

Chapter 12: Bushfire

Environment Effects Statement



12 Bushfire

12.1 Introduction

This chapter summarises the potential bushfire impacts with consideration to the construction, operation and decommissioning of the Victoria to New South Wales Interconnector (VNI) West (Victorian Component) (the Project). This chapter describes how impacts will be avoided, minimised or managed and summarises the outcomes of *Technical Appendix E: Bushfire*.

The north-west of Victoria is considered to be a bushfire prone area (BPA), where bushfires have historically occurred and are likely to occur in the future. The risk of a bushfire is typically heightened when summers follow dry winters and springs, resulting in vegetation becoming dry and easier to burn.

To minimise bushfire risk, the Project has avoided locating infrastructure in forested areas such as state and national parks, and areas of denser vegetation covered by a bushfire management overlay (BMO). Bushfires are more likely to occur in these areas and are likely to be more intense. Across the entire 240 km Proposed Easement, there is an interaction of up to approximately 2 km with the BMO.

As such, the dominant vegetation type surrounding the Project is grassland which presents a less severe bushfire risk when compared with areas of dense vegetation. Grassland vegetation can generally be safely treated with planned burning during the spring and autumn months which reduces the risk of bushfire ignition.

The Project has also avoided areas of steep topography where possible, as bushfires generally spread faster uphill. Across the 240 km Proposed Easement, the Project experiences little variation in elevation. In its southern extent, the Project has avoided the hills of the Northern Grampians (including Mount Bolangum) and avoids Kara Kara National Park, where there are steeper topographic changes.

Bushfires originating within the Proposed Easement, as well as external to the Project, can impact on farming properties, adjacent communities and Project assets. Therefore, to understand bushfire related impacts the following has been assessed:

- The potential for bushfire ignition during construction and operation of the Project
- The ability to suppress a bushfire in proximity to the Project

Construction of the Project is expected to take approximately 3.5 years and consist of multiple working fronts. The introduction of construction plant, equipment and vehicles to the region would result in an elevated risk of bushfire ignition.

The overall residual impact of bushfire ignition during construction remains high due to the existing bushfire prone environment. EPRs are proposed which, when correctly implemented, would reduce the ability for a bushfire to ignite and spread. These EPRs include a Construction Bushfire Mitigation and Management Plan (CBMMP) to be developed in consultation with the Country Fire Authority (CFA) and relevant fire authorities. The CBMMP will include policies and procedures to manage hot works and works during elevated fire danger periods and specify strict construction standards for temporary workforce accommodation areas.

Construction activities are not expected to impact bushfire suppression. The Project would provide improved access opportunities for firefighting resources. Any potential disruptions caused by construction vehicles to bushfire suppression resources would be managed by a CBMMP and a Construction Fire Emergency Management Plan (CFEMP).

The risk of bushfire ignition would decrease during operation, relative to the construction phase of the Project, due to a reduction in plant, equipment and vehicles. It is considered unlikely that the transmission line infrastructure itself would cause a bushfire.

The residual impact of bushfire ignition remains high in the context of an existing bushfire-prone environment. The implementation of EPRs would reduce the likelihood of bushfire ignition. A feasibility assessment will be undertaken for the installation of bushfire detection technology, such as smoke detection cameras.

During operation, the potential for impact on aerial bushfire suppression resources (airplanes and helicopters) is considered unlikely as aerial firefighting operators are suitably trained and both on-ground and aerial resources would be able to safely fight a bushfire in proximity to the Proposed Easement. While there would be a risk of bushfire interaction with the proposed transmission line infrastructure, both the risks associated with exposure of transmission line infrastructure to dense smoke and infrastructure damage during a bushfire were determined to be low.

Decommissioning of the Project would involve the same, or similar, issues as those associated with the construction of the Project. Similar to the construction phase of the Project, it is expected that during decommissioning, there would be an increased amount of plant, vehicles and equipment, representing additional sources of ignition.

As the Project would be located in a BPA, an assessment against Clause 13.02-1S of the relevant planning schemes was undertaken. The objective of Clause 13.02-1S is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.

Overall, it was found that the Project has been designed to avoid or minimise bushfire hazard, despite the inherent bushfire risk in the region. EPRs are proposed to further reduce the likelihood and severity of bushfire hazard, and to protect human life and communities surrounding the Project. While the bushfire risk profile changes through the stages of construction and then operation of the Project, there is no net increase in the overall bushfire risk due to the ability to manage bushfire ignition risk during construction activities.

12.2 Assessment scope

The scoping requirements provided by the Minister for Planning for the Project set out the specific environmental matters to be investigated and documented in this EES. The scoping requirements inform the extent and scope of each EES technical study. The following issue was identified in the scoping requirements with respect to bushfire:

- Implications of the Project for fire risk management or bushfire suppression on surrounding land, including fire ignition risks arising from the Project.

The scoping requirements identified bushfire risk as a high priority for investigation. This was due to concerns regarding the ability to effectively manage and fight fires in proximity to transmission lines and associated infrastructure.

Technical Appendix E: Bushfire was prepared in support of this EES. The technical appendix provides more detailed information on the investigation and impact assessment conducted in response to the EES scoping requirements.

This chapter should be read in conjunction with other relevant EES chapters where those studies address overlapping impact pathways or shared receptors, or inform related EPRs, monitoring requirements, or management responses. EES chapters related to this assessment are listed in Table 12-1.

Table 12-1 Related EES chapters relevant to bushfire

EES Chapter	Description
<i>EES Chapter 13: Climate change</i>	Details climate change implications for areas traversed by the Proposed Easement with bushfire implications relevant to Project design and potential bushfire impacts.
<i>EES Chapter 23: Land use planning</i>	Details potential impact on land use and planning associated with the construction, operation and decommissioning of the Project, which includes consideration of planning clauses relating to bushfire.
<i>EES Chapter 26: Ecology</i>	Details ecological values in and around the Proposed Easement including values associated with bushfire prone areas.
<i>EES Chapter 21: Aviation</i>	Refers to engagement with CFA in relation to aerial firefighting.
<i>EES Chapter 24: Social</i>	Details community concern around the perception that powerlines could increase bushfire ignition risk.
<i>EES Chapter 18: Traffic and transport</i>	Considers the requirement to ensure adequate access and minimal delays for emergency vehicles reaching the worksite in the event of a bushfire.

12.3 Methodology

To respond to the scoping requirements in Section 12.2, the bushfire impact assessment undertook the following methodology:

- Definition of a study area (refer to section 12.5) and desktop assessment of bushfire risk indicators using available data and mapping. This review includes:
 - Regional weather and topography
 - Fuel hazard mapping
 - Predominant land use
 - Review of the legislative framework, including planning scheme overlays
 - Developing a detailed understanding of construction and operation of the asset, as it relates to bushfire likelihood and consequence
 - Bushfire history
- Engagement with key stakeholders as required
- Field assessment to confirm the information collected during the desktop assessment, including land use and inspection of Crown Land Reserves in the study area and their fuel loads
- Engagement of an accredited Fire Behaviour Analyst (FBAN) to model possible bushfire scenarios
- Assessment of bushfire risk in the study area with consideration to the existing environment and modelled bushfire scenarios
- Assessments against Clause 13.02-1S of the relevant planning schemes for the Project and the four workforce accommodation areas being assessed in the EES.
- Assessment of bushfire related impacts during construction, operation and decommissioning of the Project
- Identification of EPRs where necessary to address potentially significant environmental impacts

12.1.1.1 Avoidance and minimisation

The Proposed Easement was selected based on a combination of feedback from landholders, community members, Traditional Owners, government agencies and other stakeholders, as well as technical, engineering and environmental assessments. The selection process was based on the principles of:

- Avoiding environmental sensitivities wherever practicable
- Minimising potential impacts
- Maintaining technical integrity

An evaluation framework was developed for the Project, where key environmental considerations were identified and used to evaluate proposed options for the Project. The evaluation framework, which was applied consistently throughout Project development, is detailed in *EES Chapter 6: Assessment framework*.

For the bushfire impact assessment, the following evaluation framework criteria are relevant:

- Avoid placing infrastructure within 5 km of major townships

- Avoid locating Project infrastructure within 300 m of a known dwelling as per the setback recommendations outlined in the Australian Energy Infrastructure Commissioner's 2022 Annual Report for 500 kV transmission lines
- Avoid location of infrastructure in national parks, state forests, state parks, nature conservation reserves, wildlife reserves and other protected areas
- Avoid high bushfire risk areas (heavily wooded areas, sloped topography) where practicable
- Avoid the following sensitive overlay where practicable:
 - Bushfire Management Overlay (BMO)
- Avoid the following sensitive zones where practicable:
 - Public Use Zones (PUZ)
 - Public Conservation and Recreation Zones (PCRZ)
 - Public Park and Recreation Zones (PPRZ)

By following these criteria, the Project has been able to avoid and minimise interaction with areas of high bushfire risk and has thus minimised the potential for bushfire related impacts to the extent practicable.

While the approach to avoidance and minimisation in this section relates to the bushfire assessment undertaken for the Proposed Easement and surrounding landscape, the broader route refinement process through which the Proposed Easement was identified is described in *EES Chapter 3: Project development and alternatives* and *EES Chapter 6: Assessment framework*. Those chapters describe the evaluation framework used during Project development, including consideration of bushfire risk and avoidance of high bushfire risk areas, including heavily wooded areas and sloped topography, where practicable.

12.4 Summary of stakeholder and community engagement

Discussions with community stakeholders including local Councils and Traditional Owners commenced as early as 2023, during the early stages of the Project.

On 13 November 2025 and again on 4 March 2026, the proponent team and bushfire specialists met with CFA to discuss the bushfire impact assessment. CFA expressed that they were pleased with the engagement and the Project's approach to avoidance and minimisation. CFA recognised the challenges during Project construction, particularly during high fire danger days. It was agreed that engagement with CFA would be ongoing and that EPRs may evolve. Over the course of the Project's community engagement, the following issues were raised:

- Bushfire ignition
- Bushfire suppression and emergency response
- Potential for high voltage, 500 kV transmission lines to result in the ignition of a bushfire
- Ability for bushfire suppression activities (both on-ground and aerial) to fight fires around Project infrastructure
- Concern about the preparedness and ability of local CFA volunteers to fight fires in the broader study area
- Concern that roads and access tracks within and around the Proposed Easement may be temporarily closed, restricted or rendered impassable during construction and potentially operation of the Project

These issues have been discussed and assessed in this bushfire assessment. A summary of all stakeholder and community engagement is presented in *EES Chapter 7: Stakeholder and community engagement*.

12.5 Study area

The study area relevant to this assessment is presented in Figure 12-1, Figure 12-2 and Figure 12-3. The study area comprises the Proposed Easement and a 20 km buffer around it.

The inclusion of a 20 km buffer from the Proposed Easement is consistent with the conditions of a bushfire hazard landscape assessment in accordance with Clause 13.02-1S. The study area enables assessment of existing landscape conditions relevant to bushfire, as well as the direct and indirect bushfire-related impacts of the Project.

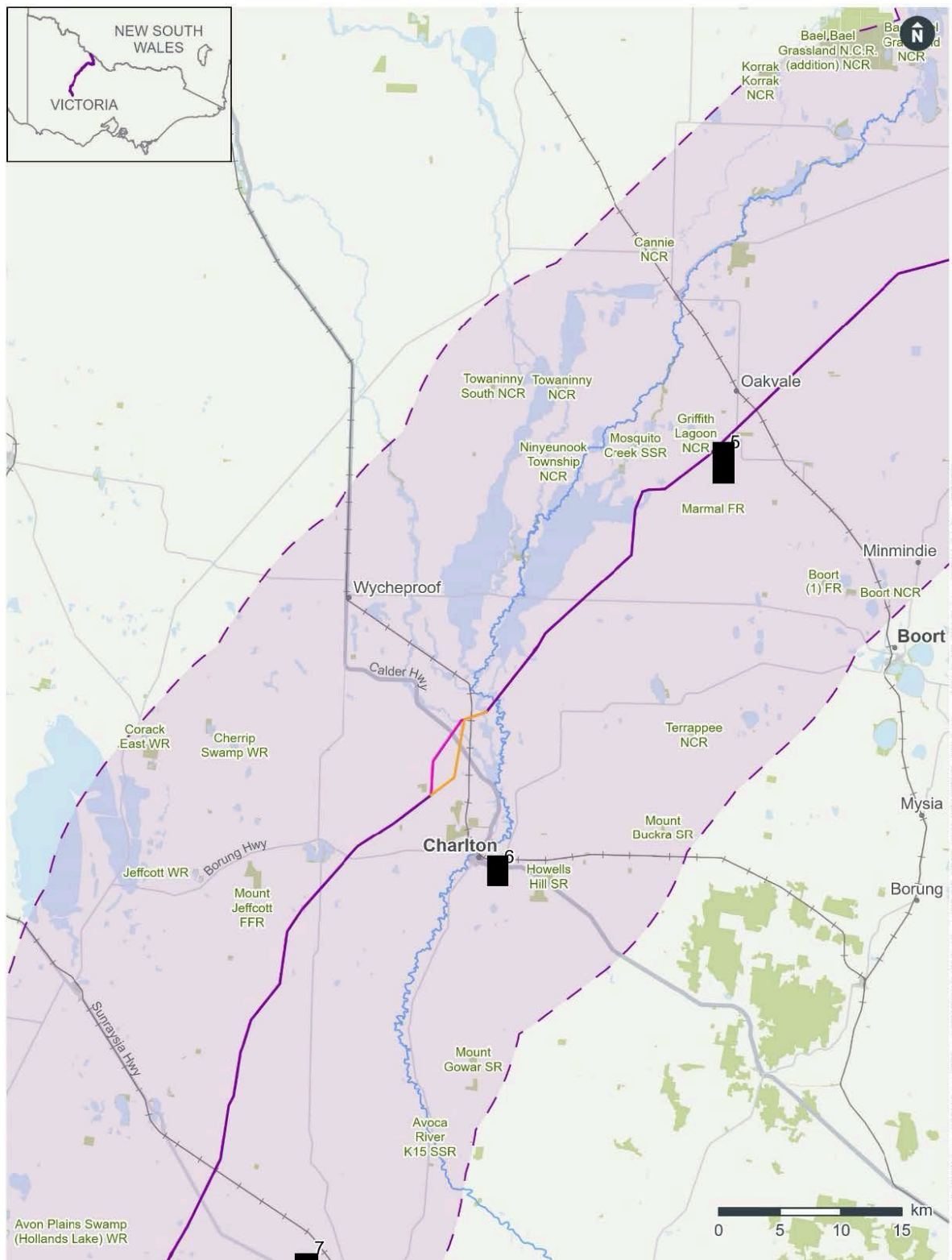
The study area also includes isolated sites outside of this buffer, such as the nine construction laydown areas and/or workforce accommodation areas. In accordance with Clause 13.02-1S, a buffer of 10 km was applied to workforce accommodation sites to assess existing landscape conditions.



LEGEND

- | | |
|---|--|
| Proposed Easement | Study Area |
| Proposed Easement Option | Combined Laydown Area and Workforce Accommodation Site |
| Proposed Easement Option | Laydown Area |
| Proposed 220kV Easement | |

Figure 12-1 Bushfire study area (1/3)

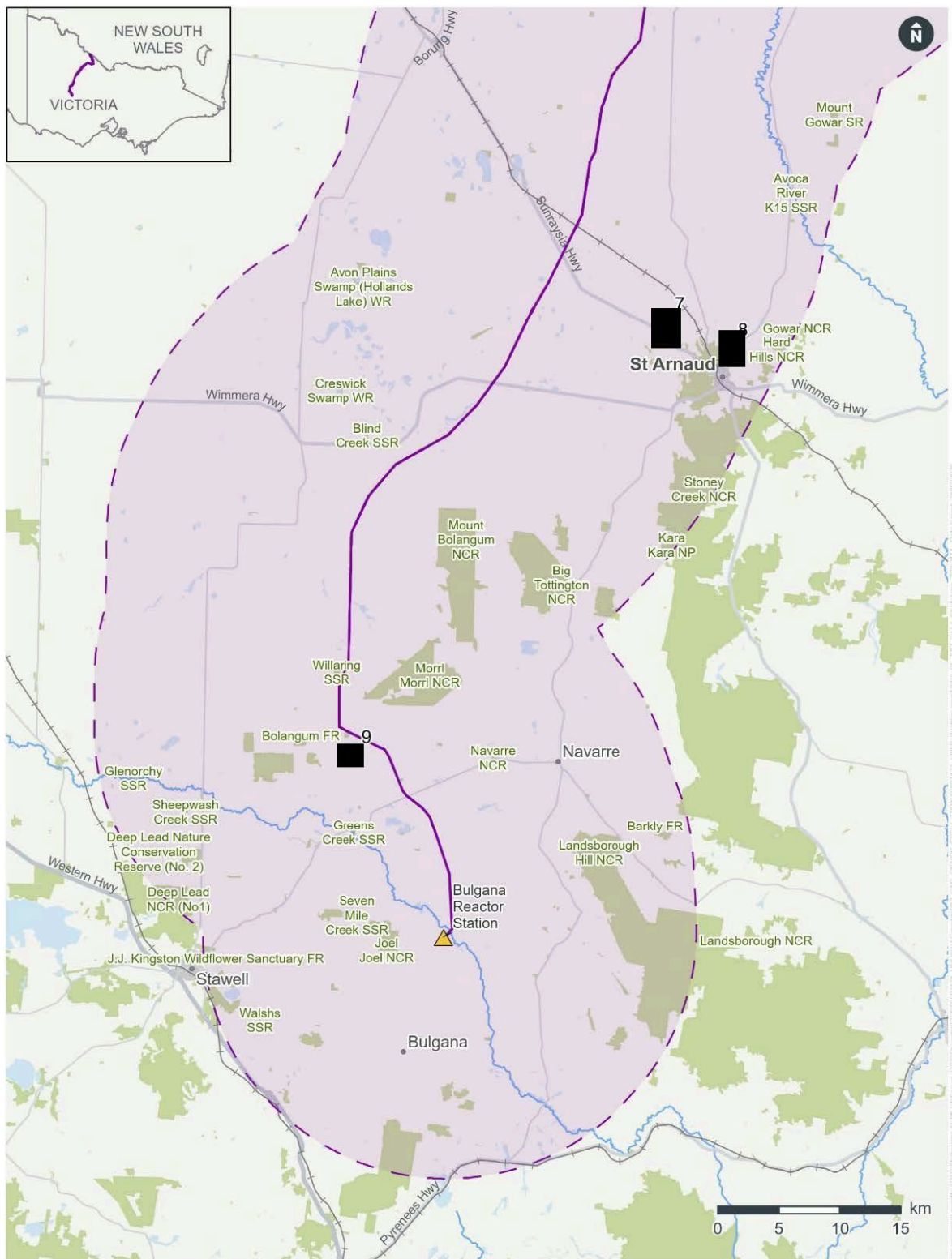


LEGEND

- Proposed Easement
- Proposed Easement Option
- Proposed Easement Option
- Study Area
- Combined Laydown Area and Workforce Accommodation Site
- Laydown Area

VicGrid
AECOM

Figure 12-2 Bushfire study area (2/3)



LEGEND

- Proposed Easement
- Study Area

- Combined Laydown Area and Workforce Accommodation Site
- Laydown Area

VicGrid
AECOM

12.6 Existing environment

South-east Australia is one of the most bushfire-prone areas of the world. The term bushfire relates to all fires involving vegetation, including grassfires. Bushfire encompasses terms such as grassfire and wildfire.

A comprehensive study was undertaken to understand the existing environment of the study area to inform the bushfire impact assessment. Three key factors impact the rate at which bushfire can spread. These are weather, topography and fuel hazard (fuel hazard is the type of potentially combustible vegetation consumed during a bushfire, contributing to its behaviour; the land use of an area influences the fuel hazard).

While the Project would be located in a bushfire prone environment, it has avoided areas that heighten bushfire risk, namely areas of steep topography and areas of dense, forest vegetation.

This section describes these components and summarises bushfire risk within the study area.

12.6.1 Weather

Extreme fire conditions, during which bushfire risk is heightened, typically occur when summer follows dry winters and springs. These seasonal conditions dry out vegetation, increasing the availability of fuel for a bushfire. Together, these factors can result in fires of high intensity that may be difficult to control, even in areas with relatively low fuel loads. Strong, gusty winds can cause the bushfire to move quickly and to change direction where there is a change in wind direction. Typical fire weather in the study area includes north-westerly winds which change to south-westerly winds. Wind speed and air temperature typically rise during north-westerly conditions and typically peak just before the arrival of a south-westerly wind change.

Data from Bureau of Meteorology (BoM) weather stations in Kerang (Station ID 080023) and Ararat (Station ID 089085) has been used in the bushfire assessment. Kerang is representative of the northern portion of the Proposed Easement and Ararat of the southern portion. Data from Stawell Aerodrome (Station ID 079105) has also been considered as it is closer to the southern end of the Proposed Easement than Ararat, noting that it has a shorter climate dataset (from 1996) than Ararat (from 1969). There are no significant differences in the data from Ararat and Stawell which would impact the bushfire impact assessment outcomes.

Around Kerang, mean maximum temperatures recorded between 1903 and 2024 range from 14.3 degrees Celsius in July to 31.8 degrees Celsius in January. Mean maximum temperatures exceed 25 degrees Celsius between November and March. The mean wind speed within the Kerang area varies between 10 to 15 km/hr throughout the year. During the summer months, the mean wind speed reaches 14.6 km/hr.

Around Ararat the mean maximum temperatures recorded between 1969 and 2024 range from 11.8 degrees Celsius in July to 27.2 degrees Celsius in January. Mean maximum temperatures between December and February exceed 25 degrees Celsius. The mean wind speed within the Ararat area varies between 15 to 20 km/hr throughout the year. During the summer months, the mean wind speed reaches 17.9 km/hr.

Within the Stawell area, mean maximum temperatures recorded between 1996 and 2026 range from 12.5 degrees Celsius in July to 29.5 degrees Celsius in January. Mean maximum temperatures exceed 25 degrees Celsius between December and March. The mean wind speed around Stawell reaches 17.8 km/hr during the summer months.

The Victorian bushfire season typically occurs between the end of October and start of May. With consideration to climate data in the study area, this period coincides with strong winds and increased temperatures.

12.6.2 Topography

Topography can influence bushfire behaviour by influencing wind patterns, the accumulation of vegetation and fuel, the speed and direction of bushfire spread and the presence of natural firebreaks. Fires generally spread faster uphill due to the preheating of fuel by radiant heat, compared to downhill.

The surface elevation of the study area falls from approximately 230 m Australian Height Datum (m AHD) in the south to approximately 70 m AHD in the north, over an approximate length of 240 km.

Overall, the Proposed Easement experiences relatively minor changes in topography, in comparison to the broader study area. The southern half of the Proposed Easement skirts around the hills of the Northern Grampians (including Mount Bolangum) and avoids Kara Kara National Park to the east, where there are steeper topographic changes. Between St Arnaud and Bulgana, the Proposed Easement experiences the most variation in topography (refer to Figure 12-6).

The northern half of the Proposed Easement is in the open river plains which are predominately flat. This means that the study area has minimal variation in elevation (refer to Figure 12-4).

12.6.3 Fuel hazard

In Victoria, two vegetation types affect the spread of bushfires: grass vegetation and forest vegetation.

Bushfires that primarily consume grass are predominately wind driven and spread rapidly under the influence of strong winds. These bushfires typically consume fine fuels such as grass, leaves, dead pine needles and twigs that readily ignite when dry. These bushfires typically burn at a lower intensity and flame height and burn out quickly.

Bushfires in forested vegetation typically have access to greater fuel loads, including trees, bark, shrubs and grasses. Although wind speeds are generally lower within forests, fully developed forest fires can produce greater flame heights and intensities than fires that primarily consume grass. Land use within the study area therefore influences the nature and level of fuel hazard present.

The Project has largely avoided forest vegetation and would predominately traverse agricultural land used for cropping and fodder. In accordance with Australian Standard AS3959 Building in bushfire prone areas (2018), the dominant vegetation type in the study area is Class G – Grassland. This is representative of the mostly agricultural land use of the Proposed Easement. In northern and western Victoria, crops are generally most at risk of fire from late spring to early summer, prior to harvest. This risk period is typically characterised by dry conditions, extreme heat and high winds which can enable fires to spread rapidly.

A Bushfire Management Overlay (BMO) is applied to land in bushfire-prone areas with very high and extreme bushfire hazards and is typically associated with densely vegetated areas, including public land reserves. The Proposed Easement has limited interaction with land subject to a BMO, reflecting the Project's general avoidance of more densely vegetated areas which typically present a higher bushfire hazard. Across the entire 240 km Proposed Easement, approximately 2 km intersect land subject to a BMO.

These interactions are presented in Figure 12-4, Figure 12-5 and Figure 12-6, noting that there is a very limited, if any, interaction between the BMO and the central portion of the Proposed Easement:

- At the Murray River, the Project interfaces with a BMO associated with its riparian habitat (Figure 12-4)
- The Proposed Easement intersects a small portion of the BMO to the north of the Greens Creek laydown/workforce accommodation area (Figure 12-6)
- In proximity to the Bulgana Reactor Station, there is a BMO associated with the Wimmera River (refer to This area is characterised by its riparian zone and primarily woodland type vegetation (Figure 12-6)

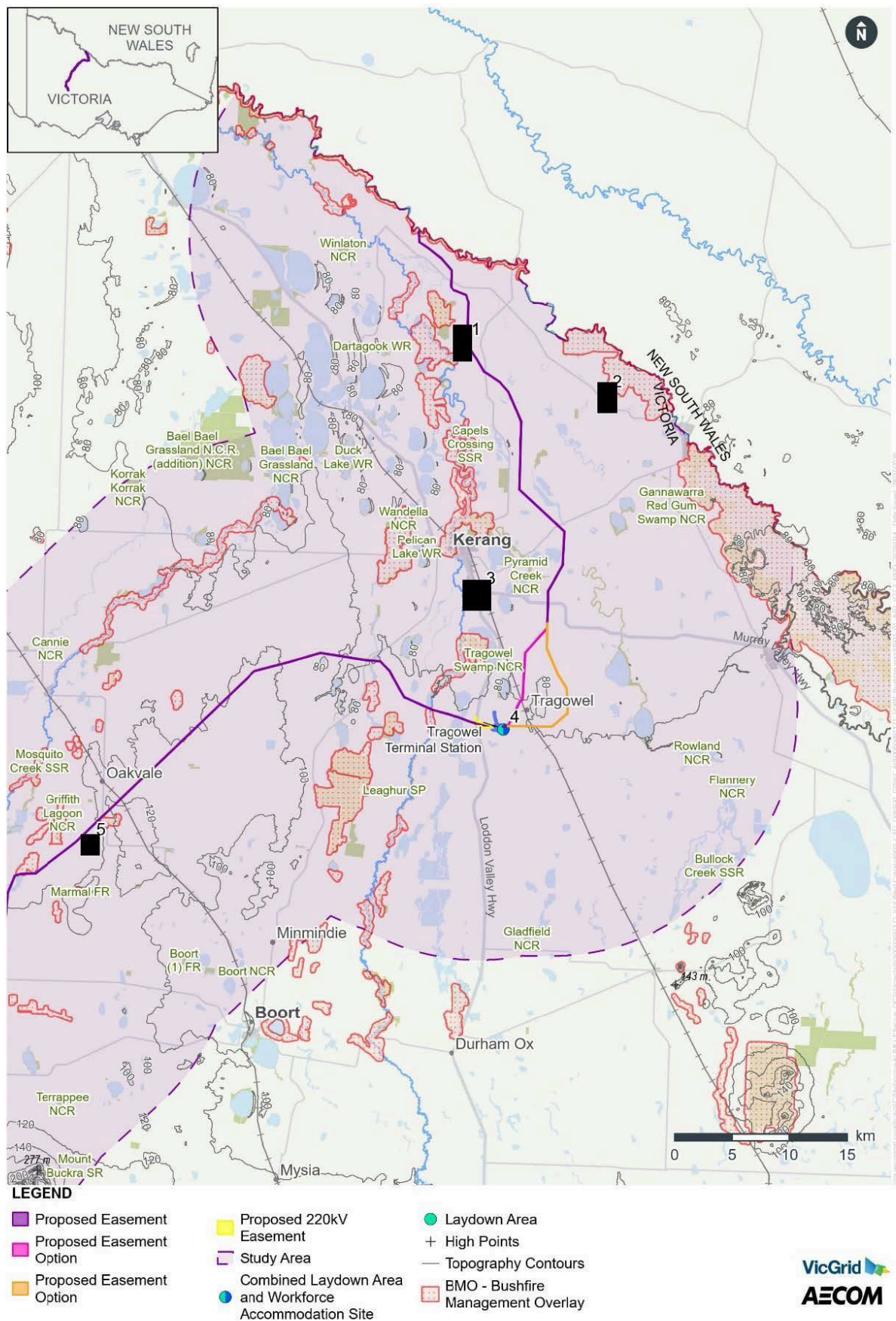


Figure 12-4 BMO surrounding the Project (1/3)

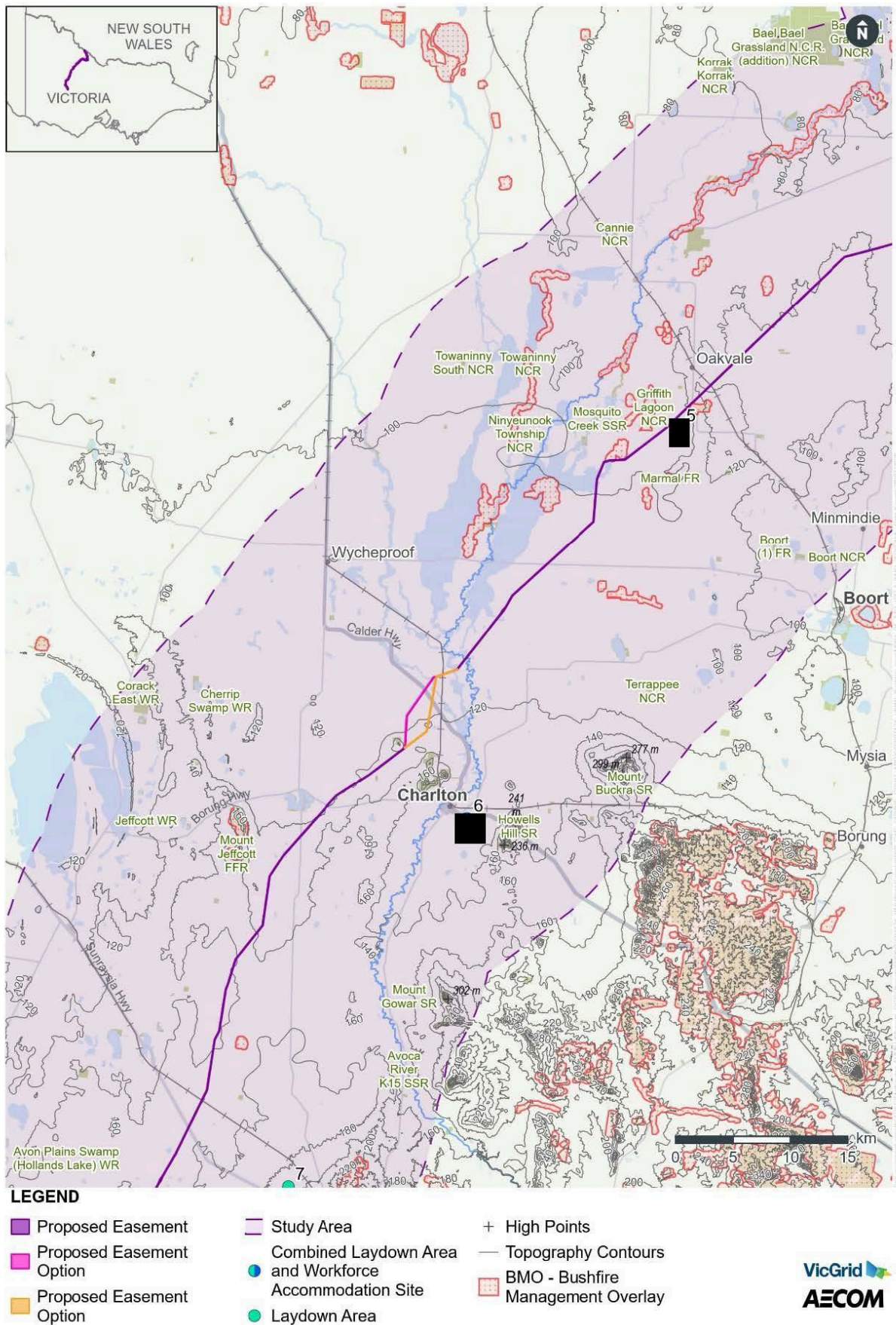
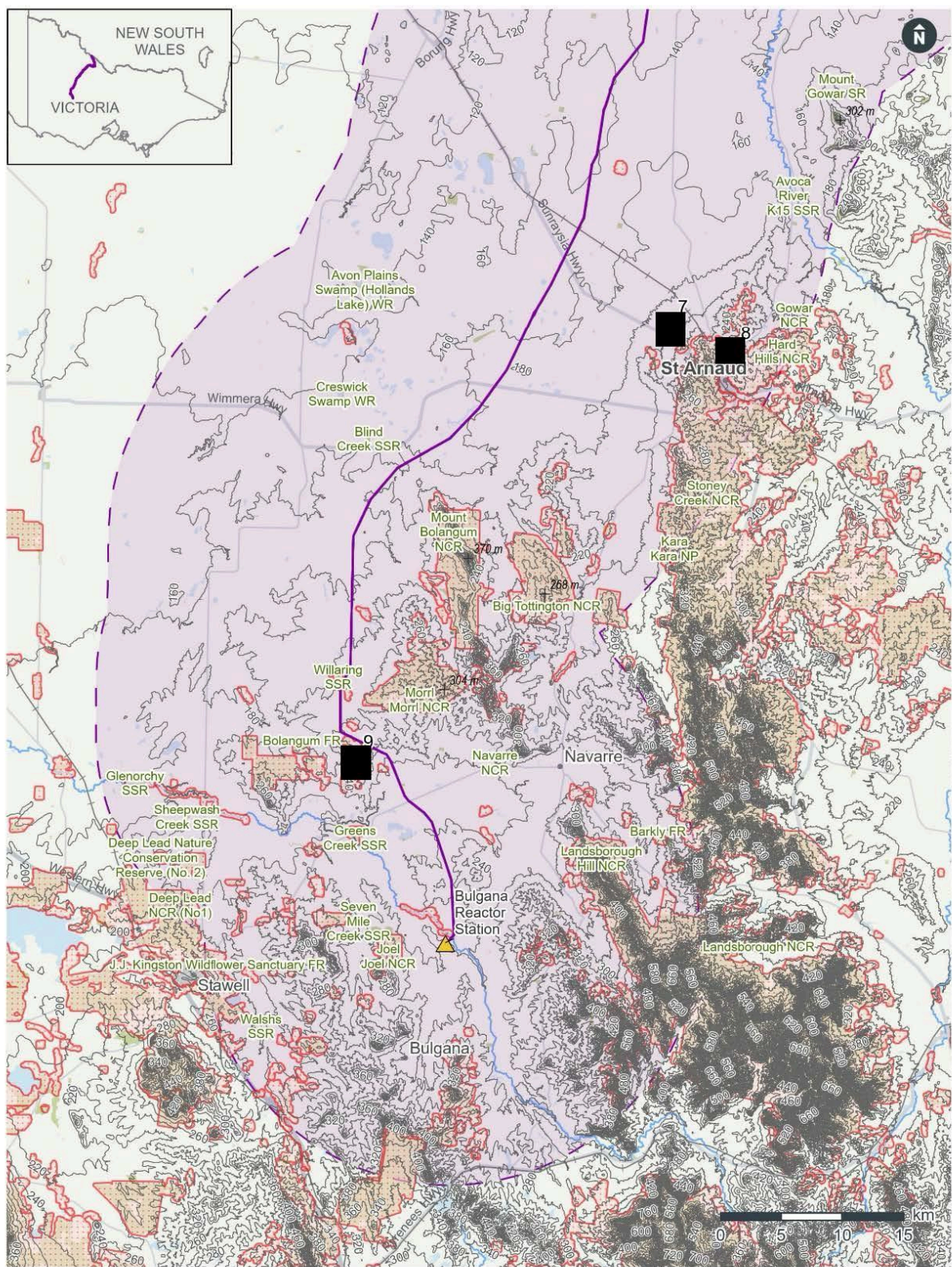


Figure 12-5 BMO surrounding the Project (2/3)



LEGEND

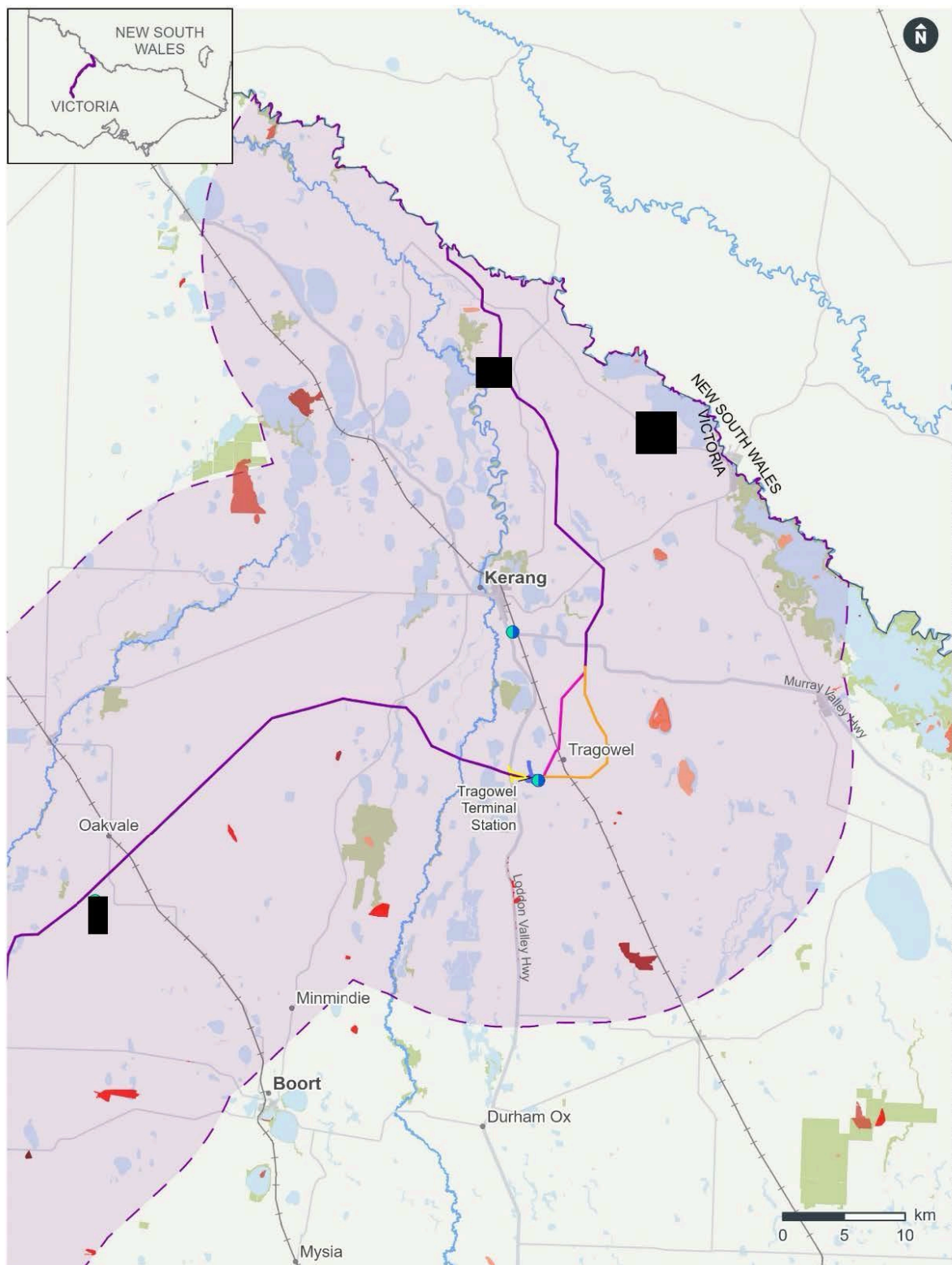
- | | | |
|-------------------|--|---------------------|
| Proposed Easement | Combined Laydown Area and Workforce Accommodation Site | High Points |
| Study Area | Laydown Area | Topography Contours |
| | BMO - Bushfire Management Overlay | |

VicGrid
AECOM

Figure 12-6 BMO surrounding the Project (3/3)

12.6.4 Bushfire history

The area surrounding the Project has experienced significant bushfires over the past 40 years. According to data from the Department of Energy, Environment and Climate Action (DEECA), a greater amount of historic bushfire activity exists beyond the study area, in the southern section of the Project. This aligns with the presence of forested public land reserves (refer to Figure 12-7, Figure 12-8 and Figure 12-9).



LEGEND

- Proposed Easement
- Proposed Easement Option
- Proposed Easement Option
- Proposed 220kV Easement
- Study Area

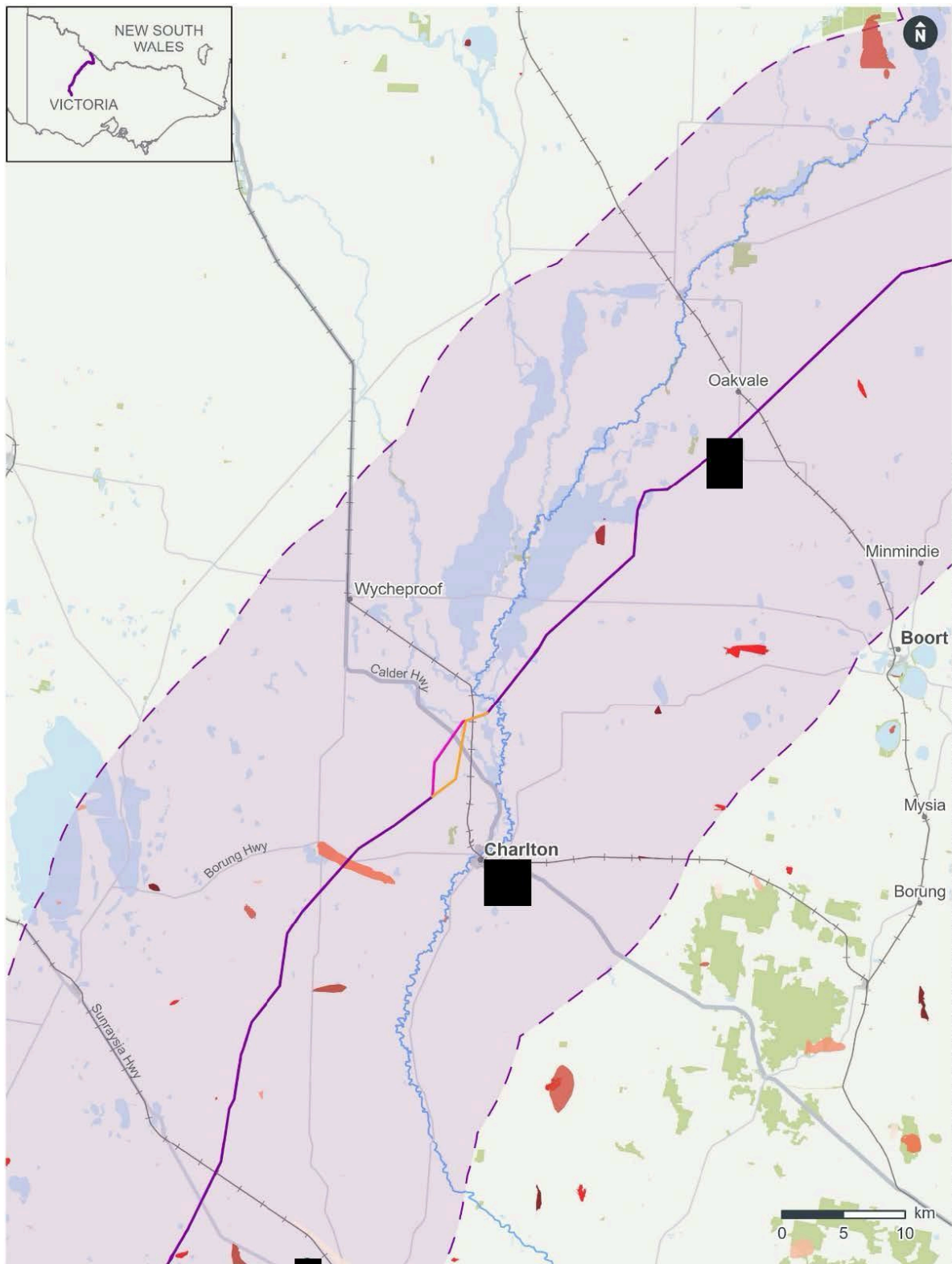
- Combined Laydown Area and Workforce Accommodation Site
- Laydown Area

Bushfire History

- 1970 - 1979
- 1980 - 1989

- 1990 - 1999
- 2000 - 2009
- 2010 - 2014
- 2015 - 2017
- 2018 - 2019
- 2020 - 2021
- 2022 - 2023

Figure 12-7 Bushfire history (1/3)



LEGEND

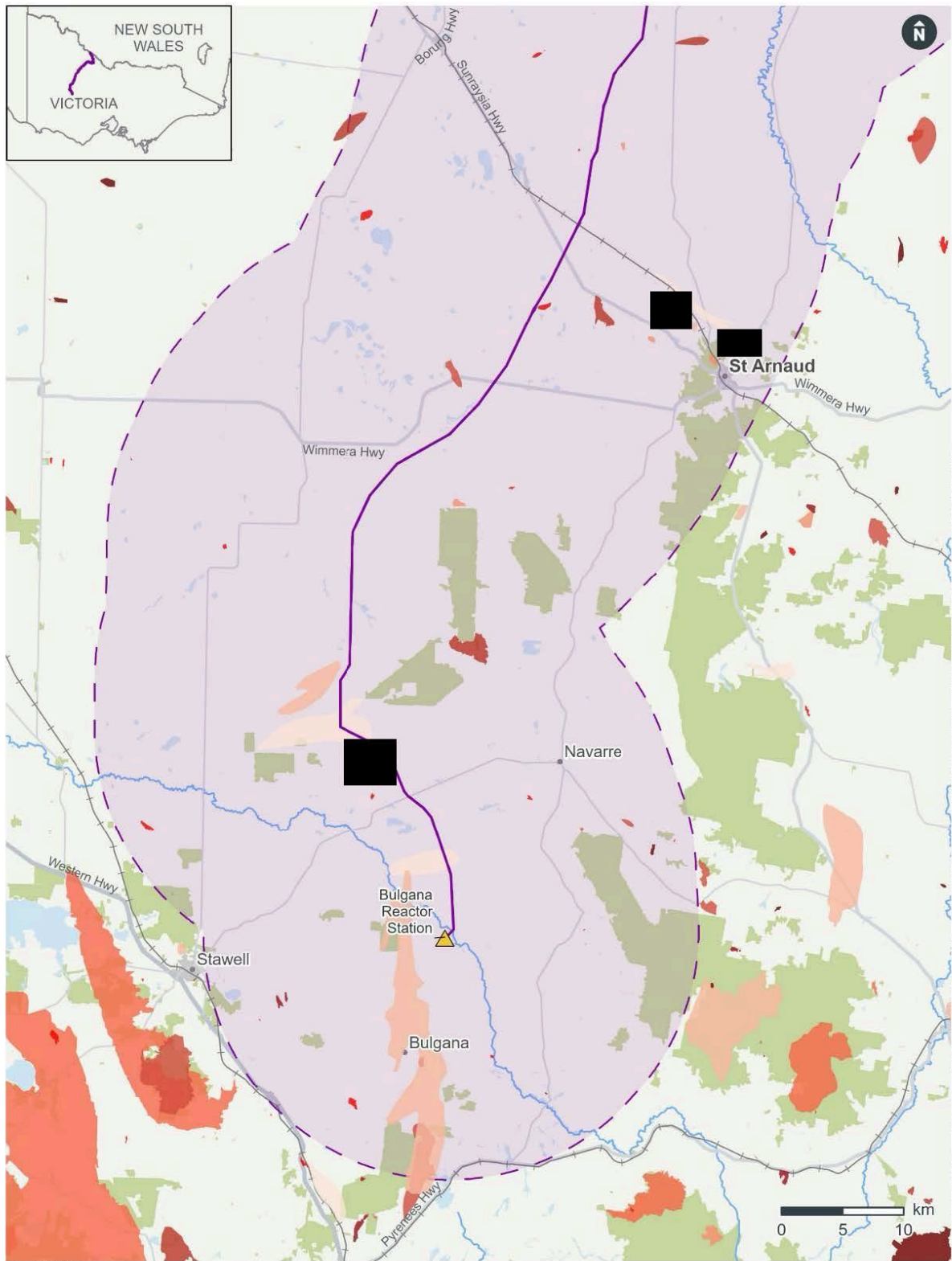
- Proposed Easement
- Proposed Easement Option
- Proposed Easement Option
- Study Area
- Combined Laydown Area and Workforce Accommodation Site
- Laydown Area

Bushfire History

- 1970 - 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2009

- 2010 - 2014
- 2015 - 2017
- 2018 - 2019
- 2020 - 2021
- 2022 - 2023

Figure 12-8 Bushfire history (2/3)



LEGEND

Proposed Easement

Study Area

Combined Laydown Area and

Workforce Accommodation Site

Laydown Area

Bushfire History

1970 - 1979

1980 - 1989

1990 - 1999

2000 - 2009

2010 - 2014

2015 - 2017

2018 - 2019

2020 - 2021

2022 - 2023

VicGrid
AECOM

Figure 12-9 Bushfire history (3/3)

The middle and northern sections of the study area have experienced lower bushfire activity typically associated with the predominant agricultural land use. The majority of recorded bushfires in these areas are indicative of grassland environments. The bushfire footprints are generally narrow and influenced by prevailing wind conditions.

Overall, while historic bushfire activity is not an indication of future bushfire activity, Figure 12-7, Figure 12-8 and Figure 12-9 demonstrate that the Proposed Easement has avoided forested areas and areas of heightened bushfire risk to the extent practicable.

12.6.5 Bushfire suppression capability

The landscape surrounding the Proposed Easement is supported by an extensive network of CFA fire stations, each equipped with firefighting appliances and supported by established resource escalation processes. In the event of a bushfire, initial response crews can request additional resources, with further support coordinated through agency and multi-agency control centres that manage incidents and arrange the deployment of personnel and equipment as required. Firefighting operations are also supported by established water supply arrangements, including permanently located water tanks, pre-identified water sources such as dams, mobile water tankers, and specialised appliances designed to rapidly replenish firefighting vehicles. As a result, fires occurring in landscapes containing transmission infrastructure are routinely responded to by CFA and other agencies, including Forest Fire Management Victoria (FFMVic), using established operational procedures and coordinated response arrangements. Where required, aerial firefighting resources may also be deployed to support ground-based suppression activities.

According to CFA Victoria, the Proposed Easement would traverse three CFA district boundaries:

- District 16, which encompasses the townships of Ararat and St Arnaud
- District 18, which encompasses the township of Charlton
- District 20, which encompasses the townships of Kerang and Murrabit

CFA dispatch model

CFA operate a dispatch model that allows for an escalation of firefighting resources. The escalation can be triggered by a request from the initial responding crews to increase suppression resources, or by a central command if a firefighting resource does not respond in an allotted amount of time. The escalation model also applies to firefighting aircraft that are automatically dispatched when the conditions of a bushfire require aerial response.

CFA have an extensive network of fire stations surrounding the Project. All of these fire stations have at least one firefighting vehicle, with CFA brigades at major towns, such as St Arnaud, having multiple firefighting vehicles.

Within the study area, an initial bushfire response would be expected from several fire stations. If the conditions of the bushfire deem it necessary, the escalation process can be triggered to ensure the support of additional resources, including aerial resources. Firefighting crews are supported by the broader CFA network, as well as other agencies such as Fire Rescue Victoria and FFMVic, who can provide resources as required.

Bushfire related firefighting operations are routinely conducted in the vicinity of transmission lines and other utility infrastructure throughout Australia. Victoria currently hosts over 6,500 km of transmission lines and CFA has standard operating procedures in place for how their members can work safely around transmission infrastructure. CFA is experienced in fighting fires around transmission lines. CFA operational procedures advise maintaining a safe working distance of at least 25 m from transmission lines when fighting fires. Methods and approaches used to fight these fires vary depending on the forecast weather conditions, fire behaviour and location. While there are restrictions in conducting firefighting operations near transmission lines there are alternatives to using water in firefighting, including the use of heavy machinery to remove fuel such as grass, bushes and scrub from the land to stop the fire from reaching assets such as transmission lines, buildings and other critical infrastructure.

With regard to aerial bushfire suppression, while transmission infrastructure presents a recognised hazard that requires ongoing management, it is a common feature of the aerial firefighting environment and is routinely accommodated through established operational controls and pilot decision-making processes.

A summary of CFA brigades surrounding the Project, as well as State Emergency Services, is presented on Figure 12-10, Figure 12-11 and Figure 12-12.

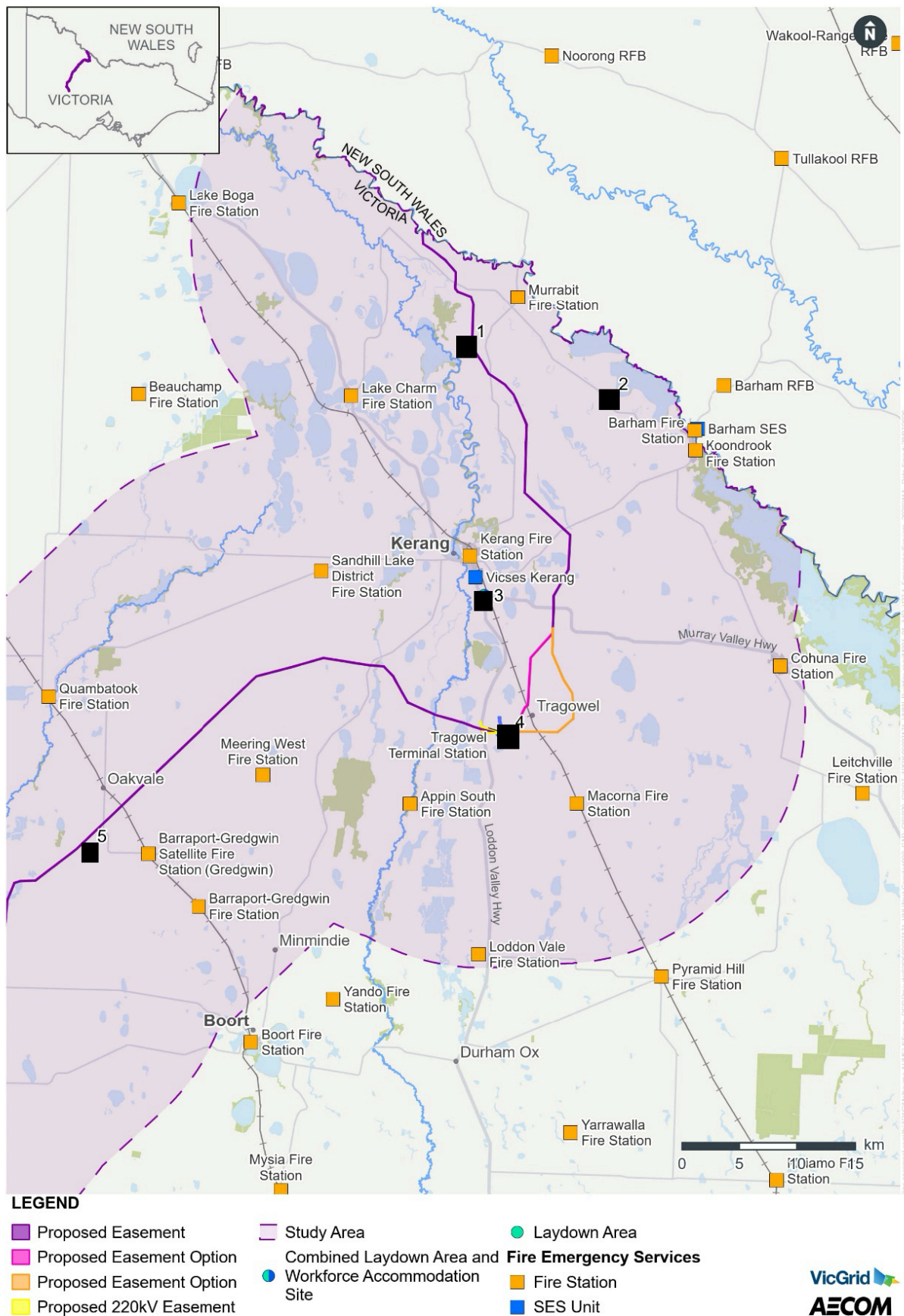


Figure 12-10 Surrounding bushfire suppression capability (1/3)

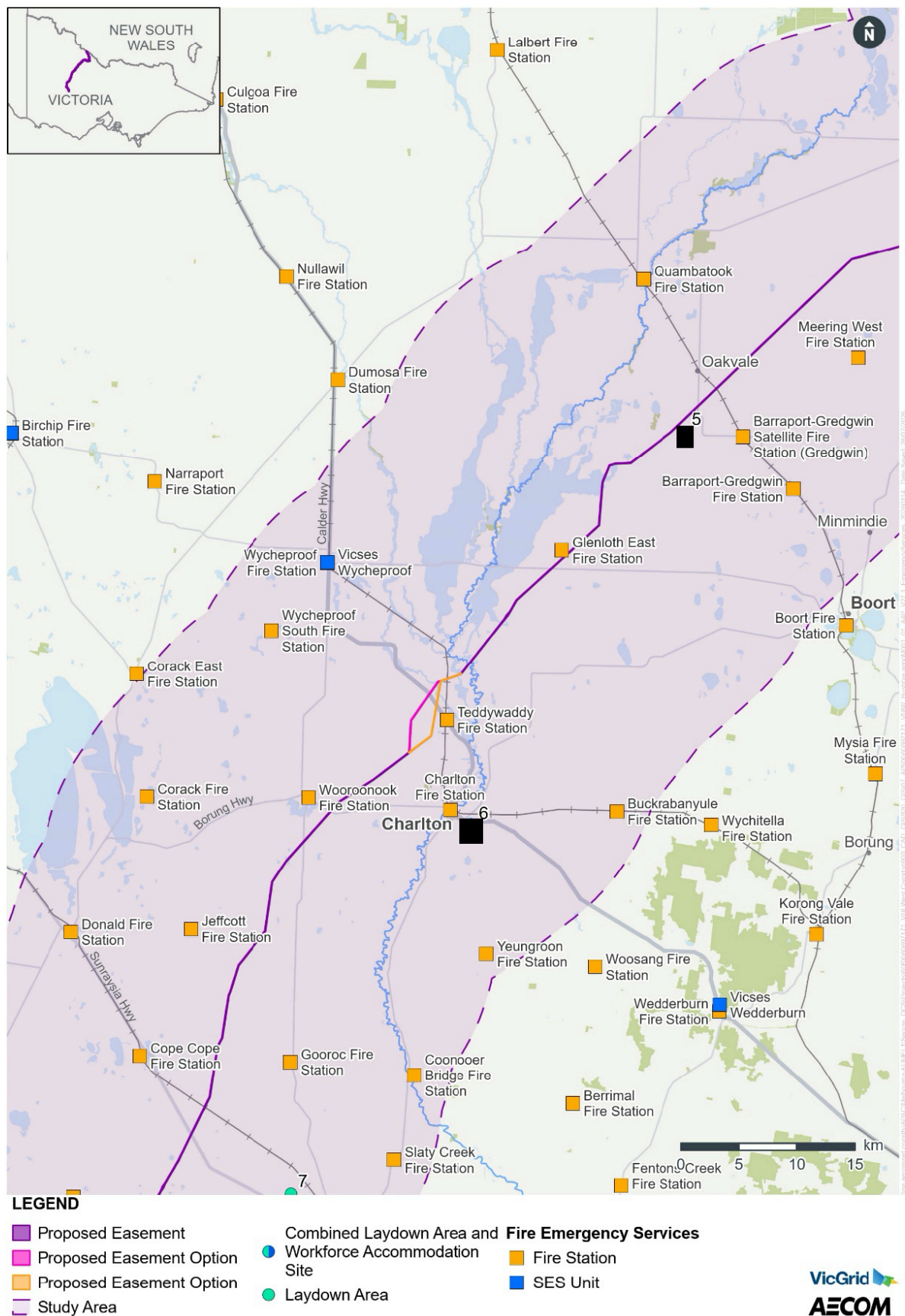
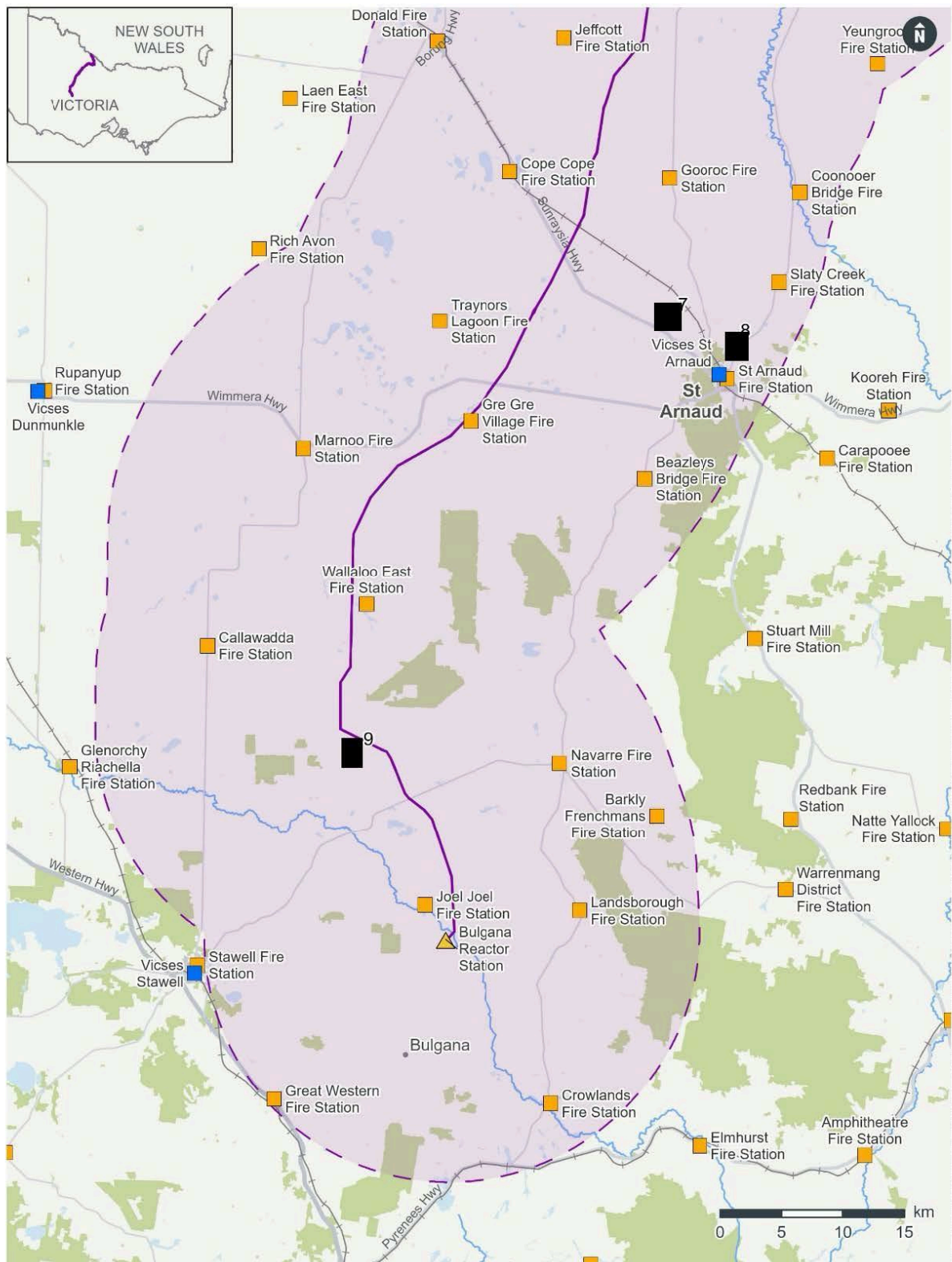


Figure 12-11 Surrounding bushfire suppression capability (1/3)



LEGEND

- Proposed Easement
- Study Area
- Laydown Area
- Fire Emergency Services
- Combined Laydown Area and Workforce Accommodation Site
- Fire Station
- SES Unit

VicGrid
AECOM

Figure 12-12 Surrounding bushfire suppression capability (1/3)



Key definition

Smoke-induced arcing refers to the phenomenon where smoke from a fire can act as a conductor, leading to electrical arcs from transmission lines to the ground. This can occur due to the conductive properties of smoke and heat, which can create a conductive path that increases the risk of flashovers, especially in high-voltage environments.

12.6.6 Aerial fire suppression

Aerial firefighting is an important component of bushfire management, supporting prevention, preparedness, response and recovery activities. In Australia, both fixed-wing aircraft and helicopters are used for a variety of firefighting and support roles, each with distinct capabilities and limitations. As bushfires become more frequent, intense and prolonged due to climate change, aviation assets are playing an increasingly critical role in supporting fire suppression efforts during bushfire emergencies. Aerial firefighting is most effective when integrated with coordinated ground-based firefighting operations.

Aerial firefighting is conducted in a complex and dynamic environment that presents a range of operational hazards. These include strong winds, smoke, reduced visibility, congested airspace, rugged terrain, fire-induced weather, and obstacles such as powerlines and other infrastructure.

Typically, to manage these hazards, aerial firefighting operators implement comprehensive training programs, detailed operational procedures, and robust safety management systems. Fire agencies and aviation providers work collaboratively to develop standard operating procedures, undertake risk assessments, and establish safe work practices. In addition to these controls, pilots continuously assess risks throughout each phase of flight, with particular attention given to identifying hazards such as powerlines, weather conditions and visibility constraints.

The impact of the Project on aerial fire suppression during construction and operation is discussed in Sections 12.8 and 12.9.

12.6.7 Transmission line fire safety

Publicly available information does not identify any documented examples of transmission lines directly causing bushfires in Victoria or elsewhere in Australia.

The Victorian Fire Risk Register (VFRR) identifies transmission lines as assets with varying levels of bushfire risk. Heavy smoke generated by bushfires can, under certain circumstances, affect transmission line operation by causing faults or temporary outages.

Bushfire smoke contains particulate matter, ash, moisture and combustion products that can alter the electrical properties of the surrounding atmosphere. In exceptional circumstances, these conditions may contribute to electrical discharge events, flashover or temporary transmission line faults.

There are currently no widely accepted methodologies in Australia for quantitatively assessing smoke conductivity or the likelihood of smoke-induced arcing. Documented Australian examples are extremely limited, with the 2007 Tatong Bushfire in Victoria being one of the few recorded instances where intense bushfire conditions and heavy smoke were associated with transmission line outages. Even in this case, investigations did not conclusively identify smoke-induced arcing as the sole cause of the faulting.

Section 12.9 discusses the potential for the Project to result in bushfire ignition during Project operation, bushfire interaction with transmission infrastructure and the ability to fight fires around transmission infrastructure.

12.6.8 Bushfire risk within the study area

Understanding the predicted bushfire behaviours and the factors influencing fire spread allows for the effective assessment and management of potential bushfire impacts.

Predictive modelling of bushfire behaviour was undertaken using *Phoenix RapidFire*, a best practice model which can predict the potential progression of a bushfire across a landscape, under different weather and fire suppression scenarios.

Phoenix RapidFire predicted how a bushfire could spread from seven potential ignition points within the study area, with consideration to variables including:

- Terrain and fuel at the point of ignition and along spread paths. This variable considers fire history, vegetation and modelled fuel accumulation.
- Prevailing weather conditions (north-westerly and south westerly winds).

Given that the dominant vegetation type within the study area is grassland, the seven ignition points along the Proposed Easement were modelled using a very high and extreme grass fire danger index (GFDI).

Grass fire danger index – Grass fire danger index (GFDI) expresses fire risk and behaviour for grass fuels. Inputs include temperature, relative humidity, average wind speed at 10 m and fuel condition. GFDIs of 35 and 75 were used as modelling inputs.

The modelling undertaken as part of this assessment considered bushfires:

- With ignition points originating external to the Project
- With ignition points originating within the Proposed Easement

Key observations of the *Phoenix RapidFire* modelled scenarios were that:

- Fire suppression using a combination of ground and aerial resources would be required.
- Where there is an increased rate of spread or where a fire enters a forest environment, there would be a greater reliance on aerial suppression
- Fire intensity and flame height increase as fires enter forested areas noting that forested areas surround the study area in the southern portion of the Proposed Easement

Outcomes of the *Phoenix RapidFire* modelling indicated that from a fire behaviour and consequence perspective, the potential severity and spread of bushfires within the study area does not increase as a result of the presence of the Project and that the bushfire risk to the proposed Project and surrounding landscape is comparable.

Bushfires originating from both within the Proposed Easement and external to the Project can impact on farming properties, adjacent communities and Project assets. The severity of the bushfire would depend on the location of the ignition point and the prevailing weather conditions at the time.

The modelling provides important context regarding bushfire behaviour and potential consequences within the existing landscape but it does not assess the likelihood of bushfire ignition occurring due to Project activities, that is, due to construction and operational activities.

The outcomes of the modelling have been used to understand the potential consequences of the following bushfire impacts, which are directly related to the presence of the Project:

- Bushfire ignition due to Project construction activities (Section 12.8.1)
- Bushfire ignition due to Project operational activities including the potential for transmission line infrastructure to ignite and cause a bushfire (Section 12.9.1)
- The ability to suppress a fire around the Project both during construction (Section 12.8.2) and operation (Section 12.9.3)

The outcomes of the modelling have also been used in the assessment of the Project against Clause 13.02-1S of the planning scheme (Section 12.7).

12.7 Clause 13.02-1S assessment

In Victoria, the *Planning and Environment Act 1987* authorises the Victoria Planning Provisions (VPP) and planning schemes. The VPP contains a range of zones, overlays, and other provisions that guide the development of land within Victoria. Clause 13.02-1S (Bushfire) of the VPP applies to planning and decision-making relating to land that is:

- Within a designated Bushfire Prone Area (BPA)
- Subject to a Bushfire Management Overlay (BMO)
- Proposed to be used or developed in a way that may create a bushfire hazard

The objectives of Clause 13.02-1S are to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. Consistent with Clause 13.02-1S, *Technical Appendix E: Bushfire* considered the following Clause 13.02-1S strategies for the Project:

- Protection of human life
- Bushfire hazard identification and assessment
- Settlement planning
- Protection of human life
- Areas of biodiversity conservation value
- Use and development control in a bushfire prone area

Clause 13.02-1S includes the requirements to consider bushfire hazard identification and assessment at the following scales:

- The site¹ for the development
- Neighbourhood conditions (400 m from the site)
- Local conditions (1 km from the site)

¹ 'Site' is terminology from Clause 13.02-1S. In this case the "site" is considered to be the entire Project footprint, that is the Proposed Easement, Tragowel Terminal Station, Bulgana Reactor Station and each of the nine laydown and/or workforce accommodation areas.

- Landscape conditions (20 km from the site and potentially up to 75 km from the site)

The outcomes of the Clause 13.02-1S assessment for the Project are discussed in Section 12.7.1. The 13.02-1S was undertaken for the Project as a whole but detailed 13.02-1S assessments were also undertaken for each of the proposed workforce accommodation areas:

- [REDACTED]
- The Tragowel Terminal Station
- [REDACTED]
- [REDACTED]

For the purposes of the workforce accommodation landscape assessments the landscape conditions assessment was undertaken up to 10 km from each site due to their location in a low-risk landscape.

The outcomes of the four Clause 13.02-1S workforce accommodation assessments are discussed in Section 12.7.6. Details of these assessments can be found in *Technical Appendix E: Bushfire*, specifically Appendices F, G, H and I of that appendix.

12.7.1 Bushfire hazard identification and assessment

At a site and neighbourhood scale the construction phase represents the highest risk of bushfire ignition. This is due to the fact that there would be personnel, plant and equipment present for Project construction, resulting in a greater risk of ignition. During operation of the Project personnel, plant, and equipment numbers would be lower and therefore the risk of ignition would be lower than during the construction phase.

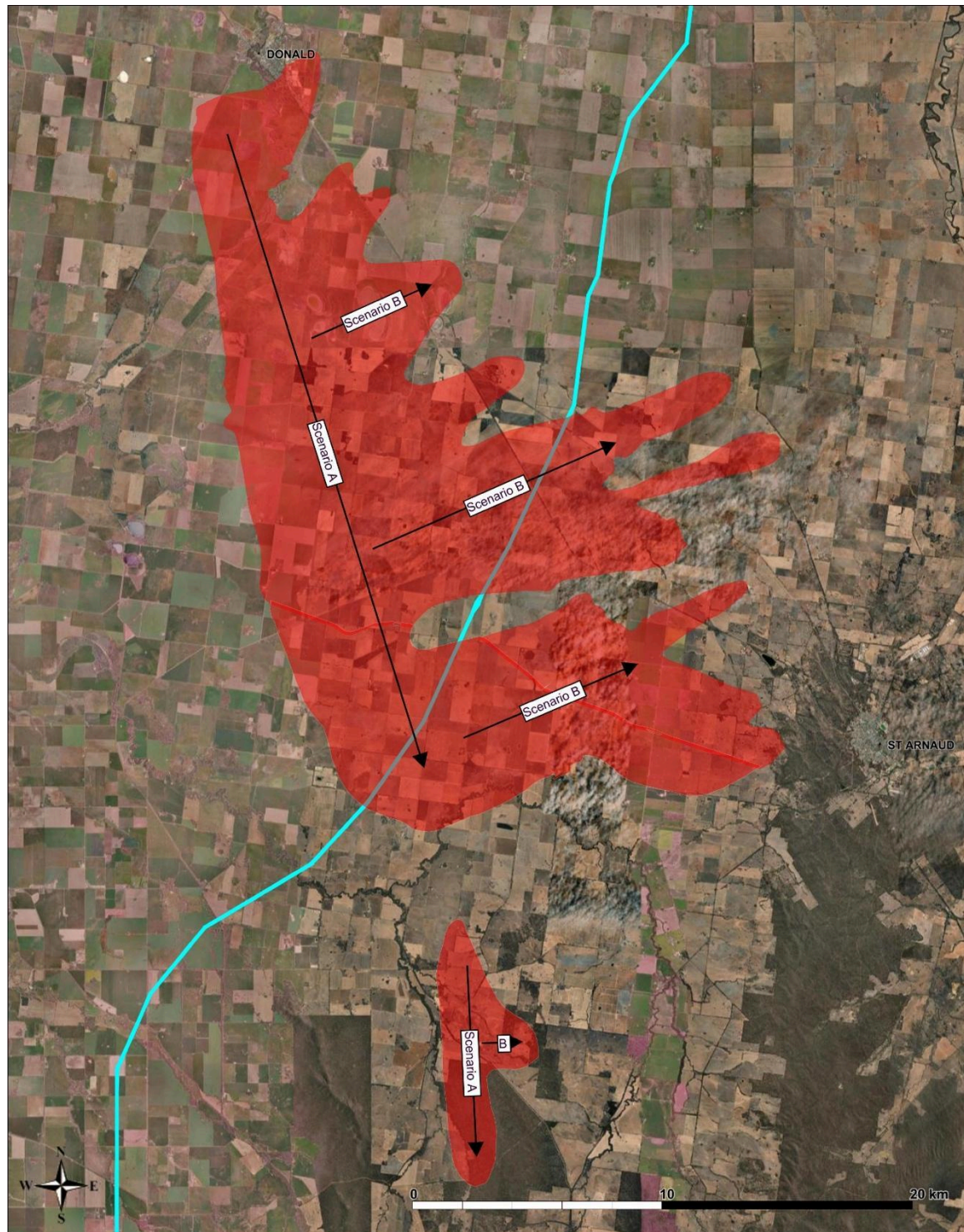
At a local scale (within 1 km of the Proposed Easement), the surrounding landscape is predominantly grassland associated with agricultural land uses, with limited areas of treed vegetation that exhibit forest or woodland characteristics. The Proposed Easement has been refined to largely avoid areas subject to a BMO, resulting in limited interaction with BMO land within 1 km of the Proposed Easement. Despite this avoidance, there remains potential for bushfire ignition within the grassland landscape surrounding the Proposed Easement. Under strong wind conditions, bushfire can spread rapidly across open grassland. Bushfire behaviour in these environments is strongly influenced by fuel characteristics (including fuel load, moisture content, continuity and arrangement) and prevailing wind conditions.

At a landscape-scale bushfire hazard is influenced by the presence of grassland associated with farming activities and some forested areas. These forested areas are associated with public land reserves and vegetated areas around waterways. The presence of the surrounding road network and the high level of vegetation fragmentation that is associated with predominantly agricultural land use may slow or stop bushfire spread under lower fire danger conditions. Given the predominance of grassland vegetation surrounding the Project, bushfire behaviour is expected to be characterised by fast rates of spread rather than high intensity, noting that fire behaviour remains strongly influenced by fuel condition and weather.

The bushfire hazard landscape assessment completed as part of the Clause 13.02-1S assessment considers the landscape within 20 km of the Proposed Easement. A 20 km extent, as opposed to 75 km, was considered appropriate because bushfire behaviour near the Project would be predominantly influenced by the vegetation within 20 km of the Proposed Easement, which is primarily grassland.

As discussed in Section 12.6.6, bushfire behaviour in the region surrounding the Project is influenced by the wind. A bushfire in the region surrounding the Project is likely to spread in accordance with two scenarios. Scenario A is when a bushfire is influenced by a north westerly wind and Scenario B is when a bushfire is influenced by a south-westerly wind (which occurs after the north westerly wind). These combined scenarios are presented in Figure 12-13 noting that bushfires can also be influenced by local variations in wind.

Figure 12-13 below provides an example of a bushfire either side of the Proposed Easement. The figure shows how each bushfire would spread under a north westerly wind (Scenario A) that is then followed by a south westerly wind (Scenario B).



Legend

Bushfire scenario	Example bushfire	Proposed Easement	Populated Places (Geoscience Australia)
➔ Potential bushfire travel		Proposed Easement	

Figure 12-13 Likely bushfire scenario

Scenario A – North-westerly wind

Bushfires that are influenced by north-westerly winds can travel for some distance under elevated fire danger conditions. Due to the fragmented vegetation that is influenced by townships, roadways and the surrounding agricultural land use, the behaviour and intensity of the bushfire may be varied.

Sources of ignition beyond the Proposed Easement may include vehicles traveling along roadsides, agricultural plant and equipment, or arson. Within public land reserves, lightning could ignite bushfires, which can then burn for extended periods before reaching the Proposed Easement.

A bushfire approaching from the north-west may be heavily influenced by the forested areas associated with the public land reserves (for example Wandella Nature Conservation Reserve). Whilst there has been some vegetation management within these reserves including fuel reduction burning or perimeter fuel breaks, under elevated fire danger conditions there are unlikely to slow the bushfire spread. These areas would also support the generation of embers that may start new bushfires ahead of the main fire front. Within the Proposed Easement itself, the absence of dense vegetation would limit this potential.

The presence of the local road network and variable fuels within the farming properties may influence the way the bushfire travels through the landscape. Under lower fire danger conditions, the bushfire is likely to be influenced by the surrounding landscape features including roads, managed properties, and other fuel managed areas.

As described in Section 12.6.1, the higher bushfire risk period occurs from November to March. During this period, agricultural properties surrounding the Proposed Easement would likely contain reduced vegetation quantities in comparison to other months. This is due to the summer period slowing grass growth and the fact that harvesting activities typically occur in late spring/early summer.

Scenario B – South-westerly wind

A bushfire that approaches under a south-westerly wind usually occurs after a north westerly wind has been influencing weather conditions. This wind change can occur after a bushfire has been burning for some time under north-westerly winds.

The characteristics of a bushfire influenced by south-westerly winds in proximity to the Proposed Easement would be similar to that influenced by north-westerly winds. The potential change in wind does indicate however, that the same bushfire could cross the Proposed Easement on more than one occasion and in different locations.

12.7.2 Settlement planning

Under Clause 13.02-1S settlement planning objectives ensure that a development is not increasing bushfire risk to nearby residents and their communities and that bushfire mitigations are implemented where possible to reduce bushfire risk overall.

The specific objectives are:

- Directing population growth to low-risk locations²

² Low risk locations are those 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).

- Ensuring the availability/safe access to areas assessed as a BAL-LOW³
- 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
- Achieving no net increase in bushfire risk through the implementation of bushfire protection measures
- Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour at a landscape, settlement, local, neighbourhood and site scale
- Assessing alternative low risk locations

The Project is considered to meet these objectives, where they are relevant. Broadly speaking, the Project has been designed to minimise the risk of bushfire ignition and escalation where possible. Notable design influences include:

- The Proposed Easement has been selected to avoid forested areas including the Pyrenees to the south of St Arnaud and other public land reserves to the southwest
- Only small sections of the Proposed Easement are contained within the BMO
- The Proposed Easement primarily traverses grassland vegetation
- Where the Proposed Easement does pass through remnant vegetation that may represent higher fuel loads, this vegetation would be modified to reduce risk in line with Electricity Safety (Electric Line Clearance) Regulations 2020

Outcomes of the *Phoenix RapidFire* modelling indicated that from a fire behaviour and consequence perspective, the potential severity and spread of bushfires within the study area does not increase as a result of the presence of the Project.

It is acknowledged that bushfire risk may increase during Project construction due to the fact that there would be personnel, plant, and equipment present for Project construction. Bushfire ignition during construction and operation is assessed in Section 12.8.1 and Section 12.9.1. EPRs to avoid or minimise bushfire impacts are discussed in these sections and are presented in Section 12.12.

³ BAL-LOW rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).

12.7.3 Protection of human life

Under Clause 13.02-1S, this strategy gives priority to the protection of human life by:

- Prioritising the protection of human life over all other policy considerations
- Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire
- Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process.

The design of the Project has ensured that the protection of human life has been prioritised. As discussed in Section 12.3.1, the Project has been located to avoid areas of heightened bushfire risk, including public reserves and areas covered by BMO to the extent practicable.

The vast majority of the Proposed Easement traverses a grassland dominated landscape, indicative of the surrounding agricultural land use. While grassfires in Australia still have the potential to result in property loss and/or loss of life, bushfires in grassland environments typically burn with less intensity when compared to fires in forested areas. This, together with the avoidance and minimisation strategy of the Project, demonstrates that high risk landscapes have been avoided to the extent practicable.

The Grampians Bushfire Management Strategy 2020 and the Loddon Mallee Bushfire Management Strategy 2020, have objectives which include the protection of human life, economy, infrastructure, nature, heritage and social connectedness and wellbeing. These are also considered in the assessment.

12.7.4 Areas of biodiversity conservation value

Clause 13.02-1S seeks to ensure that developments can implement bushfire protection measures without unacceptable biodiversity impacts, by discouraging settlement growth and development in bushfire affected areas that are important areas of biodiversity.

As discussed in Section 12.3.1, the Project has avoided locating infrastructure in national parks, state forests, state parks, nature conservation reserves, wildlife reserves and other protected areas. A Project-specific ecology impact assessment has been undertaken to assess impacts to biodiversity and provide mitigation to avoid and minimise ecology related impacts. Further information is provided in *Technical Appendix S: Ecology*.

Technical Appendix S: Ecology also considers the management of vegetation during construction of the Project. For example, during construction of the Project, vegetation within 50 m of work areas where hot work activities are occurring (i.e. welding) would be managed during periods of high fire danger. Management measures may include mowing or slashing the grassed areas to a maximum of 100 mm length and removing all loose vegetation including branches and leaf litter.

12.7.5 Use and development control in a bushfire prone area

Under Clause 13.02-1S, developments in a bushfire prone area should:

- Consider the risk of bushfire to people, property and community infrastructure
- Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk
- Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts

A bushfire prone area is defined as an area designated under Section 192A of the *Building Act 1993* which is likely to be subject to bushfires. As described in the above strategies, the risk of bushfire to people, property and community infrastructure has been assessed. The Project has been designed to avoid and minimise bushfire impacts to the extent practicable and EPRs have been proposed to minimise this risk to the extent practicable.

Bushfire impacts during construction and operation are presented in Section 12.8 and Section 12.9. EPRs are presented in Section 12.12.

12.7.6 Workforce accommodation areas

For the purposes of the EES, four workforce accommodation options are being assessed, with the assumption that three would ultimately be used. A Clause 13.02-1S assessment was undertaken for each of the four workforce accommodation sites. Each of these proposed workforce accommodation areas would be located within a BPA.

A BMO, which is one indicator of elevated bushfire risk, extends to the north-east portion of the Greens Creek workforce accommodation area (Figure 12-14).

Given that the workforce accommodation areas would be in the same region as the Proposed Easement, the likely bushfire scenarios are consistent with those described in Section 12.7.1. Each workforce accommodation area is predominantly occupied by grassland vegetation, and conditions between 400 m and 10 km of the areas are indicative of agricultural landscapes.

A forested area abuts the north-east corner of the proposed Greens Creek location. A BMO, which is associated with this forested area extends into a portion of the site. The forested area, and the BMO, extend north-west to Bolangum nature conservation reserve, which is located approximately 500 m at its closest point, from the north-west corner of the site (Figure 12-14). None of the other workforce accommodation areas have a BMO.

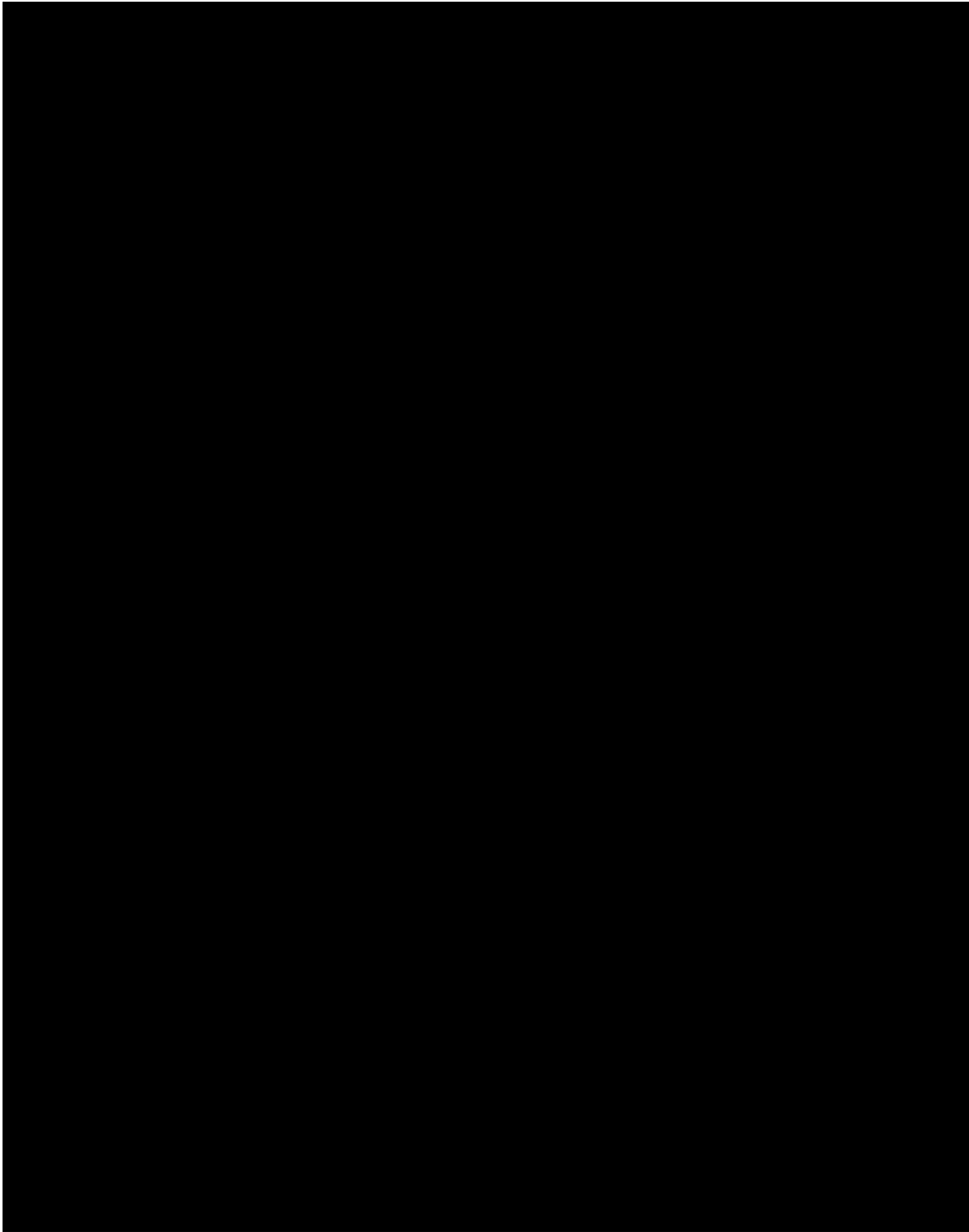
For each workforce accommodation area, the settlement planning objectives would be met. An EPR (EPR-BF01) is proposed which requires the preparation of a Construction Bushfire Mitigation and Management Plan (CBMMP). In relation to the workforce accommodation areas, the CBMMP will require the provision of:

- The provision of asset protection zones that ensures all structures are not exposed to more than 10 kW/m²
- Bushfire attack level 29 construction standard for all buildings
- At least 45,000 litres static water supply
- A perimeter road along the boundary of the subject land between the adjacent bushfire hazard and future development within the site. The road is to have a minimum width of 5.5 m and be an all-weather road. The final location/design of perimeter road will be agreed in consultation with CFA once the detailed design of the site is developed by the Principal Contractor.
- Adequate access to and from each accommodation structure

- Resources to manage the site in a low threat condition
- Upgrades to some roads [REDACTED] to allow for firefighting vehicles to safely access the site as well as some vegetation management along these roads
- A bushfire emergency management plan, with the requirement to close the site when the fire danger forecast is to be catastrophic

In addition, no buildings are to be placed within the BMO of the Greens Creek workforce accommodation area. Further information is provided in *Technical Appendix E: Bushfire*.

EPRs to avoid or minimise bushfire impacts are discussed in these sections and are presented in Section 12.12.



Legend

Transmission Line route	Accommodation & laydown site	Populated Places (Geoscience Australia)	Bushfire Management Overlays	BMO Schedule 2
Transmission line route	Accommodation and laydown area	*	BMO	BMO Schedule 3
			BMO Schedule 1	

Map Printed from FireMaps on Tue Jul 29 17:01:00 AEST 2025

Figure 12-14 Greens Creek workforce accommodation area

12.7.7 Summary of Clause 13.02-1S assessments

Overall, the Project and its workforce accommodation areas meet the requirements of Clause 13.02-1S. Assessment against Clause 13.02-1S demonstrates that the Project has been designed to avoid or minimise bushfire hazard, despite the inherent bushfire risk in the region. This approach is also consistent with the Grampians Bushfire Management Strategy 2020 and the Loddon Mallee Bushfire Management Strategy 2020, whose objectives include the protection of human life, economy, infrastructure, nature, heritage and social connectedness and wellbeing.

EPRs will be implemented to further reduce the likelihood and severity of bushfire hazard, and to protect human life and communities surrounding the Project.

12.8 Construction impact assessment

Construction activities would result in the presence of increased vehicles, plant and equipment and people. These represent potential sources of bushfire ignition, which means that there is an increased risk of bushfire ignition during Project construction. In addition, increased construction traffic may disrupt on-ground bushfire suppression resources in the event of an emergency.

With consideration to the existing bushfire prone environment, the risk of bushfire ignition is high. EPR-BF01 requires the development and implementation of a CBMMP to reduce the likelihood of bushfire ignition from Project activities and the consequence of a bushfire on the Project. The CBMMP, together with a Construction Fire and Emergency Management Plan (EPR-BF02) would also manage construction traffic in the event of a bushfire, allowing suitable access for bushfire suppression resources. These plans must be specific to each workforce accommodation area.

The Proposed Easement options at both Tragowel and Teddywaddy traverse similar environments and construction activities for each Proposed Easement option would be identical. The risk of bushfire ignition for each Proposed Easement option would therefore be equally high. Similarly, there would be no difference in impacts on bushfire suppression between each Proposed Easement option.

12.8.1 Bushfire ignition

The Proposed Easement would traverse a bushfire prone environment dominated by grassland vegetation. Construction of the Project is expected to take approximately 3.5 years and consist of multiple working fronts.

To support Project construction, there would be nine laydown and/or workforce accommodation areas spread along the Proposed Easement. During construction, there would be a maximum workforce of approximately 550 workers for the transmission line infrastructure and 120 workers for the Tragowel Terminal Station.

Impact

The introduction of construction plant, equipment, vehicles and personnel would result in an elevated risk of bushfire ignition within the study area. The increased risk arises due to the introduction of a workforce into an area that normally has a low population. Considering that Project construction is expected to take 3.5 years, this period would interact with multiple declared fire danger periods.

Fire danger period – The Australian Fire Danger Rating System has four fire danger ratings – moderate, high, extreme and catastrophic. The CFA declares the fire danger period for each municipality depending on local conditions. This period may be declared as early as October and can remain in place until the fire danger lessens, which could be as late as May.

Bushfire ignition could occur within the study area as a result of Project activities and then spread to adjoining areas. Bushfire ignition could also occur outside of the Proposed Easement, especially considering the existing bushfire prone environment, and then impact the Proposed Easement, infrastructure and personnel. As described in Section 12.7.1, a bushfire starting within the study area can travel for some distance under elevated fire danger conditions and would be influenced by weather conditions and vegetation.

EPRs

Mitigation is focussed on reducing the likelihood of a bushfire occurring and, if ignition occurs, reducing the severity of a bushfire on the Proposed Easement, infrastructure and personnel.

A CBMMP (EPR-BF01) and an CFEMP (EPR-BF02) will be developed and implemented in consultation with CFA and the relevant fire authority.

Residual impact

Based on existing conditions and the potential impacts of the Project, the assessment identifies a potential increase in the likelihood of fire ignition associated with activities within the Proposed Easement. While the presence of additional personnel and construction activities may elevate ignition risk, it also increases the potential for early detection and facilitates timely suppression response due to increased presence of people.

The proposed EPRs are intended to offset the increased ignition risk likelihood and ensure that fire-related risks are managed to an acceptable level. In addition, vegetation management activities within the Proposed Easement and surrounding areas may reduce the consequence of bushfire under lower fire danger conditions by improving access and supporting suppression efforts. Overall, although there is an increased likelihood of ignition within the Project Area, the implementation of EPRs and enhanced response capability ensures that residual risk remains appropriately managed. As a result, there is no net increase in the overall bushfire risk associated with the Project, notwithstanding the change in the bushfire risk profile between construction and operation.

12.8.2 Bushfire suppression and emergency response

Bushfire suppression can consist of both on-ground and aerial resources. At a very high GFDI, direct fire suppression by ground resources is difficult. At an extreme GFDI, direct fire suppression by ground crews is extremely difficult and support from aerial units is typically required. Aerial fire suppression would also be needed when a fire enters a forest environment, where flame height and intensity increases. As described in Section 12.6.5, the existing bushfire suppression capability in the study area consists of ground-based vehicles. Firefighting aircraft can also be provided in the event of an escalation to support on-ground units, or to suppress high intensity bushfires in forested areas.

Impact

To respond to a bushfire, fire agency resources would require the ability to access the fire location safely and efficiently.

During construction of the Project, the provision of access points to the 70 m wide Proposed Easement, made up of public roads and private access tracks, would improve the ability of fire suppression resources accessing the fire location. That said, it is expected that there would be increased vehicle movements associated with Project construction. In the event of an emergency or bushfire response, fire suppression resources must be provided priority so that bushfire suppression activities are not impacted.

Establishment of the 70 m wide Proposed Easement would result in:

- Improved access opportunities for firefighting resources
- Increased fallback areas and areas where active suppression can occur
- More specific ignition location information and the ability to quickly suppress a potential ignition source due to the increased numbers of people working within and around the Proposed Easement. The quick suppression of an ignition source may include personnel extinguishing an ignition caused by a discarded cigarette.
- Potential disruption of fire suppression resources by increased construction vehicle movements

In addition, it is noted that the construction of the Project represents a changing environment. the extent of completed transmission infrastructure would progressively change as towers, conductors and overhead earth wires are installed. This evolving construction environment has the potential to impact aerial firefighting operations.

EPRs

The CBMMP (EPR-BF01) will include measures relating to provision of firefighting water supply, details of induction programs, details of a dedicated firefighting capability, details of how construction traffic will be managed to maintain firefighting appliance access, and the process for notifying Airservices Australia of the presence and location of the constructed towers.

The development and implementation of a CFEMP (EPR-BF02) would also minimise potential impacts to bushfire suppression during construction of the Project.

To manage the impact associated with the progressive construction of transmission infrastructure, current information regarding construction progress, temporary aviation hazards and completed infrastructure would be communicated to relevant aviation stakeholders through the Project's aviation consultation and notification processes (refer EPR-AV01). This approach recognises that the potential impact to aviation and aerial firefighting operations during construction is dynamic and requires ongoing communication as the Project progresses.

Residual impact

Based on the existing conditions and the potential impacts of the Project, the assessment indicates that there would be a low residual impact to bushfire suppression during Project construction. Overall, it is considered that there is likely to be an improvement in the access of firefighting resources responding to a bushfire within the Proposed Easement, as well as an increase in response capacity including personnel movement and dedicated firefighting capability.

12.8.3 Summary of residual impacts

The Project, including portions of the Project that intersect designated BMO areas, would be constructed in a bushfire prone area, with an inherently high likelihood of bushfire ignition. The implementation of EPRs would reduce the likelihood of Project activities resulting in bushfire ignition and may help manage the severity and consequence of a bushfire occurring, however the overall residual impact of bushfire ignition remains high.

In the context of bushfire suppression, there would be a low residual impact following the implementation of EPRs. Construction of the Project would provide increased access for firefighting resources and would improve response capacity through the presence of additional personnel.

12.9 Operational impact assessment

During operation, activities within the Proposed Easement would primarily involve the inspection and maintenance of infrastructure. These operational activities would include (but may not be limited to):

- Vegetation management to ensure appropriate electrical safety clearances to the transmission lines are maintained along the easement
- Thermographic inspection of the transmission lines and both ground based and aerial light detection and ranging (LiDAR) imaging to identify potential issues such as overheating, electrical faults and line degradation
- Ground-based inspections of infrastructure involving multiple maintenance crews utilising access roads to drive vehicles along the Proposed Easement to inspect each transmission tower
- Repair or restore infrastructure if faults or degradation are identified through the inspection methods
- Routine inspection and maintenance activities at the Tragowel Terminal Station and Bulgana Reactor Station

Once the Project moves into this operational phase, the need for personnel, plant and equipment to be working within the Proposed Easement is reduced significantly. Therefore, the primary concern for bushfire ignition during operation of the Project is the 500 kV double-circuit overhead transmission line itself.

Overall, it is considered unlikely that the transmission line would result in failure. Design measures will be implemented to ensure towers can withstand tornado winds and to ensure that there is lightning protection. In addition, the interaction of a bushfire with transmission infrastructure would be readily managed.

A feasibility assessment will be undertaken for the installation of bushfire detection technology, such as smoke detection cameras.

Similar to the construction phase of the Project, there would not be any difference in the Proposed Easement options at Tragowel and Teddywaddy with respect to bushfire ignition and suppression.

12.9.1 Bushfire ignition

During operation, the 500 kV double-circuit overhead transmission line represents the principal potential source of bushfire ignition, given the reduced presence of plant, personnel and equipment relative to the construction phase and the corresponding decrease in ignition sources.

Broadly speaking, Australia's electricity network consists of high voltage transmission (such as this Project) and medium to low voltage transmission, responsible for safely providing power to homes and businesses (refer to Figure 12-15). High voltage transmission is typically in the range of 220 kV to 500 kV. Medium to low voltage distribution lines that connect to businesses and homes are typically 66 kV and lower.

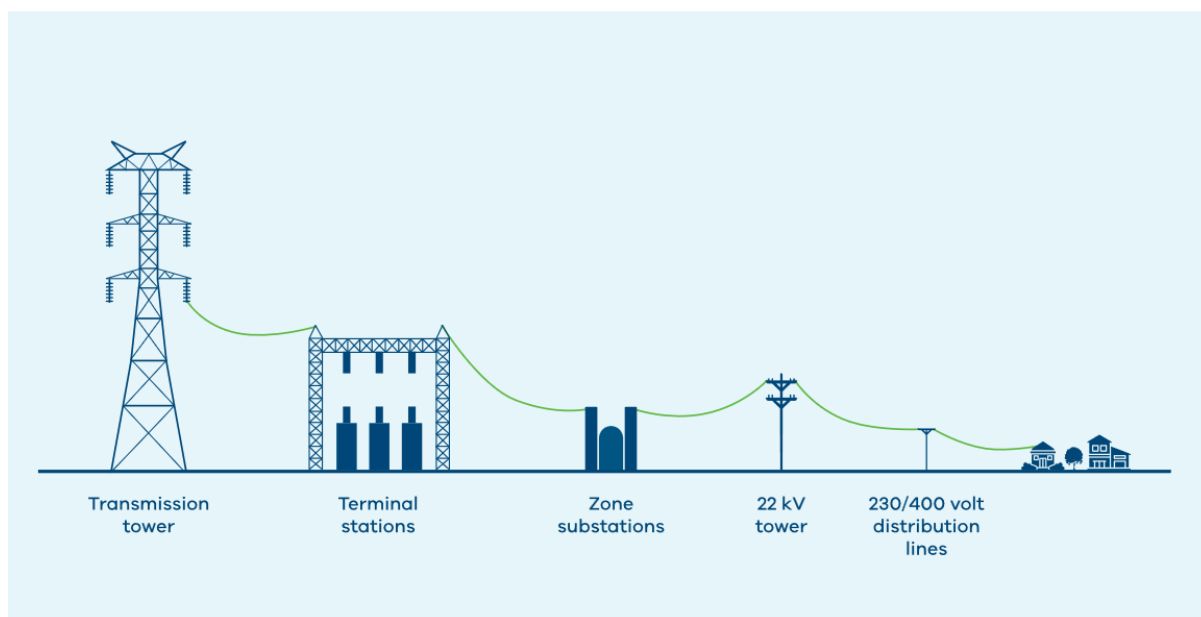


Figure 12-15 An overview of Australia's electricity network

The 2009 Royal Commission into the Black Saturday bushfires (Victorian Government, 2010) stated that the proportion of fires that are caused by electricity infrastructure is low and that these sources of ignition make up approximately 1.5 per cent of all ignitions in normal circumstances. On days of elevated fire danger however, fires linked to electrical assets rise dramatically.

The 2009 Royal Commission identified that five of the examined Black Saturday bushfires were associated with the failure of electricity assets. These were assets associated with the distribution network, consisting of 22 kV distribution lines. As such, the 2009 Royal Commission made recommendations for the progressive replacement of all 22 kV distribution lines.

A submission by Transgrid's CEO to the New South Wales Government Standing Committee on State Development Inquiry on the Feasibility of undergrounding the transmission infrastructure for renewable energy projects (Parliament NSW, 2023), advised the committee that Transgrid could not find any instance of a bushfire started by a transmission line operating above 66 kV.

In the same inquiry, Australian Energy Infrastructure Commissioner Professor Andrew Dyer reported that the risk of a 220 kV or higher transmission line causing a bushfire was 'virtually zero', and noted that the risk is higher from the distribution network.

The VFRR does acknowledge the risk level of transmission lines across Victoria. Treatments listed to reduce the risk of transmission lines resulting in bushfire ignition include the development and implementation of a Bushfire Mitigation Plan. A Bushfire Mitigation Plan is required under the *Electricity Safety Act* Victoria (1998) for any new transmission line infrastructure. The responsibility to ensure that the Bushfire Mitigation Plan is maintained and effective is assigned to Energy Safe Victoria. In addition, VicGrid VNI West has elected to adopt the guidance found in the Electricity Safety (Electric Line Clearance) Regulations which requires a minimum of 6.4 m separation between vegetation and a transmission line.

As with the construction phase, and irrespective of the Project proceeding, bushfire ignition could also occur outside of the Proposed Easement, considering the existing bushfire prone environment.

Impact

During Project operation potential sources of bushfire ignition include lighting strikes, possible tower failure during extreme weather events, arson, or the use of vehicles and plant for maintenance activities. Given the existing bushfire-prone environment, any bushfire ignited during operation would likely occur under elevated fire danger conditions.

As discussed above, the transmission line infrastructure itself is unlikely to cause a bushfire, as 500 kV transmission lines have not historically resulted in ignitions due to failure or faults.

Similarly, tower failure and subsequent ignition during extreme weather events is considered unlikely, given modern construction standards.

EPRs

To mitigate the likelihood and severity of a bushfire in the study area, an Operations Bushfire Mitigation and Management Plan (OBMMP) will be developed and implemented (EPR-BF03). This plan will include a number of measures aimed at avoiding or reducing the risk and severity of bushfire ignition during operation of the Project.

Other relevant measures to be included in the OBMMP include:

- Installation of lightning conductors to dissipate electricity to ground should the towers be impacted by lightning strike
- The requirement to undertake regular inspections and maintain records of all towers, power lines (including easements) and associated infrastructure
- The requirement to develop and document bushfire preparedness audits to record all “annual” fire danger season preparedness activities and prevention works

As presented in *Technical Appendix F: Climate change*, EPR-CC01 will require detailed design of the Project to consider projected climate change conditions over its operational life, including changes to extreme weather events. EPR-CC04 requires these controls to be reviewed and updated throughout the Project’s life-span.

Residual impact

With the implementation of EPRs, there is considered to be a moderate residual impact. The likelihood of bushfire ignition caused by the Project or activities related to the Project is low when considering the reduced plant and personnel present and the construction standards of the Project. That said, there would be an elevated consequence of bushfire ignition when the existing, bushfire prone environment is considered.

12.9.2 Bushfire interaction with transmission line infrastructure

The Project would be located in a bushfire prone area and as such there would be a potential risk of bushfire interaction with the proposed transmission line infrastructure. The potential impacts associated with exposure of transmission infrastructure to dense smoke and infrastructure damage during a bushfire are discussed below.

Impact

The majority of the Proposed Easement traverses grassland and predominantly cleared agricultural landscapes rather than heavily forested vegetation communities. Grassland fuels generally contain substantially lower fuel loads than forested environments and are typically consumed more rapidly during bushfire events. However, it should be noted that the fuel loads of agricultural landscapes differ according to cropping cycles, generally peaking for a short period of time just before harvest. After crops are harvested, this fire risk is reduced again, as the remaining stubble interacts with moisture and becomes less available to fire. While grass fires may generate periods of locally dense smoke, they generally produce lower overall smoke volumes and shorter-duration smoke plumes than equivalent fires occurring within forested vegetation. As a result, the potential for prolonged exposure of transmission infrastructure to dense smoke and elevated particulate concentrations is expected to be lower across the predominantly grassland sections of the Proposed Easement than would be anticipated within heavily forested landscapes.

Notwithstanding this, isolated areas of remnant woodland, riparian vegetation and other higher fuel load vegetation communities occur within and adjacent to sections of the Proposed Easement and may generate localised dense smoke plumes under severe bushfire conditions. Accordingly, the potential for smoke-related transmission line faulting cannot be entirely discounted during extreme bushfire events.

The likelihood of smoke-induced transmission line faulting affecting transmission infrastructure is considered to be rare, as such events appear to require a combination of exceptional bushfire intensity, sustained dense smoke production and direct interaction between the bushfire and Proposed Easement. Should a smoke-related fault occur, the most likely consequence would be the operation of transmission protection systems and a temporary outage rather than sustained infrastructure damage or the creation of a prolonged ignition source.

In addition to the risk of smoke-related transmission line faulting, there is a risk that towers and conductors may be damaged during a bushfire. However, if any damage were to occur, the protection equipment at the terminal station would trip within milliseconds resulting in a de-energised line. The network operator may even switch off the transmission line during extreme weather events to minimise any further risk or to allow for safe firefighting. The chances of a transmission tower collapsing onto a local road is no greater risk than a local distribution line or large tree falling onto a road. For the Project, towers have been located a minimum of 300 m from dwellings and setback from roads to the extent practicable. As such, any damage or collapse of transmission infrastructure, would generally avoid impacting on egress routes during a bushfire event.

Overall, the qualitative risk associated with smoke-induced arcing, transmission line faulting or transmission infrastructure damage during bushfire events is assessed as low.

EPRs

The VFRR recommends the implementation of bushfire management plans to reduce risks associated with bushfire interaction with transmission line infrastructure. EPR-BF03 recommends the development and implementation of an OBMMP.

Additionally, EPR-BF05 includes:

Undertaking and documenting a feasibility assessment for the installation of bushfire detection technology, including tower-mounted cameras at key locations, to support bushfire detection and response.

The feasibility assessment would be informed by advice from suitably qualified bushfire specialists, CFA and relevant fire authorities. The assessment will consider whether the technology can be practicably and effectively implemented having regard to tower locations, power supply, communications requirements, monitoring and notification responsibilities, maintenance requirements, access requirements, integration with emergency response arrangements, and ongoing operation and maintenance requirements.

The feasibility assessment would consider, at a minimum, whether the technology would be able to:

- Detect smoke plumes from up to 20 km away
- Automatically alert predetermined contacts via a mix of text messages, emails and other forms of communication
- Allow camera footage to be accessed from handheld devices and relevant Project or network control room(s), where practicable
- Be accessible by fire agencies or other relevant parties, where agreed

The outcome of the feasibility assessment, including whether bushfire detection technology is proposed to be installed and the reasons for that conclusion, would be documented.

Where the feasibility assessment determines that bushfire detection technology is feasible and the technology is proposed to be installed, the Transmission Network Service Provider (TNSP) would incorporate relevant operational, monitoring, maintenance, access, notification and response requirements into the OBMMP required by EPR-BF03.



Figure 12-16 An example of smoke detection cameras in South Australia's Green Triangle forestry region (ABC, 2023)

Residual impact

The implementation of an Operations Bushfire Mitigation and Management Plan (OBMMP) would assist in reducing the risks associated with bushfire interaction with transmission line infrastructure. However, given the Project would be located in a bushfire prone area, some risk would remain.

As such, the residual impact associated with smoke-induced arcing, transmission line faulting or transmission infrastructure damage during bushfire events is assessed as low.

12.9.3 Bushfire suppression and emergency response

As described in Section 12.8.2, bushfire suppression can consist of both ground and aerial resources. During operation of the Project, the primary concern for bushfire suppression relates to the ability of aerial resources to fight fires immediately around the 500 kV transmission line infrastructure. For ground resources, there is a risk of electrical arcing.

Significant fire resources exist across northwestern and western Victoria in the vicinity of the Proposed Easement. These include local CFA brigades and groups, on-farm fire units, and FFMVic depots staffed by a combination of seasonal and full-time firefighting personnel. Together with aerial firefighting resources, these ground-based suppression capabilities form part of the standard and coordinated response to bushfires in the region, with established operational procedures enabling crews to safely and effectively undertake fire suppression activities in the vicinity of transmission infrastructure.

The CFA has standard operating procedures in place for working safely around high voltage transmission lines. Depending on the severity of the fire and if reported, the TNSP would coordinate with Emergency Management Victoria about risks and response actions (which can include de-energisation).

Aerial firefighting can consist of either fixed wing (airplanes) or rotary wing (helicopters) aircrafts. Aerial firefighting operators require significant levels of experience and training to be able to operate safely in a dynamic and rapidly changing environment, such as a bushfire.

Specific hazards encountered during aerial firefighting operations include:

- Strong and turbulent winds
- Smoke and reduced visibility
- Congested airspace with multiple aircraft operating in a small area
- Man-made obstacles (such as the proposed Project)

Aerial firefighting operators have a robust safety management system to manage these specific hazards. This would include pre-operational reconnaissance of the fireground and surrounding area to identify any potential hazards, such as powerlines and communication towers, prior to any low-level firefighting operations. For higher altitude operations, the risk of collision with transmission line infrastructure is reduced significantly, given that operations would be conducted at heights greater than transmission line infrastructure.

Impact

It is common for firefighting operations to be conducted near transmission line infrastructure, and the Project is unlikely to have a significant impact on aerial bushfire suppression. Therefore, there are limited impacts on bushfire suppression and emergency response capability when compared to the existing conditions.

In accordance with CFA operational procedures, ground resources would need to maintain a safe working distance of 25 m from transmission lines in the event of a bushfire. If the power is isolated and the transmission lines are de-energised, the risk of electrical arcs would be greatly reduced. Effective ground suppression can still be undertaken and can be supported by aerial firefighting operators.

There are limited recorded examples of a collision between transmission line infrastructure and aerial firefighting operators. Aerial firefighting operators are suitably trained and experienced, and they encounter many hazards while fighting fires, which are managed by best practice safety management systems. For example, if firebombing in the vicinity of the transmission line, an aerial operator would select a water source for replenishing their tank on the same side of the transmission line as their water drop zone. This would eliminate the need to cross the transmission line each refill. If an aerial operator is required to cross the powerline, best practice would be to cross at a tower, not mid-span, to ensure visibility of the hazard is maximised.

As detailed in *Technical Appendix N: Aviation*, the final design of the Project, including the co-ordinates and elevation of transmission infrastructure will be provided to key stakeholders such as (but not limited to) Airservices Australia, Department of Defence, CFA, Parks Victoria, Royal Flying Doctor Service and Department of Energy, Environment and Climate Action (DEECA) Forest Fire Management. This would ensure that the relevant stakeholders are informed on the Project and can adequately plan in the event of a bushfire or emergency.

EPRs

An OBMMP and OFEMP will be developed and implemented in consultation with CFA (EPR-BF03 and EPR-BF04). Relevant operational bushfire management information from the OBMMP will be communicated to landholders and other stakeholders, where appropriate, in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08.

The development and implementation of an OFEMP, will include at a minimum:

- Details of the various activities that will occur during the fire danger period in accordance with the Australian Fire Danger Rating System requirements including
- Details of appropriate signs to assist emergency response crews to determine road names, location etc
- Documentation to ensure all access roads and tracks are identified and meet CFA and FFMVic Guidelines for emergency vehicle access
- Details of the locations of assembly areas
- Consideration of all hazards including storm, flood and bushfire
- A process for incorporating available property-specific emergency response information, including known landholder access, water sources, tracks and firefighting considerations, where relevant

Details of the content of this plan are presented in Section 12.12.

As detailed in *Technical Appendix N: Aviation*, the final design of the Project, including the co-ordinates and elevation of transmission infrastructure will be provided to key stakeholders in accordance with EPR-AV01.

Residual impact

Bushfires can be effectively suppressed by both ground and aerial resources in the vicinity of transmission line infrastructure. The implementation of EPRs would ensure that the relevant stakeholders are informed on the Project and can adequately plan in the event of a bushfire or emergency. They would also ensure that there is adequate access to transmission line infrastructure during a bushfire. Therefore, there would be a low residual impact to bushfire suppression during operation of the Project.

12.9.4 Summary of residual impacts

When considering the existing bushfire prone environment of the Project, the residual impact related to bushfire ignition remains moderate. The implementation of EPRs, such as lightning protection and protection against high winds, would reduce the likelihood of transmission line failure and ignition as a result. There is little evidence to suggest that high-voltage 500 kV transmission lines start bushfires. In addition, VicGrid VNI West has elected to adopt the guidance found in the Electricity Safety (Electric Line Clearance) Regulations which requires a minimum of 6.4 m separation between vegetation and a transmission line.

The residual impact associated with smoke-induced arcing, transmission line faulting or transmission infrastructure damage during bushfire events is assessed as low.

The Project is expected to have a low residual impact on bushfire suppression during operation. Both on-ground and aerial firefighting resources would be able to effectively fight a bushfire around Project infrastructure.

12.10 Decommissioning impact assessment

Decommissioning of the Project would involve the same, or similar, issues as those associated with the construction of the Project.

Decommissioning activities would be conducted in accordance with the relevant legislative requirements, industry standards and best practice relevant at the end point of the infrastructure lifespan and would be managed as part of a Decommissioning Environmental Management Plan (refer to *EES Chapter 28: Environmental management framework*).

Key bushfire impacts during decommissioning would relate to bushfire ignition and bushfire suppression. Similar to the construction phase of the Project, it is expected that during decommissioning there would be an increased number of plant, vehicles, and equipment, representing additional sources of ignition.

To manage these impacts, a dedicated bushfire management plan will be developed for the decommissioning phase of the Project in consultation with the relevant fire authority (EPR-BF06). This plan would include appropriate ignition and emergency response management considerations, appropriate for the climatic conditions at the time of decommissioning. Consistent with the construction impact assessment, the residual impact of bushfire ignition during decommissioning would be high, however EPRs are expected to reduce the likelihood of ignition occurring from Project activities.

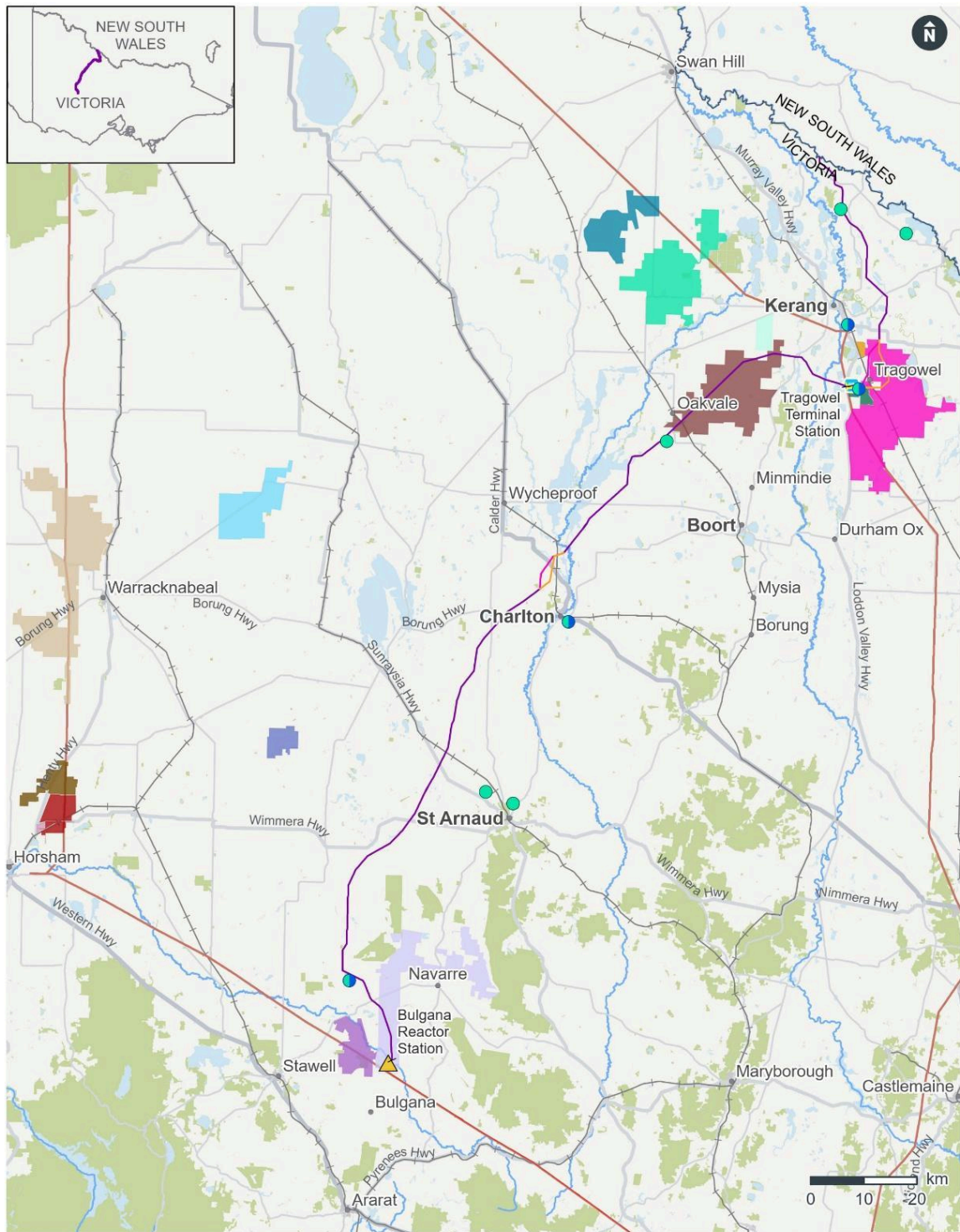
12.11 Cumulative impact assessment

A cumulative impact assessment of bushfire impacts was undertaken with other proposed developments in the region. For the purpose of evaluating cumulative impacts, this assessment identified developments within 20 km of the Project.

Sixteen proposed developments have been identified within 20 km of the Project, five of which are within 100 m of the Project (refer to Figure 12-17):

- Cannie Wind Farm
- Donald Mineral Sands Project
- Goschen Mineral Sands Project
- Kerang II (CleanGen2) Solar Farm
- Macorna Solar Farm (Project area has not yet been confirmed)

- Macorna Wind Farm (project area has not yet been confirmed; however, it is assumed that there would be a significant area of overlap with the Project)
- Navarre Green Power Hub (intersects with Project, in development phase, construction after 2029)
- NewSky Tragowel Solar Farm (adjacent to Tragowel Terminal Station)
- Normanville Energy Park
- The Wimmera Intermodal Freight Terminal Precinct
- Watta Wella Wind Farm
- Wilkur Energy Park
- Wimmera Plain Wind Facility
- Wimmera Renewable Energy Solutions
- Virya Energy Meering West Wind Farm (intersects with Project, construction proposed 2029 - 2032)
- Western Renewables Link (intersects with Proposed Easement)



LEGEND

- | | | | |
|--|----------------------------------|--|------------------------------------|
| Proposed Easement | Existing 220kV Transmission Line | Kerang II (CleanGen2) Solar Farm | Tragowel Solar Farm |
| Proposed Easement Option | Avonbank Mineral Sands | Macorna Wind Farm | Watta Wella Wind Farm |
| Proposed Easement Option | Cannie Wind Farm | Meering West Wind Farm | Western Renewables Link |
| Proposed 220kV Easement | Donald Mineral Sands Project | Navarre Green Power Hub | Wilkur Energy Park |
| Combined Laydown Area and Workforce Accommodation Site | Goschen Mineral Sands Project | Normanville Energy Park | Wimmera Plain Wind Facility |
| Laydown Area | | The Wimmera Intermodal Freight Terminal Precinct | Wimmera Renewable Energy Solutions |

Figure 12-17 Surrounding developments

Assuming Project construction commences in 2027, the construction periods of some nearby developments may overlap with the Project. These include Cannie Wind Farm, Macorna Solar Farm, Normanville Energy Park, Watta Wella Wind Farm and Western Renewables Link. The construction timeframes for the remaining developments are either unknown or are expected to commence after VNI West construction begins in 2027.

Given that both the Project and the proposed developments listed above are located within a bushfire prone area, the potential for bushfire ignition during construction and operation phases would be high, consistent with the high impact assigned to this Project. Increased personnel and plant working around development footprints would result in an increased risk of bushfire ignition during construction. As with this Project, it is expected that these developments would implement appropriate bushfire mitigation prepare relevant bushfire and emergency response plans in consultation with CFA. While bushfire hazard is an inherent feature of the surrounding environment, these EPRs would reduce the likelihood of development activities resulting in bushfire ignition.

If a nearby development were to result in bushfire ignition, this would impact the Project no differently to a bushfire occurring in the environment. The preparation of an EMP in consultation with CFA would ensure that Project personnel can respond appropriately to a bushfire during construction. Further detail on the EPRs that this Project would implement is presented in Section 12.12.

It is expected that bushfire suppression activities involving ground and aerial resources would be able to occur in the region with minimal impact. Additionally, it is considered that the increased access to the landscape as a result of these developments would assist in overall bushfire suppression and response.

Overall, there would not be a significant cumulative bushfire impact from the Project and proposed surrounding developments. The risk of bushfire ignition would remain high during the construction and operation of each of these developments, however the implementation of EPRs may result in a reduced likelihood of related activities resulting in bushfire ignition. Increased regional access as a result of the proposed developments, as well measures for the early detection of bushfires, would help support bushfire response and suppression.

12.12 EPRs

Table 12-2 outlines the EPRs developed to avoid and minimise potential impacts during construction, operation and decommissioning of the Project.

Table 12-2 EPRs

ID	EPR	Phase
BF01	Construction Bushfire Mitigation and Management Plan (CBMMP) Prior to the commencement of construction, the Principal Contractor will develop and implement a CBMMP, in consultation with CFA and relevant fire authorities, to avoid and minimise bushfire risk associated with construction of the Project. Preparation of the CBMMP must be undertaken in accordance with relevant ecology EPRs, including EC02 (Construction Vegetation and Habitat Management Plan) and EC10 (Understory Retention and Partial Clearance Plan). The CBMMP will include as a minimum: • All areas of the Project including the Tragowel Terminal Station, Bulgana Reactor Station, workforce accommodation sites, laydown areas and transmission infrastructure to be provided with appropriate setbacks from the surrounding unmanaged vegetation. Vegetation removal or management required to establish setbacks or to comply with fuel management requirements must be undertaken in accordance with EPR-EC02. • Policies and procedures to be developed and implemented including: – Equipment test and tag programs – Smoking only occurring in fuel-free areas, subject to a documented assessment confirming that the area is fuel-free and suitable for smoking – The Introduction of a hot works permit system – Restricting vehicles travelling on vegetated surfaces during the fire danger period • Procedures for ensuring all activities undertaken during the Fire Danger Period are appropriate under the <i>Country Fire Authority Act 1958</i>, including: – Compliance with Total Fire Ban Day restrictions – Obtaining permits for “hot work” activities • Details of induction programs for all staff, contractors and site visitors to ensure they are informed of fire response procedures and have appropriate personal protective clothing. • Details of the requirements for daily toolbox briefings and documented pre-start checks of the construction site to confirm that bushfire safety requirements have been considered and relevant controls are in place.	Construction

ID	EPR	Phase
	• A communication plan to facilitate a high standard of communication with landholders, relevant stakeholders, including local crews, and the community regarding daily activities, to be developed in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08. • Details of a primary contact person for the community to contact with concerns, questions or issues. • Details of a suitably qualified (in fire response) primary contact person for CFA to contact with concerns, questions or issues. • Procedures to ensure all contractors: – Are appropriately briefed and understand their legal obligations in relation to managing bushfire risks – Have appropriate procedures, safe work practices, contingency plans, Material Safety Data Sheet (MSDS) for operation of all equipment, chemicals, flammable materials that may contribute to bushfires – Have appropriate “initial” suppression equipment available on site. • A policy for “no work” on declared Catastrophic Fire Danger days • Requirements for declared Extreme Fire Danger days, including review of proposed activities and identification of appropriate controls or actions • Details of the proponent’s fire suppression capability, in addition to local CFA resources, to enhance response in the development area • Procedures to ensure all temporary building construction is in line with all regulations and codes of building in bushfire prone areas and <i>Construction of buildings in bushfire-prone areas</i> (AS 3959:2018) • Details of the appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks • Measures for the provision of portable firefighting water supply during the fire danger period along the easement and a permanent supply of firefighting water at the workforce accommodation and laydown areas during construction of the Project • Details of a dedicated firefighting capability that will enable quick attack suppression services for the duration of the construction phase, including during the fire danger period • Details of how construction traffic will be managed to maintain firefighting appliance access to the Proposed Easement and the surrounding landscape • Documentation of how the current static water supply locations in the landscape have been assessed for their suitability to support aerial firefighting operations in the future	

ID	EPR	Phase
	- The process for notifying Airservices Australia of the presence and location of the constructed towers Regarding temporary workforce accommodation facilities, the CBMMP will include details of the following measures: - The provision of asset protection zones that ensures all structures are not exposed to more than 10 kW/m². - BAL-29 Construction standard for all temporary workforce accommodation buildings. - The provision of a perimeter road along the boundary of the subject land between the adjacent bushfire hazard and future development within the site. The road is to have a minimum width of 5.5metres and be an all-weather road. The final location/design of perimeter road will be agreed in consultation with CFA once the detailed design of the site is developed by the Principal Contractor. - The site will be managed in a low threat condition in accordance with the below: - Grass will be short cropped and maintained during the declared fire danger period. - All leaves and vegetation debris will be removed at regular intervals during the declared fire danger period. - Within 10 metres of a building, flammable objects will not be located close to the vulnerable parts of the building. - Plants greater than 10 centimetres in height will not be placed within 3 metres of a window or glass feature of the building. - Shrubs will not be located under the canopy of trees. - Individual and clumps of shrubs will not exceed 5 sq. metres in area and will be separated by at least 5 metres. - Trees will not overhang or touch any elements of the building. - The canopy of trees will be separated by at least 2 metres. - There will be a clearance of at least 2 metres between the lowest tree branches and ground level. - Provide at least 45,000 litres static water supply with fittings compliant with BMO requirements. Static water supplies will be located so that all buildings are within 60 metres of a tank outlet. - Access to each accommodation structure, as per the BMO access requirements. A Bushfire Emergency Management Plan will be established for the operation of the temporary workforce accommodation facilities and include the requirement to close the site when the fire danger is forecast to be catastrophic.	
BF02	Construction Fire Emergency Management Plan (CFEMP)	Construction

ID	EPR	Phase
	The Principal Contractor will develop and implement a CFEMP, in consultation with the relevant fire authority, and in accordance with Planning for emergencies in facilities (AS3745), to manage bushfire and other emergency response requirements during construction, that includes as a minimum: • Details of the various activities that will occur during the fire danger period in accordance with the Australian Fire Danger Rating System requirements, including details of how to evacuate the workforce accommodation when the fire danger is forecast to be catastrophic • Details of appropriate signs to assist emergency response crews to determine road names, location etc • Documentation to ensure all access roads and tracks are identified and meet CFA and FFMVic Guidelines for emergency vehicle access • Details of the locations of assembly areas, including for each accommodation area • Details of access to each accommodation structure, as per the BMO access requirements • Consideration of all hazards including storm, flood and bushfire • Details of the workforce accommodation and the number of personnel on the site. Details of current static water supply locations in the landscape and confirmation that they have been assessed for their suitability to support aerial firefighting operations in the future • Identification and mapping of local firefighting and emergency management assets, including assets identified through community and emergency services consultation as important to local fire response, in relation to the Proposed Easement, construction areas, access routes and nearby fire stations • Assessment of potential construction-related disruption to local fire response capability at a location or zone level, having regard to construction timing, sequencing, access arrangements, traffic management and proposed construction activities • Identification of additional mitigation measures where potential disruption to local fire response capability is identified, which may include maintaining access to existing firefighting assets, temporary access arrangements, temporary water supply or other temporary firefighting/emergency management assets at specific locations where required. Relevant emergency management information from the CFEMP will be communicated to landholders and other stakeholders, where appropriate, in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08.	

ID	EPR	Phase
BF03	Operational Bushfire Mitigation and Management Plan (OBMMP) The TNSP will develop and implement an OBMMP, in consultation with the relevant fire authority, to manage bushfire risk associated with operation of the Project, that includes as a minimum: • Installation of lightning conductors to dissipate electricity to ground should the towers be impacted by lightning strike • The requirement to undertake regular inspections and maintain records of all towers, power lines (including easements) and associated infrastructure • The requirement to develop and document bushfire preparedness audits to record all “annual” fire danger season preparedness activities and prevention works, including the management of vegetation. Vegetation management required for bushfire preparedness and electrical safety clearance obligations must be undertaken in accordance with relevant ecology EPRs, including EC02 (Construction Vegetation and Habitat Management Plan) and EC09 (Operational Vegetation and Habitat Management Plan) and EC10 (Understory Retention and Partial Clearance Plan). • Details of induction programs for all staff, contractors and site visitors to ensure they are informed of fire response procedures and have appropriate personal protective clothing • The requirement to ensure that temporary/permanent access tracks within private properties, which are required for access to and along the easement, are maintained to meet industry standards for emergency vehicle access The TNSP will also develop an induction package for use by CFA members containing all relevant information on the Project operations, including specific bushfire response information which will form part of the Operational Fire Emergency Management Plan (OFEMP). This will include information to support emergency response decision-making near the operational transmission infrastructure during bushfire events, including relevant electrical safety considerations, access arrangements and emergency contact/escalation protocols. Relevant operational bushfire management information from the OBMMP will be communicated to landholders and other stakeholders, where appropriate, in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08. This OBMMP will be reviewed regularly (at least every five years) to ensure that the best available climate change science is applied and that it considers the most relevant controls and objectives for the Project.	Operation

ID	EPR	Phase
BF04	Operational Fire Emergency Management Plan (OFEMP) The TNSP will develop and implement an OFEMP, in consultation with CFA, and in accordance with AS3745, to manage bushfire and other emergency response requirements during operation, that includes as a minimum: • Details of the various activities that will occur during the fire danger period in accordance with the Australian Fire Danger Rating System requirements • Identification and mapping of local firefighting and emergency management assets, nearby fire stations, access routes and relevant aerial firefighting considerations in relation to the operational transmission infrastructure • Details of appropriate signs to assist emergency response crews to determine road names, location etc • Documentation to ensure all access roads and tracks are identified and meet CFA & FFMVic Guidelines for emergency vehicle access • Details of the locations of assembly areas. • Consideration of all hazards including storm, flood and bushfire • A process for incorporating available property-specific emergency response information, including known landholder access, water sources, tracks and firefighting considerations, where relevant Relevant emergency management information from the OFEMP will be communicated to landholders and other stakeholders, where appropriate, in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08. The OBMMP should be updated with any findings from the five-yearly review of climate change science.	Operation
BF05	Bushfire detection technology assessment During detailed design the Project will undertake and document a feasibility assessment for the installation of bushfire detection technology, including tower-mounted cameras at key locations, to support bushfire detection and response. The feasibility assessment will be informed by advice from suitably qualified bushfire specialists, CFA and relevant fire authorities. The assessment will consider whether the technology can be practicably and effectively implemented having regard to tower locations, power supply, communications requirements, monitoring and notification responsibilities, maintenance requirements, access requirements, integration with emergency response arrangements, and ongoing operation and maintenance requirements. The feasibility assessment will consider, at a minimum, whether the technology would be able to:	Pre-construction Operation where technology is installed

ID	EPR	Phase
	• Detect smoke plumes from up to 20 kilometres away • Automatically alert predetermined contacts via a mix of text messages, emails and other forms of communication • Allow camera footage to be accessed from handheld devices and relevant Project or network control room(s), where applicable • Be accessible by fire agencies or other relevant parties, where agreed The outcome of the feasibility assessment, including whether bushfire detection technology is proposed to be installed and the reasons for that conclusion, will be documented. Where the feasibility assessment determines that bushfire detection technology is feasible and the technology is proposed to be installed, the TNSP will incorporate relevant operational, monitoring, maintenance, access, notification and response requirements into the Operations Bushfire Mitigation and Management Plan required by BF03.	
BF06	Decommissioning Fire Emergency Management Plan (DFEMP) The Principal Contractor for the decommissioning phase engaged by the TNSP will develop and implement a DFEMP in accordance with EM05 of the EMF and will include within that plan, the assessment and management of bushfire risk in consultation with CFA. Relevant emergency management information from the DFEMP will be communicated to landholders and other stakeholders, where appropriate, in accordance with the principles outlined in the Communications and Stakeholder Engagement Plan (CSEP) required by EPR-EM08.	Decommissioning

12.12.1 Relevant EPRs from related studies

EPRs from other EES studies that relate to this assessment are summarised in Table 12-3. The complete list of Project EPRs is provided in *EES Chapter 28: Environmental management framework*.

Table 12-3 Relevant EPRs from other technical studies

ID	EPR	Project phase
CC01	Climate change resilience in design	Design
CC04	Review climate change science and update climate risk assessment	Operation
AV01	Aviation stakeholder notification and consultation	Design Pre-construction Construction

12.13 Conclusion

South-east Australia is one of the most bushfire-prone areas of the world. While the Project would be located in a bushfire prone environment, it has avoided areas that heighten bushfire risk, namely areas of steep topography and areas of dense, forest vegetation.

Construction of the Project would introduce multiple sources of ignition, including plant, equipment and vehicles. The likelihood of construction activities resulting in ignition would be managed through the development and implementation of a CBMMP in consultation with the CFA. This would include policies and procedures to manage hot works and works during elevated fire danger periods, and for the provision of initial suppression procedures. The CBMMP would also detail the high construction standards for temporary workforce accommodation areas to ensure that they offer an appropriate level of protection to construction personnel. While the overall residual impact of bushfire ignition during construction remains high due to the existing bushfire prone environment, EPRs would minimise the likelihood of Project activities resulting in a bushfire and may reduce the consequence of a bushfire.

There would be a low impact to bushfire suppression during Project construction. Both on ground and aerial resources would be able to respond to a bushfire in proximity to the Project, and the development and implementation of a CBMMP and CFEMP would ensure that construction vehicles do not result in impacts to emergency resources in the event of a bushfire.

A key concern of the community is the potential for high-voltage 500 kV transmission infrastructure to cause a bushfire. The 2009 Royal Commission into the Black Saturday bushfires (Victorian Government, 2010) stated that the proportion of fires that are caused by electricity infrastructure is low and that these sources of ignition make up approximately 1.5 per cent of all ignitions in normal circumstances. There is little evidence in Australia to suggest that high-voltage 500 kV transmission infrastructure starts fires. Fires are typically started by lower voltage distribution infrastructure, such as the 22 kV distribution lines responsible for five of the Black Saturday fires (Victorian Government, 2010). In addition, VicGrid VNI West has elected to adopt the guidance found in the Electricity Safety (Electric Line Clearance) Regulations which requires a minimum of 6.4 m separation between vegetation and a transmission line.

The Project is expected to have a low residual impact on bushfire suppression during operation. Both on-ground and aerial firefighting resources would be able to effectively fight a bushfire around Project infrastructure

Earth wires would be installed to protect Project infrastructure from lightning strikes and towers would be designed to withstand tornado winds. A feasibility assessment will be undertaken for the installation of bushfire detection technology, such as smoke detection cameras.

During operation, the Project is not expected to result in a material increase in bushfire risk to the surrounding landscape or neighbouring communities when designed, operated and maintained in accordance with the applicable electricity safety framework, including requirements for vegetation management and electric line clearance. Given the Project would be located in a bushfire prone area, there would be a risk of bushfire interaction with the proposed transmission line infrastructure. However, both the risks associated with exposure of transmission line infrastructure to dense smoke and infrastructure damage during a bushfire were determined to be low.

There is a concern within the community that aerial bushfire suppression resources, such as airplanes and helicopters, would not be able to fight fires around transmission infrastructure. Aerial firefighting operators are suitably trained and experienced and they encounter many hazards while fighting fires, which are managed by best practice safety management systems. Similarly, on-ground bushfire suppression activities are routinely conducted around transmission infrastructure throughout Victoria, and existing firefighting practices, operational procedures and resource arrangements are expected to enable the continued safe and effective management of bushfires within the Proposed Easement. The transmission line is unlikely to hinder bushfire suppression activities and both on-ground and aerial resources would be able to safely fight a bushfire in proximity to the Project.

Decommissioning of the Project would involve the same, or similar, issues as those associated with the construction of the Project and would be managed via similar measures.

In summary, this assessment has considered the potential implications of the Project for fire risk management or bushfire suppression on surrounding land, including fire ignition risks arising from the Project. Overall, bushfire risk for the Project has been addressed through a holistic approach that incorporates prevention, preparedness, response and recovery measures. The Project's bushfire mitigation framework emphasises proactive risk reduction and emergency preparedness, supported by established fire detection, suppression and response capabilities. Consistent with emergency management principles, the primary consideration in all bushfire mitigation and suppression activities is the protection of human life, followed by the protection of property, infrastructure and the environment.



vniwproject.com.au