

18. Bushfire Assessment

Kyoto energypark

18.0 BUSHFIRE RISK

18.1 Introduction

Bushfire Consultants Conacher Travers Pty Ltd, were engaged to prepare a bushfire Protection Assessment for the Kyoto Energy Park. This report is attached as *Appendix C Conacher Environmental Group – Bushfire Protection Assessment (August 2007)*.

This bushfire assessment has been prepared using the methodology set out in the NSW Rural Fire Service (RFS) publication, *Planning for Bushfire Protection - 2006 (PBP 2006)*. Construction of buildings has been assessed under the *Environmental Planning and Assessment Act - Section 79 BA*.

The report looks at the potential for bushfire risk on buildings within the site in relation to surrounding topography, slope and vegetation. The assessment of the fire threat to the Maintenance Shed, Manager's residence and the Visitor and Education Centre provided the following information which influences the fire behaviour around each of these assets.

Also included in assessment is the recommended APZs derived from the slope and vegetation characteristics using the RFS methodology. There are also recommendations for ongoing fire hazard management, water storage on site solely for fire fighting reserves, and communications.

Conacher Travers Bushfire consultants conducted independent site inspections to determine site and vegetation characteristics around proposed locations of facilities.

18.2 Manager's Residence

The location of the Managers residence will potentially be exposed to a medium level of bushfire attack. 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.

Asset protection zones (APZs) would be constructed around the Managers residence as shown in Figure 18.0.

Table 18.0 Asset Protection Zone (APZ)- 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 |

18.3 Visitor's and Education Centre

The location of the proposed Visitors and Education Centre will potentially be exposed to a medium level of bushfire attack. 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.

The APZ would be constructed around the Visitor and Education Centre as shown in Figure 18.1.

Table 18.1 Asset Protection Zone (APZ)- Visitor's 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 |

18.4 Potential Ignition Sources

Bushfire risk can be defined as the chance of a bushfire occurring that will have harmful consequences to human communities and the environment. Bushfire risk is usually assessed by considering the likelihood of ignition and also the consequences of a bushfire occurring.

Given the proximity of the proposed Kyoto Energy Park wind turbines to native bush land there is a need to evaluate the effects of the proposal on fire behaviour and the possibility of bushfire ignition from equipment or operations associated with the Kyoto Energy Park. The risk of fire ignition from the construction and operational phases have been considered separately in this report.

18.4.1 Construction Risk Management

The 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'.

Ignition during the construction phase is a possibility. Activities which may cause accidental ignition include on site works involved in construction and installation of all facilities. These activities include welding and cutting (hot works), flammable liquids and accidents (eg smoking) and other risks from construction activities. Fire is also a risk originating from pole and line construction crews within road reserves and on private property.

During construction certain measures will be adopted by the Contractors using the site to manage bushfire risk. A Bushfire Risk Management Plan (BRMP) will be prepared prior to construction activities on site to reduce risk of ignition from these job tasks. These tasks shall include, but not limited to:

- Consultation with the Rural Fire Service. The closest firefighting services are located at Scone Fire Brigade located at Scone approximately 20 kilometres away;
- Management of vegetation around construction areas. Construction areas have been located within cleared areas. Vegetation management would include slashing of grasses around works areas, access roads and removal of dry vegetation around site works areas;
- Designated areas for construction activities including hot works prescribed areas. The site depot shall be used for most installation and hot works activities. Where activities are to be located away from prescribed zones appropriate risk assessments are to be preformed prior to activities being approved;
- No smoking on site except for prescribed areas;
- Management of 'hot works' areas on site, storage or flammables in locked facilities, and provision for water spraying equipment during site works activities;

- There should be no long grass or deep leaf litter in areas where plant and heavy equipment will be working; and
- All plant and heavy equipment should carry at least one Pressure fire extinguisher.
- Human Error - human error is likely to cause the greatest level of risk of ignition to the surrounding bushfire prone vegetation. Work practices should be established in recognition of the likely risk of ignition of the adjoining vegetation. These should include the provision of portable fire extinguishers during maintenance activities that involve cutting, grinding, welding etc. Particular attention shall be given to work practices during the construction and commissioning stages of the energy park. A temporary water supply shall be made available during this period.

18.4.2 Operations Risk Management

A Bushfire Risk Management Plan (BRMP) will be prepared to reduce bushfire risks during operations and protect life and property, Management plans will be developed covering Bushfire Hazard Management, fire fighting access, emergency services, emergency water supply and evacuation details.

Bushfire Risk from operational activities has been assessed. The main areas of bushfire risk were identified from:

- Overhead Power Lines
- Site Substation
- Wind Turbine Generators
- Solar PV
- Fuel/Vegetation Management
- Water for Emergency Bushfire Hazard

Overhead Power Lines

Overhead lines shall be designed in accordance with Energy Australia design specifications and management practices, including vegetation clearances, buffer zones, line and pole dimensions and configurations.

Line infrastructure shall be maintained by Energy Australia to reduce potential for Bushfire Risk from vegetation, lightning strikes, line contact, power surges and the like.

Site Substation

The generation and distribution of electricity has the potential to cause fire ignition within the substation compound area although the malfunction of equipment is rare. Potential ignition sources would include equipment malfunction such as transformer explosion, burning out of motors and overhead wiring failure. If a transformer was to explode it could have the potential to shed molten metal and burning oil for some distance from the transformer. Motors and fans can fail with the potential impact generally restricted to localised sparks.

The site substation will be located close to the Mountain Station access point in a cleared area free from vegetation and fuel source. The clearance between the equipment and the compound fence will be designed to mitigate the risk and transfer of an ignition source within the compound to the surrounding vegetation. The compound is covered with gravel to prevent ignition and spread of fire outside the compound.

Overhead wiring failure is uncommon and is usually the result of physical damage from lightning strikes or sparks given off during light rain, as a result of dust build up on the insulators over extended dry periods.

Wind Turbine Safety Standards and Design

Wind turbines manufactured today incorporate the highest quality and safety standards. Nevertheless there is always still a small risk of fire ignition from malfunctioning electrical or moving parts within the generator enclosure. The risk of fire can be associated with malfunctioning turbine bearings, inadequate crankcases lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities.

Wind turbines can also be potentially impacted on by a bushfire entering the site. This is less of an issue in comparison to normal power generation sites as turbines are well above the fuel source and power transmission cables are located within the towers and underground.

Measures to reduce bushfire ignition risk are considered below and would be adopted in the EMPs for the sites:

- All structures (including wind turbines) on site must comply with The Building Code of Australia (BCA) and the Australian Standards (AS). Internal fire protection systems, are designed in accordance with industry electrical standards and inclusion of fire suppression where appropriate;
- High Voltage (HV) electrical and communications cables are buried underground; and dedicated monitoring systems within each wind turbine that detect temperature increases in the turbines and initiates shutdown when the threshold temperature is reached. i.e. wind turbine generators can automatically shut down if overheating of bearings or machine parts occurs;
- All turbine are fully enclosed;
- Nacelles (generators) are proposed at an elevation of 80 to 105 m agl well above potential fuel load sources from vegetation;
- Nacelles are designed for containment of oil leaks and spillages;
- Generators are regularly maintained to reduce potential faults;
- The Kyoto Energy Park design has located the majority of infrastructure on cleared land away from significant native vegetation;
- Vegetation around the base of turbine and transformer would be grassed and kept at a height of less than 100mm to minimise potential for fire risk;
- High voltage power cable reticulation and connections will be located underground;
- Because of their height (hub height up to 150m), wind turbines can be susceptible to lightning strikes and therefore if not designed properly can cause electrical damage and possible fire risk. Lightning protection devices will be fitted to each turbine, additionally turbines will be earthed to prevent arcing or surging resulting from lightning strikes which may potentially ignite fires;
- Metallic conductors are installed within the turbine blade for connection to the main tower. Towers are properly earthed in accordance with electrical safety standards. Internal electrical works are also protected from voltage rises due to lightning strikes. Site substation would be designed in accordance with Energy Australia design parameters.

Solar PV Plant

The potential for bushfire risk from the solar PV plant during operations would be extremely rare. The PV plant will be located on a cleared plateau with substantial vegetation clearances on all sides and on critical slopes.

All structure design would comply with The Building Code of Australia (BCA) and the Australian Standards (AS). Solar PV systems would be installed by BSCE accredited installers to Australian Standards in a turnkey project. High and Low Voltage electrical and communications cables would be buried underground in cable conduits according to specifications.

Fuel/Vegetation Management

An important part of the Kyoto Energy Park Bushfire Risk Management Plan would be fuel/vegetation management. The following measures shall be included in the BMP:

- Access tracks, proposed and existing, are to act as fire breaks and will also provide access for fire fighting and emergency services;
- Asset Protection Zones (APZs) should be provided and should take the form of Inner Protection Areas, measured from the exposed wall of the any dwellings;
- Ongoing maintenance of APZs and fire trials should be undertaken;
- Fuel management within the APZs should be maintained by regular maintenance of the landscaped areas / mowing of lawns in accordance with the standard guidelines;
- Fire protection measures for plant and machinery operating on the site will be in accordance with these standards.

Water Supply for Fire fighting

Appropriate location of water access points will assist safe, effective and timely fire suppression activities. To ensure adequate access to water for Rural Fire Service (RFS), the allocation of water supplies is necessary. A separate 10,000 litre capacity water tank is required for the Managers residence and the Visitors and Education Centre respectively, dedicated solely to bushfire fighting purposes. A suitable connection for firefighting purposes is also required

In the event of a fire, water should be available and accessible to ensure that fire suppression activities are not hindered in any way and to ensure that fire appliances can identify and access water points efficiently. Multiple tankers need to be filled rapidly and simultaneously to conduct efficient and effective fire suppression.

18.5 Bushfire Risk Mitigation

In order to ensure that both construction and operational bushfire risks are effectively managed, a Bushfire Risk Management Plan (BRMP) will be prepared to identify risks to life and property, and management plans to reduce these risks. Such a plan will include, but is not limited to, fire fighting, access, emergency services, emergency water supply and evacuation details and would require completion prior to any works being undertaken on the subject site.

The Bushfire Risk Management Plan (BRMP) shall be provided to ensure that the development is in accord with the requirements of *PBP 2006* and relevant standards as follows:

- Designed in accordance with requirements of the NSW Rural Fire Service and the Upper Hunter Shire Council;
- A Bushfire Evacuation Plan prepared for the site and provide access/ egress and alternative access/egress from the site;
- 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 dwellings proximate to the Asset Protection Zones.

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