development applications considering the construction of residential buildings and tourist accommodation must therefore be constructed in accordance with AS3959 (2009). 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).

1.5.6 Planning for Bushfire Protection 2006 (PBP, 2006)

PBP, 2006 outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas. These measures include:

- Asset protection zones
- Building construction and design
- Access arrangements
- Water supply and utilities
- Landscaping, and
- Emergency management arrangements.

PBP (2006) outlines the objectives that must be achieved for all development as well as the specific objectives for subdivision, *Special fire protection purposes* development and infill developments.

1.6 Environmental Constraints

Ecological investigations undertaken by *Travers bushfire & ecology* (2010) and riparian constraint analysis by *Worley Parsons* (2010) have identified potential constraints to future development. These constraints include:

- The presence of the endangered ecological community (EEC) – Shale Sandstone Transition Forest.
- Riparian corridor adjacent to the Nepean and Bargo Rivers and the requirement for a 100m buffer between development and *environmentally sensitive areas*.
- Riparian corridors within the southern and central portions of the site and the requirement for a 10 metre buffer.
- Riparian corridor adjacent and within the northern property boundary and the requirement for a 30 metre buffer.



2 BUSHFIRE PROTECTION ASSESSMENT

Bushfire protection planning requires the consideration of the RFS planning document entitled *Planning for bush fire protection* published in 2006 (PBP, 2006). PBP, 2006 provides planning controls for building in bushfire prone areas as well as guidance on effective bushfire protection measures.

The policy aims to provide for the protection of human life (including fire fighters) and to minimise impacts on property and the environment from the threat of bushfire, while having due regard to development potential, on site amenity and protection of the environment. More specifically, the aims and objectives for all development (including industrial and commercial buildings) located on bushfire prone land should:

1. Afford occupants of any building adequate protection from exposure to a bushfire.
2. Provide for a defensible space to be located around buildings.
3. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition.
4. Ensure that safe operational access and egress for emergency service personnel and residents is available.
5. Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ.
6. Ensure that utility services are adequate to meet the needs of fire fighters (and others who may assist in bushfire fighting).

The additional objectives for 'subdivision' such as a rural residential subdivision are to:

7. Minimise the perimeters of the subdivision exposed to the bushfire hazard.
8. Minimise bushland corridors that permit the passage of fire.
9. Provide for the siting of future dwellings away from ridge tops and steep slopes, particularly up-slopes, within saddles and narrow ridge crests.
10. Ensure that separation distances (APZs) between the bushfire hazard and future dwellings enable conformity with the *deemed to satisfy* requirements of the BCA.
11. Provide and locate, where the scale of development permits, open space and public recreation areas as accessible public refuge areas or buffers (APZs).
12. Ensure the ongoing management of APZs.

13. Provide clear and ready access from all properties to the public road system for residents and emergency services.
14. Ensure the provision and adequate supply of water and other services to facilitate effective fire fighting.

The additional objectives for 'special fire protection purpose developments' (tourist accommodation) include:

15. Provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and fire fighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated.
16. Provide for safe emergency evacuation procedures. SFPP developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bushfire threats. During emergencies, the risk to fire fighters and other emergency services personnel can be high through prolonged exposure, where door-to-door warnings are being given and exposure to the bushfire is imminent.

Although not classified as a special fire protection purpose development, the proposed conference centre / restaurant / bar will attract significant numbers of people at varying times of the year. As a result this facility must also address requirements in terms of evacuation procedures during bushfire events.

Thus, development in bushfire prone areas requires consideration of the overall threat upon a site and the way occupants of a site are potentially able to cope in the event of a bushfire. To assess the bushfire threat that is likely to occur and thus affect the subject site, a review of the elements that comprise the overall threat needs to be completed. These elements include the potential hazardous landscape that may affect the site, the subsequent extent of the bushfire risk and the expected level of vulnerability that is likely to affect occupants and fire fighters.

2.1 Hazardous fuels

The bushfire hazard is defined as the potential severity of a bushfire and is measured in terms of the potential fire intensity and the resultant radiant heat flux emanating from the fire.

The factors that influence bushfire hazard are primarily the type of vegetation (fuel) and the effective slope that contributes to increasing bushfire behaviour. Factors such as wind velocity and fuel dryness also significantly contribute to the hazard achieving maximum intensity levels.

The hazardous fuels are categorised according to vegetation descriptions identified by David Keith (DECC, 2004). These units have been defined in accordance with their ability to cause different levels of fire intensity based essentially on their sustained flammability. This arises from the extent of fine fuel presence and weight.

Hazardous fuels are primarily the extensive forest vegetation associated with the adjoining Nepean and Bargo Rivers and Myrtle Creek located to the east and north of the site. Large patches of forest vegetation also exist within the surrounding rural residential lands to the south and west.

2.1.1 Potential bushfire risk

The bushfire risk is defined as the chance of a bushfire igniting, spreading and causing damage to property or the environment.

The presence of native vegetation associated with the Nepean River, Bargo River and Myrtle Creek presents a permanent potential for bushfire attack upon the proposed rezoned lands.

The forest vegetation surrounding the site on all aspects has the potential to cause a bushfire event that may, in some circumstances, require evacuation of all occupants while providing damage potential to buildings.

Thus the bushfire prone nature of the landscape will require measures to mitigate the bushfire risk such that it is deemed acceptable. These measures are primarily based on the provision of defendable space between the hazards and the buildings.

2.1.2 Level of development vulnerability

Vulnerability is the likely exposure of the intended development site to the expected fire behaviour that could impact life and / or property.

There is extensive forest vegetation located adjacent to the eastern and northern portions of the site on slopes greater than 18 degrees. Forest within the adjoining rural residential landscape also exists to the west and south on lower slopes ranging from 0 - 5 degrees.

It is possible that fires could occur within the surrounding bushland with the potential impact in the form of radiant heat, flame impact and potentially ember attack. However, with an appropriately sized APZ the intensity of the bushfire can be mitigated down to the acceptable radiant heat performance threshold of <29 k/W m² for potential future residential development and <10kW/m² for the proposed tourist accommodation.

2.2 Bushfire attack assessment

The RFS requires that a development application must include a bushfire attack assessment to determine the possible impact or vulnerability of a structure from fire.

PBP, 2006 provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. The assessment uses the vegetation type and slope gradient to determine the size of the APZ. Vegetation type is assessed for a distance of 140 metres external to the proposed development area whilst the effective slope is assessed for 100 metres. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The slope is variable on the site but can be summarised as:

- A relatively level, slightly undulating topography within the adjoining rural residential lands to the south and west.
- A variable sloping aspect of 15-18° within the forest to the east and north of the site. This slope increases beyond 18 degrees and is associated with the escarpment lands within the south eastern property boundary.

Slopes have been calculated and mapped on plans provided by *EG Property Group*.

A Fire Danger Index (FDI) of 100 has been used to calculate bushfire behaviour on the site using forest vegetation located within the Greater Sydney region.

Table 4 below provides a summary of the bushfire attack assessment and the minimum required APZs for *residential subdivision* development. Table 5 depicts the minimum APZ required for *Special fire protection purpose development* (i.e. tourist accommodation).

Table 4 – bushfire attack assessment

Lots	Aspect	Vegetation within 140 metres of development	Effective slope of land	Minimum APZ required (Appendix 2, PBP, 2006)
A10, A14, A15, C69 – C71	North	Forest	15 - 18° ^D	60 metres
A10 - A13	West	Forest	0 - 5° ^D	25 metres
C72 & C73	East	Forest	15 - 18° ^D	60 metres
C74 & C75	East	Forest	5 - 10° ^D	35 metres
C76	East	Forest	15 - 18° ^D	60 metres
C77	East	Forest	5 - 10° ^D	35 metres
C78 - C79	East	Forest	15 - 18° ^D	60 metres
D80	South-east	Forest (Riparian corridor with fire run potential > 50 metres)	5 - 10° ^D	35 metres
D81	North	Rainforest Riparian Corridor (see Note 1)	5 - 10° ^D	15 metres
D82 – D84	North	Forest	5 - 10° ^D	50 metres
D85 – D89	East	Forest	>18° ^D	60 metres
D90 & C91	Central to lots	Rainforest Riparian corridor (see Note 1)	0 - 5° ^D	10 metres
B36& C92	South	Forest	0 - 5° ^D	25 metres
B34 & B35	South & West	Grassland	0 - 5° ^D	10 metres
B27 – B29	West	Forest	Level	20 metres
B25 & B26, B30 – B33	West	Grassland	0 - 5° ^D	10 metres

Lots	Aspect	Vegetation within 140 metres of development	Effective slope of land	Minimum APZ required (Appendix 2, PBP, 2006)
A06 – A09	West	Grassland	0 - 5° ^D	10 metres
A01 – A05	West	Forest	0 - 5° ^D	25 metres

Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope

Note 1: PBP, 2006 describes remnant vegetation as a parcel of vegetation with a size of less than 1ha or a shape that provides a potential fire run directly towards a building not exceeding 50 metres. The vegetation adjacent to the 20 metre wide riparian buffer zones have a narrow width of less than 50m therefore the threat posed is considered low and APZ setbacks for this aspect are permitted to be downgraded to a Rainforest vegetation category by the RFS.

**Table 5 – bushfire attack assessment –
Special fire protection purpose development (accommodation buildings)**

Aspect	Vegetation within 140 metres of development	Effective slope of land	Minimum APZ required (Appendix 2, PBP, 2006)
North	Grassland / proposed development	0-5° ^D	N/A
South	Grassland / proposed development	0-5° ^D	N/A
East	Forest	>18° ^D	100 metres
West	Grassland / proposed development	0-5° ^D	N/A

Notes: * Slope is either 'U' meaning upslope or 'C' meaning cross slope or 'D' meaning downslope