

Kyoto energypark

Appendix C

Bushfire Protection Assessment
Conacher Environmental Group
(August 2007)



BUSHFIRE PROTECTION ASSESSMENT

KYOTO ENERGY PARK MIDDLEBROOK STATION AND MOUNTAIN STATION SCONE

**AUGUST 2007
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AUGUST 2007

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SECTION 1

INTRODUCTION

A Bushfire Protection Assessment Report has been prepared by *Conacher Travers Pty Ltd* at the request of *Pamada Pty Limited* for the proposed Kyoto Energy Park, on Middlebrook and Mountain Station, Scone.

1.1 AIMS OF THE ASSESSMENT

The aims of the bushfire protection assessment are to:

- Review the bushfire threat to the property
- Review the potential to carry out hazard management over the landscape
- Provide advice on mitigation measures including the provision of asset protection zones and construction standards in accordance with '*Planning for Bushfire Protection, 2006*'
- Advise on specific fire management issues

1.2 PLANNING RELATIONSHIPS

This report has been prepared having regard to the following legislative and planning requirements.

1.2.1 Legislation

Construction of buildings is assessed under the *Environmental Planning and Assessment Act* - Section 79 BA. This requires Councils to be satisfied that developments in bushfire prone areas comply with *Planning for Bushfire Protection, 2006* before granting development consent.

1.2.2 Planning Policies

Planning for Bushfire Protection – 2006 (PBP 2006) - This document was prepared by the Rural Fire Service and provides planning controls and bushfire protection guidance for development within a designated bushfire prone area.

The document allows two approaches to bushfire protection assessment. Firstly by a '*deemed to satisfy*' approach and secondly by an '*alternative solution*' approach.

The former is qualitatively explained within PBP 2006 whilst the latter requires specialist assessment techniques not covered within PBP 2006. The latter follows on from the *Building Code of Australia* in that it allows an '*alternative solution*' approach to bushfire protection where it can be demonstrated that performance assessment achieves the quantitative and qualitative requirements of the RFS. This is usually undertaken using fire science and materials testing.

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:

- Preliminary Assessment Report prepared by *Pamada Pty Ltd*, 2006
- Flora & Fauna Report, *Conacher Travers*, 2007, Ref 7091F
- Scone Topographical map DLPI of NSW 1:25,000, 9033 I - N
- Bunnan Topographical map DLPI of NSW 1:25,000, 9033 IV - N
- Australian Standard 3959 '*Construction of Buildings in Bush Fire Prone Areas*'

Jason Hulston of *Conacher Travers Pty Ltd* visited the site in May 2007.

An inspection of the proposed development site and surrounds was undertaken to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bush fire protection advantages and a visual appraisal of bush fire hazard and risk were also undertaken. (Bush fire protection advantages are those landscape features which act to suppress or mitigate a fire e.g. escarpments, creeks, roads and fire breaks etc.)

1.4 PROJECT SYNOPSIS

The proposed development is for the construction of an Energy Park (Figures 1.1 and 1.2) which will comprise the utilization of a combination of various energy producing technologies and associated facilities as outlined below.

Wind Turbine Generators: It is proposed to construct approximately 11 turbines on Middlebrook Station and a maximum of 31 turbines within Mountain Station. Turbines are expected to be between 80 -105m in hub height with a blade length of 45-50m at a maximum overall blade tip height of 150m. The wind turbines will be positioned along the ridgelines to enable access to prevailing winds. Construction will require the clearing of a minimal amount of vegetation to provide for construction of anchorage pads and access roads.

Solar Photovoltaic (PV) Plant: The solar PV plant will cover between 15-21 hectares of existing cleared land on the plateau of Mountain Station, it is expected that clearing of native vegetation will not be required for its construction.

Closed Loop Hyrdo Plant: The closed loop hydro plant will be located within the central valley of Mountain Station where the steep slopes are able to provide sufficient water velocity to generate power. Construction of this plant will require the removal of native vegetation and habitat disturbance to provide for the construction and access roads.

Visitor and Education Centre: This centre will be located on the cleared plateau of Mountain Station in the vicinity of the Solar PV Plant. The proposed area is already cleared and it is unlikely that further clearing for bushfire protection areas and access will be required.

Manager's Residence: The Manager's Residence is proposed for permanent accommodation of the Park Manager. The residence is to be located on cleared land adjacent to Wind turbine No 20 (Mountain Station). It would be landscaped to provide amenity and visual screening.

Electricity Transmission Lines: This project will require the installation of some sections of electricity transmission lines to connect the proposed electricity generating facilities to the existing electricity infrastructure. Some parts of the existing electricity transmission infrastructure will also need to be upgraded. Several route options for the proposed power lines have been selected for consideration and assessment. Details of these options are provided in separate documentation.

The two sites are known as Middlebrook Station (Total area = 2032ha) and Mountain Station (Total area = 2013ha). Ancillary works are also proposed including a site substation.

The purpose of this report is to assess the bushfire threat to the proposed Manager's Residence and Visitor and Education Centre on Mountain Station. Assessment of bushfire hazard on the turbines and other infrastructure is not part of this assessment as these developments are not buildings covered under the Building Code of Australia. The potential for the proposal to initiate a fire event is not considered in this report and is beyond the scope of assessments required for by Planning for Bushfire Protection 2006.

1.5 SITE DESCRIPTION

Location and Surrounding Land Use

Middlebrook Station is located 10 kilometres north west of Scone on Middlebrook Road.

Mountain Station is located 15 kilometres west of Scone. Mountain Station is sheep grazing country.

Topography and Drainage

Middlebrook Station straddles a south-north running ridgeline known as Glen Range, with lands sloping away to the east into Middlebrook Creek catchment.

The topography on top of the ridge and surrounding the site has average slopes of 15-18° to the east and west and 10-15° to the south. On top of the ridge the land is relatively flat running east to west.

Mountain Station is dominated by Mount Moori in the south east part of the station. East of Mount Moori steep slopes give way to numerous gullies. Unnamed tributaries feed into Dart Brook to the east. West of Mount Moori the drainage lines flow to Wyddagary, Webergunyah and Saphia Creeks.

Vegetation

Vegetation both within the site and across surrounding lands to the north, north west, west, and south west consists predominantly of Open Forest and Woodland vegetation.

1.6 BUSHFIRE RISK ASSESSMENT

For the purpose of this report, asset protection zones and construction standards will be measured for the Manager's Residence and the Visitor and Education Centre. Access and egress will be defined for the purpose of staff and visitor safety as well as emergency service personnel.

SECTION 2

BUSHFIRE PROTECTION ASSESSMENT

Developing in bushfire prone areas requires consideration of the overall threat upon a site and the way occupants of a site / dwelling(s) are able to cope in the event of a bushfire. To assess the bushfire threat that is likely to occur and affect this property, and the eventual dwelling occupiers, a review of the elements that comprise the overall threat needs to be completed.

These elements include the presence of hazardous fuels on site, the extent of the bushfire risk and the expected level of vulnerability of any proposed dwellings and other infrastructure.

2.1 HAZARDOUS FUELS

The bushfire hazard is defined as the potential severity of a fire.

Hazard is measured in terms of the potential intensity of the fire i.e. k/w m² (Kilowatts per square metre of fire front). The factors that influence bushfire hazard are primarily the nature of the vegetation (fuel) and the slope. Factors such as wind and fuel dryness also contribute to the hazard achieving maximum intensity levels.

The Rural Fire Service require that a Development Application that is submitted for their assessment must include an assessment of the effective slope for up to 100 metres and vegetation for up to 140 metres external to the proposed development area when such an area is located within a designated bushfire prone area – see Table 1 and 2.

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.

2.1.1 Potential Bushfire Risk

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

Manager's Residence

Vegetation to the east of the proposed Manager's residence poses a potential bushfire threat to the proposed building due to the presence of woodland.

Visitor and Education Centre

Grasslands surrounding the proposed centre pose a potential bushfire threat to the proposed building.

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.

Manager's Residence

It would be expected that a fire burning within the grass and woodland vegetation from the east of the proposal could develop significant intensities due to the total area and associated slopes and the exposure to hot dry winds.

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. Therefore asset protection zones will be required to provide defensible space between the bushfire hazard and the development.

Visitor and Education Centre

It would be expected that a fire burning within the grasses surrounding this area could develop significant intensities due to the total area and associated slopes and the exposure to hot dry winds.

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. Therefore asset protection zones will be required to provide defensible space between the bushfire hazard and the development.

2.2 BUSHFIRE PROTECTION ASSESSMENT

PBP 2006 provides concepts for building in bushfire prone areas and guidance on the planning and development control processes in relation to bushfire protection measures. The document also provides a methodology for determining asset protection zones.

Table 1 below provides a summary of the assessment relative to slope and vegetation characteristics for the proposed Manager's Residence.

Table 2 below provides a summary of the assessment relative to slope and vegetation characteristics for the proposed Visitor and Education Centre.

2.3 BUSHFIRE ATTACK ASSESSMENT

PBP 2006 provides a methodology for assessing bushfire attack at construction stage for a building within a designated bushfire prone area. This process identifies the possible vulnerability of a structure and assesses the required 'Construction Level' in accordance with AS3959 '*Construction of buildings in bushfire prone areas*'.

The assessment may be undertaken using a deemed to satisfy approach or a performance based assessment (PBA) approach. In the case of this development there is a case to utilise the PBA approach.

A Fire Danger Index (FDI) of 100 has been used to calculate bushfire behaviour on the site in accordance with Table A2.3 of *PBP (2006)*.

**Table 1 - Bushfire Attack Assessment
Manager's Residence**

Aspect	Vegetation within 140m of Development	Effective Slope of Land	APZ Provided	Level of Bushfire Attack	Construction Standard
North	Grass / Woodland	0-5° U	20 metres	Medium	Level 2
East	Grassland	18° D	>50 metres	Medium	Level 1
South	Grassland	0-5° D	20 metres	Medium	Level 1
West	Grassland	0-5° U	20 metres	Medium	Level 1

**Table 2 - Bushfire Attack Assessment
Visitor and Education Centre**

Aspect	Vegetation within 140m of Development	Effective Slope of Land	APZ Provided	Level of Bushfire Attack	Construction Standard
North	Grassland	0-5° U	20 metres	Medium	Level 1
East	Grassland	18° D	>50 metres	Medium	Level 1
South	Grassland	0-5° D	20 metres	Medium	Level 1
West	Grassland	0-5° U	20 metres	Medium	Level 1

SECTION 3

SPECIFIC PROTECTION ISSUES

3.1 ASSET PROTECTION ZONES

APZ's for the Manager's Residence

Class 1, 2 & 3 buildings constructed within a bushfire prone area is required to be provided with asset protection zones in accordance with Table A2.4 of *PBP 2006*. The following advice is provided in direct accordance with *PBP 2006*.

The proposed development has been assessed as having a theoretical medium level of vulnerability from the impact of bushfires burning within the grasslands surrounding the site.

The implementation and maintenance of the asset protection zones in accordance with Table 1 will provide compliance with the asset protection zone measures required by *PBP 2006*.

APZ's for the Visitor and Education Centre

Class 5, 6, 7 & 8 buildings constructed within a bushfire prone area are recommended to be provided with asset protection zones in accordance with Table A2.4 of *PBP 2006*. The following advice is provided in direct accordance with *PBP 2006*.

The proposed development has been assessed as having a theoretical medium level of vulnerability from the impact of bushfires burning within the grasslands surrounding the site.

The implementation and maintenance of the asset protection zones in accordance with Table 2 will provide compliance with the asset protection zone measures required by *PBP 2006*.

3.2 BUILDING PROTECTION

For the Manager's Residence

The Bushfire Attack Assessment has found that the location of the proposed dwelling will potentially be exposed to a medium level of bushfire attack. Therefore the dwelling will be required to comply with the Level 1 construction standards of AS3959.

In addition, gutters and valleys to the proposed dwelling should be fitted with a protection device which prevents the build up of leaf and other combustible material within the gutters/valleys.

For the Visitor and Education Centre

The Bushfire Attack Assessment has found that the location of the proposed dwelling will potentially be exposed to a medium level of bushfire attack. Thus the dwelling will be required to comply with the Level 2 construction standards of AS3959.

In addition, gutters and valleys to the proposed dwelling should be fitted with a protection device which prevents the build up of leaf and other combustible material within the gutters/valleys.

3.3 HAZARD MANAGEMENT

The land owners and/or future managers will have an ongoing liability to ensure the management of the lands within the property to prevent the build up of combustible fuel. Section 63 of the *Rural Fires Act* requires hazard management to occur.

There is no physical reason that could constrain hazard management in any potential asset protection zone from being successfully carried out by normal means eg. mowing / slashing following initial clearing works.

3.4 AVAILABILITY OF FIRE FIGHTING SERVICES

There is a NSW Fire Brigade located at Scone approximately 20 kilometres to the east of the site (road distance). The Scone NSW Fire Brigade would have a response time of approximately 30-45 minutes to service the development if they are not assisting elsewhere.

3.5 WATER SUPPLIES

There is no reticulated water sources present for both premises. A minimum 10,000 litre water tank will be required for the Manager's Residence and Visitor and Education Centre, dedicated solely to bushfire fighting purposes. A suitable connection for firefighting purposes is required. A 65mm Storz outlet with a Gate or Ball valve is provided. The tank is to be constructed of concrete or metal and if on a stand they are to be protected. All pipes are to be metal and pumps protected.

3.6 COMMUNICATIONS

Telephone communications can be provided for this development to aid in communications during a bushfire incident.

SECTION 4

CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

The assessment of bushfire protection has found that *PBP 2006* can be complied with for this proposed development.

The following recommendations are provided to ensure that the development is in accord or greater than the requirements of *PBP 2006*.

4.2 RECOMMENDATIONS

Recommendation 1 - Asset protection zones should be provided to the proposed development. They shall take the form of Inner Protection Areas, measured from the exposed wall of the any dwellings. The asset protection zones shall be as nominated in Tables 1 & 2.

Recommendation 2 - Fuel management within the asset protection zones should be maintained by regular maintenance of the landscaped areas / mowing of lawns in accordance with the guidelines provided in Appendix 1, and or as generally advised by Rural Fire Service in their publications.

Recommendation 3 - Construction standards as per Australian Standard AS3959 '*Construction of Buildings in Bushfire Prone Areas*', in accordance with Part 2.3.4 of the '*Building Code of Australia*', should apply to all proximate dwellings to the asset protection zones.

Recommendation 4 - Roof gutters and valleys to all dwellings proximate to the asset protection zones should be leaf proofed by the installation of an external gutter protection shroud or a gutter system that denies all leaves from entering the gutter and building up on that gutter. Any material used in such a system should have a flammability index of no greater than 5 (as measured against AS 1530.2).

Recommendation 5 - A minimum 10,000 litre water tank will be required for the Manager's Residence and Visitor and Education Centre, dedicated solely to bushfire fighting purposes. A suitable connection for firefighting purposes is required. A 65mm Storz outlet with a Gate or Ball valve is provided. The tank is to be constructed of concrete or metal and if on a stand they are to be protected. All pipes are to be metal and pumps protected.

Recommendation 6 - A Bushfire Incident and Evacuation Plan should be prepared. This plan will provide a procedure in the event of fires threatening the development complex, thus allowing the managers of the site to provide an orderly and well-trained approach to the use of fire protection equipment and the evacuation of the residents / visitors.

REFERENCES

- NSW Rural Fire Service (2006) - *'Planning for Bush Fire Protection - A Guide for Councils, Planners, Fire Authorities and Developers*. NSW Rural Fire Service.
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