Appendix V

Bushfire Risk Assessment and Mitigation Plan

KENTBRUCK GREEN POWER HUB

Kentbruck Green Power Hub

Bushfire Risk Assessment and Mitigation Plan

July 2024

FIRE RISK Consultants

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Any fire safety work, including but not limited to planned burning, back burning and/or fire suppression, on any property or building is specifically excluded from this report.

*Where the term **"Bushfire prevention and mitigation related activities"** (or words to that effect) are used, this is to be defined as the clearance of vegetation in accordance with the Victorian State Government guidelines, including clearing and maintenance of existing fire breaks and/or fire access for fire fighters under electricity pylons and properties that have been constructed to Australian Standard AS3959 and/or the National Construction Code.*

Abbreviations

The following terms, abbreviations and acronyms have been used throughout this report:

Term	Meaning
APZ	Asset Protection Zone – utilises extensive fuel management to provide the highest level of protection to human life, property, key community assets and critical infrastructure. The goal of this aggressive fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire.
AS 3959 - 2018	Australian Standard 3959 – 2018 Construction of Dwellings in Bushfire Prone Areas
Bushfire	An unplanned fire in vegetation.
Bushfire Attack Level (BAL)	Means the bushfire attack level as defined in AS3959-2009 *Construction of Buildings in Bushfire Prone Areas* as a "means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments in radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire".
Bushfire Hazard	Materials that can fuel a fire.
Bushfire Prone Vegetation	Means continuous vegetation including grasses and shrubs but not including maintained lawns, parks and gardens, nature strips, horticultural areas, vineyards and orchards.
Bushfire Risk	The probability of a bushfire starting and spreading, but it can also be used to describe the likelihood of an asset, such as a building, being damaged or destroyed by a bushfire.
CFA	Country Fire Authority Victoria
Defendable Space	An area of managed vegetation around an asset likely to be at risk from bushfire that protects it from direct flame contact and intense radiant heat, as well as providing an area where firefighters can defend the asset.
DEECA	Department of Energy, Environment and Climate Action
DTP	Department of Transport and Planning
FFMVic	Forest Fire Management Victoria
Fine Fuel	Dead plant matter less than 6mm in diameter.
FRC Pty Ltd	Fire Risk Consultants Pty Ltd, also known as the "Consultants"
FRV	Fire Rescue Victoria

Term	Meaning
Fuel Break	Synonymous with "firebreak"; any natural or constructed change in fuel characteristics, which affects fire behaviour so that fires burning into them can be more readily controlled. Fuel breaks will not stop a major bushfire but provide a fire control line from which to suppress a fire.
Fuel Structure	The quantity and type of fuel at different heights above the ground usually separated into surface, near surface, elevated and bark. Canopy fuels may also be expressed.
Hazard Reduction	Reducing fuel loads in any given area. Generally by burning, mechanical, manual or chemical means.
Inner Zone	An area between an asset at risk from bushfire and the outer zone, where fine fuels are maintained in a minimum fuel condition to ensure that the zone acts as a barrier between the assets and bushfire.
Managed Vegetation	Combustible material that is permanently maintained in a minimal fuel state. Generally, mechanically treated in an APZ.
NERAG	National Emergency Risk Assessment Guidelines
OFH	Overall Fuel Hazard (Hines, et al 2010). Classes used to quantify OFH are Low, Moderate, High, Very High and Extreme.
Outer Zone	The area between the inner zone and unmanaged vegetation where fine fuels are removed, and larger fuels strategically modified to reduce the intensity of an approaching bushfire. Provision of an inner zone and an outer zone will ensure that there is a progressive reduction of fine fuel between a bushfire hazard and any combustible structure.
PV	Parks Victoria

1 EXECUTIVE SUMMARY

Fire Risk Consultants (FRC) has been engaged by Neoen Australia Pty Ltd (the 'Proponent') to undertake a detailed bushfire risk assessment and provide recommendations on mitigation strategies to manage the bushfire risk at the proposed Kentbruck Green Power Hub (the 'Proposal').

This report is part of an Environment Effects Statement (EES) requested by the Victorian Government's Minister for Planning to assess the potential environmental effects of the Proposal.

The Proposal is for the construction of up to 105 wind turbines within the Glenelg Shire, in south west Victoria. The Proposal is situated on approximately 8,318 hectares of land, and located between Portland and Nelson.

The primary consideration for all fire mitigation and suppression efforts in Victoria is the protection of life and property. This report will assist the Proponent to make sound decisions regarding bushfire risk management and assist them to prevent, prepare and respond to bushfires in keeping with this consideration.

The report provides a detailed assessment of the bushfire risk across the site with an analysis of potential fires originating from both within and external to the property. The description and assessment of bushfire risk is not confined to the property, rather it considers the wider landscape bushfire potential.

The assessment summarises the identified risks and recommends mitigation actions intended to provide a greater level of protection to the Proposal, the surrounding property owners, and the community generally. A full analysis of the likelihood and consequence of bushfires originating from within and external to the Proposal demonstrates that there is a greater risk from bushfires originating from the surrounding landscape and entering the Site.

The assessment also considers in detail the relevant policies, guidelines and other available information including clause 13.02-1S of the Victorian Planning Scheme and CFA's renewable energy guidelines.

The report makes recommendations to manage bushfire risk relating to the provision and ongoing maintenance of static water storage, emergency preparedness, training, fire protection during construction and activities to be undertaken prior to each fire season.

The report concludes:

- The bushfire risk associated with the construction and operation of the Proposal can be mitigated to an acceptable level with the implementation of sound bushfire mitigation strategies, and
- The Proposal does not increase bushfire risk in the landscape.
- The Proposal provides additional options for emergency service vehicles in particular for fire suppression related access.

2 INTRODUCTION

2.1 Purpose

Fire Risk Consultants Pty Ltd ('FRC') was engaged by Neoen Australia Pty Ltd (the 'Proponent') to provide a Bushfire Risk Assessment and Mitigation Plan (this report). The report assesses the bushfire risk within the local area and makes recommendations to reduce potential bushfire impacts (if any) to life, property and environmental assets resulting from the proposed Kentbruck Green Power Hub (the 'Proposal'). This report assesses available data and information to make informed decisions on the level of bushfire risk currently, and during the construction and operational phase of the Proposal.

2.2 The Proposal

Neoen is proposing a renewable energy development, known as the Kentbruck Green Power Hub, comprising a wind energy facility (wind farm) with associated infrastructure. The Project would be mostly located in an actively managed and harvested pine plantation in southwest Victoria, between Portland and Nelson, in the Glenelg LGA.

The Project would involve two main components:

- A wind farm of up to 600 MW comprising up to 105 wind turbines and associated permanent and temporary infrastructure.
- A new 275 kV underground transmission line, which would connect the Project to the existing AusNet electricity transmission network. The transmission line would extend from the eastern boundary of the wind farm site to the existing 275/500 kV Heywood Terminal Station and would be approximately 26.6 km in length.

As shown in Figure 1, permanent infrastructure to be constructed as part of the Project would include:

2.2.1 Wind Farm

- Up to 105 wind turbines
- Access roads, including:
    - Public roads for site access. Existing site access routes into the commercial forestry operation would be utilised to minimise the need for new site entrances. Some public roads and intersections would need to be upgraded to facilitate delivery of Project components, particularly wind turbine blades.
    - Internal access roads. Existing access tracks within the commercial forestry operation and on land currently used for agricultural purposes would be used where possible. Some of these roads and intersections may need to be upgraded.
- Up to eight meteorological monitoring masts within the wind farm site
- Permanent hardstand areas at each turbine location, with a footprint of approximately 0.4 ha, subject to refinement based on the dimensions of the final wind turbine model selected
- Three collector substations
- Underground powerlines connecting the wind turbines to the collector substations

- A main wind farm substation to which all the collector substations would be connected. The main substation would connect the wind farm to the existing electricity transmission network via a new transmission line.
- A high voltage powerline connecting the collector substations to the main substation, which would be a combination of overhead and underground cabling
- Transition stations at which the high voltage powerline would transition from overhead to underground or vice versa (if needed; see below)
- Up to two permanent site compounds, including 30 carparking spaces at each location.

Temporary infrastructure associated with construction of the wind farm would include:

- Up to three concrete batching plants
- Laydown areas with a footprint of approximately 0.6 ha located at each turbine
- Up to six construction compounds, each containing a site office, carparking, storage, amenities, and a workshop.

2.2.2 Onsite quarry

A new limestone quarry is also proposed to be established in the wind farm site adjacent to the existing quarry operated by Green Triangle Forest Products (GTFP), on North Livingston Road (see Figure 2.1). The cemented “cap rock” quarry would operate during both construction and operation, with the extracted material to be used for hardstands and for upgrades to existing access roads or construction of new access roads.

The quarry would have a maximum footprint of 11 ha and be up to 15 m deep, with actual dimensions to be determined following a comprehensive drilling, sampling and testing program during detailed design of the Project. The total extracted volume is estimated to be up to 300,000 cubic metres (m3), with material to be extracted progressively during construction. The quarry would also be used throughout the Project’s lifetime for road maintenance and would be made safe and rehabilitated at the end of its use for the Project to a suitable landform.

2.2.3 Electrical reticulation

The Project would require new electrical reticulation that involves the construction of underground and overhead cabling throughout the wind farm site and electrical substations. A new transmission line to connect the Project to the existing transmission network is also proposed.

Main Substation

A main electrical substation would be constructed in the wind farm site to facilitate connection of the Project to the existing electricity network. This substation would be located near the eastern boundary of the wind farm site to minimise the distance between the substation and the connection point to the transmission network (at the Heywood Terminal Station) (see Figure 2).

The main substation would have a footprint of up to 3.3 ha with a maximum height of approximately 40 m. It would contain protection equipment and a control room with communications equipment, with tanks for storing water and oil for maintenance of the collector and main substation equipment.

The substation would be constructed on a hardstand, with appropriate contamination/stormwater controls used around the oil tanks such as bunding and concrete slabs. The substation would be fully enclosed in security fencing with sufficient space for a fire break and screening around the perimeter.

Collector substations

Up to three collector substations would be constructed within the wind farm site to facilitate collection and distribution of electricity generated from the wind turbines into the existing electricity network. Indicative locations of the collector substations are shown on Figure 2.

The collector substations would have a footprint of up to 1 ha with a maximum height of approximately 35 m. Each substation would contain a range of electrical equipment including step-up transformers, protection equipment (including lightning protection), and a high voltage bus bar connecting to the high voltage overhead powerline. The collector substations would be constructed on hardstands, with the transformers mounted on concrete slabs. The collector substations would be fully enclosed in security fencing.

Onsite wind farm powerlines

The Project would involve the installation of up to 190 km of underground powerlines (33 kV or 66 kV) connecting the wind turbines to the collector substations, and up to 27.8 km of high voltage powerline connecting the collector substations to the main wind farm substation.

The high voltage powerline would likely be 275 kV (subject to detailed design) and would run overhead along Portland-Nelson Road from the western collector substation to the eastern collector substation.

From the Portland-Nelson Road / Sandy Hill Road intersection it would pass beneath Portland-Nelson Road then continue underground to the main wind farm substation. The proposed alignment of the powerline, including the options described above, is shown in Figure 1.

The underground route through the GTFP plantation is the preferred option for a range of reasons, including minimising impacts on native vegetation, minimising bird and bat collision risks, and minimising traffic disruption along Portland-Nelson Road. However, part of the underground route is located within land zoned Public Park and Recreation Zone (PPRZ), which recognises areas for public recreation and open space and provides for appropriate commercial uses. GSC considers this PPRZ area to be an anomaly in the Glenelg Planning Scheme (the Planning Scheme) as it is under private ownership (timber plantation), and is seeking to rezone it to Farming Zone.

Although a wind energy facility (including infrastructure such as powerlines) is not prohibited in the PPRZ, the decision was made to remove all Project infrastructure from within the zone to be consistent with its public recreation objectives. The preferred underground route for the 275 kV powerline would therefore only be progressed if GSC's Planning Scheme amendment is successful, or if Neoen seeks permission from the land manager for the infrastructure to be located within the PPRZ. Only one of the options would ultimately be constructed.

Transmission Line

The Project would require a new 275 kV transmission line to connect the Project to the existing transmission network. The proposed transmission line route measures approximately 26.6 km in length and would extend underground from the main wind farm substation near the eastern boundary

of the wind farm site to the existing Heywood Terminal Station (see Figure 2). The transmission line would bisect Cobboboonee National Park and Cobboboonee Forest Park for approximately 17.6 km, where it would be buried beneath an existing road (Boiler Swamp Road).

After exiting Cobboboonee Forest Park the underground line would continue for 1.2 km through freehold agricultural land. As shown on Figure 2, two options have been identified for this section of the transmission line. The slightly shorter southern route is the preferred option, but due to its proximity to a swampy area adjacent to the Surrey River it may not be feasible for underground construction. The viability of this option will be determined in response to geotechnical investigations undertaken during detailed design and only one option would ultimately be constructed. After crossing the Surrey River, the transmission line would continue underground until its connection point into the Heywood Terminal Station.

The underground route through Cobboboonee National Park / Forest Park has been delineated into a 6.5 m-wide construction footprint to minimise impacts on native vegetation within the Boiler Swamp Road corridor. The cabling would be buried using a specialised machine that excavates, lays the cable and backfills the trench in a single pass, minimising the associated construction footprint through small trench widths and minimal spoil generation. Once the transmission line exits Cobboboonee Forest Park, the construction footprint would be approximately 9 m wide as it continues through freehold land until it reaches Heywood Terminal Station. Traditional open-cut trenching methods would be used for this section of the underground transmission line.

All transmission line options that have been considered for the Project, including those which are no longer being pursued by Neoen, are discussed in Chapter 4 of the EES and detailed in the options assessment report prepared by Umwelt (2023). Appendix B of this report provides a summary of the impacts associated with three alternative transmission line options considered by Neoen to date, including a combined overhead-underground option to the Heywood Terminal Station, and overhead and underground options through freehold land southeast of the wind farm site. These options are referred to as Options 1A, 2A and 2B, respectively.

Transmission Line Alternatives

Section 3.4 of the Scoping Requirements for Kentbruck Green Power Hub Environment Effects Statement requires that the Project's EES document the likely environmental effects of the Project's feasible alternatives, including routes and configurations for the transmission line. The depth of investigation should be proportionate to the potential of the alternatives to minimise potentially significant adverse effects and to meet the Project objectives (see Section 2.2 of the EES).

The Project being pursued by Neoen, and subject to full impact assessment in this report, comprises a preferred transmission line route as described in Section 8.2.4 of this report (underground through Cobboboonee National Park and Forest Park, and farmland to the Heywood Terminal Station – Option 1B). An alternative configuration to this option has also been considered by Neoen, which follows the same route as Option 1B however it involves an overhead section between Cobboboonee Forest Park and the Heywood Terminal Station.

Two other options were initially identified as feasible but are no longer being pursued by the Project due to a lack of landowner and community support: Options 2A and 2B. These options run southeast from the wind farm site and connect to the Heywood-Portland 500 kV line north of Portland. Option 2A is wholly overhead, while Option 2B is wholly underground.

The three transmission line options are described as follows:

- Option 1A: The underground transmission line would extend east from the main wind farm substation and traverse Cobboboonee National Park and Forest Park beneath an existing road. From there, the transmission line would transition to an overhead line as it travels through freehold land to reach Heywood Terminal Station.
- Option 2A: The overhead transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing. This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.
- Option 2B: The underground transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing. This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.

Section 8.2.4 of this report describes the potential impacts associated with each of the above options. This information was used by Umwelt to prepare a Transmission Line Options Assessment that details each of the transmission line options considered by Neoen for the Project

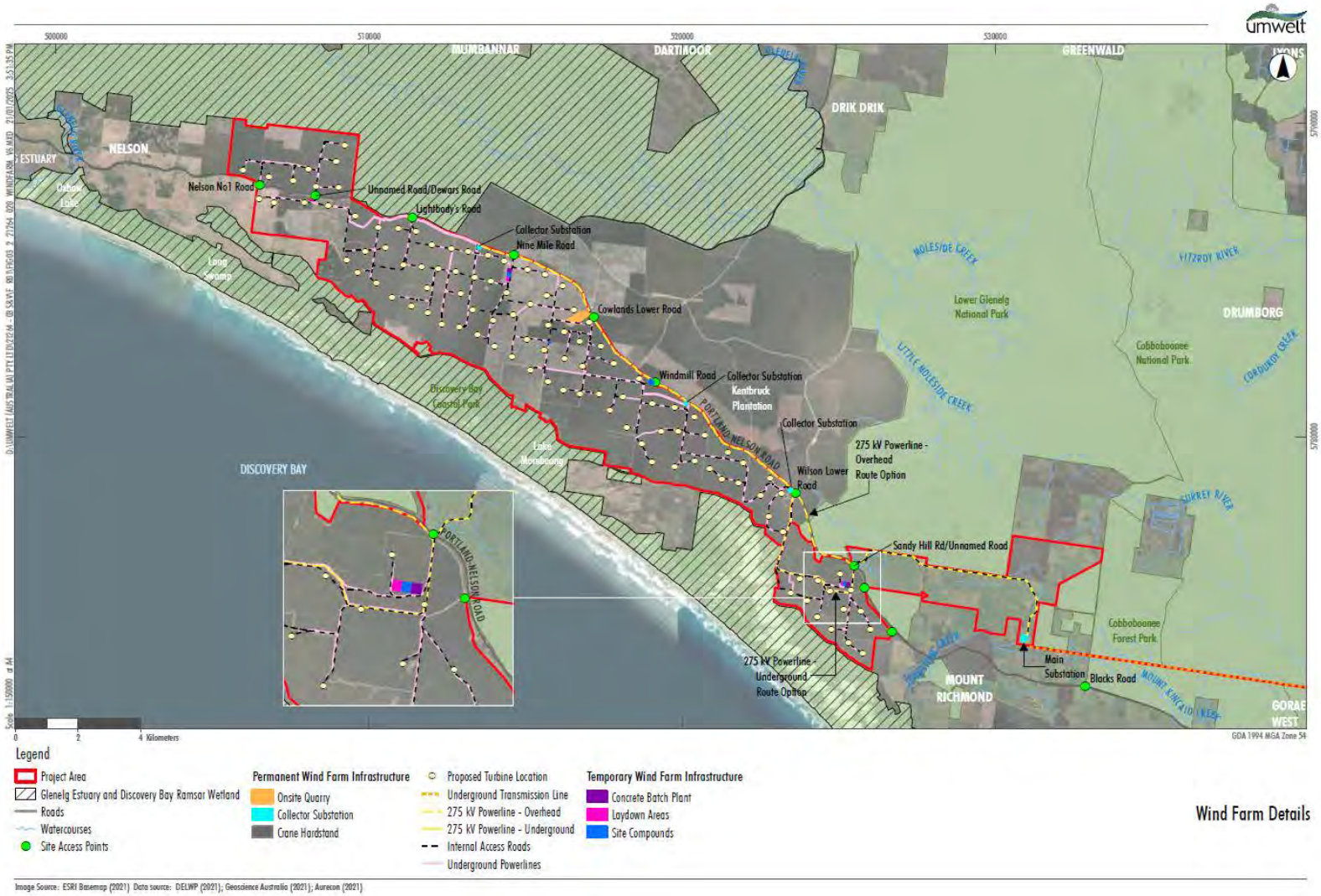

Figure 1 - Project overview (umwelt)

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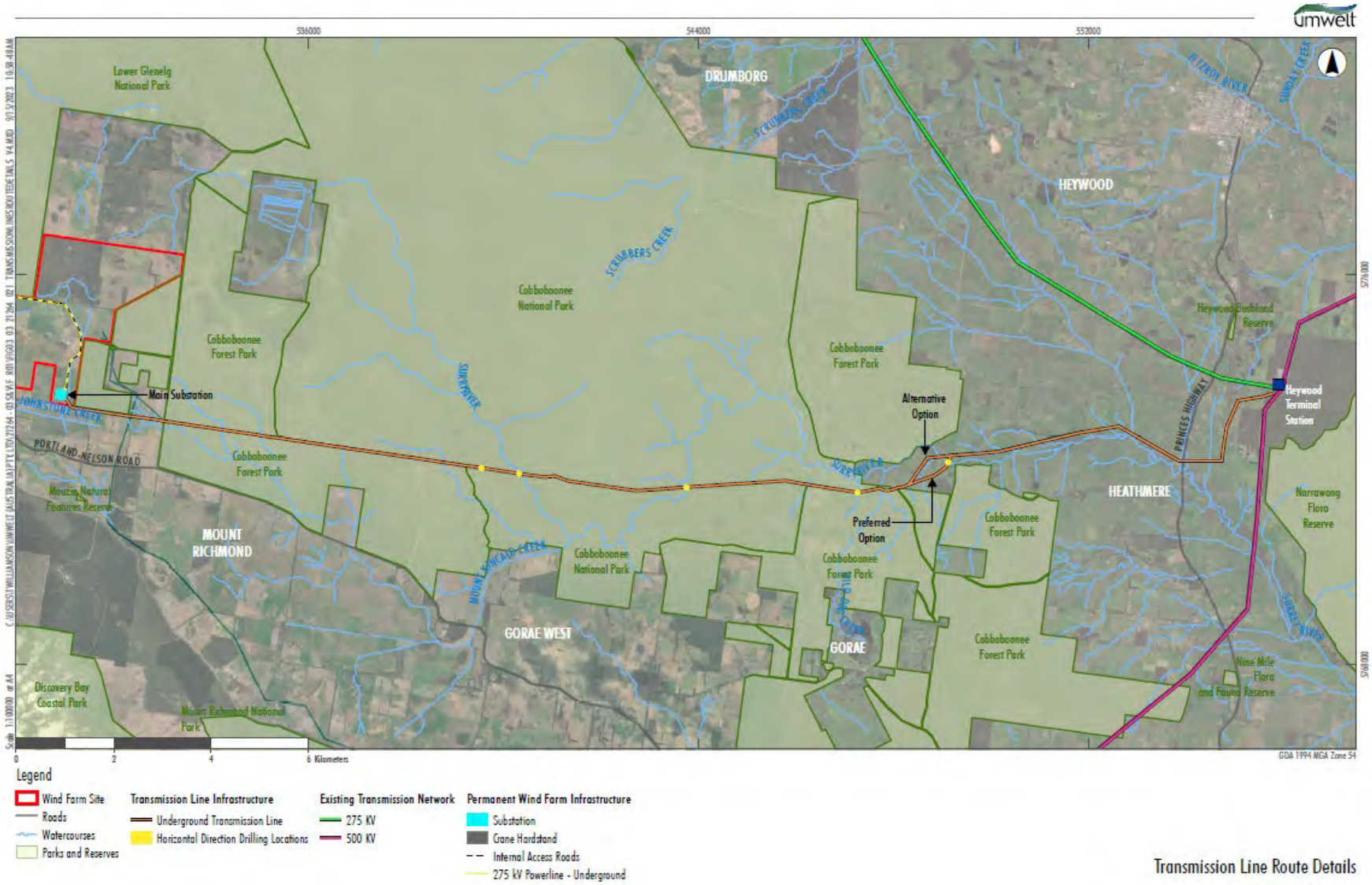

Figure 2 - Transmission Line Route Details (Umwelt)

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2.3 Environment Effects Statement – bushfire context

In 2019, Neoen Australia Pty Ltd (Neoen) applied for a planning permit for 157 wind turbines (now up to 105) to be installed on the same site, within the same footprint. On 25 August 2019, the Minister for Planning required Neoen to prepare an environment effects statement (EES) under the *Environment Effects Act 1978* to assess the potential environmental effects of the project.

This report forms part of the EES for the Proposal, and addresses the following elements from the approved scoping requirements[1]:

Table 1 - How this report addresses the EES scoping requirements

Scoping requirement	Discussion	Report reference
3.7 Environmental management framework: Management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes should be clearly described in the EMF. The EMF should describe proposed objectives, indicators and monitoring requirements, including for (but not limited to) managing or addressing aviation (including with respect to aerial firefighting) and electromagnetic interference.	The report gathers information relating to the effectiveness of aerial firefighting following the installation of a wind farm and provides the relevant guidance from firefighting agencies to ensure aerial firefighting is not compromised. The assessment of any impacts on the communications capability has been assessed in a separate report.	8.3.1
4.1 Existing environment (biodiversity and habitat) – Describe any existing threats to biodiversity value, including history or ongoing disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, changes to water quantity or quality, fire hazards, etc)	The report analyses the existing fire hazard conditions. Several risk indicators are utilised to inform the understanding of bushfire risk within the landscape. The report also outlines the potential impact of climate change on the existing conditions.	5.6 and 6

[1] Scoping requirements for Kentbruck Green Power Hub Environment Effects Statement (DELWP, 2018) https://www.planning.vic.gov.au/__data/assets/pdf_file/0032/451697/KentbruckGPH_FinalScopingRequirements-withAppendice.pdf sourced on 1/7/2021

Scoping requirement	Discussion	Report reference
4.1 Likely effects (biodiversity and habitat) - Assess the direct and indirect effects of the project, on biodiversity values, including disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, displacement due to avoidance of project infrastructure, changes to water quantity or quality, hydrological changes to wetland function, fire hazards, etc.);	The report analyses if any direct or indirect fire hazard effects occur as a result of the project. The 'Flora and Fauna Existing Conditions and Impact Assessment' report prepared by Biosis (2023) takes the findings from this bushfire risk assessment and considers the likely effects of the Project on biodiversity in relation to fire hazards. It is not the purpose of this report to assess secondary impacts (e.g. on biodiversity) arising from fire hazards.	8.2.1, 8.4 and 8.6
4.5 Existing environment (land use and socio-economic) - Characterise current use of aerial spraying and aerial firefighting that could be affected by the project (including any significant water resource that may be used for aerial firefighting in the region).	The analysis includes the assessment of the use of aerial firefighting against the available fire agency guidelines. It will also analyse if there is any reduction in relation to the availability of water resources to support aerial firefighting.	8.3.1
4.5 Likely effects (land use and socio-economic) - Identify potential long and short-term effects of the project on existing and potential land uses, public infrastructure and fire and emergency management.	The assessment includes the identification, if any, of long and short term effects on fire and emergency management infrastructure that may need to be addressed by the proponent.	8.3 and 8.4
4.5 Mitigation measures (land use and socio-economic) - Describe proposed mitigation or management measures to reduce potential effects on aviation operations and safety with regard to advice from Civil Aviation Safety Authority and emergency services.	The mitigation measures to conform with fire agency guidelines are outlined within the report.	8.3.1
4.6 Draft evaluation objective (community amenity, safety, roads and transport) - To avoid and minimise adverse effects for community amenity and safety, with regard to construction noise, vibration, dust, traffic and transport, operational turbine noise and fire risk management.	A detailed assessment of the fire risk to community amenity and safety was undertaken to avoid and minimise any changes.	8.4
4.6 Key Issues (community amenity, safety, roads and transport) – Implications of the project for fire risk management on surrounding land, including possible additional fire ignition risk arising from the project.	An ignition risk analysis has been performed to determine if any changes to the fire ignition risk arising from the project occurs and if so, what treatments are required to be implemented.	8.4 and 8.5

Scoping requirement	Discussion	Report reference
4.6 Existing environment (community amenity, safety, roads and transport) - characterise the fire risk associated with the project area and its environs.	The existing fire risk has been characterised within the report.	6.3 and 6.8
4.6 Likely effects (community amenity, safety, roads and transport) – Assess the risks that the project could cause a fire affecting land and assists within or outside the project footprint.	The post project fire risk has been analysed to determine if any increase in risk is identified. The report also outlines mitigation measures to reduce this risk.	8.4 and 8.5
4.6 Likely effects (community amenity, safety, roads and transport) – Assess the implications of the project for fire risk management or bushfire suppression activities within the project footprint or in its vicinity.	A detailed assessment has been undertaken to identify any implications for fire risk management or bushfire suppression activities. The assessment has included the project footprint and the surrounding landscape.	8.4 and 8.5
4.6 Mitigation measures (community amenity, safety, roads and transport) - Describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions during construction of the project, covering (where appropriate) road safety, temporary or permanent road diversions, different traffic routes, hours of use, vehicle operating speeds, types of vehicles and emergency services provisions.	An assessment has been made of emergency service vehicle access, in particular firefighting appliances, to determine if any of the changed traffic conditions will limit access.	6.5, 8.5 and 8.6

The Scoping Requirements provide evaluation objectives that describe the desired outcomes to be achieved for each of the matters being addressed in the EES. The following draft evaluation objectives are relevant for the bushfire risk assessment:

- Community amenity, safety, roads, and transport – To avoid and minimise adverse effects for community amenity and safety, with regard to construction noise, vibration, dust, traffic and transport, operational turbine noise and fire risk management.
- Land use and socioeconomic – To avoid and minimise adverse effects on land use, social fabric of the community, local infrastructure, aviation safety and to neighbouring landowners during construction, operation and decommissioning of the project.

The information within the EES including the scoping requirements and draft evaluation objectives have been utilised to guide this assessment.

2.4 FRC methodology

The methodology for the bushfire risk assessment includes:

- Desktop analysis of relevant existing data and reports associated with the site
- Existing conditions analysis, including overall fuel hazard analysis, plantation age and Phoenix predictive modelling to determine base conditions
- Review of legislative framework for the Proposal including a review of fire agency legislation.

- Review of relevant legislation, planning policy, strategic bushfire management planning to understand the regulatory and planning context for bushfire prevention and responses in the Proposal
- Collation and assessment of relevant data on fire weather conditions, fire history, bushfire prone areas, vegetation, topography and assets at risk from existing sources
- Review of the proposed design for the wind farm, the layout of operations and activities that could pose a risk from a bushfire perspective
- Identification of bushfire hazards for the Proposal and those arising from development and operation of the proposed wind farm for communities and the environment in surrounding areas
- Detailed site assessment to understand site conditions influencing bushfire risk and its management. This included bushfire fuel hazard, topography, access and surrounding land uses and vegetation types
- Identification of bushfire response capability in the vicinity of the site and potential for adequate response to a bushfire event on the site
- Identification of egress routes from the area and the adequacy of these in relation to potential bushfire risk
- Development of a preliminary set of preventative bushfire risk controls (which seek to avoid bushfire ignitions) and mitigating bushfire risk controls (which seek to reduce the effects of fire once it has been ignited) for the Proposal.
- Identification of measures to avoid, mitigate or manage identified impacts.

2.5 Content of this report

Victorian emergency management policy[2] prioritises the protection of human life, including the lives of both community members and of emergency response personnel, above all other considerations.

This report:

- Prioritises the reduction of risk to communities and the protection of human life in all aspects of the assessment.
- Provides a detailed assessment of the bushfire risk across the site with analysis of bushfires originating from both within and external to the site, including the bushfire potential of the broader landscape.
- Identifies the potential fire risk of wind energy infrastructure and associated mitigation strategies.
- Assesses the bushfire hazard at the site and identifies performance standards for managing fuel loads.
- Identifies strategies to reduce the vulnerability of neighbouring communities to the bushfire risk originating from the site.
- Identifies planned on-site firefighting capability, including minimum standards for water supply, firefighting equipment and the training of on-site workers.

[2] State Emergency Management Priorities https://www.emv.vic.gov.au/StateStrategicControlPriorities

- Assesses the design with the incorporation of identified mitigation treatments.
- Provides information to ensure the workplace health and safety of firefighters and Site personnel when responding to any fires at the Site.
- Demonstrates that the requirements in the CFA *Guidelines for Renewable Energy Installations (2023)*[3] are addressed.
- Demonstrates that, with the adoption of the mitigation measures advocated from this assessment, the Proposal is able to meet the policy strategies of Clause 13.02-1S of the Glenelg Shire Planning Scheme.

2.6 Engagement

This report has been updated following the feedback received from the Technical Reference Group (TRG) for this project along with additional meetings between CFA, FRC and the proponent. In summary, the feedback has resulted in the following changes or clarification:

- More specific recommendations relating to emergency management planning for the turbines and transmission station.
- Additional information relating to the use of Phoenix modelling and how it relates to the project.
- Minor layout changes to meet TRG member preferences.
- The report has been updated to reflect the new CFA Guideline released in 2023.
- Final minor changes occurred following further consultation with CFA and how the report structure would satisfy the new Guidelines.

[3] CFA *Guidelines for Renewable Energy Installations 2023* can be found here: https://www.cfa.vic.gov.au/plan-prepare/building-planning-regulations/renewable-energy-fire-safety

3 BUSHFIRE CONTEXT

3.1 Overview

Victoria is one of the most fire-prone areas in the world[4], with a history of catastrophic bushfires such as the Black Friday fires (1939), Ash Wednesday fires (1983), Alpine Fire (2003), Great Divide Fire (2006) and the Black Saturday fires (2009).

Victoria's high bushfire risk is the result of factors that increase the likelihood and consequences of fire. These factors include large areas of the state comprising highly flammable dry eucalypt forest, protracted droughts and an increasing population density in bushfire-prone areas.

While bushfire is a significant risk facing Victoria, it is also a natural part of the environment, and many plant species rely on fire to regenerate.

A variety of causes can ignite a bushfire: some bushfires result from events that are natural, such as lightning, while others result from human activity. Following ignition, the direction and speed of the fire's travel, and the height and intensity of the flames are determined by climatic and weather conditions, topography and fuel in the area.

Victoria has two main vegetation types affecting the spread of bushfires: grass and forest. Grass fires are predominantly wind driven and spread rapidly under the influence of strong winds. Grass fires burn at a lower intensity and flame height than forest fires and burn out quickly. Grass fires can often be quickly extinguished with water.

In contrast, forests have more fuel (leaf and bark litter on the ground, shrubs, grasses, trees etc.) available for a fire to burn. Wind speeds are lower in the forest and forest fires take some time to reach their full potential. However, once fully developed, forest fires usually have a greater flame height and intensity than grass fires, especially where the flames are burning the tree canopy. Forest fires can be difficult to extinguish, especially when they burn at higher intensities.

While the weather and topography in an area cannot be modified to reduce the fire hazard, a reduction in the flammable fuels in an area can reduce the flame height and intensity of a forest fire. Reduced flame height and intensity makes it safer and easier for firefighters to suppress a forest fire.

Infrastructure such as roads can increase the speed of a fire response, allowing firefighters to suppress a fire safely and effectively before it reaches maximum intensity and flame height. Roads also perform as fuel breaks and can slow or prevent fire spread.

[4] https://www.cfa.vic.gov.au/plan-prepare/am-i-at-risk

3.2 Plantation fires

Although plantations are a type of forest, fire behaviour in both hardwood and softwood plantations can vary greatly according to the stage of growth and the level of silvicultural treatment undertaken by the plantation manager.

Newly planted plantations are much more exposed to wind, and fires will behave like grass fires. During the growth stages, a plantation can have very dense vegetation, with continuous fuels reaching from the ground to the tree crowns. Fires at this time can behave like an intense forest fire.

However, during the 20 – 35 years or so that it takes a plantation to mature, plantation managers can greatly reduce the fire risk by pruning the lower branches, removing alternate rows (thinning) and actively managing weed and shrub infestations. As well as benefitting the quality of the timber, these treatments also reduce both the horizontal and vertical continuity of the fuels and subsequently the intensity of any fire.

The fire risk in mature plantations is much lower than the risk in younger plantations, as the tall trees and heightened crowns reduce the likelihood of a crown fire. Pruning, thinning and weed management at an earlier stage reduce the risk in older plantations.

A newly established plantation on land not previously used for plantation forestry is referenced as a first rotation plantation. The timeframe from plantation establishment to harvest could be up to 35 years.

Second and third rotation plantations are established on ground that previously supported earlier plantations. Where possible, fallen vegetation from the previous plantation (slash) and bushfire fuel is treated prior to the establishment of a new plantation. Over 80% of GTFP's area is treated with a chopper rolled technique after clear fell. Chopper rolled treatment involves breaking up the residue or slash from harvesting to smaller pieces so that it breaks down quicker. GTFP have advised that in their experience firefighting in chopper rolled slash and recently established plantations (after chopper rolling) is that the rate of spread is low, however intensity is greater than on grass fuels. The chopper rolling helps reduce fine fuel loading and improves fuel arrangement (almost no elevated fuels remain) Any fuel loading can increase fire behaviour in the first few years of a new plantation until the timber decomposes and becomes less available for fire. Softwood offcuts generally decompose more quickly than hardwood offcuts.

Many fires in well-maintained plantations can be extinguished using water. Plantation managers can reduce the fire risk by installing and maintaining track networks with greater access for firefighters, contracting firefighting aircraft during the fire season, and by limiting public access to reduce the potential for fire ignition.

In Victoria, the objective of all bushfire management activities is to reduce the impact and consequences of bushfire on people, property and the environment, with the protection of human life the highest priority. This objective applies equally to the plantation managers and to the Proponent.

3.3 Fire management responsibility

Bushfire safety is considered a shared responsibility between the fire services, the Victorian and local governments, communities and individuals. All parties are responsible for preparing prior to the fire season to protect themselves and their interests from the impact and effect of bushfires.

Victoria has three fire services:

- Fire Rescue Victoria (FRV) is responsible for the prevention and suppression of fires in the FRV fire districts, including the fire district of Portland (the urban area of Portland). FRV supports the Country Fire Authority (CFA) service delivery and the joint response to fires and other emergencies outside of this area.
- CFA is responsible for the suppression of fire in the country area of Victoria (defined as private property outside of the FRV fire districts).
- The Department of Energy, Environment and Climate Action (DEECA) is responsible for the prevention and suppression of fire on public land in Victoria outside the FRV fire districts. DEECA delivers its responsibilities through Forest Fire Management Victoria (FFMVic), which comprises staff from DEECA, Parks Victoria, VicForests and Melbourne Water.

In November 1997, the Victorian Government introduced legislation requiring forest plantation companies to form fire brigades under the auspices of CFA once their plantation assets reached a critical size. These industry-based fire brigades are operated by the plantation company but are under the operational control of CFA. Industry brigades are only required to service their company's plantation assets for bushfire response and for fire management planning. However, if the plantation company desires, the brigade is empowered to operate outside their designated area.

The plantation companies within the area participate in joint planning and mutual dispatch arrangements. This provides an increased capability when responding to bushfires within the area within and surrounding the plantation assets.

4 BUSHFIRE MANAGEMENT PLANNING FRAMEWORK

This section reviews relevant legislation, planning policy and strategic bushfire management planning frameworks for bushfire prevention and response in the Kentbruck Green Power Hub.

4.1 Legislation

4.1.1 Country area of Victoria

The *Country Fire Authority Act 1958* (CFA Act 1958) relates to fire prevention and suppression in the country area of Victoria, with CFA responsible for the suppression of fire in this area.

The CFA Act 1958 provides for the CFA to declare the Fire Danger Period (FDP) in individual municipalities and Total Fire Ban by weather districts. These declarations impose restrictions on the lighting of fire and activities that may cause a fire, during the period where fire is a risk. The CFA Act 1958 also authorises municipalities to issue fire protection notices to landholders for fire hazard removal.

Section 43 of the CFA Act 1958 states '*it is the duty of every municipal council and public authority to take all practical steps (including burning) to prevent the occurrence of fires on and minimise the danger of the spread of fires on and from any land vested in it or under its control or management: and any road under its care and management*'.

Although not explicit, the onus is on individual owners and occupiers of land to ensure their properties are free of fire hazards that may put the lives and property of other people at risk.

Each municipality that has a bushfire risk appoints a Municipal Fire Prevention Officer. The CFA Act 1958 authorises Municipal Fire Prevention Officers to issue Fire Prevention Notices to owners or occupiers of private properties to complete fire management works. A Municipal Fire Prevention Officer may enter private land to remove fire hazards if they are not treated within the timeframe or manner stipulated on the Fire Prevention Notice.

The Municipal Fire Prevention Officer also acts as the executive officer of the Municipal Fire Management Planning Committees, responsible for producing a Municipal Fire Management Plan.

Victoria Police prosecute offences relating to fire pursuant to the CFA Act 1958, the *Crimes Act 1958* and the *Summary Offences Act 1966*.

The Proposal site is on land that, for fire management purposes, is considered to be in the country area of Victoria and the owner/occupier is responsible for ensuring their property is free of fire hazards. This includes fire prevention along privately owned tracks and roadsides.

A similar arrangement applies to public land managed by public authorities, such as roads managed by VicRoads or the local council (Glenelg Shire, in this situation). These roads are considered to be part of the country area of Victoria and the public authority is responsible for ensuring their respective roadside is free of fire hazards.

The CFA Act 1958 also requires plantation companies that meet a critical size, to establish and maintain a firefighting capability. The resources they develop are able to support firefighting activities outside the plantation as well as they are considered a CFA Fire Brigade.

4.1.2 Public land

The *Forests Act 1958* identifies DEECA as responsible for the prevention and suppression of fire across all National parks, State forests and protected public land. This Act imposes fire regulations all year on public land.

The land adjoining the Proposal site on the coastal side is public land (coastal park) managed by Parks Victoria. FFMVic is responsible on behalf of the Secretary of DEECA for fire prevention and suppression on this land. This includes fire prevention along roadsides where Parks Victoria manage this land.

4.2 Emergency and fire management plans

All State, regional and municipal emergency and fire management plans in Victoria relate to landscapes that cover both public and private land.

4.2.1 State and regional plans

The *Emergency Management Act 2013* requires the Emergency Management Commissioner to prepare a *State Emergency Management Plan*[5] and to approve eight regional emergency management plans.

The relevant regional plan for the site is the *Barwon South West Regional Emergency Management Plan*[6], prepared by the Barwon South West Emergency Management Planning Committee.

A sub-plan of this plan is the *Barwon South West Regional Strategic Fire Management Plan*[7], prepared by the Barwon South West Regional Strategic Fire Management Planning Committee (a sub-committee of the Barwon South West Emergency Planning Committee).

4.2.2 Municipal plans

The *Glenelg Shire Municipal Emergency Management Plan*[8] is prepared by the Glenelg Shire Emergency Management Planning Committee with community input. The plan addresses the prevention of, preparedness for, response to and recovery from emergencies within the Glenelg Shire.

The *Glenelg Municipal Fire Management Plan*[9] is prepared by the Glenelg Shire Fire Management Planning Committee (a subcommittee of the Glenelg Shire Emergency Management Planning Committee). This has received the endorsement of the Glenelg Shire Council pursuant to Section 20

[5] State Emergency Management Plan 2020 – downloaded from:
https://www.emv.vic.gov.au/responsibilities/emergency-management-planning

[6] Barwon South West Regional Emergency Management Plan 2020 – download from:
https://files.emv.vic.gov.au/2021-05/Barwon%20South%20West%20Regional%20Emergency%20Management%20Plan_Redacted.pdf

[7] Barwon South West - Regional Strategic Fire Management Plan
https://files-em.em.vic.gov.au/public/EMV-web/Barwon-South-West-Regional-Strategic-Fire-Management-Plan.pdf

[8] Glenelg Shire Municipal Emergency Management Plan:
https://www.glenelg.vic.gov.au/files/EmergencyManagement/ECM_2576536_v1_PUBLIC_VERSION_ECM_2576536_v1_Glenelg_Municipal_Emergency_Management_Plan_2019-2022_Audit_26_March_2.pdf

[9] Glenelg Municipal Fire Management Plan
https://www.glenelg.vic.gov.au/files/EmergencyManagement/Municipal_Fire_Management_Plan_2014-2020_.pdf

of the *Emergency Management Act 2013*. This Plan is deemed to fulfil Section 55A of the *Country Fire Authority Act 1958* and is a sub plan of the Glenelg Municipal Emergency Management Plan (MEMP).

The Municipal Fire Management Plan uses the VFRR system to determine bushfire risk. Against the plantations in the Proposal area, the following treatments have been identified:

Table 2 - Type of activities undertaken in relation to VFRR Treatment Codes

VFRR Treatment Code	Description of activity
203 – Reduce fuel loads on public land.	The activities associated with this treatment mainly relates to the undertaking of fuel reduction burning and vegetation management works including slashing. This work is undertaken by Forest Fire Management Victoria (FFMV) and Parks Victoria. The Joint Fuel Management Program that also includes CFA outlines the locations where fuel reduction burns have been undertaken historically and the location of proposed fuel reduction burns in the future.
205 – Fuel hazard management.	Fuel hazard management is mainly associated with private land and this includes Green Triangle Alliance activities. The Joint Fuel Management Program also identifies fuel hazard management programs on private land that is under the direction of CFA. CFA also proactively encourage private landowners to undertake pre summer vegetation management works.
300 – Restriction of the use of certain equipment on elevated fire danger days.	The legislation governing CFA and FFMV requires the people operating equipment on Total Fire Ban days to adhere to certain restrictions. These restrictions are outlined on the CFA website.
800 – Treatments to be identified.	The VFRR system identifies other treatments that may assist but have not yet been need listed. These would likely include the following: Provision of firefighting support by the Green Triangle Alliance members including trained firefighters and firefighting vehicles. The Municipality is required to engage a Municipal Fire Prevention Officer under the CFA Act. This person has the responsibility to undertake investigations and if required to issue fire prevention notices. CFA undertake proactive community engagement campaigns for land owners, tourists and other people living or travelling in high risk areas.

4.2.3 Victorian Fire Risk Register

A detailed bushfire risk assessment for each municipality in Victoria has occurred via use of the Victorian Fire Risk Register – Bushfire (VFRR-B), facilitated by the CFA. This tool identifies risks to human settlements, economic assets, and environmental and cultural assets across the municipality. The data captured also models likelihood and consequence information and effects.

Most of the Proposal is located within existing plantations and the VFRR categorisation in these areas is extreme. This is due to the plantation's economic value. As there are limited dwellings in the local area, VFRR has not identified any human settlement risks within the area surrounding the proposal. The risk locations relate to the township of Nelson and the isolated campgrounds located on public land.

The proposed wind farm has not been considered by the VFRR process as it is in development phase. Once the project is completed, the VFRR system will likely incorporate the wind farm into the assessment process.

4.2.4 Safer Together program

The Victorian Government Safer Together Program[10] involves fire and land agencies working together with communities to protect lives, homes, the economy and the environment. The Program combines in-depth local knowledge with the latest science and technology to reduce bushfire risk on both public and private land. Strategies and solutions are based on community values, and risk is measured using local knowledge, field data and bushfire simulation technology.

Fuel management is just one of the actions taken. Fuel management options include the removal of bushfire fuels such as leaves, bark, twigs and shrubs from the landscape. They include activities such as planned burning and mechanical treatments that may include mowing, slashing and mulching.

[10] Information on Safer Together can be found at: https://www.safertogether.vic.gov.au/background

4.2.5 Bushfire Management Strategies

Key outputs of the Safer Together Program are six geographically focused Bushfire Management Strategies. These were introduced in late 2020 and generally align to the Victorian Government Regions. These are strategies for regional bushfire management across all land tenures over long-term timeframes (10 to 40+ years).

The strategy that addresses the proposal area is included in the *Barwon South West Bushfire Management Strategy 2020* [11].

4.2.6 Bushfire Risk Engagement Areas

Each regional Bushfire Management Strategy includes a Bushfire Risk Engagement Area (BREA) strategy that covers both public and private land.

BREAs help to indicate the priority areas in the region where the agencies can work with communities to reduce bushfire fuels or to implement other actions where reducing fuels may not be possible. On-ground discussions and assessments between agencies and the community determine the treatments that best suit a particular place. The *Barwon South West Bushfire Management Strategy 2020* identifies a number of BREAs, but these do not include any in the area of the proposal site. This would be largely influenced by the low population that exists around the proposal site.

[11] Barwon South West Bushfire Management Strategy 2020 https://www.safertogether.vic.gov.au/__data/assets/pdf_file/0024/493530/DELWP_BushfireManagementStrategies_2020_BarwonSouthWest_rr.pdf

5 KEY POLICY DOCUMENTS

5.1 Clause 13.02 – Victorian Planning Scheme

In Victoria, the *Planning and Environment Act 1987* authorises the Victorian Planning Provisions (VPP) and planning schemes. The VPP contains a range of zones overlays and other provisions that guides the development of land within Victoria.

The Victorian State Government has introduced Clause 13.02[12] into all municipal planning schemes, aimed at strengthening the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.

Clause 13.02 must be applied to all planning and decision making under the *Planning and Environment Act 1987* relating to land that is:

- Within a designated bushfire prone area.
- Subject to a Bushfire Management Overlay; or
- Proposed to be used or developed in a way that may create a bushfire hazard.

The objective of Clause 13.02 is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. In keeping with the requirements of Clause 13.02, FRC has considered the 'Bushfire hazard identification and assessment' and the 'Settlement planning' requirements of the Clause in this report.

It should be noted that the likely bushfire scenarios are also included in the sections relating to bushfire modelling using the Phoenix Rapidfire tool.

Clause 13.02 includes the requirements to consider and assess the bushfire hazard on the basis of:

- The site for the development.
- Neighbourhood conditions (400 metres from the site)
- Local conditions (1 kilometre from the site)
- Landscape conditions (20 kilometres, and potentially up to 75 kilometres from the site)

As the development is in an existing pine plantation and remote areas including grassland, the hazard assessment resulted in a similar outcome for the local conditions, neighbourhood conditions and the site for the development, and these have been grouped together under the 'local conditions' bushfire hazard type (see Table 2).

Addressing Clause 13.02 includes the development of landscape bushfire risk assessments, analysis of bushfire history and consideration of likely bushfire scenarios. The development of likely bushfire scenarios provides the opportunity to consider how the landscape may influence bushfire behaviour within the development. This assessment is contained within Section 8.6.

[12] https://planning-schemes.delwp.vic.gov.au/schemes/vpps/13_02-1S.pdf?_ga=2.215744656.680534770.1621815805-309937377.1621815805

5.2 AFAC position paper

The National Council for Fire and Emergency Services (AFAC) has produced a position paper *Wind Farms and Bushfire Operations (2018)* [13]. The paper states the position of AFAC member agencies (Australian fire and emergency services) towards wind farms and their development. The scope of the paper is limited to the issues relating to planning for bushfire prevention, preparedness, response and to recovery operations in and around existing and planned wind farms.

The AFAC Guidelines[14] indicate that access roads should be considered when planning the layout of a wind farm. Appropriately planned access roads can increase the ability of fire and land management agencies to successfully undertake firefighting operations by allowing increased accessibility for emergency vehicles.

Access roads and other infrastructure can also reduce the likelihood of fire moving through or leaving the property and can act as an effective firebreak in many circumstances.

Naming and marking conventions for access roads should be considered to enhance accessibility. For example, marking an access road as A-B to indicate that it links landmark A with B; landmarks used for this purpose should be identifiable on site and marked on any site mapping. Access road marking should clearly indicate no through roads.

Where wind farms are located in vegetation types other than grassland, the planning for access routes and fuel modified buffer zones should consider:

- potential for bark spotting material to breach control lines.
- potential for higher intensity fires associated with higher fuel hazard and more complex fuel arrangement.
- fire vehicle off-road access challenges in woody vegetation pre-existing forest roads and fuel modified buffer zones.

As the requirements outlined within the CFA guideline (Section 5.3) address the matters outlined within the AFAC Guideline, this report is not assessed.

[13] AFAC's *Wind Farms and Bushfire Operations* position paper can be found here: https://www.afac.com.au/docs/default-source/doctrine/afac_doctrine_windfarmsbushfiresoperations_position_2019-08_04-v1-0.pdf

[14] AFAC's *Wind Farms and Bushfire Operations* position paper can be found here: https://www.afac.com.au/docs/default-source/doctrine/afac_doctrine_windfarmsbushfiresoperations_position_2019-08_04-v1-0.pdf

5.3 CFA Guidelines for Renewable Energy Installation V3

CFA has updated its publication *Guidelines for Renewable Energy Installations V3 (2022)*[15] to provide details about standard measures and processes in relation to fire safety, risk and emergency management that should be considered when designing, constructing and operating new renewable energy facilities, and upgrading existing facilities.

The CFA guidelines outlines requirements for emergency management, design and operation, wind farm siting and fire protection requirements. The Proposal has been assessed against the CFA Guidelines and is contained within Section 8.5.

5.4 SA CFS Guidelines for Wind Farms

South Australia Country Fire Service (CFS) *Guidelines for Wind Farms (March 2016)*[16] outline the steps that can be taken to minimise the possibility of bushfire being caused by a wind turbine or critical infrastructure being affected by bushfire entering the site, including:

- Development control processes which guide the siting of installations, the provision of fire vehicle access, water supply for firefighting, and vegetation management
- Development of risk and response plans to define how fire services will respond to fire in wind farm developments
- Development of emergency risk management plans by wind farm operators
- Compliance with hazard reduction responsibilities defined under legislation.

The guidelines support the use of fire bombing, subject to a risk assessment, and as part of an integrated plan to support ground resources.

5.5 Plantation forestry company fire control manuals

CFA requires each plantation forestry company to have a fire control manual that outlines the company policy and procedures for fire control.

As an example, GTFP (the main plantation forestry company for the Proposal) has a manual that outlines the fire management procedures and policies applicable to GTFP forest area and those lands beyond the defined forest area but still of strategic importance to GTFP in protecting their asset from fire.

The contents of this manual are applicable to GTFP employees, contractors and visitors and members of the Green Triangle Forest Industry Brigade (FIB).

[15] CFA *Guidelines for Renewable Energy Installations 2021* can be found here: https://www.cfa.vic.gov.au/documents/20143/0/210303-CFA-Renewable-Energy-Guidelines-2021.pdf/65a98fb2-fe56-1726-8f59-a4bd929e238c?t=1618273239968

[16] SA CFS *Guidelines for Wind Farms (March 2016)* can be found at: https://www.nwfc.gov.au/sites/default/files/cfs-guidelines-wind-farms.pdf?v=1484179504

The Fire Manual details how GTFP fire protection needs are identified and met. This manual links directly with the fire protection program and provides information as to the standard of work required and the risk and legal requirements applicable to fire protection. Key personnel who would reference this manual include all GTFP employees and external organisations such as the CFA and CFS as well as the contractors involved with fire protection activities.

5.6 Climate change and bushfire

The Victorian Government's Climate Change Framework[17] has identified the likely future impact of climate change on the emergency management sector. It states that in relation to emergency management the following scenarios will be realised:

- More complex emergency response situations as a result of increases in the frequency, intensity and severity of extreme weather events
- Response to emergency events will become increasingly more complex, especially for community preparedness and emergency responders
- Overlapping fire seasons in the northern and southern hemispheres increases the cost of bushfire response as equipment and emergency management staff may not be able to be shared.

The Framework also identifies the changing vegetation type as our forests become drier due to reduced annual rainfall. These changes combined will mean larger and more complex emergency response situations into the future. It is also anticipated that the number of high-risk days will increase which directly correlates to a reduced opportunity for Land Managers to manage the risk from their land through fuel reduction burning.

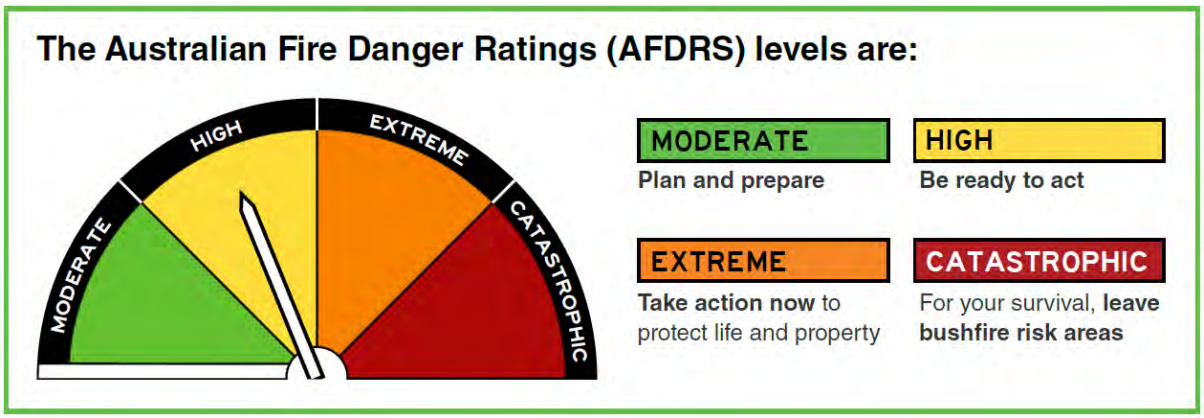
These issues strongly support the need to continually improve the way fire management planning is assessed and plans delivered into the future.

[17] Victorian Government Climate Change Framework https://www.climatechange.vic.gov.au/victorias-climate-change-framework (p.39)

5.7 Fire Danger Ratings

The Victorian State Bushfire Plan (2014)[18] outlines the importance of fire danger ratings and how they are used to inform the community and emergency management personnel about the level of fire danger at a given time.

Fire Danger Ratings give an indication of how a fire would behave under forecast weather conditions and how difficult it would be for the fire services agencies to control a fire in these conditions. During the warmer months, weather forecasts, radio and television broadcasts, some newspapers and the emergency smartphone application feature the daily Fire Danger Rating.



Fire Danger Rating categories

The Fire Danger Rating table is utilised by emergency management agencies and other industries to inform the actions that are required to be taken during preparedness and response planning activities. Industries who undertake planning against the Fire Danger Ratings benefit from this as it allows them to align their preparedness and response planning with the fire agencies.

[18] Victorian State Bushfire Plan https://www.emv.vic.gov.au/responsibilities/semp-sub-plans/state-bushfire-plan

6 BUSHFIRE AND ENVIRONMENT ANALYSIS – EXISTING CONDITIONS

6.1 Location

The site is in south west Victoria, between Portland and Nelson. It is surrounded by a mix of public land, plantations and private land being predominantly farming areas.

6.2 Topography

The site is located on the Glenelg Plains[19], which is a series of long low narrow ridges running parallel to the coastline. Topography in the project area is moderately undulating, with limited variation and comprises numerous remnant sand dunes.

On the coastal side is the Bridgewater bioregion barrier complex. A dune capped sand ridge stretches along the coastline with gently sloping sandy terrain and lagoonal systems behind. The lagoonal system supports a network of deep-water pools, collapsed caverns and sink holes.

Part of the site comprises farmland on the edge of the Warrnambool Plains.

It is not expected for the topography to influence bushfire behaviour on the site and in the surrounding area. The landscape consists of moderately undulating landscape with most of the slopes in the area being less than 5°. Isolated areas mainly along river banks indicate slopes in excess of 10 – 15°. These are mainly running east/west and do not dominate the landscape.

6.3 Vegetation

There are four main types of vegetation on the site and surrounding areas:

1. Pine plantations at various stages of growth. Note that the growth stage and management practices for the plantation are dynamic. The fire fuel characteristics of pine plantation vary in accordance with the rotation, establishment phase and management practices (refer section 3.2 of this report). Figure 2 shows the typical vegetation type and layout within a mature area of the plantation.

[19] DELWP Bioregions and EVC benchmarks https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

Figure 3 - Typical pine plantation in the Kentbruck Estate

2. Native coastal heath on the southern perimeter of the site (Bridgewater bioregion - Environmental Vegetation Class 3 - low, grassy or bracken-dominated eucalypt forest or open woodland to 15 m tall with a large shrub layer and ground layer rich in herbs, grasses, and orchids). Occurs mainly on flat or undulating areas on moderately fertile, relatively well-drained, deep sandy or loamy topsoils over heavier subsoils (duplex soils). The area is interspersed with damp swampy areas and bare sand. Due to the mix of vegetation types and bare earth areas, bushfires tend to be interrupted due to the fragmentation. Figure 3 shows the connection between the plantation and coastal vegetation on the southern edge.

Figure 4 - Coastal vegetation with the plantation at the bottom of the photo

3. Forest vegetation to the north of the plantation that is primarily contained within public land. These areas include long unburnt sections and have elevated fuel loads. Bushfires that burn through these areas would have high intensities and under elevated fire danger conditions, be difficult to suppress. Figure 4 shows the typical forest vegetation on public land to the north of the plantation.

Figure 5 - Forest vegetation to the north of the Kentbruck estate.
The Plantation can be seen on the right of the photo

4. Farmland with cropping and pastoral fields. From a fire fuel perspective, cropping and pastoral land is predominantly grassland. Grass fires are predominantly wind driven and spread rapidly under the influence of strong winds. Grass fires burn at a lower intensity and flame height than forest fires. Figure 5 shows the farming areas that have been assessed as grassland and its relationship to the plantation.

Figure 6 - Farming areas to the north of plantations

6.4 Land Use

The site is characterised by a largely modified landscape with softwood plantation forestry and areas of agricultural pasture and cropping. These landscape characteristics are also generally common within the broader regional landscape.

However, parts of the landscape beyond the site are high value coastal parks and native forested areas.

6.5 Access and egress

There is an existing network of roads and tracks throughout the site including the private land, plantations and public land. In particular, the access track network within the plantations is well defined, provides all weather access and provided with managed road verges. The network currently provides effective access to the plantation for firefighting resources.

6.6 Firefighting resources and information

6.6.1 CFA Forest Industry Brigades

As outlined in section 4.1, FIBs are established when a plantation company reaches a critical size and is required to provide firefighting resources in accordance with the Country Fire Authority Act 1958. There are two CFA FIBs within the CFA District 4 which service the site of the proposal:

- Green Triangle Forest Products FIB.
- Hancock Victorian Plantations (HVP) FIB (located at Rennick, north of the Proposal).

CFA fire brigades within the surrounding area are located at Mount Richmond, Gorae West, Dartmoor, Drik Drik, Mumbannar and Nelson. Forest Fire Management Victoria also operates within the local area and has the ability to respond to bushfires within the surrounding area and on the property. As part of the project assessment, an assessment of electromagnetic interference (EMI) impacts on the ability for fire services to utilise radio communications has been undertaken. This assessment has determined that there is no impact. Refer to the EMI report (GHD, 2023) for further information.

6.6.2 Green Triangle Fire Alliance

The Green Triangle Fire Alliance is an alliance of ten forest grower companies within the Green Triangle (the area of south-west Victoria and south-eastern South Australia) that have agreed to work together to improve the efficiency and effectiveness of fire suppression, detection and prevention activities by forest owners/managers.

Although these companies are business competitors, they have agreed to cooperate and provide mutual support to collectively spread the burden of providing and maintaining the minimum effective fire detection and suppression capabilities required.

This includes a set of agreed standards and specifications for equipment, standardised operating procedures, mutual aid arrangements and arrangements for sharing the costs of chartering and operating aircraft for detection and suppression.

6.6.3 Fire danger rating system and warnings

In September 2022, a new Fire Danger rating system (Figure 6) was established that is now utilised across Australia. The key changes include a reduction in levels of fire danger and the change from Code Red to Catastrophic.

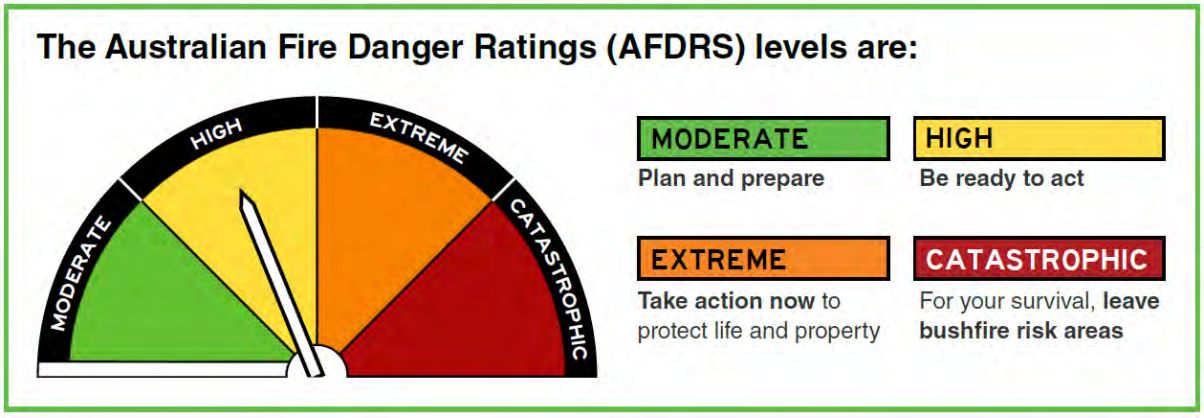


Figure 7 - Australian Fire Danger Rating System

The AFDRS is utilised by the community including industry to guide the required response to an elevated bushfire danger. In the context of Wind Farms, the system can be utilised to inform the required emergency preparedness and response procedures that are contained within an Emergency Management Plan. Based on the type of fire behaviour outlined in Figure 7 and the development is located within a Plantation, the likely trigger for works to cease or exclusion from the site is an extreme rating. However, it is acknowledged that bushfires can still be dangerous at a High rating and the Emergency Management Plan will need to reflect this and ensure appropriate actions are taken.

Fire Danger	MODERATE	HIGH	EXTREME	CATASTROPHIC
Key Message	**Plan and prepare.**	**Be ready to act.**	**Take action now** to protect your life and property.	For your survival, **leave bushfire risk areas.**
Fire Behaviour	Most fires can be controlled.	Fires can be dangerous.	Fires will spread quickly and be extremely dangerous.	If a fire starts and takes hold, lives are likely to be lost.
Supporting Messages	• Stay up to date and be ready to act if there is a fire.	• There's a heightened risk. Be alert for fires in your area. • Decide what you will do if a fire starts. • If a fire starts, your life and property may be at risk. The safest option is to avoid bushfire risk areas.	• These are dangerous fire conditions. • Check your bushfire plan and ensure that your property is fire ready. • If a fire starts, take immediate action. If you and your property are not prepared to the highest level, go to a safer location well before the fire impacts. • Reconsider travel through bushfire risk areas.	• These are the most dangerous conditions for a fire. • Your life may depend on the decisions you make, even before there is a fire. • Stay safe by going to a safer location early in the morning or the night before. • Homes cannot withstand fires in these conditions. You may not be able to leave, and help may not be available.
Monitor conditions and official sources for warnings. Adhere to local regulations governing fire activity. Ensure any industrial or agricultural activities adhere to relevant industry guidelines. If a fire starts near you, take action immediately to protect your life. Do not wait for a warning.				

Figure 8 - Community messaging related to fire danger level.

6.7 Fuel reduction burning and vegetation management

As outlined in Section 4.2.2, the Glenelg Municipal Fire Management Plan outlines one of the treatments to assist with the protection of the plantations as fuel reduction burning in the public land to the north. The available data does not indicate any fuel reduction burns occurring in recent years in these areas. The current Joint Fuel Management Plan outlines extensive areas of roadside slashing on both public and private land.

Most planned burns in the surrounding area occur to the north of Nelson. An ecological burn has been proposed for the east of the GTFP plantation to promote ecological resilience in heathland by manipulating the growth stage distribution.

In addition to the use of fuel reduction burns, the bushfires that occurred in 2013 and 2020 would still provide fuel reduced areas. The benefit that these areas provide will reduce over time as regrowth occurs.

Figure 9 indicates the planned fuel reduction and management works by the relevant government agencies. Works includes fuel reduction burning and roadside slashing. The Plan outlines extensive roadside management works align with the norther boundary of the Kentbruck Plantation along with extensive track maintenance that includes vegetation management within the Public Land to the north.

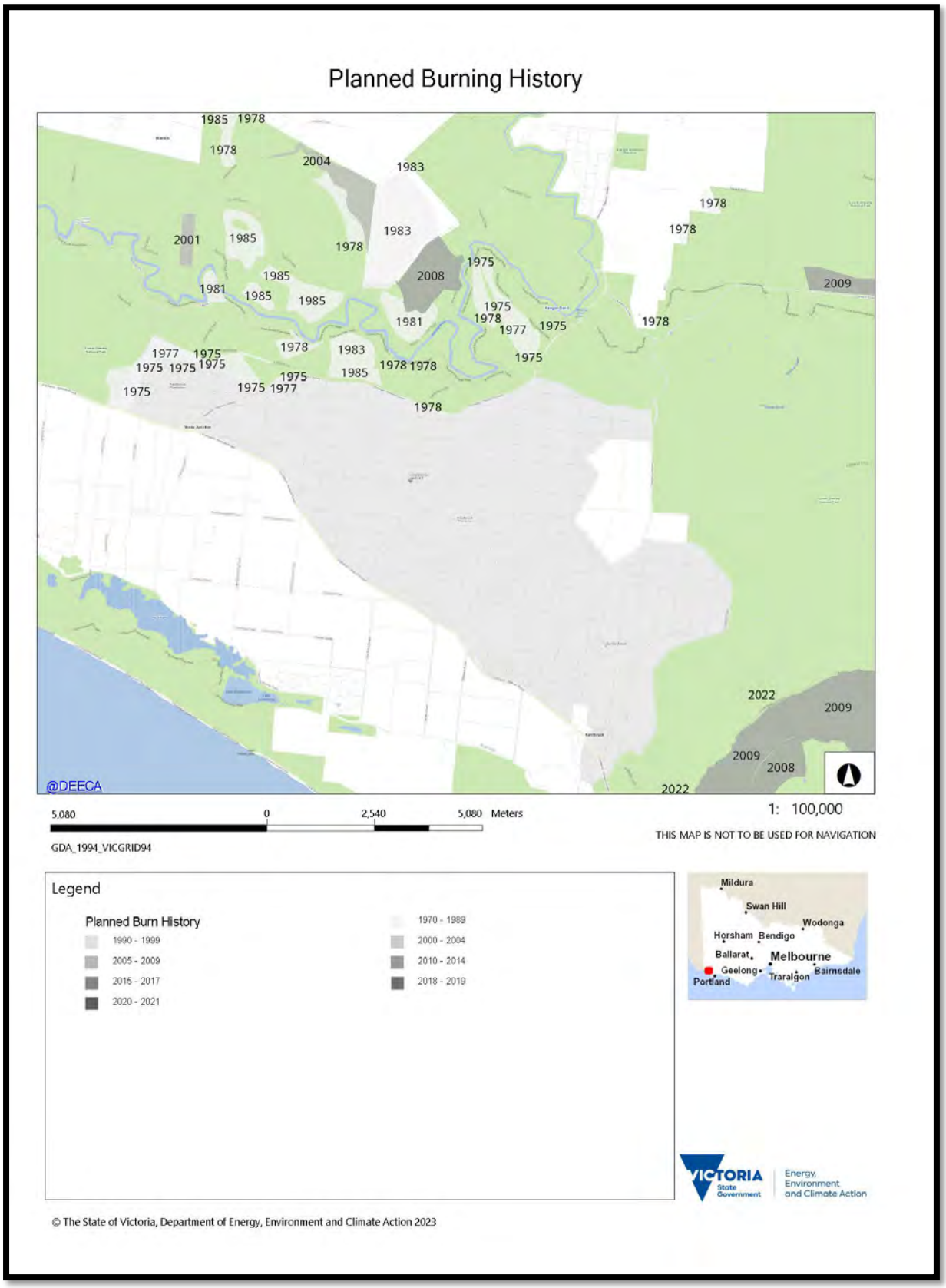


Figure 9 - Fuel reduction burning (light shading) to the north of the Kentbruck Plantation. Most of the activity occurred in the 1970s and 80s (sourced from https://mapshare.vic.gov.au/)

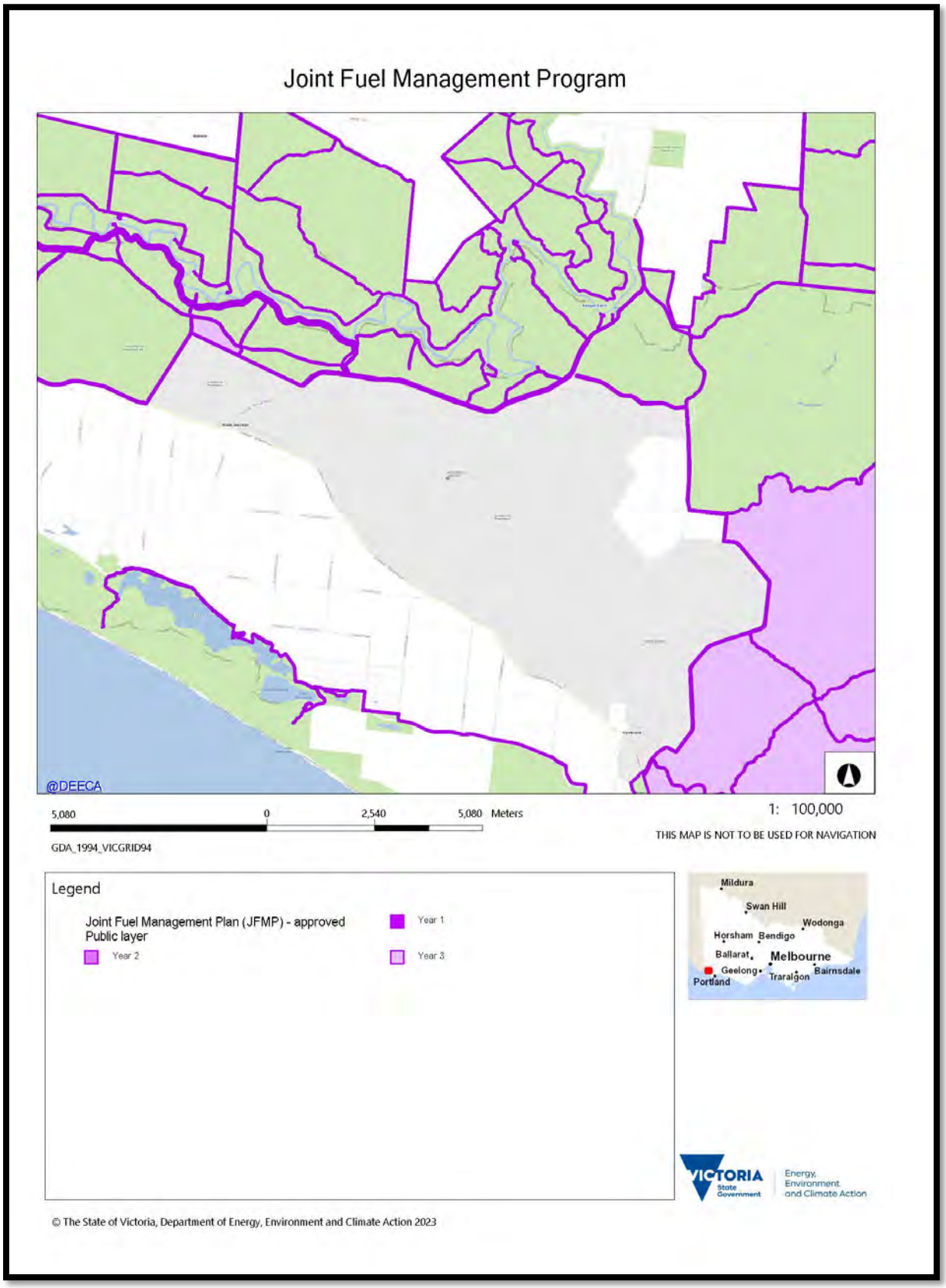


Figure 10 - Joint Fuel Management Program

6.8 Fire history

The broader landscape comprises many large patches of forested areas over a long north-south expanse that have non-forested areas in between. This typically will limit the fire size to less than 20,000 hectares as fires move out into grass areas where more rapid containment is possible.

While the classic north-west-to-south-west fire weather pattern does sometimes occur in the far south west, it is common for bushfires in this area to be primarily driven by west or west-south-west winds.

Heathy fuels, sometimes combined with very low fuel moisture conditions in the far south-west of the region make suppression difficult, even under mild conditions.

Significant fires[20] to impact the Kentbruck area include:

- 1979 – in February fires swept into the Nelson area from Caroline in South Australia after travelling 27 km. The fire burnt 7,700 hectares, including 3,300 hectares of pine plantation and 4,200 hectares of Lower Glenelg National Park.
- 2000 - a fire started in farmland at Kentbruck near the coast and spread rapidly for eight kilometres under south west winds, burning through pine plantations and the Lower Glenelg National Park
- 2013 – on 4 January a fire started in the Kentbruck area and over the course of the following seven days burnt over 12,000 hectares. No serious injuries, no loss of life and no loss of major structures in this event however significant plantation assets were lost with a reported economic loss of $12 million.
- 2020 – A bushfire started because of an unattended campfire and burnt 900 hectares in early January.

The above data has been sourced from the Municipal Fire Management Plan and DEECA. There is no doubt that additional fires have occurred in the surrounding landscape, and these are not available from CFA or FFMV.

6.9 Fire ignitions

According to the data available through the Victorian Fire Risk Register, there is a low occurrence of fire ignitions in the area proposed for the Wind Farm. Whilst the intersection of Portland-Nelson Road and Winnap Nelson Road indicates some ignitions, there are less than 10 ignitions over a 10 year period.

The reason for this low rate of ignitions could be for several reasons. These may include low population numbers, remoteness of the area and low numbers of people visiting the area and effective vegetation management along roadsides that reduces ignition sources from developing into uncontrollable fires.

[20] Glenelg Shire Municipal Emergency Management Plan: https://www.glenelg.vic.gov.au/files/EmergencyManagement/ECM_2576536_v1_PUBLIC_VERSION_ECM_2576536_v1_Glenelg_Municipal_Emergency_Management_Plan_2019-2022_Audit_26_March_2.pdf

7 BUSHFIRE RISK ASSESSMENT

The risk assessment process involves identifying, analysing, evaluating and treating the identified risks. The key considerations that have been assessed in developing this report include:

- A fire occurring within the site and spreading externally impacting neighbouring properties.
- A fire occurring on adjacent properties and entering the site.

The overall risk assessment process requires a consistent approach and follows AS/NZS ISO 31000:2009 as incorporated into the National Emergency Risk Assessment Guidelines (NERAG). Figure 11 provides an overview of the risk assessment process.

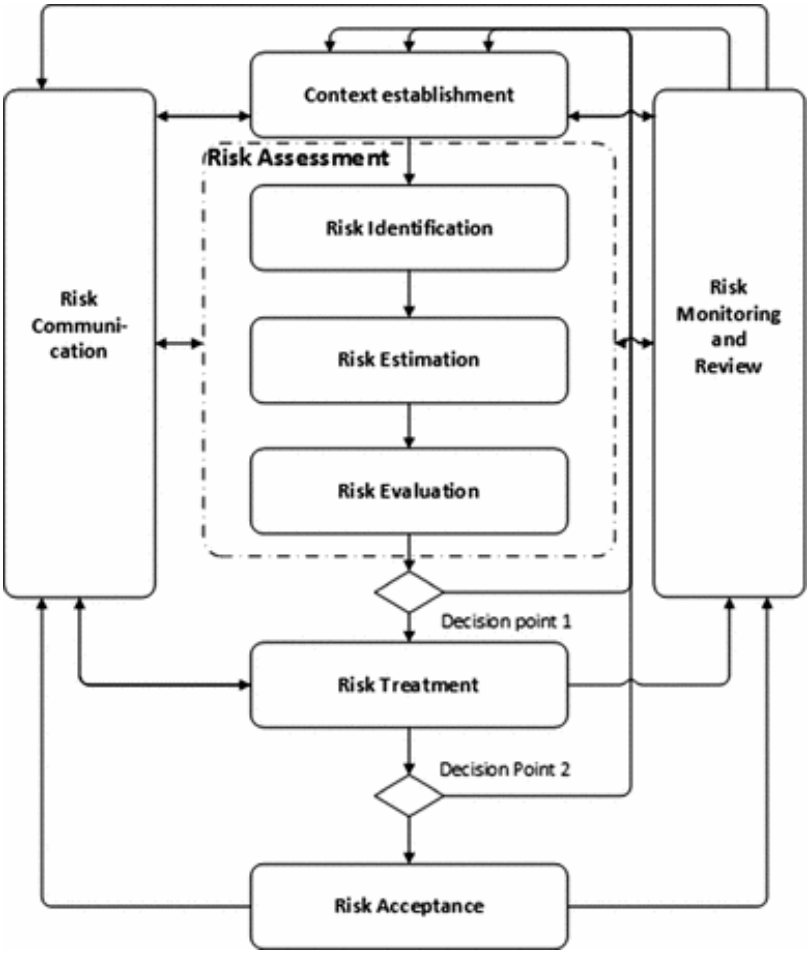


Figure 11 - Overview of AS/NZS ISO 31000-2009 risk management process

Risk management is the process of recognising risk and developing methods to both minimise and manage the risk. This requires the development of a method to identify, prioritise, treat (deal with), control and monitor risk exposures.

A bushfire risk assessment is a function of the likelihood of an adverse event occurring and the consequence of the event. A comprehensive bushfire risk assessment will identify potential risks and consequences and therefore assist with the development of mitigation actions.

The risk rating table has been developed to support the assessment in the context of the Kentbruck Wind Farm.

7.1 Bushfire Likelihood

An assessment of the likelihood of a bushfire in the area impacting people and assets considers factors such as the:

- Potential for an unplanned fire to occur
- Potential for this ignition to develop and exhibit significant fire behaviour
- Potential for that fire to destroy assets
- The potential for it to develop into a major fire.

Risk management recommendations for bushfire mitigation actions in the area may be determined by a number of approaches depending on the level of assessed risk. Strategies to lower bushfire risk are provided to ensure the risk from a bushfire is managed to an acceptable level.

The mitigation measures, once implemented, will reduce the ability for a bushfire to ignite and spread into, through or from the area.

A likelihood scale refers to the potential of unplanned fire beginning in the area and spreading to adjoining properties. An assessment of likelihood considers factors such as:

- Sources of ignition such as powerlines
- Use of the property and/or surrounding area
- History of ignitions
- Ability to spread through the area.

Likelihood scale frequency	Description
Very Likely	Almost certain: will definitely occur, and /or high level of recorded incidents, or there is a strong likelihood that the event will occur
Likely	High probability it may occur; and/or some recorded incidents
Unlikely	It is not expected to occur, but it is not impossible

7.2 Bushfire Consequence

Consequence refers to the potential seriousness of the damage that could result from a bushfire occurring in a specific area in proximity to people and assets. In assessing the possible consequences, the assessment considers a variety of hazard, exposure and vulnerability factors including:

- Number of surrounding properties
- Proximity of assets
- The fuel levels present within the reserves
- The level of access into the area for suppression actions should a fire occur.

The consequence scale refers to the potential seriousness of the damage which could occur should a bushfire occur.

Table 3 - Risk assessment consequence table

Consequence scale	Description
Major	Significant consequences – major damage or effect. Loss of life and/or property. Significant injuries, hospitalisations, large number of displaced persons.
Moderate	Moderate loss of property (i.e. damage to fences), some medical treatment but no fatalities. Localised damage that can easily be rectified. Some impact on the environment with short to long-term effects.
Minor	Minor or negligible consequences or effects. No damage to property or persons. Small impact on the environment with no lasting effects.

The risk rating table is used to combine likelihood and consequence to obtain a risk score. The risk score is used to aid decision making by determining which areas are at the greatest risk of a fire starting and spreading through the estate. Actions can be prioritised using this method to determine where risk mitigation works will occur.

Table 4 - Risk rating table

RISK RATING TABLE			
LIKELIHOOD	**CONSEQUENCE**		
	Minor Minor or negligible consequences or effects. No damage to property or persons. Small impact on the environment with no lasting effects.	**Moderate** Moderate loss of property, some medical treatment but no fatalities. Localised damage that can easily be rectified. Some impact on the environment with short to long-term effects	**Major** Significant consequences – major damage or effect. Loss of life and/or property. Significant injuries, hospitalisations, large number of displaced persons.
Very Likely: will definitely occur, and /or high level of recorded incidents; or there is a strong likelihood that the event will occur	Medium	Very High	Extreme
Likely: High Probability it may occur; and/or some recorded incidents	Medium	High	Very High
Unlikely: It is not expected to occur, but it is not impossible	Low	Medium	High

The outcomes of the risk assessment are used to inform the recommendations that are aimed at providing guidance to management to reduce the bushfire risk at the property.

7.3 Phoenix RapidFire computer model

Within Victoria, there is the ability to undertake fire modelling to generate information that indicates how a bushfire may behave in a particular landscape, and thus being able to test proposed mitigation strategies.

The Victorian Fire Agencies use a fire modelling tool called *Phoenix RapidFire* to model fire scenarios before (existing) and after (impact) of these fire risk reduction works, such as on ground fuel management activities, to calculate the residual risk.

It can be a useful tool to highlight how a bushfire will move through a landscape and the potential consequences (generally expressed as the number of houses burnt). Weather inputs can be adjusted to demonstrate the different outcomes based on lower or higher Fire Danger Indices (FDI).

A summary of the *Phoenix Rapidfire* model is listed below.

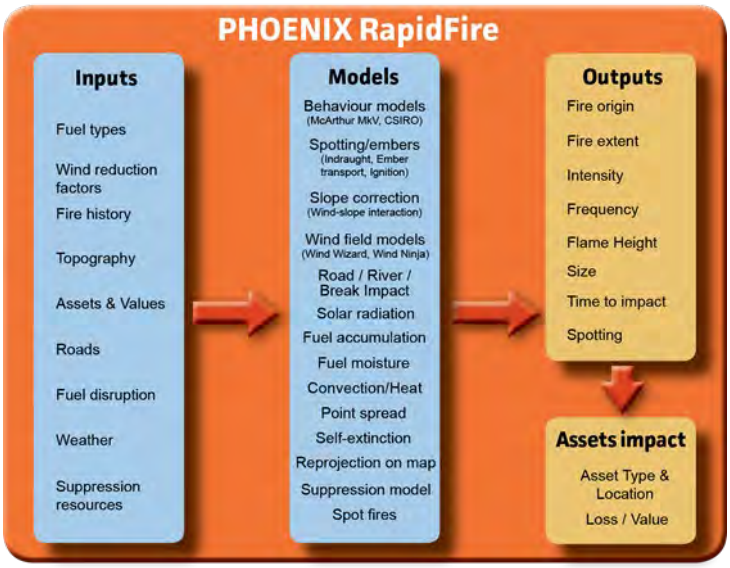


Figure 12 - Phoenix inputs, models and outputs (DELWP) 2015

The State of Victoria uses Phoenix RapidFire to model fire scenarios before and after fire risk reduction works, such as fuel management activities, to calculate residual risk. At maximum fuel levels, bushfire risk is at 100%. Through fuel management activities, the State aims to reduce fuel levels to 70% (the residual risk). This means, if a major (impacting life and/or property) bushfire was to occur, the impact of the bushfire would be reduced by about a third.

Residual risk is calculated by looking at House Loss Probability using the DEECA Corporate Spatial Data Library (CSDL) dataset. This address data simulates where there is a reasonable probability that a building exists at this address. Residual Risk is the difference in the number of dwellings (buildings) lost after all current fuel modification works – as per the current Joint Fuel Management Plan (JFMP) – have all been completed – compared to the number of dwellings likely lost before any fuel modification works.

However, *Phoenix Rapidfire* simulations have limitations including the use of input data of varying quality. Like all models, *Phoenix RapidFire* gives only an approximation of reality. Some of the factors that may limit the accuracy of Phoenix RapidFire results are:

1. The quality of its inputs. Phoenix RapidFire uses a range of data inputs to model bushfire behaviour, including fuel types, ignition locations, weather variables, topography and previous fire history. These data sets vary in accuracy. Newer fuel accumulation curves will improve the accuracy of Phoenix in the future.

2. Many bushfires are often simulated using a weather scenario which has been designed to represent a typical 'worst case' fire day in Victoria.

   In some instances, it is far more prudent to use local weather records, which can give a more accurate picture of local likely "worst day" conditions – i.e. these may be far less severe in far eastern Victoria, than in either central or north-western Victoria.

3. A full understanding of bushfire risk requires consideration of both the likelihood and consequence of bushfire impacts on human life, critical infrastructure, private property and other values. *Phoenix RapidFire* mainly considers the consequence element of bushfire risk, and the likelihood of particular ignitions is explicitly ignored.

The results of all *Phoenix RapidFire* model simulations need to be validated against the information collected from on-site data collection, as this provides a more accurate overview of the fire risk and residual risk from fire hazard mitigation works.

Whilst *Phoenix Rapidfire* has its limitations, it is a worthwhile tool to obtain an indicator on how bushfires may burn across a landscape and the possible impact of these events. Testing bushfire mitigation strategies, when used by skilled bushfire practitioners, remains a worthwhile tool of the *Phoenix Rapidfire* model.

The outcomes of the *Phoenix Rapidfire* model are outlined in Section 8.7.

7.4 Analysis against guidelines and policy

Using the information outlined in previous sections, the analysis of risk for this project uses the following:

1. Risk assessment using the information contained within this section.
2. CFA Guidelines for Renewable Energy Installations (2023) outlined in section 5.3.
3. Clause 13.02 – Bushfire planning outlined in section 5.1.1.

The outcomes of the risk assessment inform the development of treatments/recommendations to manage the bushfire risk to the surrounding landscape from the implementation of the Proposal.

8 ANALYSIS OF BUSHFIRE RISK

The risk of bushfire fires resulting from wind farms could arise from the proposal activities described below. This section refers to examples of wind farm fires in Australia and overseas, and the key policy documents outlined in chapter 5 of this report.

The risk assessment (which determines the likelihood and consequence of the fire risks occurring, which are discussed in Section 8.1-8.3) is in Section 8.4.

8.1 Bushfire risk during construction

The risk of a fire igniting during construction is always present. This is due to the presence of ignition sources including hot works, increased vehicle traffic and difficulties with keeping vehicles off vegetated areas. It can be assumed that if a bushfire starts during construction, there will be people present and they will have equipment available to make attempts to suppress the fire before it escalates.

The level of ignition risk during the construction phase is exacerbated by the expected fire danger conditions on any given day. The solution to this issue is the development of policy that will be referenced within the Emergency Management Plan (EMP). The EMP will require certain activities to be undertaken that directly correlate to the predicted level of bushfire risk.

The construction and operation of turbines and substations will likely involve the use of construction techniques that will require equipment operating within vegetated areas including plantations and grassland. Other techniques include hot work activities including welding and grinding and vehicles driving across areas that have bushfire fuels present.

The project has identified the presence of peat in the low-lying areas. The presence of peat is discussed within the *Environmental Site Investigation Report (Appendix I of the EES)*. The location of peat is generally known and is identified in Figure 3a and 3b of the Environmental Site Investigation Report *(Appendix I of the EES*) by geological unit Qm1. Peat locations will be a key consideration of the construction program. Peat when ignited can spread underground and cause new fires in other areas. The fire burning through peat also generates increased amounts of smoke that can cause respiratory issues for firefighters and others including the surrounding community. The development of a Peat Management Plan will influence the safe work practices that will need to be implemented when working in areas with peat and the remediation works required if these areas are disturbed.

8.2 Bushfire risk during operation

8.2.1 Impact on fire behaviour

Some concerns are raised in relation to the influence a wind farm will have on fire behaviour, in particular through the increased wind turbulence that occurs in close proximity to the blades.

The AFAC Guideline [21] states *'Wind farms are not expected to adversely affect fire behaviour in their vicinity. Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings. Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event. Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.'*

The project will introduce a range of procedures that will shut down areas of the wind farm that are impacted or threatened by bushfire. This will be undertaken to protect the infrastructure and to enable safe aircraft operations to occur.

8.2.2 Risk of power line fire

In relation to transmission lines, the risk of causing a bushfire is considered low. There is very little if any information available about historical bushfires that were caused by a failure with a transmission line. Whilst the Victorian Bushfires Royal Commission identified powerline failures during severe weather to have caused several of the Black Saturday fires and their recommendation #27 related to placing power lines underground in bushfire prone areas to mitigate future bushfires. These were not transmission lines.

It is widely believed that the vegetation management that occurs under transmission lines and the creation of the easement eliminates the cause of bushfires.

The key issue with the installation of transmission lines is the inability for aircraft to fly close to them and or firefighters working on the ground near them during a bushfire. Often the easements are used to assist with conducting back burns during bushfires.

8.2.3 Risk of turbine fire

It can be assumed that where there are moving parts that incorporates oils and other flammable liquids and is in proximity to electrically charged equipment, there is always the risk of fire. Other ignition sources may include the turbines being impacted by lightning or direct bushfire impact.

Modern turbines incorporate design features to reduce the risk of fire and subsequently causing fires in the vegetation surrounding the units. There is also the potential for detection and suppression systems to be installed within the turbines to provide early detection of a fire and upon activation, deliver suppressants (in most cases gas) to extinguish the fire.

To prevent lightning from starting fires, all turbines will have lightning protection systems installed. Each manufacturer will have different systems but in general the following is provided:

- Lightning receptors.
- Down conducting system that conducts the lightning current down through the wind turbine.
- Overvoltage and overcurrent protection systems.

[21] AFAC's *Wind Farms and Bushfire Operations* position paper can be found here: https://www.afac.com.au/docs/default-source/doctrine/afac_doctrine_windfarmsbushfiresoperations_position_2019-08_04-v1-0.pdf

- Shielding against magnetic and electric fields.
- Earthing system.

The AFAC Guideline [22] indicates that automatic shutdown and isolation procedures are generally installed within the turbine system. However, it is possible that turbines can malfunction and start fires within the unit. This is generally considered a low risk given appropriate protection measures.

There is also the potential for the turbine blades to be impacted by direct flame contact or elevated levels of radiant heat during a bushfire. Bushfire behaviour in a plantation under elevated weather conditions can cause flame heights at least double the height of the trees. These flame heights will penetrate into the space that the blades can be turning.

8.2.4 Risk of fires from Transmission Lines

Analysis of publicly available reports does not identity any references to Transmission Lines causing bushfires within Victoria or any other part of Australia. However, the Victorian Fire Risk Register (VFRR) identifies Transmission Lines across the State as having a risk level. An analysis of the existing Transmission Lines within the area surrounding the Heywood Terminal Station identifies that the treatment listed is the implementation of bushfire management plans by the Transmission Line operator. In some cases, the VFRR treatment identifies that the Transmission Line needs to be reinstated in a certain period due to the need to continue to service certain industries (e.g. Alcoa).

When comparing overhead and underground Transmission Lines, the two areas that would be influenced are the use of firefighting aircraft and the effect of smoke on the Transmission Line performance. Whilst firefighting aircraft can operate around Transmission Lines safely and have been doing this for decades within Victoria, it can be assumed that when they don't exist, it is one less hazard that a pilot needs to consider. This is a lesser issue when a bushfire is burning within forested areas at elevated intensities as aircraft are not able to approach close enough to be effective anyway. In the private land and where the vegetation is primarily grassland, they would be able to be more effective due to less hazards being present. It should be noted that there is an existing network of Transmission and Power Lines through the surrounding landscape that pilots would need to monitor currently.

In relation to smoke, it is widely known that heavy smoke can cause instability that may cause the Line to trip and the transmission of power is paused until the system can be reset. This usually can only occur following an inspection of the Line by an accredited practitioner. We have assumed that due to the buoyancy effects of smoke, that underground Transmission lines will not be exposed to smoke and therefore not able to cause a trip of the Line.

Finally, when constructing underground lines, the requirement for large cleared spaces to ensure the protection of the Line is not required. Underground lines do not require the level of clearance that an overhead line requires. This can be seen as a 'missed opportunity' to create cleared spaces that would likely influence the ability for bushfires to continue traveling under the prevailing wind. It is noted that

[22] AFAC's *Wind Farms and Bushfire Operations* position paper can be found here: https://www.afac.com.au/docs/default-source/doctrine/afac_doctrine_windfarmsbushfiresoperations_position_2019-08_04-v1-0.pdf

under elevated fire danger conditions, the managed area is unlikely to be effective in slowing or stopping bushfires.

Option	Option description	Bushfire considerations
1A	The underground transmission line would extend east from the main wind farm substation and traverse Cobboboonee National Park and Forest Park beneath an existing road. From there, the transmission line would transition to an overhead line as it travels through freehold land to reach Heywood Terminal Station.	The below ground Transmission Line would be considered a safer option when travelling through the Public Land. When the Transmission Line converts to an overhead line, the risk is considered slightly elevated when compared to an underground solution. The risk elevation only occurs in relation to the use of firefighting aircraft around overhead Transmission Lines.
1B - preferred	Underground through Cobboboonee National Park and Forest Park, and farmland to the Heywood Terminal Station	This is the preferred option due to the removal of the above ground infrastructure. It also utilises an existing Terminal Station and does not involve the construction of additional infrastructure within a bushfire risk landscape.
2A	The overhead transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing. This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.	An additional Terminal Station would be seen as increasing the risk due to another piece of infrastructure now exposed to the existing bushfire risk that exists within the landscape. The risk is primarily related to infrastructure exposed to the impacts of bushfire. The introduction of additional overhead lines within the landscape would increase slightly the hazards that firefighting aircraft need to be look for. This may cause them to be slightly less effective, but this reduction is considered minor.
2B	The underground transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing. This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.	The underground line is considered safer than overhead lines. This proposal increases the risk due to the creation of an additional Terminal Station in the landscape. The risk is primarily related to infrastructure exposed to the impacts of bushfire.

8.3 Potential impact on bushfire suppression operations

8.3.1 Impact on fire bombing

Firebombing is the use of aircraft to support suppression activities on a bushfire. It is a widely used strategy across Australia with numerous aircraft on standby during the fire danger period. Firebombing can be undertaken by various types of aircraft including helicopters and fixed wing aircraft.

The AFAC *Wind Farms and Bushfire Operations* document notes the following precautions that need to be taken with firebombing:

- Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers. Developers should record these towers in the Tall Structures Database maintained by Air Services Australia and install warning lights or visible markers (such as orange balls) on all masts to minimise risks during aerial firefighting operations.
- Aerial firefighting operations will treat the turbine towers similar to other tall obstacles.

The South Australian Country Fire Service (CFS) Guidelines for Wind Farms[23]supports the use of firebombing around wind farms, subject to a risk assessment, and as part of an integrated plan to support ground resources. Pilots and Air Operations Managers will assess these risks as part of routine procedures. Risks due to wake turbulence and the moving blades should also be considered.

8.3.2 Impact on firefighting operations

The development of a wind farm introduces a range of infrastructure into the landscape including wind turbines, cable easements, access tracks, asset protection zones and transmission lines. The available guidance material acknowledges that this infrastructure may create new risks, in relation to bushfire suppression activities, the ability to intervene may be improved.

The provision of the following will assist firefighters with undertaking suppression activities:

- Cleared areas surrounding the turbines and additional tracks to access the turbine locations.
- Cable easements requiring areas with no vegetation thereby providing additional access opportunities.

Firefighting suppression activities are directly related to the fire danger conditions being experienced in any given day. The CFA[24] indicates that conditions above FDI50 will usually mean that firefighting activities will likely be unsuccessful. Above FDI 50 also coincides with conditions that could support flame surges within the Plantation where the blades could be immersed in flames for a short period of time. If blade failure occurs, there is no possibility for firefighters to be within the local area as under these conditions, it is unsafe to be attempting to directly attack a fire from within the plantation. In these cases, firefighting operations will occur when the fire danger conditions reduce

[23] https://www.nwfc.gov.au/sites/default/files/cfs-guidelines-wind-farms.pdf?v=1484179504

[24] https://www.cfa.vic.gov.au/warnings-restrictions/total-fire-bans-and-ratings/about-fire-danger-ratings

8.3.3 Consideration in incident planning

The AFAC Guidelines indicate that wind farms are an infrastructure development that must be considered in the preparation of Incident Action Plans for the suppression of bushfires in their vicinity.

These considerations are routine and wind farms are not expected to present elevated risks to operations.

8.4 Bushfire Risk Assessment Matrix

The following information has been developed using the process contained in Section 7.

Table 5 - Risk assessment - bushfire risk during construction

RISK	Bushfire risk during construction
CAUSE	Bushfire ignited because of poor work practices or other causes. Lack of separation between the works and existing vegetation including plantations.
LIKELIHOOD	Likely
JUSTIFICATION	There is a history of bushfires being caused during construction works. These causes can include welding, grinding, etc. Staff and contractors who are not aware of the bushfire risk and what to do if a fire starts can cause delays in responding to fires.
CONSEQUENCE	Major
JUSTIFICATION	A bushfire can cause a life-threatening environment for workers. If the workers do not leave early, they could be trapped at the construction site. Due to the height of the plantation trees in most areas, the workers will not be able to see smoke or flames in the distance to provide them early notification. Mobile phone reception is limited in most areas and alerts and warnings are likely to not be received. A fire can cause the loss of plantations which results in an economic loss.
RISK RATING	Very High
STRATEGY TO LOWER RISK	Develop an Emergency Management Plan that outlines the exclusion of staff and contractors from the plantation when the weather is forecast to be above a fire danger rating of extreme. Implement a communication system that ensures the workers at the construction sites can be always contacted and be notified of warnings and alerts. When moving to a new construction site, ensure the vegetation clearance occurs and the required hard stand is installed prior to works commencing. When construction is occurring on days where the fire danger rating is forecast to be Very High or greater, ensure a person is appointed as the fire watch. The fire watch position is to monitor the surrounding areas and ensure all hot works and other activities that may cause a bushfire are monitored and reviewed regularly. Undertake regular familiarisation inspections with the local CFA fire brigades so that they are aware of the construction method and emergency management planning arrangements. Implement a staff and contractor induction system that includes an overview of the bushfire risk and the procedures to follow if a bushfire starts. Develop and implement a peat management procedure that ensures any peat identified during construction is managed to prevent fire ignitions. This procedure is to be endorsed by CFA.
RESIDUAL RISK	Medium

Table 6 - Risk assessment - bushfire during operations - turbine fires

RISK	Bushfire risk during operations – turbine fires
CAUSE	Bushfire ignited because of poor work practices or other causes. Lack of maintenance can cause failures within the turbines that may start a fire. Lack of fire detection systems not able to detect fires early. Use of combustible and flammable materials and liquids including lubricants, oils, etc. Flames and radiant heat can impact on the turbine blades under elevated fire weather conditions.
LIKELIHOOD	Likely
JUSTIFICATION	Lack of suppression systems will allow a fire to burn uncontrollably until complete destruction or intervention occurs. Lack of detection systems will not allow early detection of fires. Depending on the materials used to construct the turbines, fire spread may be rapid. Weather conditions that can create bushfire behaviour that would result in flame impact on the turbine blades may occur 1 -2 times per year.
CONSEQUENCE	Major
JUSTIFICATION	During periods of warmer weather, ignited materials may drop from the turbine and start a bushfire in the surrounding areas. These fires would likely spread rapidly as numerous fires could be started. Depending on the wind speeds, burning materials could land some distance from the base of the tower. Any equipment that involves moving parts and mechanical and electrical systems can cause fires. Flame contact on the blades may cause warping or the blades to ignite. Under these conditions a blade or part of the blade may become dislodged.
RISK RATING	Very High
STRATEGY TO LOWER RISK	Develop an Emergency Management Plan that outlines the exclusion of staff and contractors from the plantation when the weather is forecast to be above a fire danger rating of extreme. Whilst it is highly unlikely that personnel will be in the cleared area around a turbine tower during a bushfire that can cause blades to be impacted, the EMP should mandate that during bushfire events, firefighting should not occur in the cleared space surrounding the tower unless a risk assessment has occurred. Install detection and suppression systems within the nacelle to allow for early detection and suppression. Connect these systems to the SCADA system to allow for early notification to the operators. Provide a fuel managed area around the base of the tower to prevent fires starting from falling materials. Within the nacelle, use where possible non-combustible or low combustibility and low flammability liquids including oils, lubricants, etc. Ensure a hot works management system is implemented and includes consideration of the bushfire risk on the given day. Implement a maintenance regime that ensures turbines are inspected and serviced in accordance with the manufacturer's specifications.

	All structures 110m or more above ground level will be notified to the Civil Aviation Safety Authority (CASA) as per CASA Advisory Circular AC 139-08, v2.0, March 2018. All guy wires and towers are to be clearly marked, even where marking is not required by CASA. Open static water source locations of 50-75m in diameter are to be clear of any vertical vegetation within approach and departure paths, to facilitate the uptake of water for aerial firefighting helicopters.
RESIDUAL RISK	Medium

Table 7 - Risk assessment - bushfire risk during operations - transmission lines

RISK	Bushfire risk during operations – transmission lines
CAUSE	Bushfire ignited because of poor work practices or other causes. The presence of transmission lines may cause suppression activities to be delayed. Failure in transmission lines may cause a bushfire to start.
LIKELIHOOD	Not Likely
JUSTIFICATION	Transmission lines have not been the cause of bushfires in the past. Transmission lines can at times provide strategic fuel breaks for firefighters to work from. Transmission lines are required to be installed along easements that provide vegetation management. Aircraft need to be aware of the transmission lines to ensure their own safety.
CONSEQUENCE	Moderate
JUSTIFICATION	As transmission lines are not recognised as the cause of bushfires, there are limited consequences. The introduction of transmission lines can cause delays in firebombing activities due to pilots needing to carefully operate around the infrastructure. The creation of an easement under the transmission lines will reduce the risk of a fire escalating if burning on the easement.
RISK RATING	Medium
STRATEGY TO LOWER RISK	Develop an Emergency Management Plan that outlines the exclusion of staff and contractors from the plantation when the weather is forecast to be above a fire danger rating of extreme. Ensure an easement is provided under the transmission lines and is regularly maintained as per regulatory requirements.
RESIDUAL RISK	Low

Table 8 - Risk assessment - Bushfire risk during operations - external bushfire impacting on the site

RISK	Bushfire risk during operations - external bushfire impacting on the site
CAUSE	Bushfire starts in adjoining properties that may be caused by lightning, arson or accidental causes. A controlled burn may become uncontrollable and spread into the Wind Farm footprint. Lack of fire breaks and fuel reduction burns in the surrounding landscape may increase the severity of a bushfire and assist with it spreading.
LIKELIHOOD	Likely
JUSTIFICATION	Historically, bushfires have occurred in the surrounding landscape, and this is likely to continue. There may be a reduction in ignition occurrences due to the increased monitoring of the Plantations due to the presence of the Wind Farm and the associated maintenance personnel. As a result of the plantation cycle, the risk varies including a low risk following harvest and elevated risk leading up to the harvesting stage.
CONSEQUENCE	Major
JUSTIFICATION	During periods of warmer weather, bushfires that start in the surrounding landscape may spread into the plantations surrounding the Wind Farm. With the increased response capability resulting from the additional Kentbruck Green Power Hub firefighting resources, fires that start will have a greater chance of being attacked earlier. It is likely for the existing fire breaks and access roads on both private and public land to be maintained.
RISK RATING	Very High
STRATEGY TO LOWER RISK	Develop an Emergency Management Plan that outlines the response arrangements for Kentbruck Green Power Hub on days of elevated bushfire risk. Work closely with Forest Fire Management Victoria and plantation managers to ensure early notification is provided to fires in the local area. Ensure staff are trained in firefighting procedures to the GTFP standard and on elevated fire danger days, work closely with GTFP resources. Work closely with FFMV to inform the identification of fuel reduction burns that assist with managing the strategic bushfire risk around the Wind Farm development.
RESIDUAL RISK	Medium

8.4.1 Risk assessment summary

The risk assessment has identified the need to implement effective emergency management arrangements to ensure that staff and contractors are fully aware of the risks associated with working in these environments during periods of elevated fire danger. The arrangements will also enable the reduction in personnel needing to work from these locations during elevated fire danger periods. The need to also implement vegetation clearance initially before the construction of the turbine occurs is critical to provide additional protection to the location.

The area of most concern is the placement of turbines within the plantation areas. The strategies to lower risk will ensure that the risk is managed and providing all systems are installed and maintained, it is unlikely for fires to escalate to complete destruction of the nacelle and for bushfires to start in the surrounding area.

8.5 CFA Renewable Energy Facilities Guidelines

The CFA guidelines outline a range of requirements and considerations. These are listed below and outline how the wind farm proposal addresses each of the requirements:

Note: figures mentioned within this table relate to the Figures within the CFA Guidelines.

Table 9 - CFA Guideline Model Requirements

Model requirement	Compliance	Comments
Section 2 – consulting with CFA		
a) Where located within a Bushfire Prone Area, bushfire risk is addressed according to the Victoria Planning Provisions, Clause 13.02-1S (Bushfire Planning), through bushfire hazard identification and assessment (including a bushfire hazard site and landscape assessment). This assessment must include risks to the proposed technologies from the landscape (bushfire/grassfire).	✓	An assessment against Clause 13.02-1S has been completed (Clause 8.6).
b) Address risks from proposed technologies through a comprehensive risk management process, documented in a Risk Management Plan.	✓	This report meets the requirements of the Risk Management Plan as per the CFA Guideline.
c) Indicate where the exact specifications of elements within the renewable energy facility will be determined during the detailed design phase, such as solar panel and wind turbine model/manufacturer and battery chemistry.	✓	The detailed design will occur following the Planning Permit being issued.
d) Explicitly state that the following documentation will be prepared in accordance with this guideline, in consultation with CFA, before development starts:	✓	Any planning approvals that are issued will outline the requirement to develop the required documents in consultation with CFA.

Model requirement	Compliance	Comments
• Risk Management Plan • Fire Management Plan • Emergency Management Plan		
Section 4- Facility Location and Design		
Section 4.1 – Facility Location		
Planning applications for all renewable energy facilities proposed in high-risk environments must address the following:		
a) An assessment against policy at Clause 13.02-1S (Bushfire Planning) where the facility is located in a Bushfire Prone Area (BPA).	✓	This report provides an assessment against Clause 13.02 of the Planning Scheme.
b) The impact of any ignitions arising from the infrastructure (solar panels, wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets.	✓	The assessment of the potential impacts on the nearby communities, infrastructure and assets has been completed in section 8.4 and 8.6 of this report provide the outcomes of this impact assessment.
c) The impact of bushfire on the infrastructure (eg. ember attack, radiant heat impact, flame contact).	✓	A bushfire impact assessment has been undertaken and is contained within sections 8.4 and 8.6.
d) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.	✓	This assessment has been completed in sections 8.4 and 8.6.
Section 4.2 – Facility Design		
Section 4.2.1 – Emergency vehicle (Fire Truck) access		
All facilities		
a) Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	As outlined in section 6.2.1 of the CFA Guideline, this requirement does not relate to Wind Energy Facilities.
b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g. no compacted earth).	✓	The roads will be of all weather construction and capable of accommodating vehicles of up to 15 tonnes. These roads will initially be constructed to withstand vehicles including cranes that is associated with the construction of the turbines and towers. These will be maintained following the completion of the construction phase.

Model requirement	Compliance	Comments
c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. Ensure any fencing along access routes allows for width of fire vehicles.	✓	The roads will be at least 4 metres in width and will be provided with a 4 metre vertical clearance.
d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres.	✓	All roads will meet the specified requirements. The landscape surrounding the Kentbruck Wind Farm is mainly flat.
e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	All roads will meet the specified requirements.
f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. At least one passing bay must be incorporated where roads are less than 600 metres long.	✓	The constructed roads will incorporate passing bays as required.
g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, battery energy storage systems and related infrastructure, substations and grid connection areas.	✓	The existing road network along with the new roads created to provide access to the towers, will provide access to all areas of the development.
h) Provision of at least two (2) but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process, in consultation with CFA.	✓	The proponent has identified 8 access points that will be utilised by contractors and operators. Numerous other access points are available due to the existing nature of the plantation layout. These will be detailed in the site plans that are provided within the Emergency Information Containers and Emergency Management Plan.
Wind Energy Facilities		
Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes. The number and location of vehicle access points must be determined in consultation with CFA.	✓	The roads constructed to support the construction phase of the project will be retained and maintained during the operational phase.
Section 4.2.2 Firefighting Water Supply		

Model requirement	Compliance	Comments
All Facilities		
a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	All water tank access points will be clearly identifiable both at the tank and on the site plans available for firefighting agencies.
b) Static water storage tank installations must comply with *AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning*.	✓	All static water tanks and fittings will comply with AS 2419.1.
c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	The static water tanks will be above ground and constructed of concrete or steel.
d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	The static storage tanks will be capable of being refilled within 24 hours through the use of water cartage contractors.
e) The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).	✓	The static water tanks will be located near entrances to the plantation property. Final locations will be determined in conjunction with the local CFA fire brigades.
f) The hard-suction point must be provided, with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance. *Adapters that may be required to match the connection are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters with a matching blank end cap to be provided.*	✓	The outlets will conform with the CFA guidelines and will be provided with the appropriate outlets.
g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.	✓	A hard stand area will be provided at the tank in accordance with the CFA guideline that is within 4 metres of the tank outlet.
h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.	✓	The tanks will be located adjacent to access roads and appropriate hard stand will be provided so that a firefighting appliance that is accessing the water supply does not obstruct the road.
i) The road access and hardstand must be kept clear at all times.	✓	The operations plan will include the requirement to keep road access and hardstand areas cleared at all times.

Model requirement	Compliance	Comments
j) The hard-suction point must be protected from mechanical damage (eg. bollards) where necessary.	✓	Bollards will be installed to protect the tank outlet.
k) Where the access road has one entrance, a eight (8) metre radius turning circle must be provided at the tank.	✓	The tanks are likely to be located on through roads. Where this does not occur, turning provisions will be provided.
l) An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	An external water level indicator will be provided at the tank.
m) Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	Signage in accordance with the CFA guideline will be provided at the tank. This will include the following:
n) Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank (s).	✓	Appropriate signage will be provided at each tank.
Wind Energy Facilities		
a) The fire protection system for wind energy facilities must incorporate at least one static fire water storage tank of at least 45,000L effective capacity at each site entrance.	✓	Each of the eight entrances will be provided with a 45,000 litre static water supply for firefighting use. These will be provided along Portland Nelson Road and surrounding areas.
b) Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design. The number and location of tanks is to be determined through a comprehensive risk management process (Risk Management Plan), in consultation with CFA.	✓	Additional static water supplies will be determined in conjunction with CFA.
c) Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.	✓	The Nacelles will be provided with automatic fire detection, alarm and fire suppression systems. This aligns with the outcome of the risk assessment that specifies the need for static water supply at various locations across the development.
Section 4.2.3 Fire Detection and Suppression Equipment		
All Facilities		
Suitable fire detection and suppression equipment must be provided:		
a) For on-site buildings and structures, according to the requirements of the National Construction Code.	✓	The onsite buildings will be required to comply with the National Construction Code as per the Victorian building regulatory controls.

Model requirement	Compliance	Comments
b) For storages of dangerous goods, according to the requirements of any Australian Standards for storing and handling of dangerous goods.	✓	It is unlikely for dangerous goods to be stored onsite but if this is required, compliance the dangerous goods legislation will be implemented.
c) For electrical installations, a minimum of two (2) suitable fire extinguishers must be provided within3m-20m of each PCU.	✓	Each PCU will be provided with a minimum of two fire extinguishers.
d) In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	✓	All vehicles will carry the appropriate fire protection equipment during the fire danger period.
Section 4.2.5 – Fire Breaks		
A fire break must be established and maintained around:		
a) The perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.	✓	As per the model requirements for Wind Energy Facilities, this clause is not required to be achieved.
b) The perimeter of control rooms, electricity compounds, substations and all other buildings onsite. *The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.*	✓	All infrastructure will be provided with a minimum of 10 metres separation between the structures and the classifiable vegetation.
Wind Energy Facilities		
A fire break must be established and maintained around the base of wind turbines.	✓	Fire breaks of a minimum of 50 metres surrounding the base of each wind turbine will be provided.
Section 4.2.6 – Design Specific to Facility Type		
Wind Energy Facilities		
a) Wind turbines must be located no less than 300 metres apart.	✓	The wind turbines are located more than 300 metres apart.
b) Wind turbines must be provided with automatic shut-down, and the ability to be completely disconnected from the power supply in the event of fire.	✓	The wind turbines will be designed to ensure they can be automatically shut down when certain triggers are activated.

Model requirement	Compliance	Comments
c) Installed weather monitoring stations must be notified to the Civil Aviation Safety Authority (CASA) as per *CASA Advisory Circular AC 139.E-05 v1.1, October 2022* (as for all structures 110m or more above the ground).	✓	CASA will be notified of all weather monitoring stations as er the CASA Advisory Circular.
d) All guy wires and monitoring towers must be clearly marked, even where marking is not required by CASA.	✓	All guy wires and monitoring towers will be clearly marked.
Section 5– Facility Construction and Commissioning		
Section 5.1.4 – Emergency Management		
An Emergency Plan must be developed for the construction and commissioning phase, before development starts.	✓	An Emergency Management Plan will be developed in accordance with the CFA Guidelines and AS3745 for the construction and commissioning phase of the project.
Section 6 – Facility Operation		
Section 6.1 –Fire Management Plan		
A Fire Management Plan must be developed for the facility, in consultation with CFA, before development starts.	✓	A Fire Management Plan will be developed for the facility.
Section 6.2 1 –Fire Hazards and Risk Controls		
If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan.	✓	The Fire Management Plan will address these requirements.
Section 6.2 2–Vegetation Management		
Facility operators must undertake the following measures during the Fire Danger Period:		
a) Grass must be maintained at or below 100mm in height during the declared Fire Danger Period.	✓	The vegetation within the cleared areas surrounding the turbines and other infrastructure will be managed during the fire danger period. All grass will be maintained at below 100mm in height.
b) Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.	✓	The Emergency Management Plan will clearly articulate the need to develop an induction program that will include the ban on heavy equipment operating off the formed tracks and maintained fire breaks.
c) Restrictions and guidance must be adhered to during the Fire Danger Period, days of high (and above) fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).	✓	The Emergency Management Plan will clearly articulate the role of all staff and contractors as the fire danger is at high or above.

Model requirement	Compliance	Comments
Section 6.2 4–Facility and System Monitoring		
Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled. Any fire must be notified to 000 immediately.	✓	The Wind Energy Facility will be provided with multiple methods of identifying faults that may lead to a fire if not addressed early. The installed SCADA system will monitor multiple sensors including the detection and suppressions systems that will have predetermined operator responses. Any activation of the detection and suppression system will automatically notify a local maintenance operator and the site procedures will also require notification to 000.
Section 6.2.5 – Maintenance		
All Facilities		
Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and the manufacturer's requirements.	✓	The maintenance the infrastructure, equipment and vehicles will be performed as per the manufacturer's requirements and the relevant Australian Standard. The operator will ensure policies are in place that clearly articulates the importance of maintenance programs.
Section 7 – Emergency Planning		
All Facilities		
An Emergency Plan must be developed specific to the facility, in conjunction with CFA, before development starts.	✓	An Emergency Management Plan will be developed that conforms with AS3745 and the CFA Guideline.
Section 8 – Provision of Emergency Information		
All Facilities		
An Emergency Information Book must be developed and available to emergency responders. Emergency Information Books must be located in Emergency Information Containers, provided at each vehicle entrance the facility.	✓	As Emergency Information Book will be developed and made available at locations determined in conjunction with CFA. The contents of the Emergency Information Book will comply with the requirements outlined within the CFA Guideline.

Table 10 - Other requirements outlined within the CFA Guideline

CFA Guideline requirement	Relevant section	Comments	Compliance
Where wind energy facilities are located within high-risk environments (including timber plantations), strengthened or additional fire risk mitigations will be required.	Section 6.1	The Kentbruck Wind Farm is proposed to be developed within a pine plantation. It is acknowledged that this is an extreme bushfire landscape area and additional treatments are required to offset this risk. The treatments that will be implemented for this development include: • 50 metre fire break around the base of each tower. • EMP including a section for bushfire emergency planning. • Detection and suppression systems installed in each Nacelle. As the development is within an existing pine plantation, the plantation manager has a firefighting resource in place which is a requirement of CFA legislation.	✓
The entire substation must be surfaced to eliminate all vegetation including grasses.	Section 6.2.3	The substation design will comply with Ausnet requirements, and these include the requirement to have a no vegetation policy in place at all times.	✓
Any turbines located in high-risk environments are to have a fuel-reduced zone to the envelope of the wind turbine blades.	Section 6.2.4	This requirement of the Guideline won't be implemented. The provision of a 50 metre fire break surrounding the towers along with detection and suppression and the development located in an operating plantation with a dedicated firefighting resource available results in the risk assessment identifying that the treatments are sufficient.	✗ **(refer to Section 8.5.1)**
Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction.	Section 7.1.1	The Nacelles will be fitted with the detection and suppression systems whilst the unit is on the ground and therefore, they will be in place and operational when the turbine is ready to be commissioned.	✓
Vegetation management within any electric line easement is to be such that falling trees would not impact the transmission lines, towers and associated infrastructure.	Section 8.1	Transmission lines and the substation is required to comply with Ausnet guidelines. These guidelines require that no tree can fall onto any of the infrastructure.	✓

A wind energy facility EMP must include: • **Emergency procedures for fires within, and in the vicinity of, wind turbines.** • **Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Code Red Days or approach of bushfire/grassfire to the facility.** • **Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.** **This information must also be provided within the facility's Emergency Information Book.** **Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies.**	Section 10.1	The EMP developed for both the construction and commissioning phases will include procedures for what occurs on certain fire danger days or if a bushfire is burning in the local area. It will also outline the maximum safe operational speed and temperature conditions. The design of the turbines will ensure that the blades can be stopped into the 'Y' position and yawed to the same direction to allow firefighting aircraft to fly between the towers more easily.	✓
Bushfire risk is different for every location, and the potential impact of bushfire is unique to renewable energy facilities facility due to the infrastructure, electrical and chemical hazards. If your facility is at risk of bushfire it must be addressed in your facility's risk management processes.	Section 11	The development is within an area prone to extreme bushfire behaviour and the risk assessment has addressed this. The EMP will include a dedicated section of preventing, preparing for and responding to bushfires within the footprint of the development.	✓

8.5.1 Assessment of fuel reduced zone to the blade envelope requirement

The CFA Guideline outlines the following:

Any turbines located in high-risk environments are to have a fuel-reduced zone to the envelope of the wind turbine blades.

As stated in Table 9, this won't be implemented for this project. The information pertaining to providing vegetation clearances to the envelope of the wind turbine blades is not stated as a Model Requirement and is within the body of the Guideline. It has been assumed that the clearance requirement is aimed at limiting the potential for a blade to fall into the plantation following a blade failure event. A blade failure event may be caused by structural integrity failures or because of a fire

within the Nacelle extending into the blade structure and causing the blade to detach from the main structure.

The cleared space provided at the base of the turbine tower is a radius of 50 metres. The blade lengths are proposed to be up to 95 metres. This will result in an overhang when the blades are horizontal of approximately 45 metres. This overhang only occurs when the blade is horizontal.

The history of these types of events are limited and it is difficult to locate case studies that outline this type of event and the main causes. For the blade to cause a bushfire the following is required to occur:

- The blade must be located at a point that it is overhanging the plantation vegetation which only occurs when the blade is approaching and leaving the horizontal plane.
- The likely scenario is for the blade to ignite because of a fire in the Nacelle and extending to the blade. This is unlikely due to the fire detection and suppression systems and the multiple sensors that will generate alerts to the monitoring centre. These alerts wilk likely result in the turbine being shut down prior to a fire starting.
- It is likely for the blades to be in the Y position if a fire is detected to ensure the burning blade does not fall into the plantation.
- The blade is manufactured with a composite material that has a low combustibility level.

Note: the concept of a blade ignited due to a bushfire has been excluded as the vegetation surrounding the turbine tower will already be on fire and the failure of the blade will not likely assist with further bushfire spread.

Based on the above and the other mitigation measures, it is believed that the extension of the asset protection zone to the blade envelope is not justified.

8.5.2 Assessment against CFA Guideline summary

The CFA Guidelines provide an extensive range of recommendations to ensure developments of this type are safe and allow for effective response arrangements to be maintained. The outcomes of the assessment against the CFA Guidelines include a range of mitigation and operational recommendations that are outlined in Section 9.

These treatments include reducing the risk of fires starting and spreading from the wind farm infrastructure, provision of firefighting water supplies, vegetation clearance and management arrangements and emergency management planning requirements.

The development of the 50-metre separation and the required separation between infrastructure and vegetation is based on FDI100 which is enshrined with the planning and building systems within Victoria. It should be noted that the FFDI35 that was used in the Phoenix modelling is for a different purpose. We are not moving away from the provision of separation based on the FFDI100 figure.

8.6 Clause 13.02 – Settlement planning

Clause 13.02 of the Victorian Planning Scheme plans to strengthen the resilience of settlements and communities and prioritise protection of human life by a number of objectives. However, it should be noted the Proposal does not introduce new settlements into the landscape. The assessment has been undertaken within the context of a wind farm development including the turbines and transmission lines.

Table 11 outlines the hazard assessment relating to the proposed Kentbruck Green Power Hub. Figure 13 and Figure 14 provide an overview of the likely bushfire scenarios within the surrounding area.

Table 11 - Bushfire hazard identification and assessment

Bushfire hazard type	Conditions	Likely scenario/s	Considerations
Local conditions (local, neighbourhood and site conditions)	The vegetation type within 1 kilometre of the site is a mix of plantations, forests on public land and coastal vegetation. There are large fuel breaks associated with roads and strategic fuel breaks established by the plantation managers. **Refer to Figure 13 for further detail.**	The likely scenarios include a bushfire travelling from the north west and south west aspects. The approach from the north west and south west may occur during the same bushfire. A bushfire from the north west can travel through vegetation that is continuous well beyond the one kilometre assessment area. This is further described in the landscape conditions section. A bushfire approaching from the south west has less distance to travel due to the presence of the ocean. However, bushfire travel of up to 2 – 3 kilometres could be experienced. There are a number of campgrounds and private land that could contribute to fire ignitions.	• The existing road network (public and private) provides fuel breaks that would likely be effective at lower fire danger conditions. • There is an existing bushfire ignition hazard including arson, accidental causes including unsupervised camp fires and lightning. These risks are already present, and the introduction of this development is not likely to increase these risks. • Suppression capability due to the remoteness of the area is mainly provided by Green Triangle resources. These resources won't be reduced and will likely increase with the requirement to ensure all Wind Farm staff are trained in firefighting.
Landscape conditions	The landscape hazard up to 20 kilometres from the proposed wind farm indicates significant areas of plantation and forested public land. There are isolated tracts of grassland that are used for farming purposes. **Refer to Figure 14 for further detail.**	Due to the extensive presence of forests and plantations to the north west of the site, there is the potential for bushfires to travel large distances towards the site. Bushfires that have travelled long distances are likely to be large and would likely be generating extreme bushfire behaviour. Under elevated bushfire conditions, fires are unlikely to be suppressed in this type of landscape. Treatments including fuel breaks and access roads will likely be effective at lower fire danger conditions. Due to the short potential for bushfire travel from the south west aspect, this is addressed in the local conditions section below.	• Maintenance of perimeter fuel breaks and access roads. • Early identification of fire ignitions. • Engagement with land managers to ensure fuel management treatments on surrounding land including roadsides and public land are implemented and maintained.

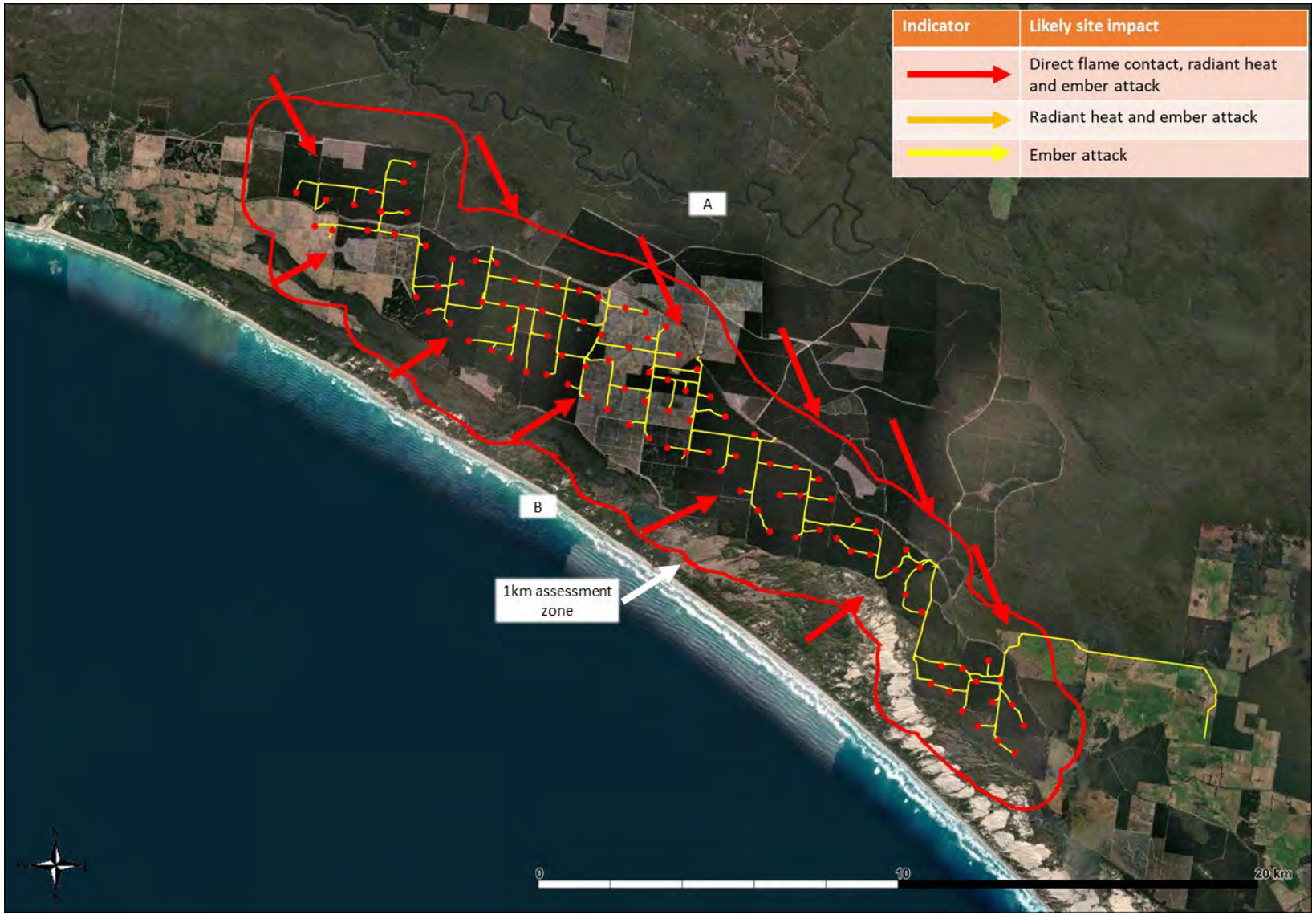


Figure 13 - Landscape bushfire risk - 1km assessment (local conditions in the hazard identification)

Figure 14 - Landscape bushfire risk - 20km assessment (landscape conditions in the hazard identification)

Table 12 - Response to the settlement planning objectives

Settlement planning objective	Project response	Achieved
Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).	The project includes a range of structures and infrastructure. The majority of the structures and infrastructure will not be occupied and if they are, the ability to leave the area on elevated fire danger days is achievable.	✓
Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.	The development is providing increased access roads and will provide defendable space surrounding the turbines and other infrastructure. This will provide staff and contractors the ability to travel safely to locations that would achieve a BAL LOW rating. The Emergency Management Plan for the development will also restrict staff and contractors entering the plantations on elevated fire danger days.	✓
Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.	The development will result in reduced plantation vegetation through the creation of cleared areas for the wind turbines and the creation of access roads to the turbines from the existing track network. The risk from the turbines will be reduced through fire protection systems within the nacelle and other mitigation treatments. The fire risk associated with the transmission lines will be managed through compliance with regulatory requirements.	✓
Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall.	The development will reduce bushfire risk through a reduction of vegetation and the installation of cleared areas surrounding the turbines. Bushfire protection measures will include: • Vegetation clearance • Additional response capability • Vegetation thinning • Restricted operations during high fire danger periods	✓
Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction.	As per Table 2 the hazard has been assessed. Based on the detailed assessment contained in this report and the additional information contained with the Phoenix analysis this development does not increase the hazard compared to the current situation.	✓

Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.	As the development does not increase risk across the landscape, identification of low risk areas has not been completed.	✓
Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).	The wind turbines and transmission lines are not required to comply with AS 3959 due to the development type. Any structures that are deemed to be buildings by a Building Surveyor will comply with the relevant parts of the National Construction Code.	✓

8.6.1 Assessment against Clause 13.02 summary

The assessment against Clause 13.02 has identified the need to ensure that buildings and infrastructure where staff and contractors are working from including the control room and works depot are required to be in areas where the radiant heat does not exceed 12.5 kW/m². Other treatments include mitigation works that will see vegetation clearance occurring within the plantation footprint to make way for the turbine towers.

8.7 Phoenix RapidFire predictive scenarios

The development of *Phoenix Rapidfire* models to determine the likely influence that the Proposal has on the current bushfire risk has been undertaken as part of this assessment.

In this Report, FRC has utilised the outputs of the landscape bushfire risk modelled by *Phoenix Rapidfire* but has then validated this with field observations. The *Phoenix Rapidfire* modelling used for this report has generated fire "runs" of a potential bushfire based on various inputs, including the key bushfire dependencies of fuel, weather and topography.

To support the predictive modelling, it was determined that the weather conditions that were experienced in the Portland and Kentbruck areas on 3rd January 2013 would be used. The model was further modified to achieve an FDI of 35. The model was also focussed on one turbine as it can be assumed that similar behaviour will occur for all locations.

FDI 35 is typical of a High /Very High FDR and is approaching the rating where a Total Fire Ban is considered by the Agencies. This is well below the FDI of 100 and like Victoria experienced on Black Saturday in 2009. This is an important point as it is widely known in the bushfire industry that on ground bushfire fuel modification activities are most effective at an FDI 50 and under. Above FDI 50 fuel management becomes less effective as bushfire behaviour and spread tends to be driven by weather and atmospheric conditions, and less by the available bushfire fuel.

As described in Section 7.3, the model can be used to assist with analysing risk and understanding the influence the introduction of the wind farm will have on bushfire risk. History shows us that there is potential for asset and life loss at FDI 35 whilst at FDI 100 it is almost guaranteed.

Fire "runs" were developed in the proposed windfarm footprint for both the existing conditions (current state) and then modelled again with enhanced fuel management modification in place. Within the modification model a 100 metre in diameter cleared area was selected at the base of a randomly chosen wind tower location. This cleared area was chosen to test the effects of fuel management activities on the proposed wind farm infrastructure via the bushfire impacts of direct flame contact, radiant heat and embers.

The summary of results from the *Phoenix Rapidfire* assessment are:

- The most significant reduction in bushfire impacts was in flame height on the turbine locations where the cleared area did not support increased bushfire activity. The model has assumed that the bushfire will burn around the cleared area but not through it due to the lack of available bushfire fuel in this area.
- There was only a marginal result in the house loss probability assessment in the cleared area at the subject site. This is due to the size of cleared area that has been proposed for a turbine footprint, in relation to the broader plantation estate and its effects on fire behaviour.
- There was no real change in ember density. Ember density in plantations is assumed as being low due to the pine trees not being known to produce large quantities of embers when compared to native forests. Pine plantations do not have the same level of bark hazard as native eucalypt forests and bark is the key contributing factor to short and long distance "spotting" in a bushfire.

The gridded output from Phoenix shows ember density in terms of embers per square metre. This means that in general terms:

- 0-5 embers/sq m - easy to extinguish with knapsacks and hand tools
- 5-10 embers/sq m - hard to extinguish, even with firefighting tankers
- 10-15 embers/sq m - virtually impossible to extinguish
- 15-20 embers/sq m - houses and assets lost
- 20+ embers/sq m - evacuate early, practical firefighting measures are very limited

The outcome of the *Phoenix Rapidfire* assessment is that there is a minor reduction in bushfire impacts resulting from the development of a wind farm, mainly through reduced flame heights in the cleared areas. This is mainly due to the nature of the fuel modification works at each proposed turbine location.

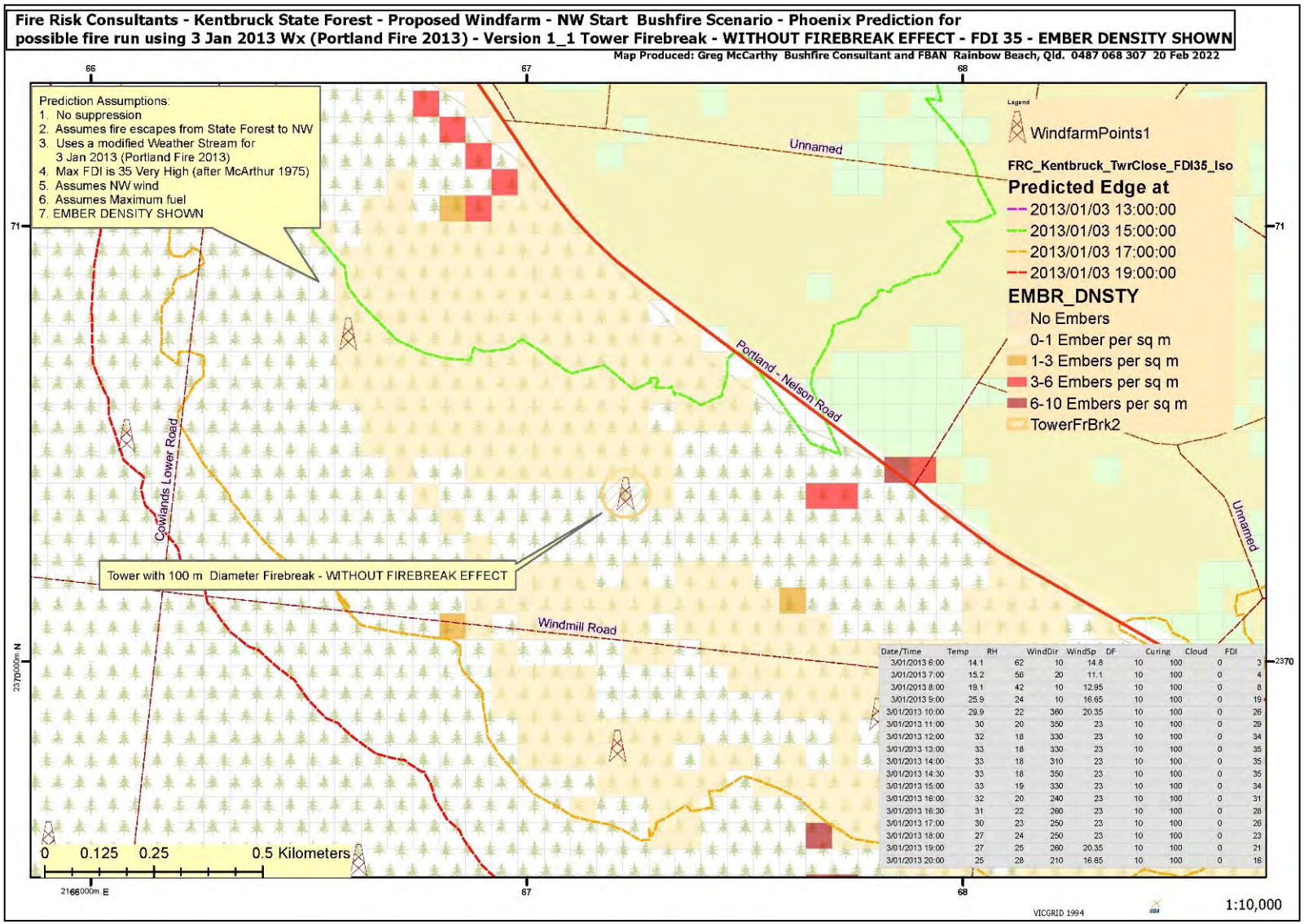


Figure 15 - Ember density resulting from a bushfire no firebreaks

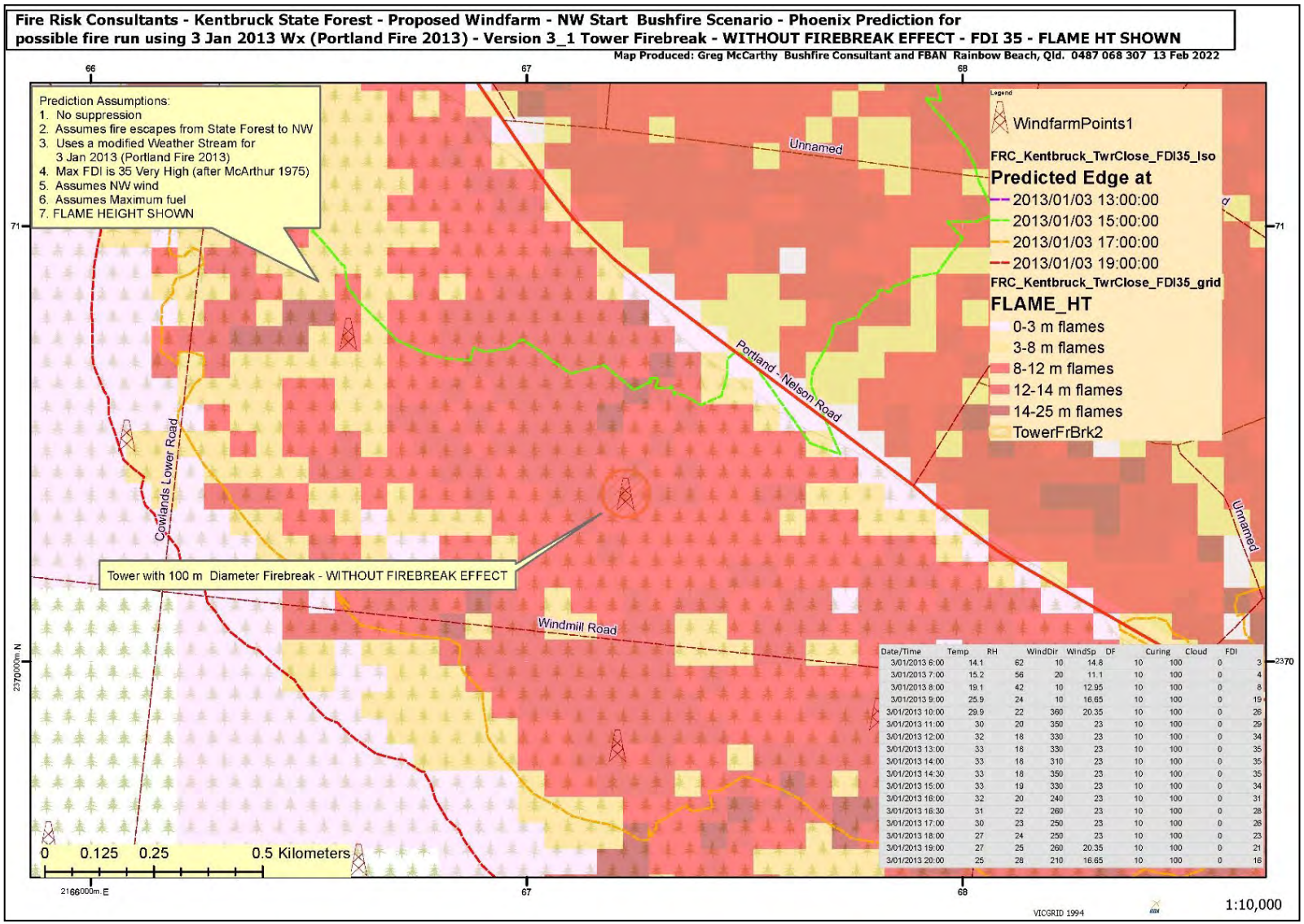


Figure 16 - Flame heights with no firebreaks

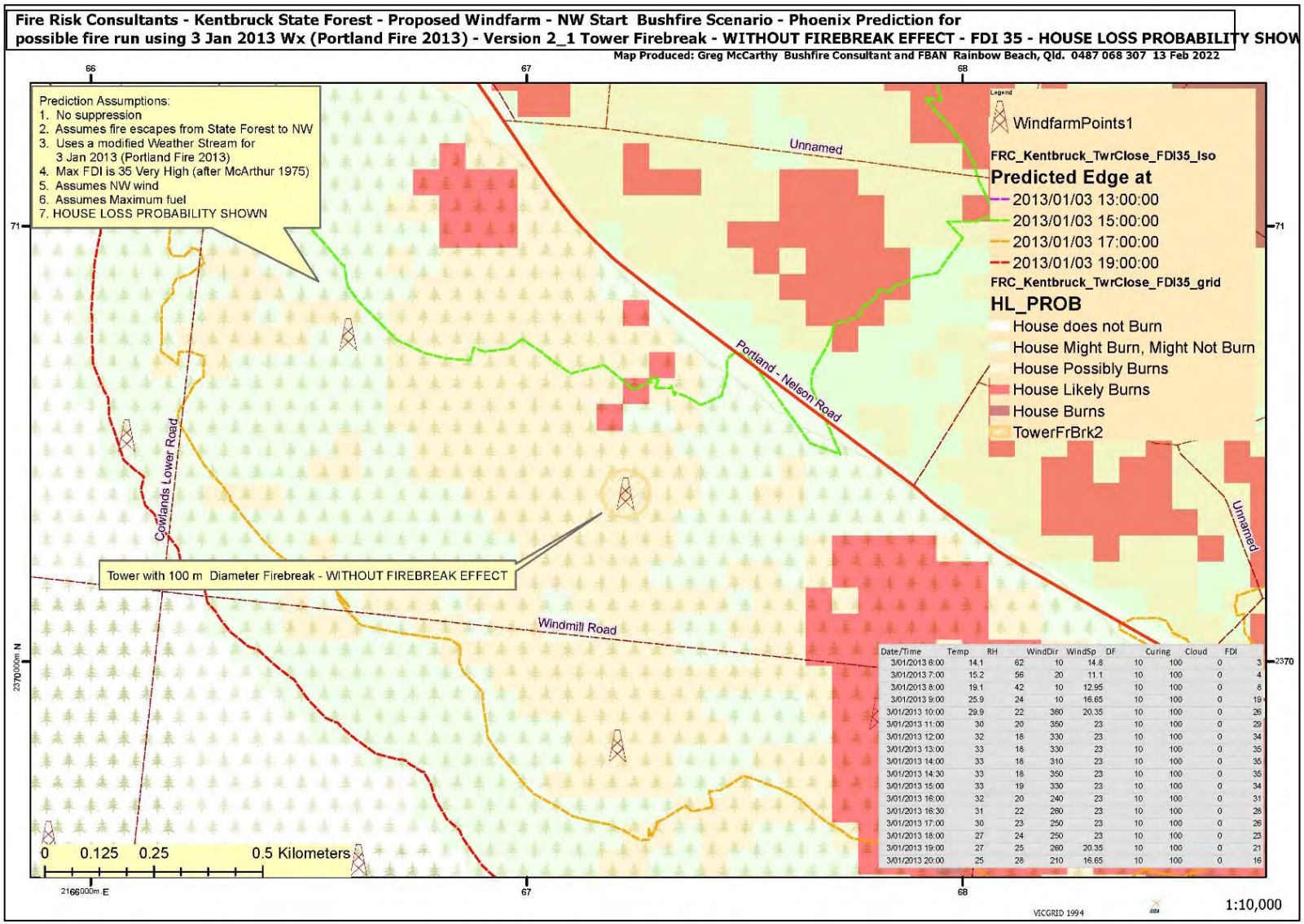


Figure 17 - House loss probability with no firebreaks

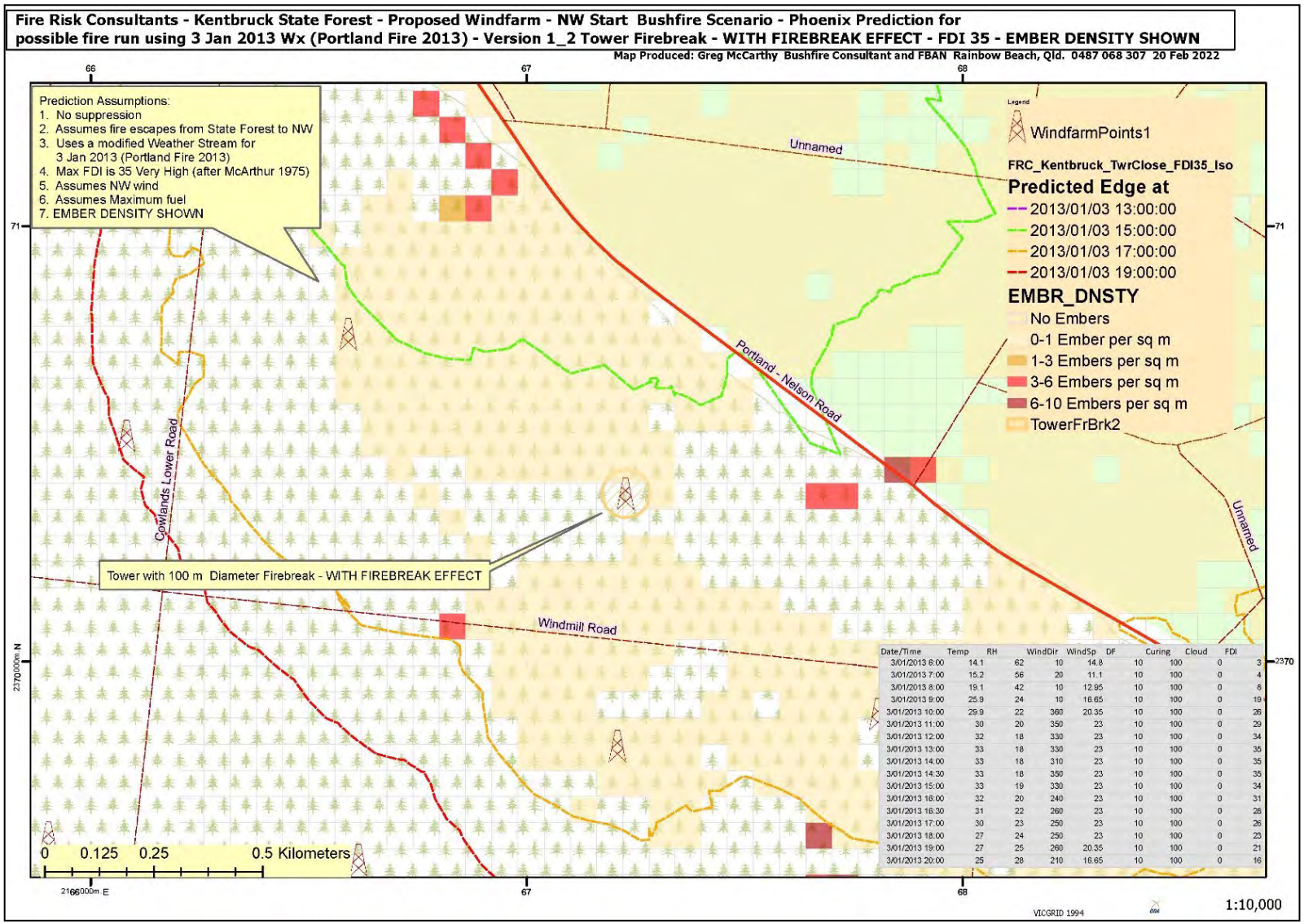


Figure 18 - Ember density with firebreaks

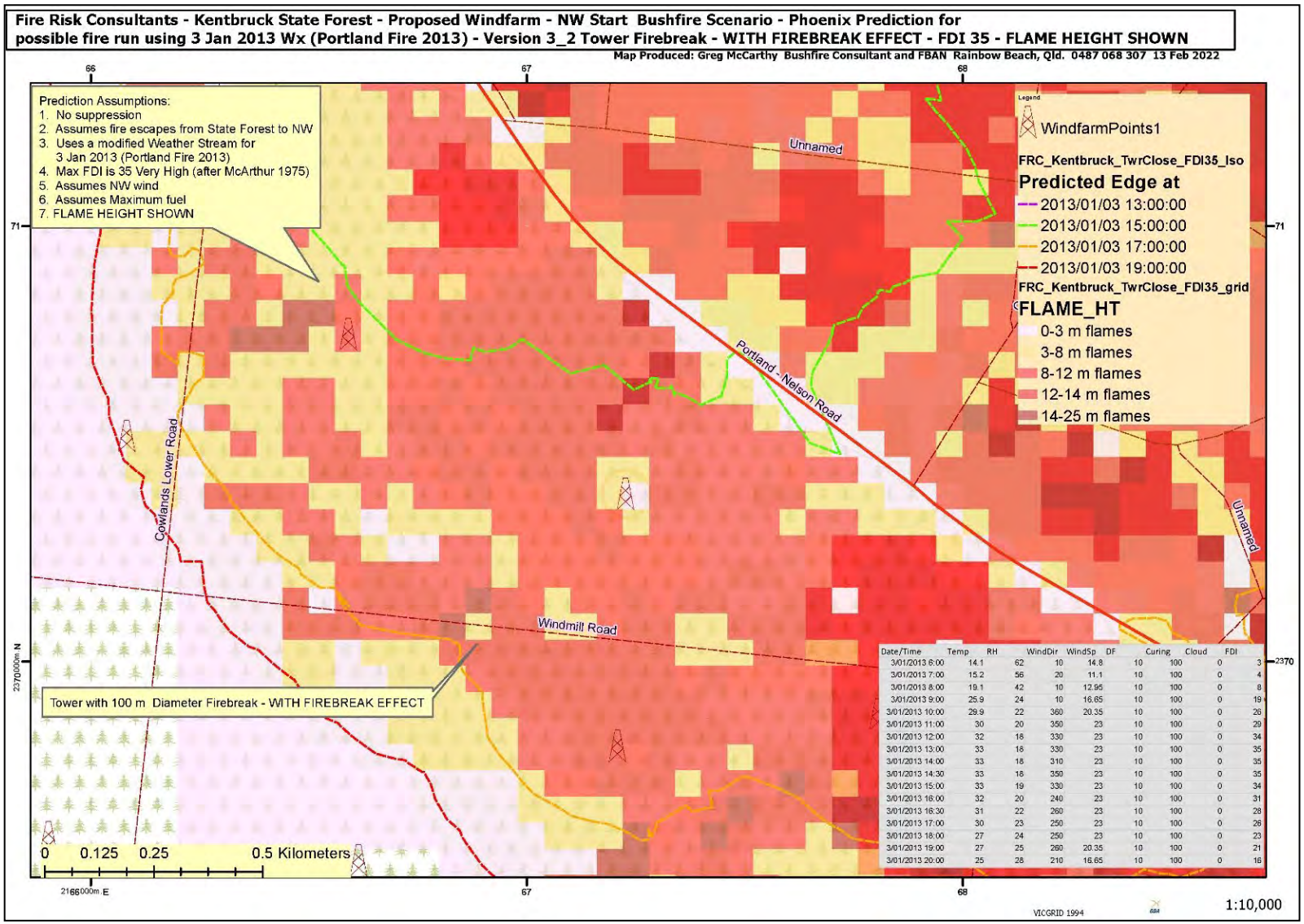


Figure 19 - Flame heights with firebreaks

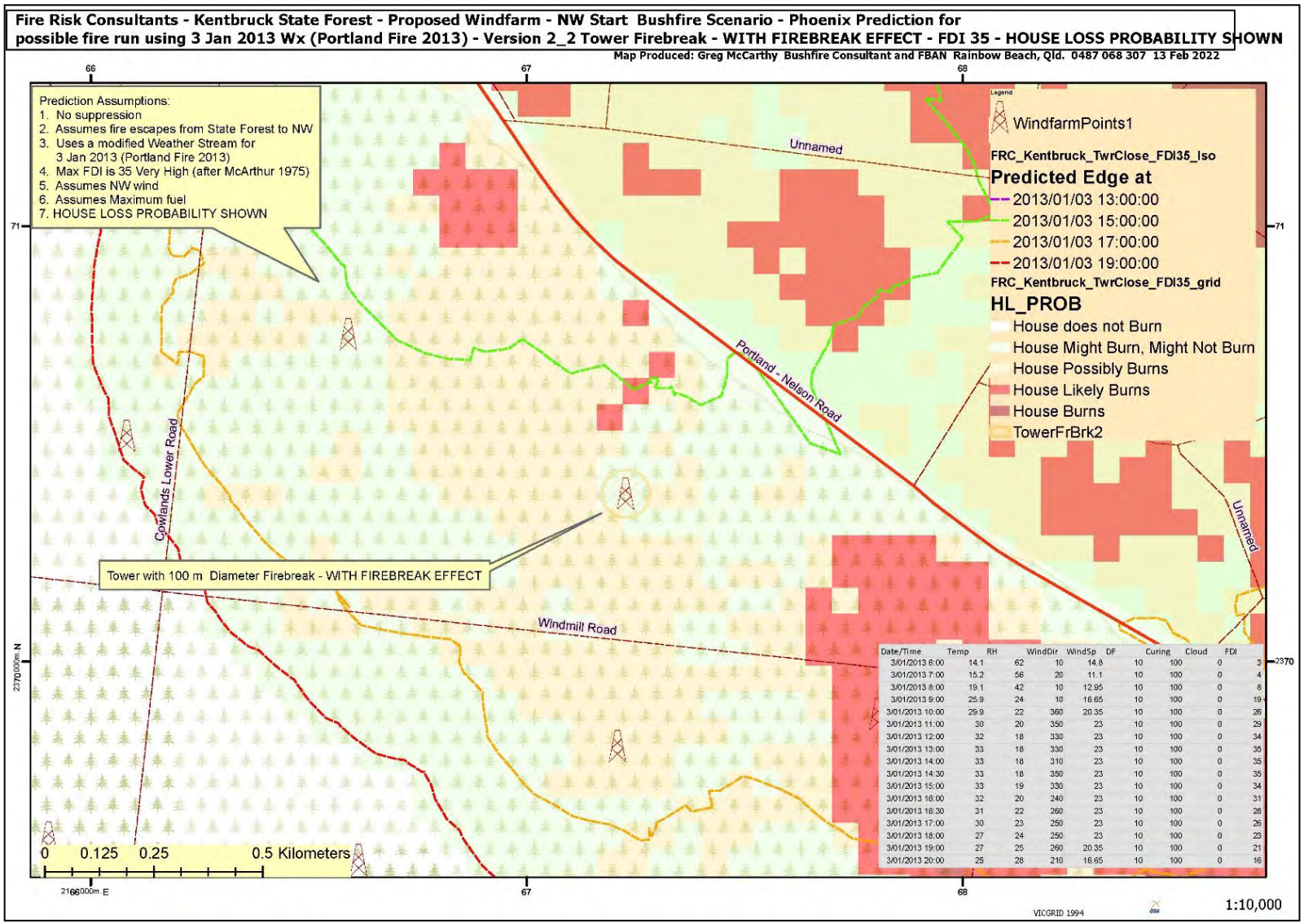


Figure 20 – House loss probability with firebreaks

9 RECOMMENDATIONS

The following recommendations are made based on the outcomes of the risk assessment, meeting the specifications outlined with the various guidelines and publications and good practice:

9.1 Construction phase

The following recommendations are made to ensure the bushfire risk is managed during the construction phase:

1. Develop an Emergency Management Plan that includes procedures for managing the risk from bushfire during the construction phase. As a minimum the plan must:
    a. Outline the procedures that must be undertaken against fire danger ratings.
    b. Outlines the induction and other training requirements for staff and contractors working at the site during the fire danger period.
    c. Includes all the information contained within CFA's Guidelines for Renewable Energy Installations (2023) pertaining to emergency management planning.
    d. Be developed in accordance with AS 3745.
    e. Establish emergency assembly areas.

2. Develop a communication system that operates during the fire danger period that provides the ability to contact all staff and contractors in the plantations to inform them of bushfire alerts and warnings.

3. Ensure that vegetation clearance is implemented prior to any works being undertaken at each turbine location and other infrastructure.

4. Appoint a fire watch position to each construction location during the fire danger period to monitor the surrounding area and to regularly ensure hot work activity is being managed safely.

5. Engage with local CFA Fire Brigades and offer regular familiarisation tours to support their understanding of the activities occurring.

6. Design all facilities and infrastructure to not be exposed to more than 12.5 kW/m² of radiant heat.

7. Provide vegetation clearance around the base of the wind turbines of 50 metre radius.

8. Surface the substation facilities to eliminate all vegetation including grasses.

9. Manage vegetation within any overhead electric line easement so that falling trees would not impact the transmission lines, towers and associated infrastructure.

10. Ensure all activities undertaken during the Fire Danger Period are appropriate under the CFA Act 1958, including:

a. compliance with Total Fire Ban Day restrictions

b. obtaining permits for any “hot work” activities.

11. Facilitate a high standard of communication with landowners, relevant stakeholders and the community regarding daily activities via a ‘steering committee’ or the like and an appropriate communication plan.

12. As each stage of the project commences, install the static water supply relevant to that set and ensure it is filled during the fire danger period. Ensure the static water supply is installed in accordance with the CFA Guideline.

13. Establish a primary contact person for the community to contact with concerns, questions or issues.

14. Ensure all access roads and tracks are identified and meet CFA and FFMVic Guidelines for emergency vehicle access.

15. Consider appropriate signs to assist emergency response crews determine track names, location and turbines etc.

16. In conjunction with the plantation companies, develop a fire response capability that as a minimum includes tanks and firefighting pumps fitted to vehicles during the fire danger period.

17. Any buildings or structures that meet the requirements to be addressed by the BMO or BPA will be constructed to the relevant BAL rating.

9.2 Recommendations for the operational phase

The following recommendations are made to address bushfire risk during the operational phase of the development:

1. Update the emergency management plan to cover the operational phase that includes:

    a. For unmanned sites, appropriate monitoring and intervention measures must be provided to ensure that any shorts, faults, off-gassing, temperature increases above normal parameters and equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any off-gassing, smoke or fire is notified to 000 immediately.

    b. Incorporate emergency procedures based on identified risks and hazards at the facility, as per CFA’s Guidelines. Emergency procedures are to include, but not be limited to:
        i. Bushfire/grassfire.
        ii. Wind turbine faults and fire.
        iii. Electrical infrastructure faults and fire.
        iv. Other dangerous goods spills/leaks.

c. The EMP is to incorporate a plan for partial and full decommissioning of the BESS in the event of an emergency incident that renders the facility inoperable or unsafe, prior to its anticipated end-of-life.

d. Procedures must incorporate activities prior to and during days of Catastrophic, Extreme and Very High fire danger rating and align with local planning including the Municipal Emergency Management Plan.

e. Procedures are to be developed and in place to identify and respond to the Fire Danger Ratings/Total Fire Ban status during the declared Fire Danger Period.

f. Procedures are to be developed and in place for detecting and responding to bushfire activity within 50km of the facility (e.g., through the VicEmergency website, or ABC local radio) including the ability to monitor for bushfire for at least three days in advance.

g. Advising non-essential personnel that site access is limited on days of Very High and above Fire Danger Ratings.

h. Limiting non-essential activities on days of Very high and above Fire Danger Ratings.

i. Including bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.

j. As a minimum, excludes all unnecessary work on Catastrophic days.

k. Outlines the induction and other training requirements for staff and contractors working at the site during the fire danger period.

l. Specifies that firefighting activities should not be undertaken in the cleared area surrounding the turbine towers under elevated fire danger conditions.

m. Includes all the information contained within CFA's Guidelines for Renewable Energy Installations (2021) pertaining to emergency management planning.

n. Is developed in accordance with AS 3745.

o. Establish emergency assembly areas.

2. Develop a Fire Management Plan (FMP) for the facility. The FMP may form part of the broader EMP. The FMP is to consider fire risks to and from the site and detail the control measures (systems, activities and accountabilities) for the prevention and management of fire.

3. The FMP is to include but not be limited to:
   a. Monitoring for fire in the area.
   b. Vegetation and fire break management across the wind farm, substation and associated areas.
   c. Wind turbine monitoring and servicing.
   d. Peat presence and management.

e. Fire protection systems and equipment inspections and servicing.

f. Hot work permits/processes and other ignition control mechanisms.

g. Internal access roads, gates and fencing maintenance.

4. Install fire detection systems, in built fire protection and suppression systems, remote alarming and notification systems in turbines to report potential bushfire risks. Ensure this is connected to the SCADA system that also monitors other inputs that may indicate fire risks.

5. Where possible, install cameras on selected turbines to increase landscape situational awareness to provide early warning of bushfires.

6. Establish remote shut down procedures for turbine operations during bushfires or reported faults, or at the request of the emergency services.

7. Install lightning conductors to dissipate electricity to ground and reduce turbine damage and bushfire risk.

8. Undertake regular inspections and maintain records of all turbines, the substation, and power lines (including easements).

9. Develop bushfire preparedness audits to record all “annual” fire danger season preparedness activities and prevention works.

10. Manage vegetation within any overhead electric line easement so that falling trees would not impact the transmission lines, towers and associated infrastructure.

11. Ensure suitable firefighting equipment is available onsite or readily accessible (as per response plan).

12. Ensure the maintenance of APZs around turbines and buildings.

13. Ensure all access roads and tracks are maintained to meet industry standards for emergency vehicle access.

14. Ensure Neoen management vehicles carry firefighting water and basic fire equipment during the declared Fire Danger Period.

15. Install static water supplies at strategic locations across the development with 45,000 litres installed in each set.

9.3 Recommendations to assist bushfire operations

The following recommendations are provided to support the Proponents integration with existing bushfire operations:

1. Develop a response plan and suppression strategies to assist firefighters understand the risks associated with fires in turbines.

2. Liaise with the local CFA Brigades and Groups to assist with familiarising them with the operations and infrastructure.

3. Provide liaison person to support incident management during bushfires.
4. Shut down turbines in the vicinity of reported fires to support firefighting operations.

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Appendix A – GTFP – existing fire access tracks/fire break

FIRE RISK Consultants

Appendix B – Transmission Line options

Background

Section 3.4 of the Scoping Requirements for Kentbruck Green Power Hub Environment Effects Statement requires that the Project's EES document the likely environmental effects of the Project's feasible alternatives, including routes and configurations for the transmission line. The depth of investigation should be proportionate to the potential of the alternatives to minimise potentially significant adverse effects and to meet the Project objectives.

This appendix describes the feasible transmission line alternatives that have been considered by Neoen for this Project, and the potential effects of each alternative. The preferred option for the Project, referred to as "Option 1B", has been assessed in detail in this report, so is not subject to any further assessment in this appendix. Instead, this appendix considers the potential environmental effects of the following transmission line alternatives (see Figure 21):

- Option 1A ("Heywood Underground-Overhead Combined": Follows the same route as Option 1B (the preferred option) underground through Cobboboonee National Park / Forest Park, however it then transitions to an overhead transmission line for the remainder of the alignment to the Heywood Terminal Station.
- Option 2A ("Portland Overhead"): A wholly overhead option that connects to the existing Heywood-Portland 500 kV line north of Portland. Runs southeast from the wind farm site through rural landholdings. No final route was determined for this option as landowner agreements were unable to be secured for the entire length of transmission line. This option therefore includes several route options.
- Option 2B ("Portland Underground"): Follows the same route as Option 2A but is wholly underground.

A full description of each option is provided in Section 8.2.4.

Transmission line Project objectives

The fundamental objective of the Project is to provide a source of clean, renewable energy to help power homes and businesses in Victoria and throughout eastern Australia which are connected to the National Electricity Market (NEM). Neoen's environmental and social objectives for the Project, as described in Section 2.2 of the EES, stem from the need to develop the Project in accordance with the principles of ecologically sustainable development. Neoen's objectives relating specifically to the transmission line component of the Project are to:

- Deliver renewable electricity from the Project to the NEM
- Seek opportunities to co-locate infrastructure with existing compatible land uses such as existing easements and transport routes
- Avoid or minimise potential adverse impacts on the natural environment
- Avoid or minimise potential adverse impacts on Aboriginal and historical heritage
- Avoid or minimise potential adverse impacts on nearby residents associated with visual amenity, noise, traffic, and air quality
- Avoid impacts to business and commercial operations

- Avoid or minimise potential impacts on productive agricultural land
- Avoid or minimise the risk of bushfire
- Ensure an appropriate land use outcome by avoiding areas of sensitivity and potential land use conflicts
- Be able to obtain necessary agreements with landowners and land managers to install and operate infrastructure
- Be able to obtain planning and environmental approvals from all necessary authorities
- Provide a constructable and cost effective grid connection.

Umwelt (2023) has prepared a Transmission Line Options Assessment which describes all the transmission line options considered by Neoen to date, including those which were not found to be viable and were removed from the Project before the EES process commenced or very early in the EES process. The Options Assessment uses an objective, criteria-based approach to assessing each option. The assessment criteria and scoring metrics were developed in accordance with the transmission line objectives provided above.

This appendix describes the potential impacts of the feasible transmission line options identified in the options assessment report, providing information for use by Umwelt in the options assessment in relation to the related criteria.

Description of the alternative transmission line options

The Project being pursued by Neoen, and subject to full impact assessment in this report, comprises a preferred transmission line route as described in Section 8.2.4 of this report (underground through Cobboboonee National Park and Forest Park, and farmland to the Heywood Terminal Station – Option 1B). An alternative configuration to this option has also been considered by Neoen, which follows the same route as Option 1B, however it involves an overhead section between Cobboboonee Forest Park and the Heywood Terminal Station.

Two other options which were identified as feasible in the Transmission Line Options Assessment but are no longer being pursued by the Project due to a lack of landowner and community support, are Options 2A and 2B which run southeast from the wind farm site and connect to the Heywood-Portland 500 kV line north of Portland. Option 2A is wholly overhead, while Option 2B is wholly underground.

The three transmission line options are described as follows:

- Option 1A: The underground transmission line would extend east from the main wind farm substation and traverse Cobboboonee National Park and Forest Park beneath an existing road. From there, the transmission line would transition to an overhead line as it travels through freehold land to reach Heywood Terminal Station.
- Option 2A: The overhead transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing. This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.
- Option 2B: The underground transmission line would extend southeast from the main wind farm substation and traverse several freehold rural landholdings used primarily for grazing.

This option would require development and construction of a new terminal station adjacent to the existing Heywood-Portland 500 kV line north of Portland.

The three options are shown in Figure 21.

Figure 21 - Transmission Line Options (Umwelt)