



# Emergency Management Guidelines for Wind Energy Facilities



**Cover Image: Toora Wind Farm – South Gippsland, Victoria (CFA District 9).**

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## Other relevant considerations

Whilst CFA is not the responsible authority for Occupational Health and Safety or Dangerous Goods legislation it recommends that the following be considered, when planning, designing or developing Wind Energy Facilities.-

- Compliance with relevant statutory legislation and should implement safety and health management systems so as to mitigate hazard and risk;
- Hazard analysis and risk assessment undertaken in accordance with AS/NZSISO 31000 Risk Management – Principles and guidelines; and with HB203 Environmental Risk Management Principles and Processes;
- Development and implementation of emergency response plans detailing mitigation strategies to achieve specific outcomes as outlined in the State Planning Policy (SPP) 1/03 – Guideline for Mitigating the Adverse Impacts of Flood, Bushfire and Landslide; and maintain adequate separation of vegetation from exposures to prevent wildfire events threatening infrastructure in isolated areas.

## Aim

The Emergency Management Guidelines for Wind Energy Facilities provide Wind Energy Facility operators with CFA's preferred safety measures to be considered when constructing and operating Wind Energy Facilities.

These principles should be considered at the design and planning stages of a wind energy project.

Application of the guidelines may vary throughout Victoria depending on the associated level of risk and should be implemented with the assistance of local CFA Brigades, Districts and Regions.

## Context

Wind turbines manufactured today are required to meet accepted quality and safety standards. Despite this, CFA recognises that the risk of fire always exists when electronics and combustible oils and hydraulic fluids exist in the same enclosure. Wind farms can also be impacted by bushfire or grass fire entering the site.

There are a number of measures that can be put in place to reduce the likelihood of a fire occurring. These include both passive and active measures, such as;

- Lightning protection
- Non-combustible hydraulic and lubricant oils
- Heat barriers to protect combustible elements
- Heat and/or smoke detection systems, for early notification of fire
- Suppression systems, either water or foam that can contain a fire

These guidelines provide advice on recommended fire safety measures for consideration when either building a new or upgrading an existing facility.



Wind energy facility in the landscape, including high voltage power lines and substations. Source: B. Gane.

The types of fire risks related to wind energy facilities may include:

- Nacelle (including turbine oil) fires
- Electrical faults during construction or from connection lines
- Firefighting limitations within and adjoining the wind farm footprint, such as limitations on aerial support, and access and egress conditions

- Access to water sources within or adjoining the facility
- Operation of winches and machinery during monitoring and maintenance tasks
- Impacts from downwind air turbulence on fire behavior
- Impacts of lightening



Wind turbine components. Source: <http://www.alternative-energy-news.info/images/technical/wind-turbine.jpg>

CFA's involvement in Wind Energy Facilities extends only to implementing appropriate plans and response arrangements for incidents in and around these facilities, and therefore meeting its statutory responsibility for fire prevention and suppression. CFA's responsibility does not extend to regulating and certifying Wind Energy Facility building standards, operator's insurance arrangements, or operational restraints on the operator and maintenance staff.



Wake effect. Source: Danish Wind Energy Association Guide, 2003, pg. 34

## Emergency Management Guidelines for Wind Energy Facilities

In accordance with the Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (Department of Environment, Land Water Planning (DELWP), January 2016), Wind Energy Facility operators must develop a Bushfire (Wildfire) Prevention and Emergency Response Plan as part of their Environmental Management Plan. The plan must be prepared in consultation with and to the satisfaction of CFA and DELWP. Section 113A of the Electrical Safety Act 1998 and Section 5 of the Electricity Safety (Bushfire Mitigation) Regulations (2013) require that a Bushfire Mitigation Plan be prepared for approval by Energy Safe Victoria.

The requirements outlined below, have been specified to reduce the risk of fire in and around Wind Energy Facilities, during the planning, constructing and operating phases. The Bushfire Prevention and Emergency Response Plan and Bushfire Mitigation Plan must address the following measures:

### **Planning, Design and Development of Wind Energy Facilities**

#### **1. Consultation**

- 1.1. The plan for the Wind Energy Facility needs to be forwarded to CFA for its consideration and to its satisfaction, in accordance with the above DELWP Planning *guidelines*;
- 1.2. Wind Energy Facility operators should include firesafetyreferrals@cfa.vic.gov.au Operations Managers/Officers, as well as the local CFA District, in the consultation process when designing the facility for the planning application. They should also be consulted regarding the consequent construction and operational stages;
- 1.3. An invitation should be made to fire brigades who are likely to respond to an incident at these site/premises.

#### **2. Siting**

- 2.1. Where practicable, Wind Energy Facilities should be sited on open grassed areas (such as paddocks grazed by cattle and sheep);
- 2.2. Clearing of vegetation, such as scrub, trees, etc. within 30m of a turbine is recommended;
- 2.3. Wind turbines should be located approximately 300 metres apart. This provides adequate distance for aircraft to operate around a Wind Energy Facility given the appropriate weather and terrain conditions. Fire suppression aircraft operate under "Visual Flight Rules". As such, fire suppression aircraft only operate in areas where there is no smoke and during daylight hours. Wind turbines, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan;
- 2.4. Adjoining property use and distances to habitable buildings need to be considered In the design of a wind energy, with regard made to turbine height and prevailing wind speeds.

#### **3. Access**

Adequate access to and within the Wind Energy Facility will assist CFA in responding to and managing fires on site. To enable access for fire appliances the following provisions should be considered:

- 3.1. Constructed roads should be a minimum of 3.5 metres in trafficable width (with 0.5m each side) with a four (4) metre vertical clearance for the width of the formed road surface;
- 3.2. Roads should be constructed to a standard so that they are accessible in all weather conditions and capable of accommodating a vehicle of 15 tonnes (30 tonne if a CFA aerial appliance is within the District) for the trafficable road width;
- 3.3. Roads need to be accessible in all weather conditions;
- 3.4. The average grade should be no more than 1 in 7 (14.4%) (8.1°) with a maximum of no more than 1 in 5 (20%) (11.3°) for no more than 50 metres;
- 3.5. Dips in the road should have no more than a 1 in 8 (12.5%) (7.1°) entry and exit angle;
- 3.6. Passing bays should be located every 200m on access tracks.

#### 4. Water Supply

Appropriate location of water access points will assist safe, effective and timely fire suppression activities. To ensure adequate access to water for CFA, the allocation of static water supplies is necessary.

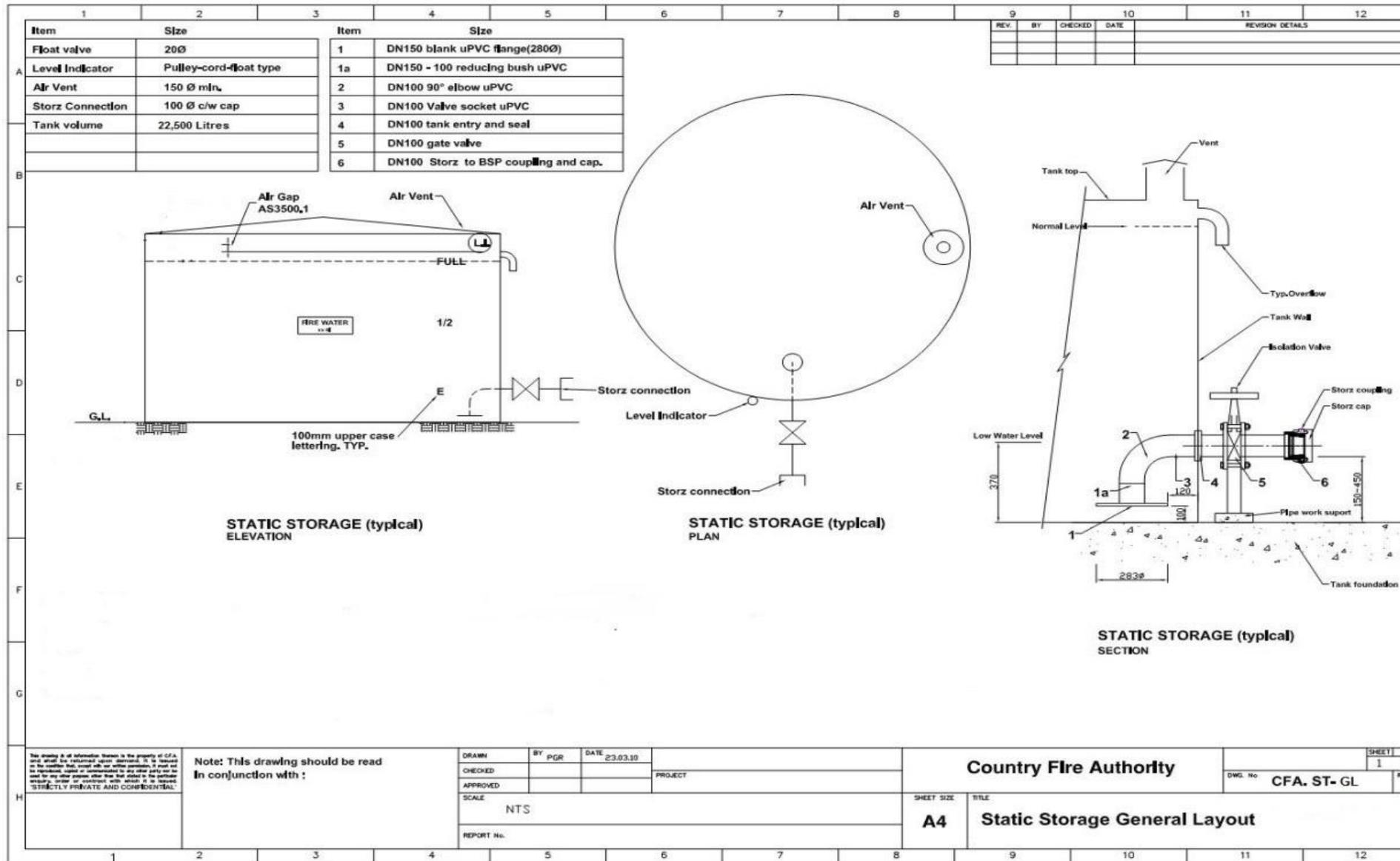
Location of water access points should be consistent with the type of risk that exists within the area. There may be a need for multiple treatments to address the type of risk and community requirements. In the event of a fire, water should be available and accessible to ensure that fire suppression 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.

The following measures should be provided:

- 4.1 Static water storage tank installations are to comply with AS 2419.1 and the following conditions;
- 4.2 The static water storage tank shall be of not less than 22,500 Litres effective capacity. The static water storage tank must be an above ground water tank constructed of concrete or steel (Refer to Figure 1) the location and number of tanks should be determined in consultation with a CFA Fire Safety Officer;
- 4.3 The static storage tanks shall be capable of being completely refilled automatically or manually within 24 hours;
- 4.4 The hard suction point shall be provided, with a 100mm full bore isolation valve, (Figure 1) equipped with a Storz connection, sized to comply with the required suction hydraulic performance. Adapters that may be required to match the connection are, 100mm to 90mm, 90mm to 75mm and 75mm to 65mm Storz adapters with a matching blank end cap to be provided;
- 4.5 The hard suction point shall be positioned within 4m to a hardstand area and provide a clear and safe access for fire personnel;
- 4.6 An all-weather road access and hardstand shall be provided to the hard suction point. The hardstand shall be maintained to a minimum of 15 tonne GVM (30 tonne if a CFA aerial appliance is within the District) and 6m wide or to the satisfaction of the Delegated Officer;
- 4.7 The road access and hardstand shall be kept clear at all times;
- 4.8 The hard suction point shall be protected from mechanical damage (i.e. Bollards) where necessary;
- 4.9 Where the access road has one entrance, a 10m radius-turning circle shall be provided at the tank;
- 4.10 An external water level indicator is to be provided to the tank and be visible from the hardstand area;
- 4.11 Signage (Figure 2) shall be fixed to the tank;
- 4.12 Signage (Figure 3) shall be provided at the front entrance to the site, indicating the direction to the static water tank and being to the satisfaction of the Chief Officer.

Figure 1: Static Storage General Layout.



**Figure 2: Sign Fixed To Tank.**

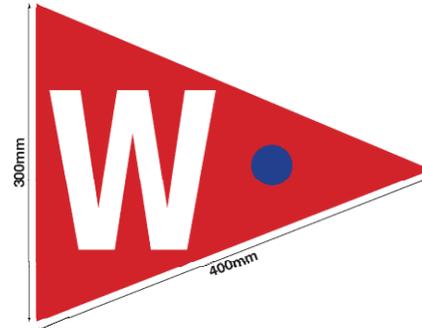
Fade Resistant Sign Fixed to Tank in Contrasting Lettering, White Sign Writing on Red Background

75mm upper case lettering 'FIRE WATER' 50mm upper case lettering '22,500 LITRES'

**Figure 3: Directional Sign.**

Fade Resistant Sign Fixed to Rigid post in Contrasting Lettering, White Sign Writing on Red Background, with a circle Reflective Marker

150mm upper case lettering 'W'

**5. Infrastructure**

Sound engineering design using Australian Standards and principals of fire safety should be considered including:

- 5.1. Internal fire protection systems, where appropriate, to assist with fire suppression;
- 5.2. Lightning protection devices installed on each wind turbine;
- 5.3. Electrical and communications cables underground;
- 5.4. Dedicated monitoring systems within each wind turbine that detect temperature increases in the turbines, to either place turbine in a "safe state" or shuts them down when the threshold temperature is reached and
- 5.5. Wind turbines should have a cut off system to prevent overheating when the temperature inside the nacelle is too high.

**6. High Angle Rescue**

- 6.1. CFA's rescue guidelines should be considered to enable safe rescues. Contact the local CFA Region and/or District office for more information on this;
- 6.2. If turbine can be entered, the confined space rescue protocol including signage should be provided and Emergency Services informed.

**7. Construction**

During construction, pre-development monitoring activities and maintenance of a Wind Energy Facility, developers must:

- 7.1. Ensure that appropriate permits have been issued for work during Fire Danger Period (FDP) and Total Fire Bans (TFB) if required;
- 7.2. Adhere to restrictions during the FDP and on TFB's;
- 7.3. Carry fire extinguishers or firefighting equipment in vehicles;
- 7.4. Carry emergency communications equipment;
- 7.5. Vehicles should keep to the tracks whenever possible;
- 7.6. Restrict low clearance vehicles with catalytic converters from entering the site on high fire danger days; and
- 7.7. Restrict smoking to prescribed areas.

## **8. Operation and Maintenance of Wind Energy Facilities**

- 8.1 Maintenance and repair activities that involve flame cutting, welding, and soldering (hot works) can increase the risk of fire. It is recommended that the establishment of a "Hot Work Permit" process be considered, in areas where combustible and/or flammable materials may be present.

## **9. Awareness and Training for Emergency Services**

- 9.1 Within three months after commencement of the operations of the Wind Energy Facility operators should offer a familiarisation visit to the site and explanation of emergency service procedures to CFA and other emergency services, and training in relation to suppression of Wind Energy Facility fires and rescue;
- 9.2 Subsequent familiarisation sessions and training must be given to new emergency services personnel as required.

## **10. Fuel/Vegetation Management**

Wind Energy Facility operators should undertake the following fuel management measures during the Fire Danger Period:

- 10.1 Grass should be kept well maintained and at a low height during the declared Fire Danger Period;
- 10.2 A fuel reduced area of four-ten (4-10) metres width should be maintained around the perimeter of electricity compounds and substation type facilities;
- 10.3 There should be no long grass or deep leaf litter in areas where plant and heavy equipment will be working;
- 10.4 All plant and heavy equipment should carry at least one 9 litre water stored pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment;
- 10.5 Adhere to restrictions and guidance during the Fire Danger Period, high fire danger days and Total Fire Ban days (refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au));
- 10.6 Vehicles associated with the wind energy facility should carry 1 x 9 litre fire extinguisher with a minimum rating of 3A and rake hoe as a minimum when on site during the fire danger period, or equivalent firefighting equipment. Other equipment may be prescribed by the local CFA.

## **11. Evacuation procedures**

- 11.1 Evacuation procedures for residents that may be impacted in the event of a nacelle fire should be informed of emergency procedures and recommended actions.

## **12. Operating temperatures**

- 12.1 Wind turbine manufacturers provide specifications for safe operating conditions for temperature and wind speed,
- 12.2 A wind energy facility fire plan shall specify maximum operational wind speed and temperature conditions and operating procedures to limit fire risk.

## **13. Training for Facilitator Staff**

Staff operating and/or working within this facility should be trained and aware of:

- 13.1 Site emergency Management arrangements,
- 13.2 Emergency contact for any Fire Fighting personnel they are expected to support the facility,
- 13.3 First Aid, as required by the owner/operator.

An annual emergency exercise should be conducted and consideration should be given to inviting the local emergency services to participate.

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**References**

Australian Wind Energy Association (AusWEA) (2001) Wind Farm Safety in Australia,  
[http://www.auswind.org/WIDP/assets/BP11\\_Safety.pdf](http://www.auswind.org/WIDP/assets/BP11_Safety.pdf)

Department of Planning and Community Development (2011) *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria*. Victorian Government, Melbourne.

Danish Wind Industry Association Guide, Version 12 May 2003.

<http://www.alternative-energy-news.info/images/technical/wind-turbine.jpg>