EIS Volume 3 Appendix S

Draft Fire Hazard Management Plan

JBS&G

project energy connect

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Executive Summary

ElectraNet is proposing to construct the South Australian portion of Project EnergyConnect (the Project) which will involve the establishment of a transmission line to connect the power grids of South Australia and New South Wales with an added connection to Victoria.

This Fire Hazard Management Plan (FHMP) has been prepared to provide overarching guidance to manage and mitigate potential bushfire impacts to life, property and environmental assets during both construction and operation of the Project. Site / stage specific Bushfire Management Plans will be prepared at the relevant stages of development in consideration of the principles and mitigation measures documented within this Plan.

This FHMP considers the potential impacts of bushfire occurring within the broader landscape surrounding the Project, as well as bushfire ignited by construction and / or operational activities on Project assets.

The bushfire risk assessment methodology is based on Australian and New Zealand Standard *AS/NZS ISO 31000:2018 Risk Management–Principles and Guidelines* and has been tailored towards assessing and mitigating bushfire risk. This Plan also considers requirements of relevant SA and federal legislation and codes relating to bushfire management, environmental protection, and electricity network safety.

Results of the bushfire risk assessment indicate that the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets with Extreme and High levels of inherent risk being identified. Following implementation of the recommended mitigation measures, the residual risk is expected to be reduced to lower levels of Low and Medium. Inherent and residual risk was identified as being higher during the construction stage, where construction activities have a greater potential to ignite a fire, compared to the operational stage of the Project.

The mitigation measures recommended to manage bushfire risk associated with construction and operation of the Project have been structured using the universally recognised Prevention, Preparedness, Response, Recovery (PPRR) framework in order to provide a holistic approach to bushfire hazard mitigation and management. The recommended mitigation measures include vegetation management adjacent to life and property assets, adoption of bushfire construction standards for habitable buildings, asset inspections and maintenance, Total Fire Ban controls, pre-emptive de-energisation of the power network, promotion of public awareness, suitable access, development of bushfire emergency evacuation, bushfire monitoring and communication procedures, training of personnel, pre-bushfire season audits direct firefighting response and continual review of bushfire risk management measures in place.

1. Introduction

1.1. Project Overview

Project EnergyConnect involves the proposed construction and operation of a new High Voltage (HV) electricity transmission interconnector between Robertstown in South Australia (SA) and Wagga Wagga in New South Wales (NSW), with an added connection from Buronga in NSW to Red Cliffs in northwest Victoria.

This Fire Hazard Management Plan (FHMP) has been prepared on behalf of ElectraNet, who is the proponent for the SA section of Project EnergyConnect (the Project), which will extend from Robertstown in the west to the SA / NSW border in the east.

1.2. Project Description

ElectraNet is seeking approval under Section 46 of the *Development Act 1993* to construct and operate the Project, which has been declared a Major Development under the Act. The State Planning Commission (SPC) has determined that the proposal will be subject to the process of an Environmental Impact Statement (EIS).

A Referral for the proposal was submitted to the then Commonwealth Department of the Environment and Energy in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Commonwealth has determined that the proposal is a controlled action and requires assessment and approval under the EPBC Act because the Project was considered likely to have significant impact on Matters of National Environmental Significant (MNES).

The Project is proposed to extend approximately 205 km between Robertstown and the SA/NSW border as shown in Figure 1-1. A 1 km wide transmission line corridor has been nominated and the final alignment and easement of the transmission line will be confirmed during detailed design. The Project traverses the local government areas of Regional Council of Goyder, Mid Murray Council, District Council of Loxton Waikerie, Berri Barmera Council, Renmark Paringa Council and Land Not Within a Council Area (Pastoral Unincorporated Areas and the Unincorporated Riverland Areas).

The Project comprises:

- a new substation located at Bundey, towards the western extent of the transmission line, approximately 14 km north east of Robertstown, that will facilitate the increase in voltage required from the existing system (from 275 kV to 330 kV) and control the flow between the two systems.
- approximately 10 km of 275 kV overhead transmission line supported by steel lattice towers from the existing Robertstown substation to the proposed new Bundey substation
- approximately 195 km of 330 kV transmission line supported by steel lattice towers from the new Bundey substation to the SA / NSW border at the interface point with TransGrid's NSW portion of Project EnergyConnect.
- associated telecommunications infrastructure for operation of the transmission line comprising overhead optical ground wires linked by radio towers (one in SA)
- associated access tracks to provide access to tower sites for construction and maintenance of the transmission line
- associated temporary facilities (i.e. construction compounds, site offices, laydown areas, mobile concrete batching plants, helicopter staging sites, and temporary construction camps).

The above listed proposed Project assets are discussed further in Section 2.1.

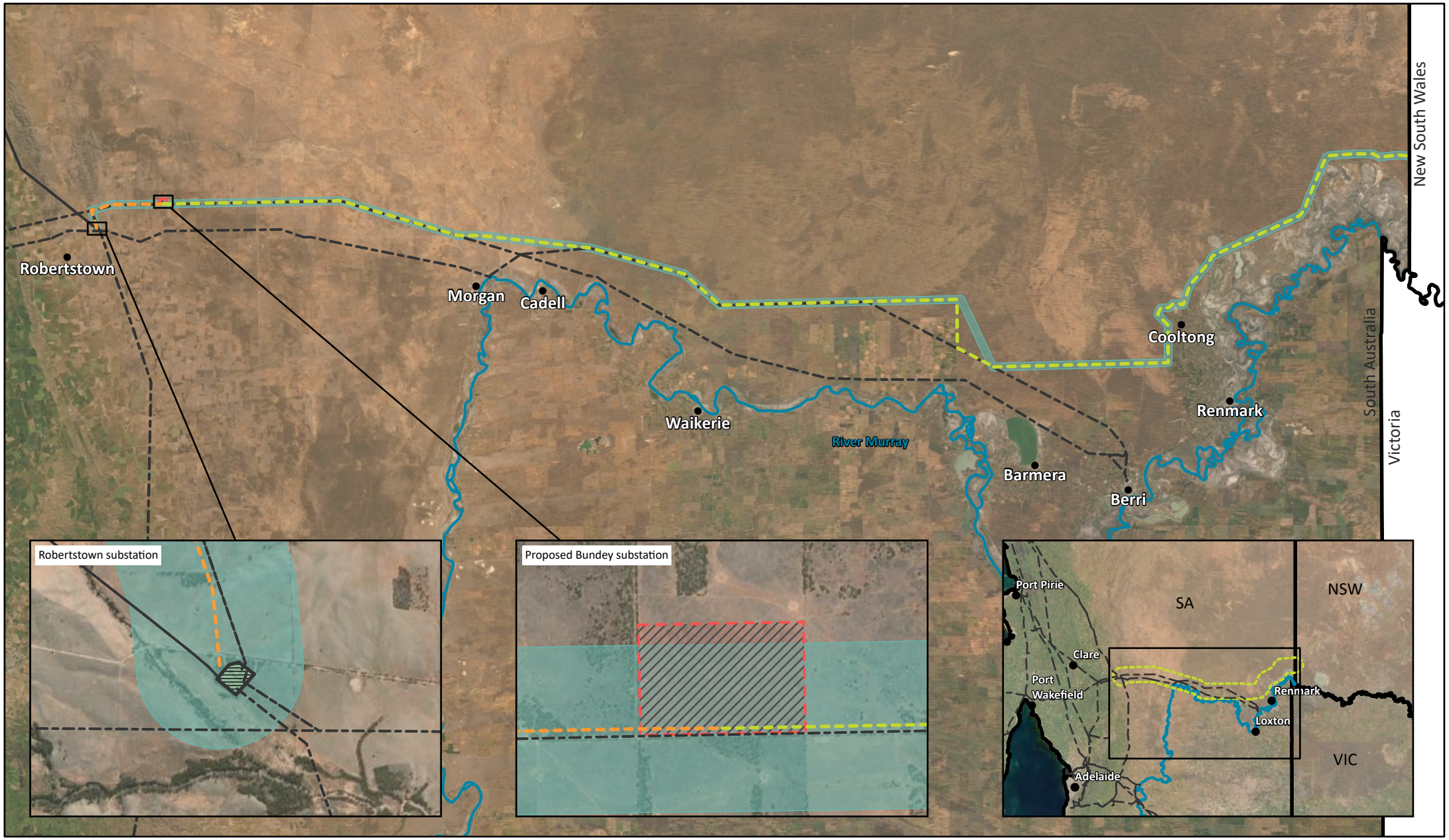

Figure 1-1
Proposed Project location

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1.3. Purpose of the FHMP

This FHMP has been prepared by JBS&G on behalf of ElectraNet and forms part of the EIS prepared for the Project.

The FHMP has been prepared in accordance with requirements of the EIS Guidelines which were issued by the State Planning Commission (SPC) on 20 November 2019. Table 1-1 lists the EIS Guidelines and requirements relating to bushfire management which have been addressed in this document.

Table 1-1: EIS Guidelines related to bushfire risk management

Assessment requirement
General Requirement
A fire hazard management plan that considers requirements both during the construction and operational phases - including measures to minimise fire risk at and to/from the site, resources and training required, sources of water to fight fires (and how this water will be accessed), options to utilise and coordinate with other operations in the region/area, and cost recovery.
Effect on Native Vegetation *Assessment Requirement 4: The proposed development traverses significant stands of native vegetation*
• 4.7 - Identify the potential impact of fire on native vegetation, and the effects of fire risk management processes during both construction and maintenance.
Effect on Native Fauna *Assessment Requirement 5: The proposed development traverses habitat that supports significant populations of native fauna*
• 5.7 - Identify the potential impact of fire on native fauna, and the effects of fire risk management processes during both construction and maintenance.
Hazard Risk *Assessment Requirement 10: The construction and operation of a high voltage powerline involves a range general and specific risks*.
• 10.1 - Evaluate the fire risk of power line and construction/maintenance equipment/vehicles and timing of maintenance to avoid fire danger season. • 10.2 - Evaluate the risk to electricity supply and infrastructure from fires, lightning, flooding, winds, sabotage etc.

1.3.1. Objectives of the FHMP

The aim of this FHMP is to identify and adopt best practice and emergency response management procedures and mitigating actions throughout the life of the Project, including during construction, to reduce potential risk to life, property and environmental assets. The FHMP also provides an overview of bushfire risk mitigation and emergency management strategies that should be considered and adopted at future stages of the Project.

These bushfire risk mitigation measures have been developed based on the Prevention, Preparedness, Response, Recovery (PPRR) framework to provide a holistic approach to reducing the likelihood of a bushfire occurring and the consequences for proposed Project assets and the surrounding landscape.

The specific objectives of this FHMP are to:

- review legislation, standards, planning controls and regional Bushfire Management Plans applicable to the proposed Project
- review existing ElectraNet bushfire risk mitigation procedures
- identify potential bushfire hazards and scenarios that could impact the Project, as well as surrounding life, property and environmental assets

- assess the inherent and residual bushfire risk to life, property and environmental assets both during the construction and operational phases of the Project through a risk-based assessment
- document bushfire risk mitigation measures to minimise risk of bushfire to and from the proposal and / or surrounding areas both during the construction and operational phases of the Project.

1.3.2. Scope of the FHMP

This FHMP is a high-level document that has a broad scope and provides an overview of the bushfire hazards and risks across an area to determine wider impacts irrespective of land tenure and ownership.

ElectraNet acknowledges the potential risk of bushfire to contractors and staff and the importance of their safety during construction. The lives and communities, property, and ecological values surrounding the Project are respected and valued and ElectraNet is acutely aware of its responsibilities and of the potential risk of construction and operational activities starting a bushfire and the impact on these values.

The scope of this FHMP encompasses the easement area of the transmission alignment and potential sites for the substation and temporary facilities, as well as the broader vegetation extent, to ensure the full scale of bushfire risk to on-site and off-site personnel, property and environment assets is assessed and managed accordingly.

This FHMP has been prepared primarily to assess the potential bushfire risk to the life, property and environmental assets listed below:

- Life assets:
  - construction and operational workforces
  - adjacent communities.
- Property assets:
  - ElectraNet infrastructure, sub-stations, laydowns and temporary facilities
  - adjacent private properties and settlements.
- Environmental assets:
- Vegetation associated with the Riverland Biosphere Reserve, including Calperum and Taylorville Pastoral Lease Scientific Reserves, Chowilla Regional Reserve and Game Reserve and various other adjacent Reserves, Conservation Parks and National Parks
  - RAMSAR wetlands
  - River Murray.

This is an initial overarching FHMP consisting of high-level bushfire mitigation strategies and provides guidance for the preparation of future Bushfire Management Plans at the relevant stage/s of development (be it construction or operational).

1.4. Report terminology

The following terms are used within this plan and are defined as:

- Project area – the South Australian portion of Project EnergyConnect, between Robertstown and the SA/NSW border, including the proposed transmission lines, substation and temporary facilities.
- Transmission line corridor – the 1 km wide corridor in which the final 80 m wide easement and transmission line is expected to be located.

1.5. Stakeholder Consultation

Extensive stakeholder and community consultation has been undertaken for the Project including targeted engagement with the community, special interest environment groups and traditional owner representatives to determine the optimal alignment for the Project.

Community engagement has been supported by the establishment of a dedicated website and social media page (Facebook), a newsletter (the Connector) and the attendance by key project team members at community field days. Interactive iPads have also been stationed in council offices allowing members of the community to provide feedback on the project.

Engagement has extended to all councils along the proposed route and engagement is ongoing. CFS Region 3 was also consulted early to identify key concerns and opportunities for the proposed route alignment.

To support the release of the EIS, an online engagement room has been established to enable ease of community and stakeholder feedback. The engagement room provides important information on the Project, facts sheets which can be downloaded and points to collect feedback from site visitors.

1.6. Relevant Legislation, Planning Controls and Standards

This section summarises the relevant legislation, policy, planning controls, standards and guidance documents that are relevant to preparing this bushfire risk assessment report.

1.6.1. *Development Act 1993* and *Development Regulations 2008*

The proposed development has been assessed as a Major Development pursuant to Section 46 of the *Development Act 1993* (the Act). An Environmental Impact Statement (EIS) has been prepared in accordance with Section 46B of the Act.

1.6.2. *Fire and Emergency Services Act 2005*

The *Fire and Emergency Services Act 2005* (FES Act) establishes the SA Fire and Emergency Services Commission and provides for the metropolitan and country fire and emergency services as well as the State Emergency Service.

The FES Act outlines the governance, structure and areas of responsibility including for the SA Country Fire Service (CFS), which maintains responsibility for the Project area, including:

- establishment and function of the State Bushfire Coordination Committee and Bushfire Management Committees
- State Bushfire Management Plans and Bushfire Management Area Plans
- fire prevention (fire danger season, total fire bans and permits to burn)
- duties relating to fires and emergencies.

Part 4A, Division 3 of the FES Act sets out the requirement for bushfire fuels to be managed on both private and public land to prevent or inhibit the outbreak and spread of fire, protect property and minimise the threat to human lives. The FES Act also provides for declaration of fire danger seasons and total fire ban restrictions which must be adhered to by Project operations (Part 4, Division 8, Subdivisions 1 and 2).

1.6.3. State Bushfire Management Plan

The State Bushfire Management Plan (SBMP) identifies the major bushfire risks in the State and recommends appropriate action that will provide protection to life, property and the environment from the effects of bushfire. The SBMP sets out principles, policies and standards for bushfire

management in the State from a high level or strategic perspective, including a strategic approach to hazard reduction, and strategies for state-wide coordination and integration of bushfire management activities.

1.6.4. Bushfire Management Area Plans

South Australia is divided into nine Bushfire Management Areas for which a Bushfire Management Area Plan (BMAP) has been developed as part of a project funded by the Natural Disaster Resilience Program in partnership with the Commonwealth and State Governments.

The majority of the Project is located within the Murray Mallee (MURRM) BMAP area while the western portion near Robertstown is located within the Flinders Mid-North Yorke BMAP area.

Each BMAP contains a risk assessment in respect of human settlement, economic, cultural heritage and environmental assets and consists of a spatial on-line map, an explanatory text document (the plan) and risk treatment registers for specific assets. BMAPs also identify Bushfire Safer Places and Last Resort Refuges within the BMA. The purpose of each BMAP is to:

- identify assets as risk from bushfire.
- outline bushfire prevention and mitigation strategies.
- identify responsibilities for implementation of risk mitigation treatments.
- establish principles and standard to guide the success of the bushfire management strategies.

Bushfire Management Zones are identified within each BMAP to designate areas where fuel management activities are regularly undertaken with the aim of reducing the risk and impacts of bushfire on life, property and environmental assets identified in the risk register. The three bushfire management zones are:

- asset Protection Zones (A-zones).
- bushfire Buffer Zones (B-zones).
- conservation Zones (C-zones).

Asset Protection Zones should be maintained on an annual basis to ensure that the Overall Fuel Hazard levels are reduced to a level of Moderate or below throughout the fire season. The *Native Vegetation Act 1991* allows for the clearing of understorey vegetation up to 20 m around a residence and can be extended in response to down slopes and higher vegetation classifications to achieve Bushfire Attack Level (BAL) 12.5 in accordance with AS 3959 methodology (refer Section 1.6.12). Maintaining BAL-12.5 (<12.5 kW/m^2) is designed to prevent ignition of structures from low to moderate levels of radiant heat and ember attack.

The Bushfire Management Zone Standard and Guide for Use publication (SBBC 2017) prescribes standards for establishment and maintenance for each of the three zones.

The existing Robertstown substation is registered as an existing asset on the Flinders Mid-North York BMAP and requires an Asset Protection Zone.

1.6.5. Bushfire Protection Overlays

The SA Planning and Design Code (the Code) designates bushfire protection overlays which are subject to bushfire related planning and building requirements according to the level of bushfire risk determined for a site. Under the Code, SA has been mapped based on six categories of bushfire protection: General Risk, Medium Risk , High Risk, Outback, Regional and Urban Interface. The proposed alignment in located within four of the six bushfire hazard overlays: General Risk, Outback,

Regional and Medium Risk. The Medium Risk areas in relation to the transmission line corridor are primarily located south of Hawks Nest Station and in the Cooltong area (refer Figure 1-2).

The development controls in place provide guidance as to how bushfire risk should be considered / addressed on such land.

The Code bushfire policies are very similar across all the overlays. Attachment 1 contains an extract of the bushfire overlay Code policy that applies to the transmission line corridor. The overlay policy seeks to ensure that development considers the level of bushfire risk, including the increased frequency and intensity of bushfires as a result of climate change. The location of structures, such as electricity towers, should ensure the threat and impact of bushfires on life and property is minimised as much as possible, and ensures appropriate access for emergency service vehicles.

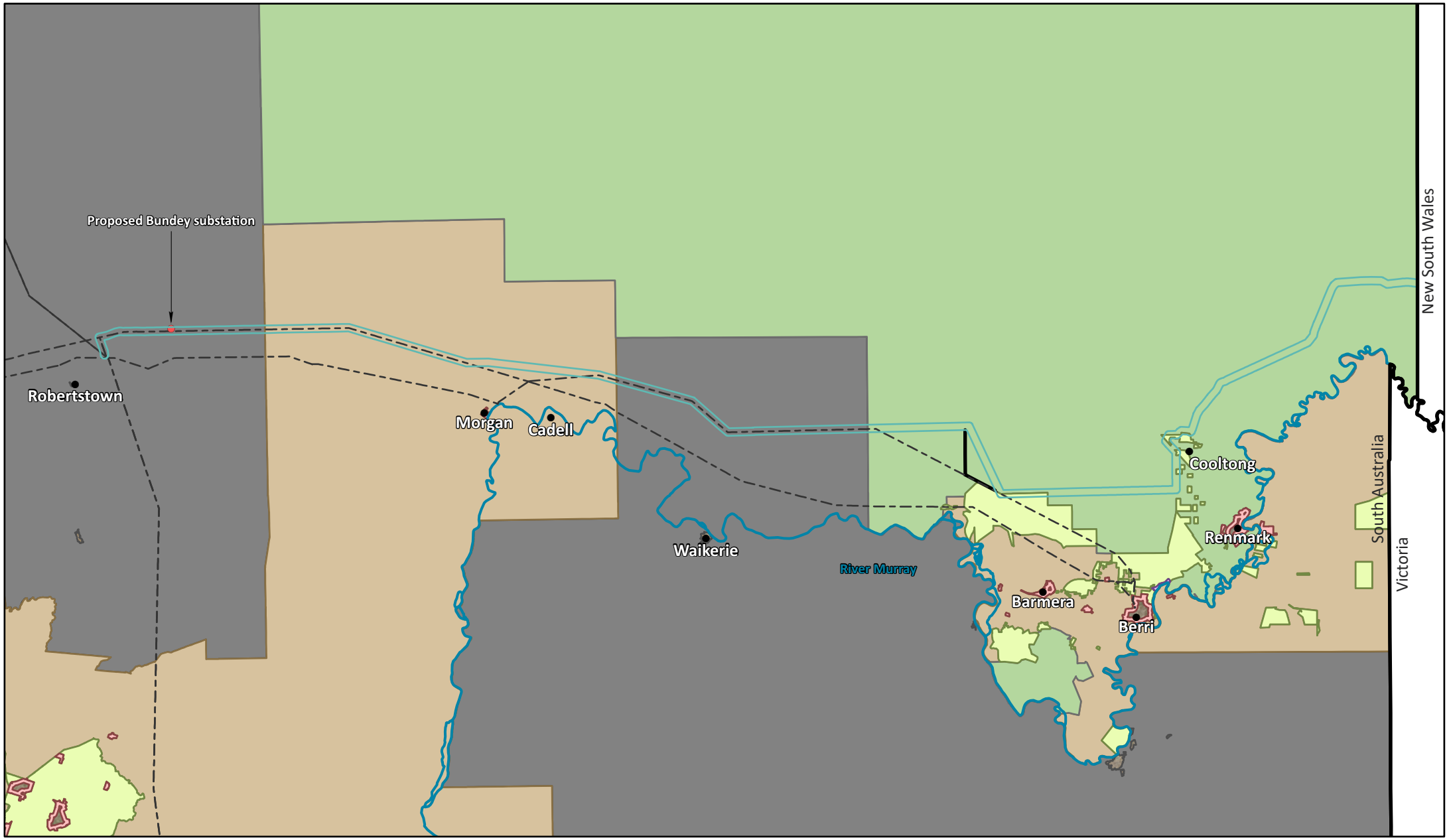


Figure 1-2
Hazards (Bushfire) Overlays in the Planning and Design Code

1.6.6. Bookmark Mallee Bushfire Management Plan

A large proportion of the proposed alignment runs within / adjacent to the Riverland Biosphere Reserve (previously known as the Bookmark Biosphere Reserve), which includes Calperum and Taylorville Stations. This reserve has significance due to the extensive area of intact mallee vegetation, as well as the presence of threatened bird species and their habitats, including wetlands and is protected by a Native Vegetation Heritage Agreement by the State.

The Bookmark Mallee Bushfire Management Plan (BMBMP; DEH 2009) has been prepared to guide bushfire management measures, including suppression with an emphasis on the protection of life and property as well as protection of natural and cultural heritage values.

The main objectives of the BMBMP are to:

- protect life and property on all reserves
- restrict the extent of non-prescribed fire in order to protect and maintain mallee habitat as much as possible for the conservation of threatened species
- contain bushfires within single fire management blocks wherever possible, and to prevent fire spreading beyond the reserve
- minimise the impacts of both bushfire suppression and pre-suppression works on the through better incident management, planning and targeted rehabilitation
- monitor the effects of fire on mallee ecosystems
- facilitate a better understanding of the role of fire and its impacts in mallee ecosystems, and the efficacy of prescription burning in mitigating the threat that bushfire presents through targeted research and monitoring programs
- protect Cultural Heritage sites from fire
- bushfire mitigation measures proposed within this FHMP aim to align with objectives of the BMBMP, especially in relation to preventing uncontrolled large-scale fires that have potential to cause adverse ecological impacts on the Reserve.

The proposed route has been aligned to follow and be within the fire management (B) zone around the south- eastern and southern boundary of Calperum (northern boundary of Cooltong Conservation Park). The proposed alignment along the southern boundary of Calperum, the southern and western boundary of Hawks Nest and the southern boundary of Taylorville presents an opportunity to extend the fire management zone linking and improving fire access and therefore protection of the Riverland townships. Further discussion will be undertaken with the CFS and DEW as the project progresses.

1.6.7. Code of Practice for Fire Management on Public Land in South Australia

The Code of Practice for Fire Management on Public Land in South Australia (the Code; GoSA 2018) provides a framework for fire management on public land in order to reduce the occurrence, severity and impacts of bushfires on life, property and the environment and promote improved ecological and biodiversity outcomes using the PPRR framework.

The Code applies to all public land managed by the CFS, Department for Environment and Water (DEW), ForestrySA and SA Water. As the Project extends through land under management by DEW, ElectraNet will be required to adopt the Code as part of its bushfire management measures in accordance with Agency requirements.

1.6.8. South Australian Firebreaks, Fire Access Tracks and Sign Standards Guidelines

The South Australian Firebreaks, Fire Access Tracks and Sign Standards Guidelines (CFS 2018) guides government agencies to achieve a consistent approach in the establishment and maintenance of

firebreaks and tracks used for fire access. The document also aims to provide a guide for private landholders.

The guidelines state that:

- Firebreaks are an area or strip of land where vegetation has been removed or modified to reduce the risk of fires starting and reduce the intensity and rate of spread of fires that may occur; and
- Fire access tracks are tracks used for fire access that are designed, constructed and maintained for the safe passage of fire fighting vehicles undertaking fire suppression activities. All designated tracks will permit access by standard 34 units (4WD vehicles capable of carrying up to 3,500 litres).

The following guidance is provided for firebreaks and fire access tracks:

- Firebreaks and fire access tracks should complement any existing or planned firebreaks or tracks on adjoining lands specified in Regional and District Bushfire Prevention Plans.
- Wherever possible, firebreaks and fire access tracks should be established on previously cleared land to minimise the impact on native vegetation and reduce establishment and maintenance costs.
- Firebreaks should be strategically placed to aid in the protection of fixed assets including dwellings and other building.
- Firebreaks and fire access tracks should be positioned to aid fire suppression and should be as straight as practicable.
- As firebreaks normally include access tracks, ease of vehicle access in difficult terrain needs to be considered.
- Firebreaks should, where practicable, be located in vegetation of least fuel load to improve the chance of fire control.
- The range of firebreak treatments can extend from total removal to partial modification of components of its vegetation, leaving trees and only reducing the understorey and fine litter fuel may achieve a significant reduction in fire intensity while retaining some vegetation to maintain soil stability and aesthetic value.

A summary of technical requirements for firebreaks and fire access tracks under the Guidelines is provided in Table 1-2. ElectraNet will liaise with CFS at the detailed design stage to ensure that the proposed access tracks meet CFS requirements. It is not proposed that the transmission line easement act as a firebreak, rather the easement access track can be established and maintained to CFS access requirements.

Table 1-2: Firebreak and access track requirements (CFS 2018)

Technical Requirements	
Firebreaks	
General	Where practicable and environmentally acceptable, a firebreak should incorporate a fuel-free strip of a minimum width of 1.8 metres
Grassland firebreaks	• 4 to 10 m width, including a track used for fire access. • In native grasses a firebreak up to 5 m wide is permitted, greater width requires approval of the Native Vegetation Council.
Native vegetation firebreaks	The Native Vegetation Act allows for firebreaks up to 5 m wide to be established through native vegetation without the need for consent from the Native Vegetation Council. For areas of native vegetation under Heritage Agreement, a perimeter firebreak up to 5 m width may be established during boundary fencing. Any

Technical Requirements		
		additional clearance for firebreak purposes requires the specific approval of the Native Vegetation Council.
Firebreaks for building protection	New dwellings	New dwellings should be established in existing cleared areas to maximise setback from native vegetation.
	Existing dwellings	The CFS recommends a firebreak around an existing dwelling of 20 m minimum width.
Fire access tracks		
Major fire tracks		• minimum 7 m width. • sufficiently clear of vegetation (both sides and overhead) to allow ready and safe two-way access.
Standard fire tracks		• 4 to 5 m width. • sufficiently clear of vegetation (both sides and overhead) to allow ready and safe access. • constructed with passing bays permitting two-way access (minimum length of 17 m, minimum width of 6 m, maximum width in native vegetation of 8 m). • maximum intervals between opportunities to pass of 400 metres.
Minor fire tracks		• 4 to 5 m width. • sufficiently clear of vegetation (both sides and overhead) to allow ready and safe access. • single lane access is permitted on through roads
Service tracks (restricted access)		• not maintained to any standard for access or clearance and may not be trafficable. • marked on maps but may only be used with the approval of the Incident Controller. • should only be used during emergency operations with absolute caution under suitable fire behaviour or weather conditions.

1.6.9. *South Australia Electricity (Principles of Vegetation Clearance) Regulations 2010*

The *South Australia Electricity (Principles of Vegetation Clearance) Regulations 2010* set out vegetation clearance standards in accordance with Part 5 of the *Electricity Act 1996*.

The regulations identify Non-Bushfire Risk Areas and Bushfire Risk Areas. The Project's proposed alignment is depicted as being located within a prescribed Bushfire Risk Area.

The regulations provide specifications for powerlines up to 275 kV and will need to be revised in the future to provide for the 330 kV powerlines proposed as part of this Project. In the absence of specific guidance for 330 kV powerlines, the 275 kV standards will be used to guide vegetation clearance requirements for the Project.

1.6.10. National Electricity Network Safety Code

The National Codes National Electricity Network Safety Code (ENA 2006) provides information on safety clearances for overhead transmission lines. The Code states that trees should be kept clear of transmission lines to minimise risk of fire caused by contact between trees and the lines. Clearance requirements also aim to protect the public and reduce the number of power interruptions and damage to assets. These initiatives will be adopted for the length of the Project in SA.

1.6.11. Overall Fuel Hazard Guide for South Australia

The Overall Fuel Hazard Guide for South Australia (GoSA 2011) provides a means of assessing bushfire hazard through the assessment of Bark Fuel, Elevated Fuel, and Surface Fine Fuel in forest, woodland

and shrubland fuels. The Guide is designed to be used during fire management planning, before and after prescribed burning and during fire suppression operations. The Guide will assist with determining the hazard adjacent to the proposed towers during the preparation of future BMPs at construction and operational stages of the Project.

1.6.12. AS 3959 Construction of buildings in bushfire prone areas

AS 3959 Construction of buildings in bushfire prone areas (AS 3959; SA 2018a) outlines the methodology for determining Bushfire Attack Levels (BALs). BALs provide a measure of a building or assets potential exposure to ember attack, radiant heat and direct flame contact based on vegetation type, proximity of vegetation and effective slope under the vegetation.

The BAL ratings assigned within AS 3959 are outlined in Table 1-3.

Table 1-3: Bushfire attack levels under AS 3959

BAL		Bushfire impact
BAL LOW		Insufficient risk to warrant specific construction requirements.
BAL-12.5	≤12.5 kW/m^2	Ember attack with minor radiant heat flux
BAL-19	≤19 kW/m^2	Increasing ember attack with increasing radiant heat flux.
BAL-29	≤29 kW/m^2	Increasing ember attack with increasing radiant heat flux.
BAL-40	≤40 kW/m^2	Increasing ember attack with increasing radiant heat flux and increased likelihood of exposure to flames.
BAL-FZ	>40 kW/m^2	Direct exposure to flames in addition to radiant heat flux and ember attack.

The BMAPs relevant to the Project area specify that that Asset Protection Zones (A-zones) should be of a width sufficient to achieve BAL-12.5 in order to prevent ignition of structures from low to moderate levels of radiant heat and ember attack. Asset Protection Zones are currently required for the existing Robertstown substation in accordance with the Flinders Mid-North York BMP and are likely to be applicable to the new proposed Bundey substation and the proposed temporary construction compounds, site offices and mobile construction camps.

1.6.13. Other Acts and Regulations

State

Native Vegetation Act 1991, Section 27 to 29

Native Vegetation Regulations 2017

National Parks and Wildlife Act 1972

Wilderness Protection Act 1992

Aboriginal Heritage Act 1988

Crown Land Management Act 2009

Planning, Development and Infrastructure Act 2016

South Australian Murray-Darling Basin Biodiversity Plan

Commonwealth

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) Section 14, 18 and 269AA

1.7. ElectraNet Bushfire Risk Management Guideline

This internal Guideline establishes the approach to bushfire risk management within ElectraNet. The bushfire risk management measures are designed to assist ElectraNet in preventing, preparing for, responding to and recovering from bushfire events and contain a suite of bushfire controls and actions with specific triggers for implementation.

These controls, actions and triggers are listed below in the context of the Prevention, Preparedness, Response, Recovery (PPRR) framework.

Prevention and planning

- vegetation management adjacent to assets, particularly in high bushfire risk areas.
- promote public awareness of bushfire protection measures in proximity to the Project.
- conduct regular asset inspections and asset maintenance.
- investigate network events for fire ignition potential.

Preparedness

- have due regard for fire danger season dates and controls.
- regularly monitor bushfire and weather information.
- ElectraNet Fire Danger Levels (FDL) are calculated on days with Total Fire Bans in order to provide a trigger for specific actions to be carried out:
  - FDL 1 - mean wind speed ≥ 35km/h < 45 km/h.
  - FDL 2 - mean wind speed ≥ 45km/h < 63 km/h.
  - FDL 3 - mean wind speed ≥ 63 km/h.
- The ElectraNet Emergency Liaison Coordinator (ELC) maintains relationships with key bushfire planning and management organisations and is prepared to prevent, respond to and recover from bushfire events.

Response

- total Fire Ban day controls are carried out.
- transmission lines may be identified as a fire risk based on vegetation management, maintenance, defects and operational performance risk.
- transmission lines may be deenergised if damaged due to adverse conditions if there is risk of fire ignition or at the request of emergency services (triggered by FDL 2 or FDL 3).
- automated disconnection occurs on identified lines in FDL 2 or FDL 3 conditions.
- reenergisation only occurs once FDL reduced and/or inspections have been carried out.
- fire reports are prepared for all accidents involving fire.
- ELC may attend CFS State Control Centre to assist the response effort.

Recovery

A post bushfire season review is conducted to assess effectiveness of risk management measures, bushfire incident responses, lessons learned and areas for improvement.

2. Assets

2.1. On-site assets

2.1.1. Existing Robertstown substation

The existing Robertstown substation is located approximately 2 km northeast of the Robertstown townsite (refer Figure 1-1). The site is predominantly surrounding by grazed pastureland and immediately bordered by fringing screening vegetation (mallee woodland type).

The substation will be upgraded to facilitate the proposed Project through a separate approvals process.

Plate 2-1: Existing Robertstown substation

2.1.2. New Bundey substation

A new substation is proposed to be located at Bundey, near Robertstown, at the western end of the transmission line (Figure 1-1) which will allow an increase in voltage required from the existing system (from 275 kV to 330kV) and control flow between the two systems.

The Bundey substation will cover an area of approximately 400 m by 250 m (9 ha) and will comprise typical primary plant (refer Figure 2-1), including:

- transmission gantries which guide transmission lines into the substation
- surge arrestors
- power transformers
- line disconnectors
- voltage and current transformers
- circuit breakers
- busbars
- light poles
- lightning masts
- a weather station
- communication / radio tower
- associated control and amenities buildings.

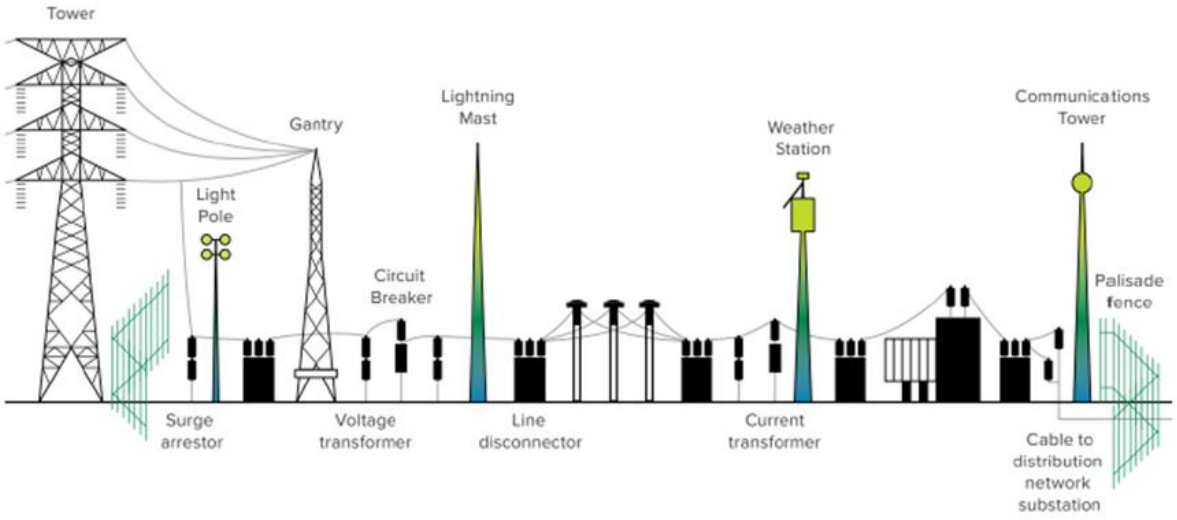


Figure 2-1: Typical substation components

2.1.3. Transmission lines

The proposed transmission lines will comprise:

- approximately 10 km of 275 kV transmission line supported by steel towers from the existing Robertstown substation to the proposed new Bundey substation.
- approximately 195 km of 330 kV transmission line supported by steel towers from the new Bundey substation to the SA/NSW border at the interface with TransGrid's NSW portion of the Project.

The transmission lines will be situated in an 80 m wide easement where most of the existing vegetation will remain undisturbed. The alignment will comprise approximately 380 steel lattice transmission towers spaced between 400 m and 600 m apart with a height of approximately 45 m and 65 m.

Construction of the towers requires clearing of an approximately 50 m by 50 m footprint which will be allowed to naturally revegetate once construction has been completed. The actual footprint of each tower will be reduced to approximately 25% or less of the construction footprint.

Vegetation clearance requirements along the transmission alignment have been calculated in accordance with the South Australia Electricity (Principles of Vegetation Clearance) Guidelines discussed in Section 1.6.9 and are shown diagrammatically in Figure 2-2.

Much of the native vegetation over the alignment is relatively low, slow growing and at mature height, therefore, it is planned to design the line to span across mature vegetation with minimal clearance required, where feasible. If this is not feasible, some clearance or lopping of trees may be required under the conductors in some areas. Preliminary calculations indicate that trees up to a height of approximately 8 m may be able to be spanned without trimming. This will be confirmed when detailed line design is undertaken.

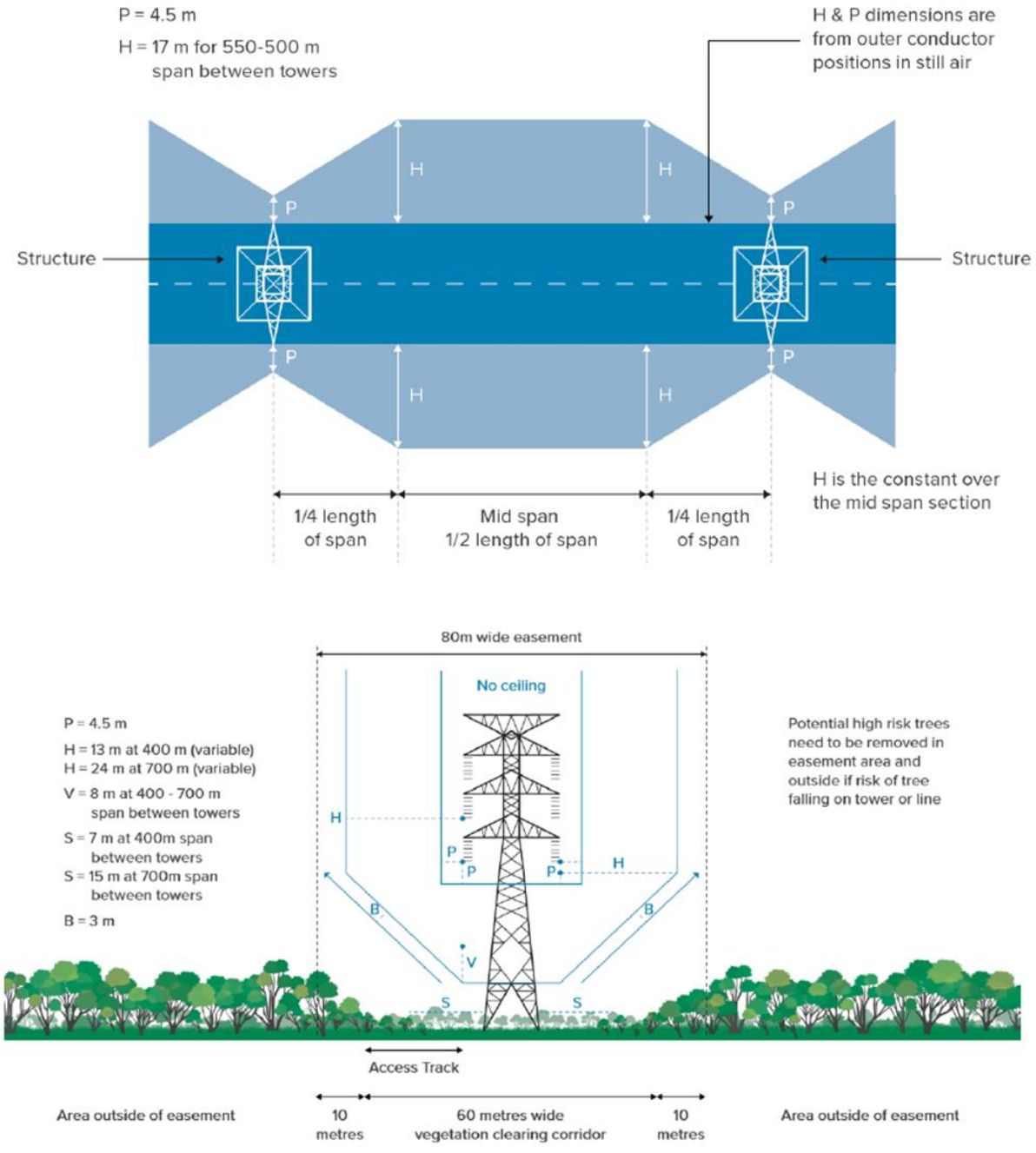


Figure 2-2: Electricity (Principles of Vegetation Clearance) Regulations 2010 requirements

2.1.4. Telecommunications infrastructure

Telecommunications infrastructure will comprise overhead optical ground wires linked by a 50 m high radio tower and telecommunications hut which will be co-located at the new Bundey substation.

2.1.5. Access tracks

Access tracks will be required along the transmission alignment to allow construction of the towers and transmission lines and ongoing maintenance of the infrastructure. In order to reduce environmental disturbance and promote ease of access, primary access to the transmission alignment

will be via existing public and private roads and access tracks located on public and private land that the corridor traverses.

A 5 m wide permanent access track to each tower is proposed for the entire alignment, although alternative access arrangements (such as an adjacent existing road) may be made in environmentally sensitive areas. An additional temporary stringing access corridor (approximately 5 m wide) will be established during the construction stage and will be reinstated as natural vegetation post-construction works (see Figure 2-3).

Existing access roads and tracks along the transmission alignment are depicted in Figure 2-4. The location of new tracks will be determined during the detailed design stage.

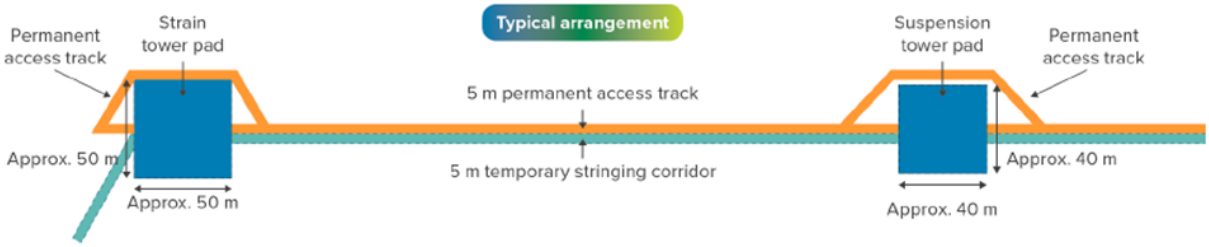


Figure 2-3: Typical arrangement of transmission line access tracks (Associated temporary facilities

2.1.6. Temporary construction camps

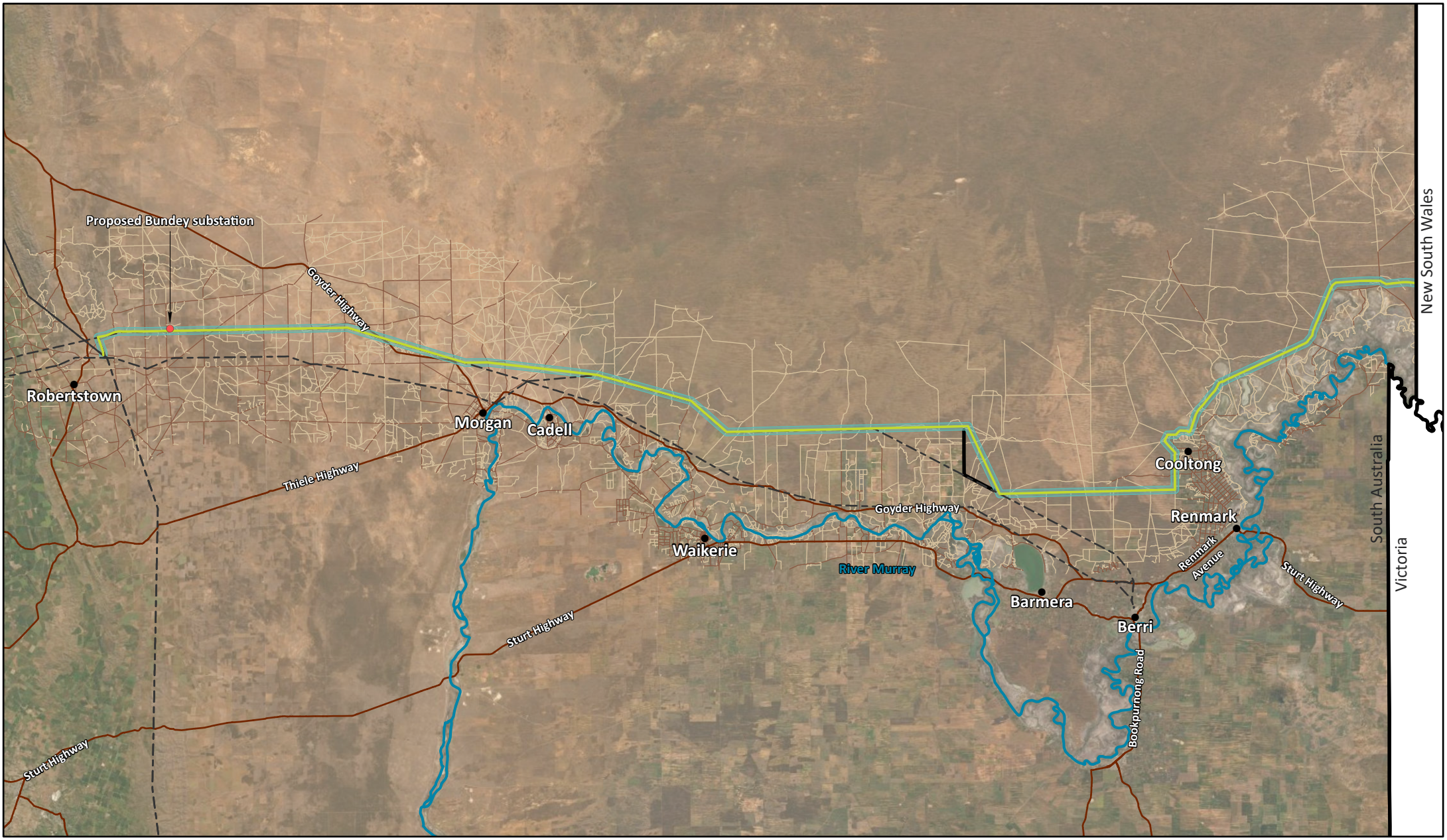
It is anticipated that up to four temporary construction camps will be located along the proposed alignments to accommodate the peak workforce of approximately 200-250 workers during peak construction of the project.

Temporary camp locations will be determined during detailed design. These locations are likely to be close to the Bundey Substation, North West Bend / Morgan, Hawks Nest Station and Chowilla. The workers camps will be located in existing cleared/disturbed area to minimise environmental impacts and are expected to include:

- accommodation buildings
- amenities buildings
- kitchen (dry mess)
- site offices
- workshops
- carpark
- site communications
- local power generation facilities (including self-bunded diesel storage fuel tanks)
- wastewater treatment
- stormwater management
- portable water supplies and firefighting equipment.

2.1.7. Laydown and staging areas

Up to four temporary laydown and staging areas will be developed along the alignment, being co-located with the workers' camps where possible. Each area will be approximately one to two hectares in area and used to store heavy vehicles, equipment and bulk materials.



Proposed alignment 80m easement
Transmission line corridor
Cultural heritage avoidance alignment
Main road
Road
Access track
Existing ElectraNet transmission line
River Murray
Proposed Bundey substation

Figure 2-4
Existing access roads / tracks and settlements in the Project area

0 20
Kilometres

N

ElectraNet
energy connect
JBS&G

2.2. Surrounding Assets

ElectraNet acknowledges and respects the potential risk of bushfire to surrounding communities and the environment and takes its asset installation and management responsibilities seriously. This FHMP outlines the measures that will be adopted to reduce the risks to these adjacent assets.

2.2.1. Life and property assets

There are numerous settlements located along the River Murray to the south of the proposed transmission line corridor as depicted in Figure 2-4. These include the town sites of Robertstown, Morgan, Cadell, Waikerie, Kingston on Murray, Cobdogla, Barmera, Glossop, Monash, Berri, Lyrup, Calperum, Renmark and Paringa. Most of these settlements are located within 6-16 km of the proposed corridor.

Inhabited land within the wider landscape is predominantly pastoral and supports private farm assets and rural residential properties.

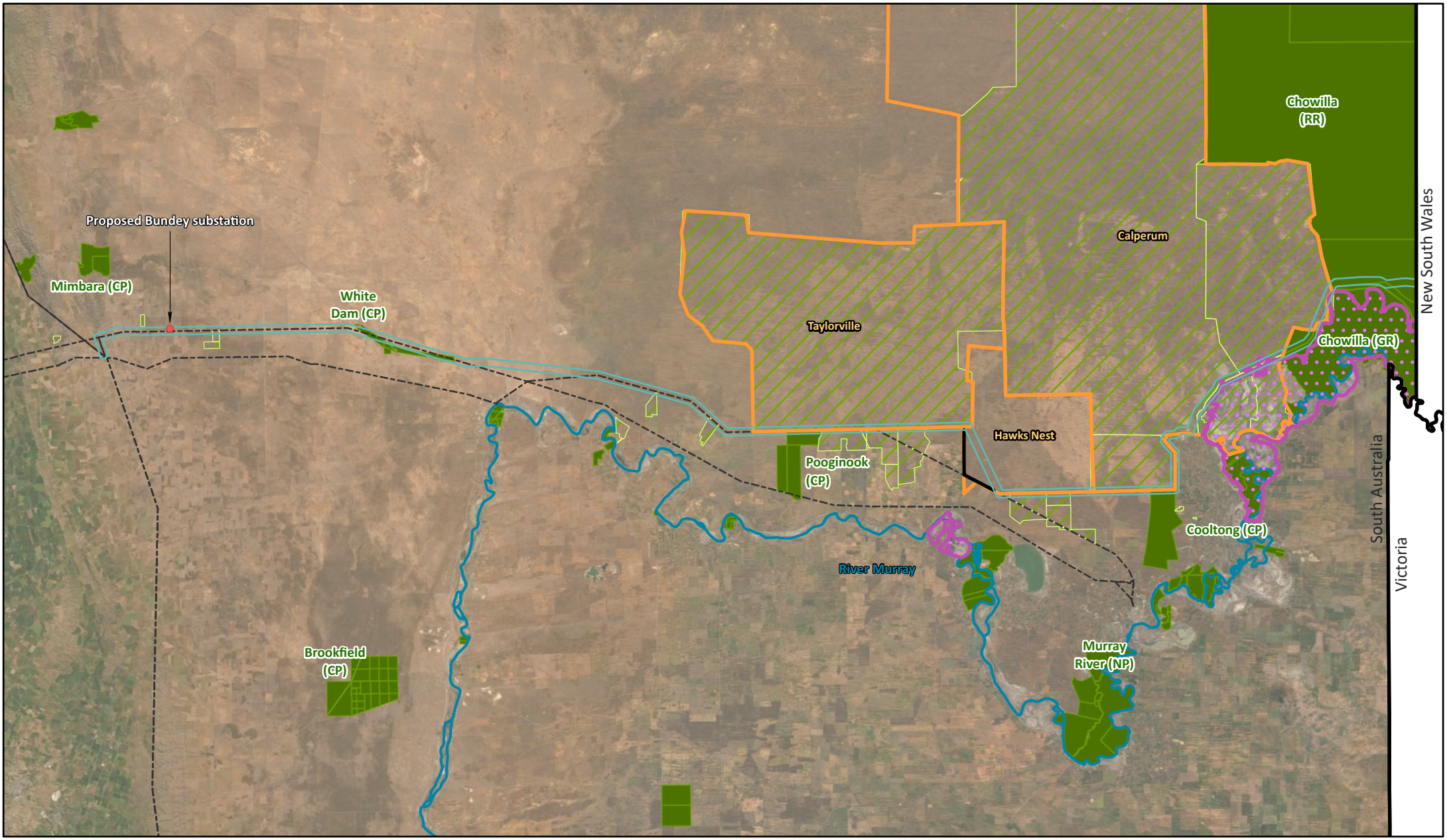
2.2.2. Environmental assets

The Project area is situated in the Murray Mallee region and surrounded by a significant amount of native mallee vegetation, particularly across the central and eastern portion of the transmission alignment. This vegetation has high environmental value and contains threatened bird species and their habitats.

The eastern portion of the transmission alignment traverses Taylorville and Calperum Stations, which are former pastoral leases now managed for conservation by the Australian Landscape Trust. The alignment will also extend through and adjacent to numerous Vegetation Heritage Agreement sites (including the abovementioned stations) where landowners have agreed to the long-term protection of native vegetation.

Extensive areas of Ramsar listed wetlands are located adjacent to the eastern portion of the Project alignment, between Calperum Station and the SA / NSW border. A further Ramsar wetland is located near Overland Corner, within 14 km south of the alignment.

Environmental assets surrounding the Project area are depicted in Figure 2-5.



Transmission line corridor
Ramsar wetland
Pastoral lease
Conservation parks and reserves
Vegitation heritage agreement
Cultural heritage avoidance alignment
Existing ElectraNet transmission line
River Murray
Proposed Bundey substation

Figure 2-5
Environmental assets in the area of the Project

0 20
Kilometres

N

ElectraNet
energy connect
JBS&G

3. Local Bushfire Environment

This section provides an overview of the local bushfire environment in order to assess the level of inherent risk associated with the proposed Project. Management and mitigation measures to address the risks associated with the potential ignition sources, vegetation, topography and bushfire weather conditions are detailed in Section 6.

3.1. Bushfire History

Bushfire history within and surrounding the Project area is an important consideration in the overall risk assessment. Figure 3-1 depicts fire history in close proximity to the Project area.

There have been two significant fire events in the past 15 years that have intersected the Project area:

- Bookmark Fire (November 2006) – 118,000 ha.
- Calperum Fire (January 2014) – 48,000 ha.

Several smaller fires have also occurred within proximity to the alignment as follows:

- Bruno Bay Fire (Spring 2007) – 800 ha.
- Cobdogla (Summer 2009) – 45 ha.
- Loch Luna (Summer 2006) – 90 ha.
- Burra Fire (Summer 2005) – 6,000 ha.

3.2. Potential Ignition Sources

3.2.1. Ignition during construction

The following potential ignition sources have been identified during construction of the Project:

- sparks resulting from the action of steel against rock during the use of heavy construction equipment (e.g. bulldozers, drillers, excavators) or vegetation removal equipment (e.g. mowers, slasher)
- ignition of grassland and other dry ground fuels by motor vehicle exhaust systems (especially diesel vehicles), wheel rims or due to vehicle collisions with infrastructure or other vehicles
- sparks produced during 'hot works' activities such as welding or grinding
- electrical faults occurring during the construction of powerline infrastructure
- flammable materials stored at lay-down areas or construction sites with potential to ignite when not stored or used correctly
- arson events, especially in proximity to towns.

3.2.2. Ignition during operation

The following potential ignition sources have been identified during operation of the Project:

- vegetation falling on or touching conductors
- extreme temperatures resulting in sagging of transmission lines and contact with vegetation, the ground or other structures
- transmission lines coming into contact with each other during high winds/extreme temperatures
- damage to transmission lines from winds, lightning, mechanical means or due to aging of equipment

- faulty installation
- bushfire smoke causing arcing to the ground or between conductors
- bird-strike / electrocution
- pole-top fires due to dust build up on insulators
- electrically induced fires
- arson events, especially in proximity to town sites.

3.2.3. External sources of ignition

The following potential external ignition sources have been identified:

- lightning, especially between September to December when dry lightning storms occur frequently (DEH 2009)
- reignition of or escaped prescribed burns in the adjacent reserves
- improperly extinguished or out of season campfires within the adjacent reserves
- arson events, particularly in close proximity to towns.

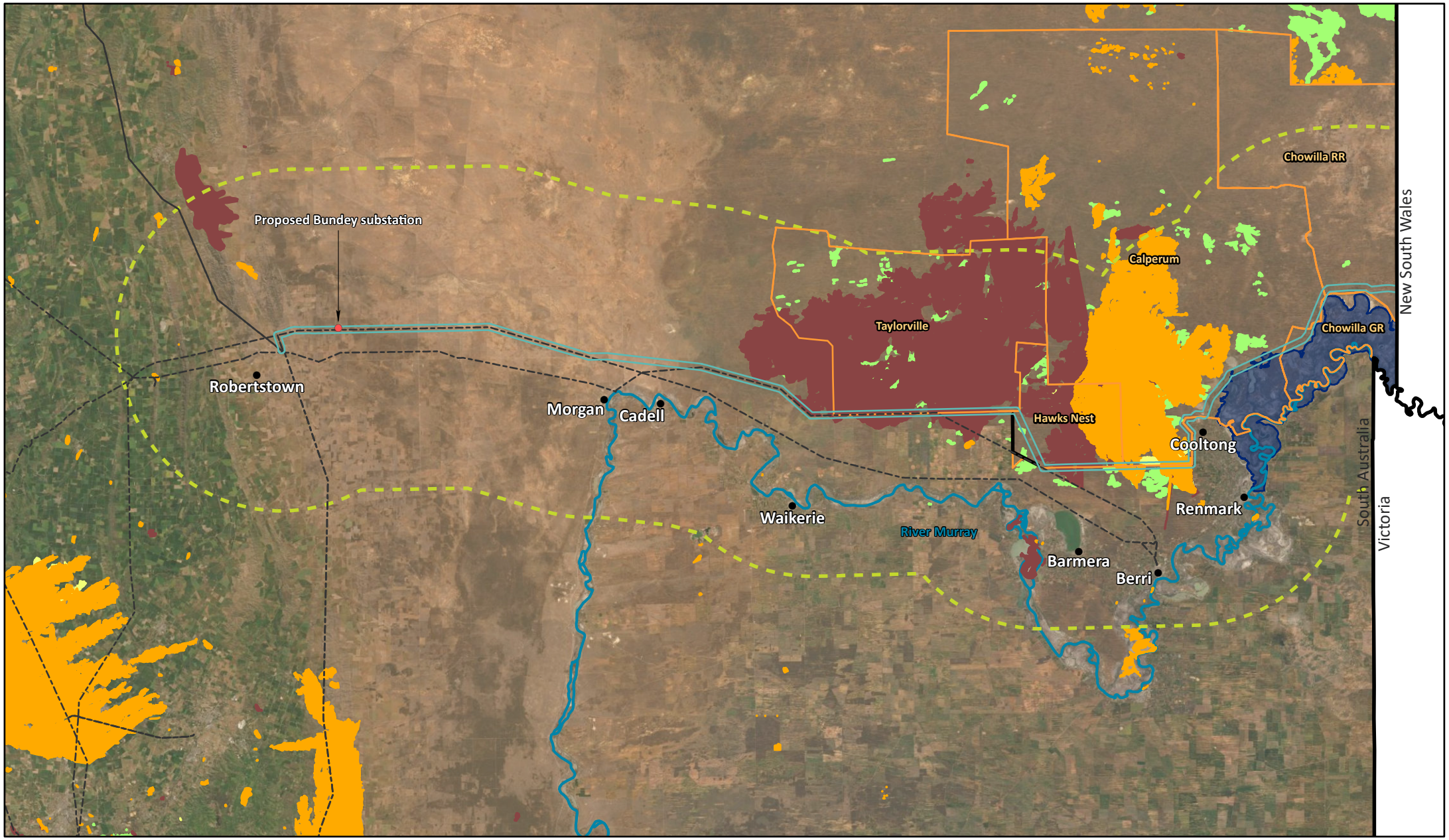


Figure 3-1
Bushfire history in the area of the Project

ElectraNet
energy connect
JBS&G

3.3. Vegetation and Topography

3.3.1. Vegetation

Vegetation type and fuel loads

The predominant vegetation throughout much of the Project area, especially to the east of Morgan, comprises mallee woodland with an open shrub understorey and mallee woodland with hummock grass. The western portion of the alignment also extends through areas of open shrubland as well as grazed open grassland/shrubland. Example photographs of these vegetation types can be found in Plate 3-1.

Recent environmental surveys of the proposed alignment (Jacobs 2021) have classified vegetation into Bushland Condition Monitoring (BCM) communities which comprise an aggregate of vegetation associations with similar vegetation structure and species richness. Each survey site (Bushfire Assessment Method [BAM] site) has been reviewed and assigned a classification under AS 3959 for bushfire risk assessment purposes. The BAM sites and representative BCM Sub Communities are listed in Table 3-1, along with their assigned AS 3959 vegetation classification. The AS 3959 classifications assigned to each BAM site are depicted in Figure 3-2.

Class E Mallee/Mulga is the predominant classification across the alignment (57% of BAM sites) however, there are areas of Class C Shrubland (31% of BAM sites) and to a lesser degree Class B Woodland, Class D Scrub, and Class G Grassland present as well (2-4% of BAM sites).

AS 3959 assigns modelled fuels loads to each vegetation type, which are also listed in Table 3-1. Class B Woodland and Class D Scrub vegetation have the highest fuel loads of 25 t/ha, whereas the predominant Class E Mallee/Mulga vegetation type is assigned a lower fuel load of 8 t/ha. The Western Australian (WA) Department of Fire and Emergency Services (DFES) has published a visual fuel load guide for the Goldfields region of WA (2010), which has similar vegetation to that of the Murray mallee region, is considered to be a useful guide for vegetation fuel loads along the transmission line corridor and is generally consistent with the modelled fuel loads referenced in AS 3959. The Guide assigns Mallee over hummock grassland a fuel load of 10-15 t/ha.

Site specific fuel load assessments should be undertaken in the field for future development stages in accordance with the Department of Environment and Natural Resources (DENR) Overall Fuel Hazard Guide for South Australia (2011), which is specific to SA vegetation, in order to accurately estimate potential radiant heat impacts to future infrastructure and assets.

Table 3-1: AS 3959 classification and estimated fuel loads according to BCM Sub Community

AS 3959 Vegetation Classification	Estimated fuel loads		No. (%) BAM sites (Jacobs 2021)	BCM Sub Community (Jacobs 2021)	Description
	AS 3959	DFES Visual Fuel Load Guide			
Class B Woodland	25 t/ha	15 t/ha	2 (2%)	MDBSA 1.1	Open Woodland with arid adapted shrubland on limestone
				MDBSA 11.6	Semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines
Class C Shrubland	15 t/ha	10-15 t/ha	29 (31%)	MDBSA 1.1	Open Woodland with arid adapted shrubland on limestone
				MDBSA 2.1	Open Mallee / Low Open Woodland with Chenopod shrub understorey
				MDBSA 2.2	Chenopod Open Shrublands

AS 3959 Vegetation Classification	Estimated fuel loads		No. (%) BAM sites (Jacobs 2021)	BCM Sub Community (Jacobs 2021)	Description
	AS 3959	DFES Visual Fuel Load Guide			
				MDBSA 11.6	Semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines
Class D Scrub	25 t/ha	20-25 t/ha	5 (5%)	MDBSA 3.1	Mallee with Very Open Sclerophyll / Chenopod Shrub understorey
				MDBSA 4.3	Shrublands on low & / or isolated red-sand dunes
				MDBSA 10.11	Low Woodlands/ Shrublands of River Terraces / Inland Drainage Lines
Class E Mallee/Mulga	8 t/ha	10-15 t/ha	54 (57%)	MDBSA 1.2	Tall Shrubland with Open Arid adapted Understorey on Limestone Plains
				MDBSA 2.1	Open Mallee / Low Open Woodland with Chenopod shrub understorey
				MDBSA 3.1	Mallee with Very Open Sclerophyll / Chenopod Shrub understorey
				MDBSA 4.1	Mallee with open shrub understorey on tall red-sand dunes or deep sand flats
				MDBSA 4.2	Mallee with understorey dominated by Triodia on moderate / low sand dunes
Class G Grassland	4.5 t/ha	0-5 t/ha	4 (4%)	MDBSA 1.1	Open Woodland with arid adapted shrubland on limestone
				MDBSA 9.1	Woodlands with an open grassy understorey
				MDBSA 10.11	Low Woodlands/ Shrublands of River Terraces / Inland Drainage Lines
Note: *AS 3959 classification varied among BAM sites assigned to the same BMC Sub Community which explains why several Sub Communities are listed multiple times.*					

Mallee woodland with spinifex/ shrubland understorey (Class E Mallee/ Mulga

Chenopod shrubland (Class C shrubland)

Grazed open grassland/shrubland (Class C Shrubland/G Grassland)

Plate 3-1: Vegetation types along the transmission line corridor

Bushfire behaviour

The severity of fire behaviour in mallee is directly linked to vegetation type and the ability of weather conditions, in particular wind, to propagate fire. The South Australian Department of Environment and Heritage (DEH, now known as Department for Environment and Water, DEW) notes in its Fire Management Plan for the Bookmark Mallee Region (2009) that significant knowledge gaps exist in understanding fire behaviour in low rainfall mallee ecosystems. These gaps are concerned with the relationships between fuel (arrangement, type and quantity), weather conditions and the resultant fire behaviour. The arrangement and types of fuel present in mallee often result in considerable variation in the intensity, rate of spread and residence time of a fire.

Areas that support a canopy of mallee with a spinifex (*Triodia spp*.) understorey present the greatest fire risk in mallee systems due to the extreme flammability of spinifex. Conversely, plains, swales and claypans that support sparser fuels such as mallee with a chenopod understorey, or Black Oak (*Casuarina pauper*) communities pose a lower fire risk. This risk increases under ephemeral fuel conditions.

During high winds, even areas with low percentage spinifex have capacity to carry a fire. Fire can also move through higher fuel load mallee areas under windy conditions. Crowning in moderate to high fire danger conditions in older mallee is commonplace given the open nature and height of the canopy, the understorey fuel and the extensive surface litter forming a continuous link with suspended bark on branches. An extension of this unpredictability in mallee fire behaviour is spotting potential.

Spotting distances of two kilometres have been observed in large fires under extreme conditions (DEH 2009).

3.3.2. Topography and slope under vegetation

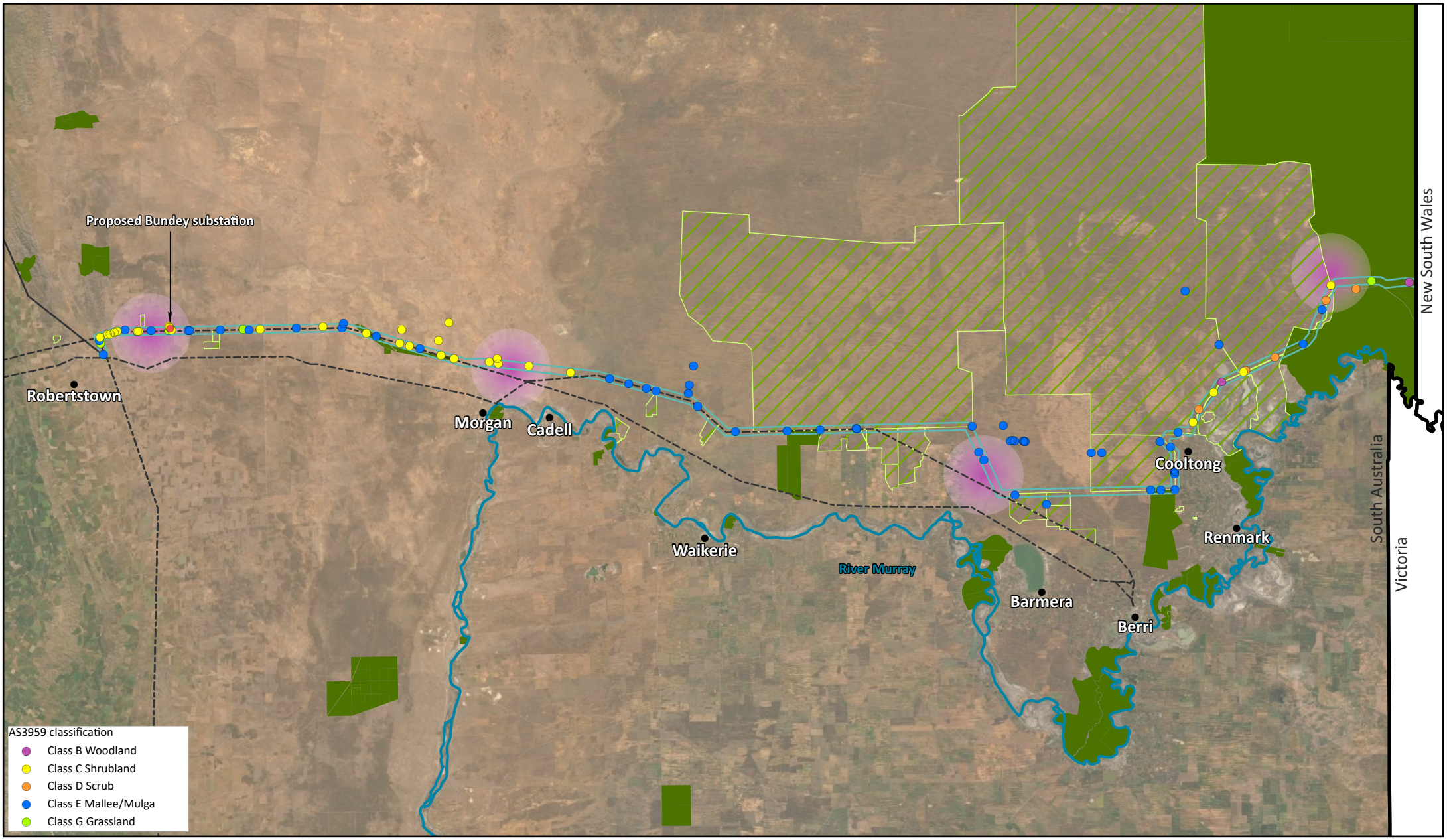
The Project alignment is primarily situated on a plain and dune system with flat to low discontinuous undulating sand hills ranging in elevation from 20 to 80 m above sea level (Plate 3-2 and Plate 3-3). This landscape supports a wide range of vegetation, including the predominant continuous woodland/mallee vegetation.

The western portion of the alignment, closest to Robertstown, has a gentle easterly sloping landscape and exhibits the highest elevation across the alignment of up to 360 m above sea level. Vegetation in this area comprises open grassland/pastureland with woodland/mallee present on the ridgeline to the north (Plate 3-4). This terrain has potential to exacerbate fire behaviour in comparison to the gently undulating plains/sand hills present in the centre and east of the alignment.

Plate 3-2: Gently undulating dunes to the north of Monash (centre/east of alignment)

Plate 3-3: Plains near Chowilla (east of alignment)

Plate 3-4: Undulating hills to the north of the Robertstown Substation (west of alignment)



Transmission line corridor
Vegitation heritage agreement
Conservation parks and reserves
Potential temporary worker accomodation laydown and staging location
Existing ElectraNet transmission line
River Murray
Proposed Bundey substation

Figure 3-2
Vegetation classification under AS 3959

0 20
Kilometres

N

ElectraNet
energy connect
JBS&G

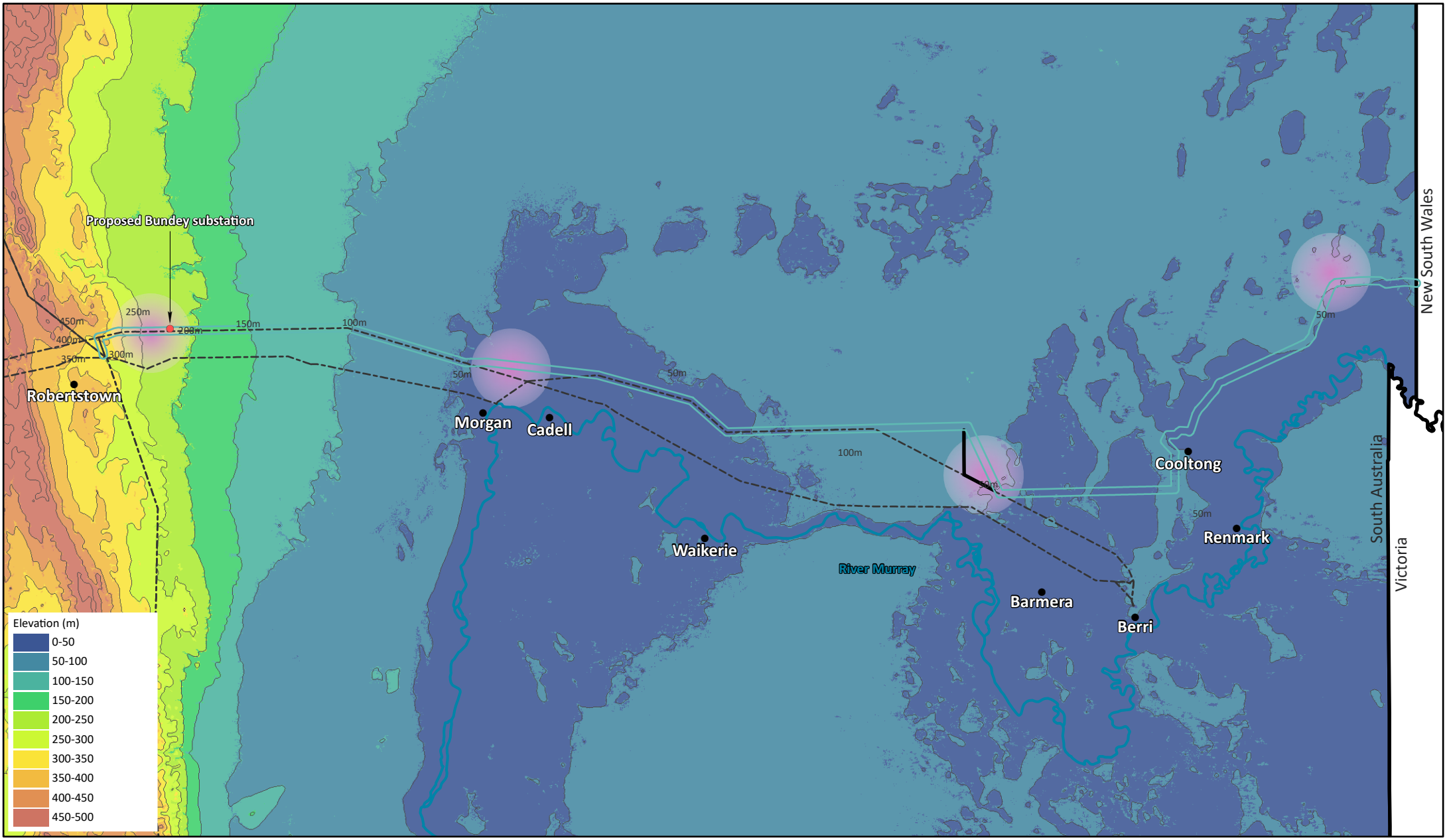


Figure 3-3
Topography in the area of the Project

3.4. Predominant and Worst-case Bushfire Weather Conditions

3.4.1. Climate statistics

Rainfall

The Project is situated in a warm temperate to semi-arid region, subject to warm, dry summers and relatively mild to cool winters. Rainfall frequency and intensity varies from year to year, with long periods of drought-like conditions evident in historical records.

Average rainfall and the number of rainfall events are typically higher in the west of the project alignment than in the east. Average annual rainfall at Renmark Aero in the east is 239 mm while in Eudunda, in the west, it is 448 mm. The average annual number of rain days is 24 for Renmark and 136 for Eudunda.

Figure 3-4 depicts the mean monthly rainfall data for eight local stations. As mentioned previously, the western portions of the alignment have significantly higher winter rainfall than locations in the east, where rainfall is more consistent throughout the year.

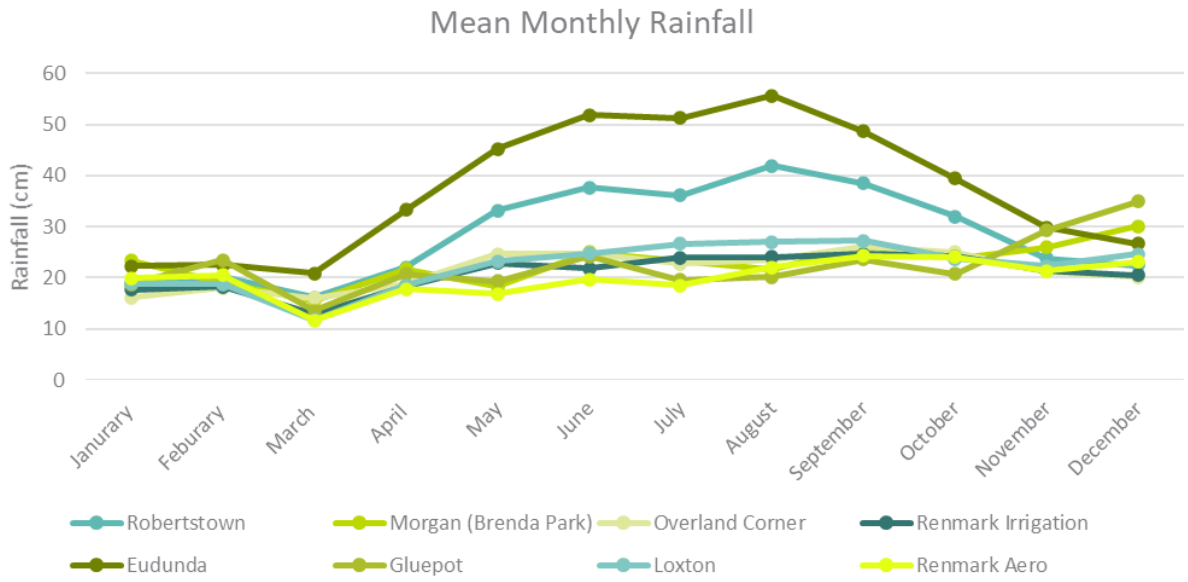


Figure 3-4: Mean monthly rainfall

Temperature

Mean monthly maximum temperature for four stations in proximity to the Project are depicted in Figure 3-5. Maximum temperatures are highest during the spring, summer and early autumn months of October to April, ranging from around 25°C in October and April, to 30–34°C in January and February.

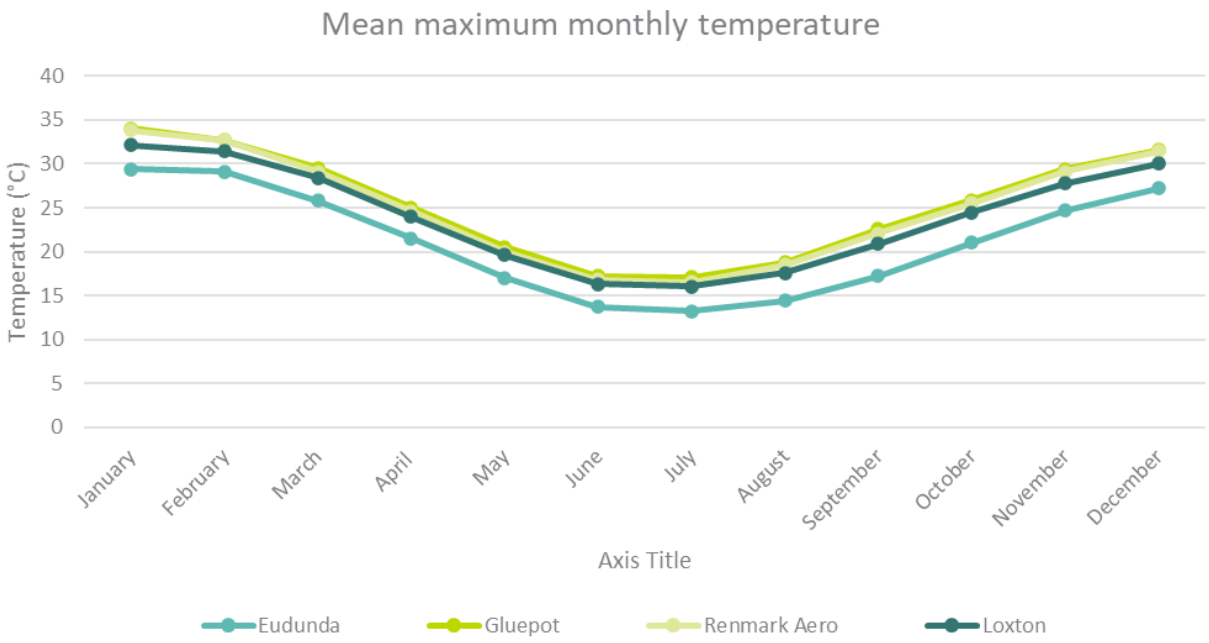


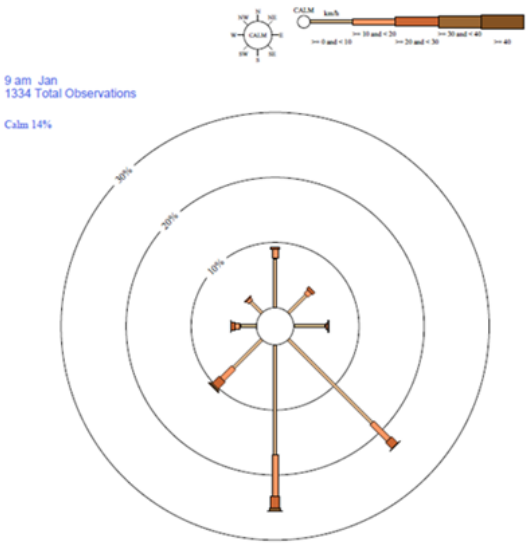
Figure 3-5: Mean maximum monthly temperature

3.4.2. Predominant bushfire weather conditions

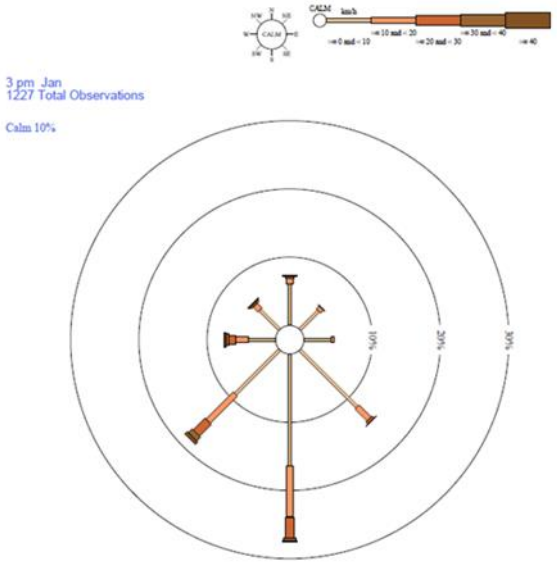
Predominant bushfire weather conditions are those that occur 95% of the time during the designated bushfire season. For the subject locality, these generally correlate with average January climatic conditions.

Mean January 9:00 am and 3:00 pm wind profiles for Renmark (in the east of the alignment) and Eudunda (in the west of the alignment) are contained in Figure 3-6. In Renmark, the predominant winds during the designated bushfire season are from the south and southeast in the morning averaging around 8.5 km/h, and from the south and southwest in the afternoon averaging around 10 km/h. In Eudunda, winds are generally from the southeast in the morning averaging around 11 km/hr and west, southwest to southeast in the afternoon, averaging around 13 km/hr.

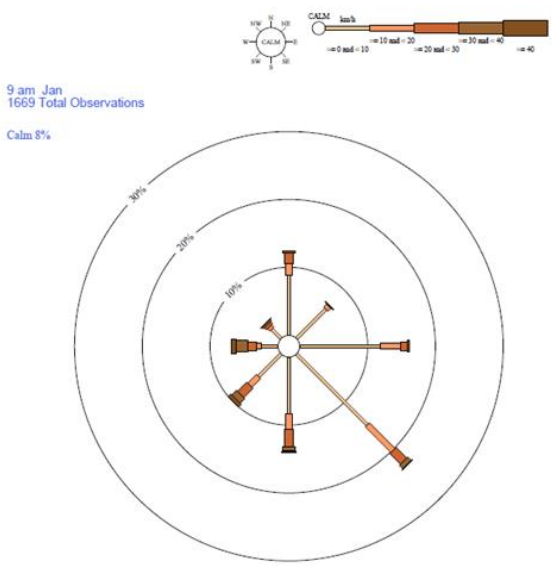
Mean January 9:00 am relative humidity for Renmark and Eudunda is approximately 52% and 57% respectively with 3:00 pm relative humidity being approximately 29% and 32% respectively. January mean maximum temperature peaks at around 32.5°C for Renmark and 29.5°C for Eudunda (BoM 2021).



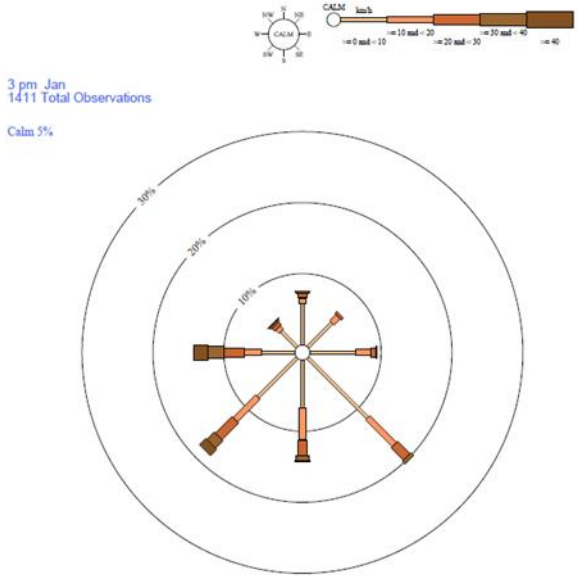
Renmark 9am January wind rose



Renmark 3pm January wind rose



Eudunda 9am January wind rose



Eudunda 3pm January wind rose

Figure 3-6: January wind roses Renmark and Eudunda

3.4.3. Worst case bushfire weather conditions

Worst case (adverse) bushfire weather conditions can occur during the summer months, following previous seasons of plentiful rainfall along with high temperatures, low relative humidity and strong winds. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire danger ratings.

Rainfall directly affects the occurrence and severity of bushfires in Central Australia with higher rainfall in previous years increasing vegetation growth and therefore the amount of fuel available to burn in successive years. Bureau of Meteorology (2021) identifies that summer is the predominant fire season for the Project area. Rainfall is lowest during the summer months of January to March.

Wind speed and direction varies seasonally within the region. While predominant winds are from the southwest to southeast, there are a significant number of days during spring and summer where adverse northeast to northwest winds, greater than 40 km/hr, can be experienced. Bushfires in the region often start during dry thunderstorms in association with the presence of a high-pressure system and strong, gusty, hot northerly winds ahead of a cool south-westerly change late in the afternoon (GoSA, 2017).

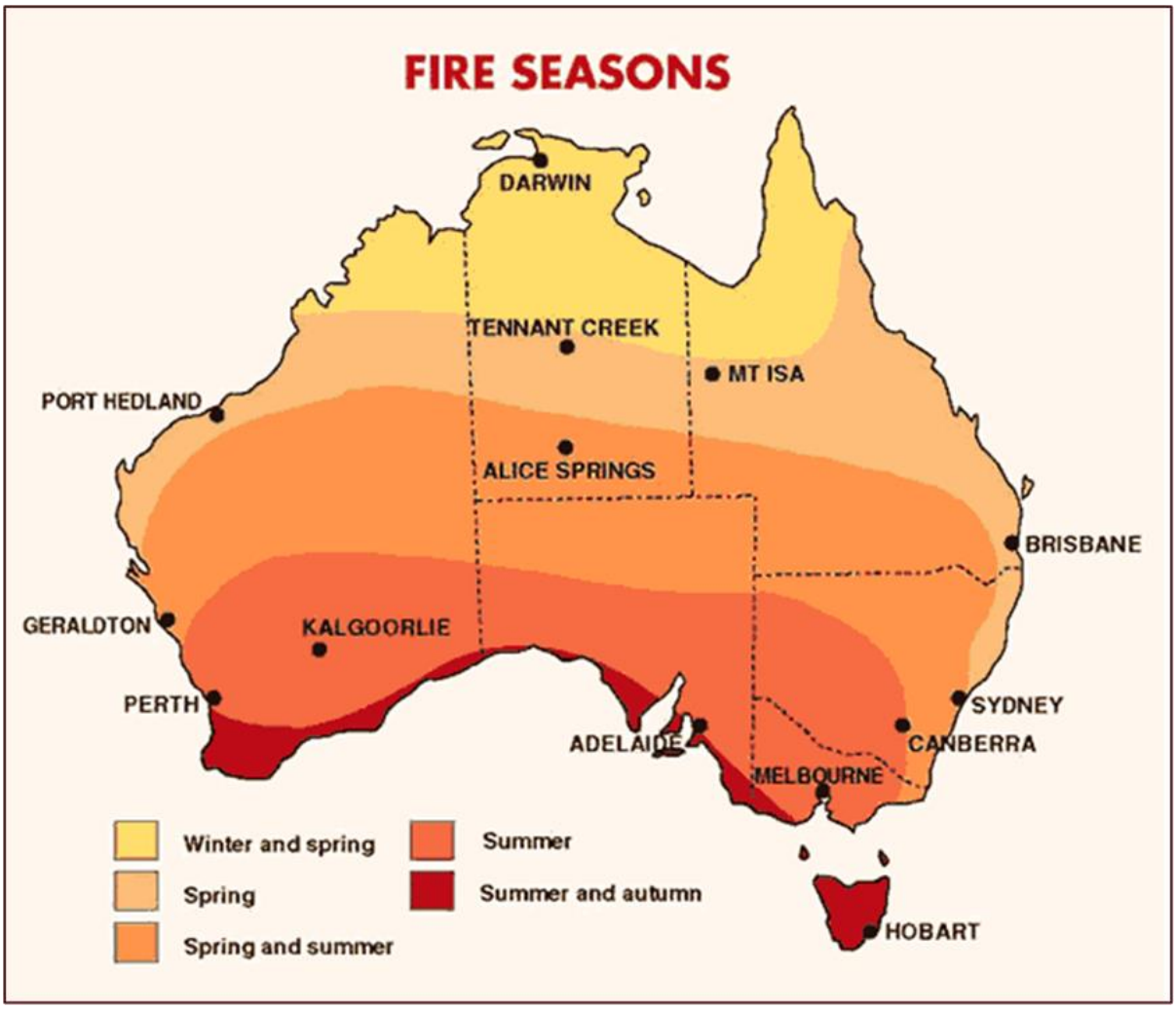


Figure 3-7: Fire seasons (BOM 2021)

4. Potential Bushfire Risk Scenarios

The following potential bushfire risk scenarios have been identified for the Project:

1. Bushfire risk to Project life and property assets as a result of a bushfire occurring within the surrounding landscape (external ignition sources).

2. Bushfire risk to Project life and property assets as a result of construction or operational activities.

3. Bushfire risk to surrounding life, property and environmental assets as a result of construction or operation activities.

These potential bushfire risk scenarios have been used to inform a bushfire risk assessment to assist in the development of appropriate bushfire risk mitigation and management measures (refer to Section 6).

4.1.1. Scenario 1: Bushfire risk to the Project as a result of a bushfire occurring within the surrounding landscape

Bushfire approaching the Project area from the north, northeast and northwest

A potential bushfire approaching the transmission alignment from the north, northeast or northwest could have vast fire runs over the open landscape through continuous mallee vegetation over varied terrain.

Such a bushfire is likely to be fully developed with steady state bushfire behaviour once it reaches the Project area, due to the relative continuity of fuel structure surrounding the site. It is noted that the vegetation profile within Calperum Station is currently fragmented due to previous bushfires which will slightly moderate the fire behaviour in the short term at this location.

If left unprotected, assets within the Project area are likely to receive high levels of radiant heat and potentially direct flame contact from a bushfire. Residence time of a bushfire is expected to be relatively low given the wind driven nature of a fire in predominant mallee vegetation with low Spinifex understorey. However, the presence of low trees in the landscape will act to increase the resident burning time adjacent to assets.

Bushfire approaching the Project area from the south and southeast – Morgan to Renmark

A potential bushfire from the south or southeast of the Project area between Morgan and Renmark has potential for fire runs of up to 15 km through intact mallee vegetation. The built-up environments along the Murray River provide a buffer to vegetation further to the south. While there are significant tracts of intact mallee vegetation, including within Cooltong and Pooginook Conservation Parks, there are also areas of farmland consisting of crops and orchards that fragment this landscape.

Depending on the point of origin, a bushfire approaching the Project area from the south would most likely spread through farmland areas, before spreading into areas of remnant mallee vegetation, or alternatively, through long runs of intact mallee vegetation. The vegetation is more fragmented than that to the north of the Project area, which is expected to limit growth of a large-scale bushfire from this direction.

Given the relatively long potential fire runs (up to 15 km), there is potential that the Project area could be impacted by fully developed, steady state bushfire behaviour, however, this would depend on the location of the assets along the alignment. It is expected that response from nearby CFS brigades would help prevent a significant bushfire event occurring from the south.

Bushfire approaching the Project area from the west and southwest – Robertstown to Morgan

A bushfire approaching the Project area from the west and southwest is expected to be predominantly through grassland and scattered fragments of remnant mallee vegetation over open landscapes.

Although there is a reduced fuel load due to the nature of the predominantly grassland vegetation, the long fire runs mean that fully developed, steady state bushfire behaviour would be achievable and potential fire behaviour would likely be fast moving over the undulating landscape with a relatively low exposure timeframe.

4.1.2. Scenario 2: Bushfire risk to the Project as a result of construction or operation activities

A bushfire resulting from potential construction / operational ignition sources, as detailed in Section 3.2, has potential to damage property / infrastructure assets and place the Project workforce at risk. This is a particular risk given the proximity and extent of vegetation hazards along the transmission line alignment and remoteness of the Project, meaning that a firefighting response may not be practical or feasible. Remote workers would be especially at risk during a bushfire event.

Given an ignition point in proximity to the transmission line corridor, and limited potential to reach steady state fire behaviour, bushfire impact under this scenario is expected to be relatively localised. There is expected to be a higher likelihood of ignition during the construction phase due to potential fire generating activities, however, there is a great likelihood of fire spread during the operation phase, due to absence of on-site personnel to quickly respond to a localised fire.

The existing Robertstown substation is surrounded predominantly by grassland, although the fringing screening vegetation could result in increased residence time of a fire if it were to ignite as a result of operations at the site. The infrastructure currently maintains a cleared Asset Protection Zone but it is uncertain whether this is sufficient for the assets to achieve BAL-12.5 in accordance with requirements of the Flinders Mid-North York BMAP.

The location for the proposed Bundey substation occurs on predominantly farmed grassland with limited bushfire fuels and is therefore unlikely to be significantly impacted by bushfire. In addition, an Asset Protection Zone will be established in accordance with BMAP requirements to further protect this infrastructure.

The proposed workers accommodation camps and laydown/staging areas will be located within already disturbed areas with limited native vegetation, which will reduce the potential bushfire impacts to these facilities and their occupants.

4.1.3. Scenario 3: Bushfire risk to surrounding life, property and environmental assets as a result of construction or operation activities

Life and property assets

Built up environments comprising agricultural and urban land uses border the River Murray to the south of the proposed transmission alignment. These areas are all within 10 km of the alignment and have the potential to be adversely impacted due to a bushfire occurring as a result of construction or operation activities and subsequent bushfire spread emanating from the alignment towards external assets. Whilst these areas are less vegetated than surrounding remnant mallee areas, they do still contain large areas of vegetation that could carry a bushfire.

The settlements to the south of the transmission line would be particularly vulnerable to a bushfire originating along the alignment under adverse bushfire weather conditions, with strong, hot winds occurring from the north during the summer months driving a bushfire southward.

Bushfire fuels in the urban areas are largely patchy in nature, which would limit fire spread. There are also significant areas of orchards and vineyards surrounding major towns, which provide a barrier to bushfire spread.

There are nine CFS stations located along the length of transmission line within 10 km. It is probable that response times would be under 1 hour, which would reduce the likelihood of a fire reaching its full rate of spread potential.

Environmental assets

The Project area is surrounded by high value environmental assets including mallee vegetation and wetlands.

A bushfire occurring as a result of Project construction and operational activities has potential to damage large tracts of sensitive vegetation and would likely be difficult to control due to the isolated location and limited access for firefighting operations to be carried out.

Wetland areas are particularly vulnerable to the impacts of bushfire. The wetlands located adjacent to the eastern portion of the Project and to the south have potential to be impacted by a bushfire originating along the transmission alignment during adverse bushfire weather conditions and strong winds from the north.

5. Bushfire Risk Assessment

5.1. Assessment of Potential Bushfire Scenarios

The potential bushfire scenarios identified in Section 4 have been subject to bushfire risk assessment through determination of likelihood and consequence in accordance with the methodology detailed in Section 5.2 below. This process determines the inherent bushfire risk associated with each scenario and informs the level of mitigation or management response required to reduce the risk to an acceptable level.

5.2. Bushfire Risk Assessment Methodology

Australian Standard AS ISO 31000:2018 Risk Management–Principles and Guidelines (SA 2018b) provides an internationally recognised approach to risk management. The risk assessment methodology adopted in this FHMP is based on ISO 31000 and has been tailored towards assessing and mitigating bushfire risk with respect to Project construction and operation. The risk management process involves:

1. **Communication and consultation**: Relevant stakeholders are communicated with at the appropriate stage and a general understanding of the process and role of stakeholders is promoted.
2. **Scope, context and criteria**: The context in which risk management process will occur is defined and criteria are set to evaluate risk.
3. **Risk assessment**: Undertaken through identification, analysis and evaluation of risks. The risk assessment process is described in detail in Section 5.2.1.
4. **Risk treatment**: The purpose of risk treatment is to reduce the likelihood of a bushfire occurring and/or the potential impact of a bushfire on an asset or facility. This is achieved by implementing treatment strategies that modify the characteristics of the risk, the asset / facility or the environment.

   Treatment strategies will depend on the level of risk associated with the scenario and the type of assets being treated. Asset specific bushfire mitigation strategies are generally based on fuel management, ignition management, preparedness, planning and engagement of personnel and a direct fire suppression response.
5. **Monitoring and review**: The effectiveness of each stage and effectiveness of risks and treatment strategies are monitored and any new risks are detected.
6. **Recording and reporting**: The risk management process needs to be recorded and reviewed to communicate to all stakeholders at key stages, deliver information on the effectiveness on the risk treatment plan, provide valuable information to decisions making across the organisation.

These steps of the risk management process are summarised in Figure 5-1.

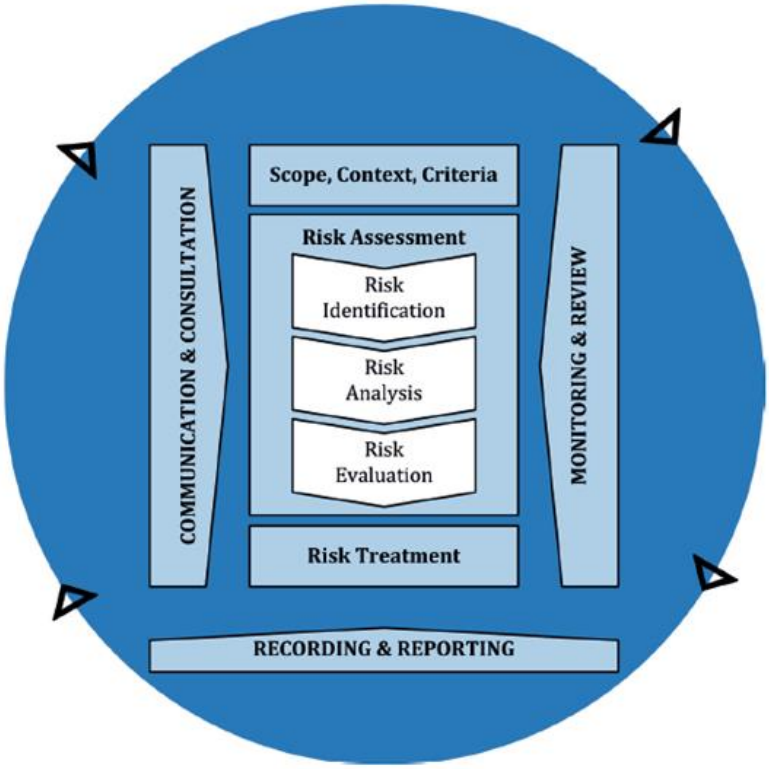


Figure 5-1: Risk management process (SA 2018b)

5.2.1. Risk assessment

Risk identification

Events or circumstances that could impact the achievement of the outcomes are identified as well as assets that could be impacted by bushfire.

Risk analysis

The likelihood of an event occurring and expected consequences are combined to give a level of risk to the Project area or external receptors. The level of risk is evaluated against pre-established criteria and the urgency and nature of treatments are prioritised.

From a bushfire management perspective, this methodology can be useful in determining:

- the *inherent* bushfire risk (i.e. the initial level of risk prior to risk treatment and mitigation).
- the *residual* bushfire risk (i.e. the level of risk remaining following risk treatment and mitigation).

Assessing likelihood

Likelihood is defined as the chance of a bushfire igniting, spreading and reaching an asset. The likelihood rating system is included in Table 5-1.

Table 5-1: Likelihood rating system

Likelihood rating	Description
Almost certain	Consequence expected to occur in most circumstances, may occur once every year or more.
Likely	Consequence will probably occur in most circumstances, may occur once every five years.
Possible	Consequence might occur at some time, may occur every ten to twenty years.

Likelihood rating	Description
Unlikely	Consequence is not expected to occur, may occur once every one-hundred years.
Rare	Consequences may occur only in exceptional circumstances; may occur once every five-hundred or more years.

Assessing consequence

Consequence is defined as the outcome or impact of a bushfire event on people, property and the environment, taking into consideration the degree and severity of potential bushfire scenarios, location of bushfire hazard areas, assets present in the area and the level of management and suppression response available. The consequence rating system is included in Table 5-2.

Table 5-2: Consequence rating system

Likelihood rating	Description
Catastrophic	A large number of severe injuries, widespread damage and displacement of the community, significant impact on the environment
Major	Extensive number of injuries requiring hospitalisation, significant damage and impact on the community, longer term impacts on the environment
Moderate	Some injuries requiring medical treatment but no fatalities, localised damage and short-term impact on the environment
Minor	Small number of injuries but no fatalities, some damage and disruption but no lasting effects
Negligible	No injuries or fatalities, little damage or disruption

Determining the risk rating and treatment priorities

Inherent (existing) and residual (post-treatment) risk ratings for each scenario are the product of likelihood and consequence. The risk assessment matrix used to determine the risk rating is included in Table 5-3.

The risk ratings also provide a treatment priority which determines the order, importance or urgency for allocation of resources to apply the treatment strategies. Treatment of assets with an extreme risk rating should be addressed before assets with lower risk ratings. A treatment priority of 1A is the highest priority and a treatment priority of 5C is the lowest priority.

Table 5-3: Risk assessment matrix

LIKELIHOOD	CONSEQUENCES				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost Certain	High	High	Extreme	Extreme	Extreme
Likely	Medium	High	High	Extreme	Extreme
Possible	Low	Medium	High	Extreme	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Rare	Low	Low	Medium	High	High
RISK LEVEL	**RISK RESPONSE**				
Low	**Acceptable risk:** Application of standard management measures will ensure risk level remains low and risk should be eliminated or reduced as time permits.				
Medium	**Potentially unacceptable risk:** Development of site-specific management measures may be required to lower the risk level and risk should be reduced as soon as reasonably practicable.				
High	**Potentially unacceptable risk:** Development of additional site-specific management measures will be required to lower the risk level and requires urgent action as soon as possible.				
Extreme	**Unacceptable risk:** Additional site-specific mitigation will be required to lower the risk level and an immediate mitigation response is required.				

Risk Evaluation

The purpose of evaluating risk is to confirm that the risk ratings for each asset are appropriate, identify treatment priorities (as discussed previously) and identify which scenarios require treatment. At a more detailed level, evaluating risk can help identify specific assets that require treatment and this will be carried out during the development of future site-specific BRMPs.

The acceptability of a risk level can be evaluated using the criteria listed in Table 5-4. Some risk ratings may be acceptable without any treatment (e.g. Low risk ratings) while the risk to others may be suitable with standard management controls (e.g. Moderate and High-risk ratings). Determining the acceptability of risk allows decisions to be made on whether treatment is required or whether routine controls are sufficient.

Table 5-4: Risk acceptability

Risk rating	Risk acceptability
Extreme	**Unacceptable risk** – only acceptable with excellent controls. An urgent mitigation response is required to lower the risk level.
Very high	**Unacceptable risk** – only acceptable with excellent controls. A mitigation response is required to lower the risk level.
High	**Potentially unacceptable risk** - only acceptable with adequate controls. Development of a mitigation response may be required to lower the risk level.
Medium	**Potentially unacceptable risk** - only acceptable with adequate controls. A mitigation response may not be required to lower the risk level but the risk must be monitored regularly.
Low	**Acceptable risk with routine controls -** Application of standard management measures will ensure risk level remains low. Treatment action is not required, but the risk must be monitored.

5.3. Bushfire Risk Assessment Results

The context for the risk assessment is to inform bushfire mitigation strategies for the protection of life, property and environmental assets within and adjacent to the Project. The risk assessment adopts a broad area and supports a tenure blind approach to ensure wider risk impacts and adjoining lands are captured to suitably address potential risk.

The bushfire risk identified is the potential bushfire scenarios outlined in Section 4, which discusses the potential bushfire scenarios that could impact life, property and environmental assets within the Project area and adjacent land.

The risk analysis and evaluation for each of the potential bushfire scenarios is provided in Table 5 5, which specifies the likelihood and consequence of each scenario with and without mitigation to determine inherent and residual risks.

Results of the bushfire risk assessment indicate that the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets with Extreme and High levels of inherent risk being identified. Following implementation of the mitigation measures recommended in Section 6, the residual risks are expected to be reduced to lower levels of Low and Medium. Inherent and residual risk is identified as being higher during the construction stage, where construction activities have a greater potential to ignite a fire (i.e. increased likelihood) compared to the operational stage of the Project.

Table 5-5: Bushfire risk assessment

Bushfire scenario	Comments	Inherent (pre-treatment risk)			Mitigation / management measures	Residual (post-treatment) risk		
		Likelihood	Consequence	Inherent risk		Likelihood	Consequence	Residual risk
Scenario 1: Project life and property assets are impacted by a bushfire occurring within the surrounding landscape (external ignition sources).	This scenario is primarily concerned with bushfire impacts on life and property assets as a result of a bushfire occurring external to the Project area, both during construction and operation of the Project. The inherent risk is considered to be Extreme due to large areas of native vegetation and potential for landscape scale bushfire to impact Project assets. Frequency of a major fire is expected to be every 10-20 years	Possible	Major	**Extreme**	Implementation of management measures identified in Section 6	Possible	Minor	**Medium**
	The level of risk to people and infrastructure will depend on factors such as fuel loads, weather, scale of the bushfire and accessibility.							
Scenario 2: Project life and property assets are impacted by a bushfire resulting from construction and operation activities.	<u>Construction:</u> Ignitions from laydown areas and accommodation camps are possible. The inherent risk during construction is considered to be Extreme due to the potential presence of workers in isolated, high fuel environments and construction activities that have potential to ignite a bushfire in these areas. Implementation of the bushfire management measures should manage and minimise these risks to a Medium level of residual risk.	Likely	Major	**Extreme**	Implementation of management measures identified in Section 6	Possible	Minor	**Medium**
	<u>Operation:</u> Ignition of a bushfire from high voltage transmission towers and lines is considered to be rare. The inherent consequences are considered to be lower than construction due to the reduced workforce but there still remains possibility of ignition.	Possible	Moderate	**High**	Implementation of management measures identified in Section 6	Unlikely	Minor	**Low**

Bushfire scenario	Comments	Inherent (pre-treatment risk)			Mitigation / management measures	Residual (post-treatment) risk		
		Likelihood	Consequence	Inherent risk		Likelihood	Consequence	Residual risk
	The inherent risk is considered to be Moderate due to the potential impacts on Project assets. Adoption of the bushfire management measures would result in Low residual risk.							
	The level of risk to people and infrastructure will depend on factors such as fuel loads, weather, scale of the bushfire and accessibility.							
Scenario 3: Surrounding life, property and environmental assets are impacted by a bushfire resulting from construction and operation activities	Construction: Ignitions from laydown areas and accommodation camps would be possible. The inherent risk to surrounding assets during construction is considered to be Extreme due to the relative proximity of the Project to settlements and areas with high environmental value along with the potential for landscape scale bushfire behaviour. Implementation of the bushfire management measures would manage and minimise these risks to a Medium level of residual risk	Likely	Major	**Extreme**	Implementation of management measures identified in Section 6	Possible	Minor	**Medium**
	Operation: Ignition of a bushfire from high voltage transmission towers and lines is considered to be rare. The inherent risk is considered to be High due to the potential impacts on surrounding assets and potential for landscape scale bushfire behavior. Adoption of the bushfire management measures would result in the risks being minimised and managed to a level of Low residual risk.	Possible	Major	**Extreme**	Implementation of management measures identified in Section 6	Unlikely	Minor	**Low**
	The level of risk will to life, property and the environmental assets will depend on factors such as fuel loads, weather, scale of the bushfire, importance/sensitivity of vegetation and biota, proximity to settlements and accessibility.							

6. Recommended Bushfire Risk Mitigation and Management Measures

This section provides an overview of the bushfire mitigation measures to be considered and applied during both construction and operation of the Project. These measures will be further developed and refined within the future Bushfire Management Plans prepared to support the construction and operation stages of the proposed development and any other required or non-statutory bushfire risk/emergency management plans prepared at later stages.

As discussed in Section 1.7, ElectraNet has an existing internal Bushfire Risk Management Guideline which contains a suite of bushfire management controls and triggers specific to electricity networks. These measures should be considered when developing future Bushfire Management Plans for the Project.

The recommended bushfire risk mitigation measures have been categorised below according to the Prevention, Preparedness, Response and Recovery (PPRR) emergency management framework which is a widely used emergency management philosophy adopted by most emergency management agencies in Australia. This framework provides a holistic approach to hazard mitigation and management for the Project.

6.1. Prevention

Bushfire prevention strategies are mitigation measures that are designed to reduce and avoid both the risk of bushfire ignition and the effects of a bushfire on life, property and environmental assets. Prevention measures are primarily associated with vegetation and asset management, bushfire constructions standards and limiting activities with the potential to ignite a bushfire.

6.1.1. Vegetation management

Transmission line towers and communications tower

In order to protect the base of the towers, consideration should be made to creating an Asset Protection Zone (APZ) of a sufficient width to achieve BAL-12.5. This strategy aligns with the requirements of the Murray Mallee and Flinders Mid-North Yorke BMAPs and is designed to reduce the occurrence of ignition of the structure through direct flame contact and radiant heat impact, thereby improving the resilience of the infrastructure during a bushfire event.

The width of the APZ would need to be determined independently for each tower in accordance with AS 3959 but is likely to be between 17 m (Class G Grassland on flat land/upslope) and 43 m (Class B Woodland on land with a downslope of between five and 10 degrees.

The predominant vegetation type, Class D Mallee/Mulga, would require an APZ of 20 m to achieve BAL-12.5 on undulating slopes of between zero and five degrees.

The environmental value of surrounding vegetation will need to be considered when deciding on the appropriate width of APZs as the transmission line extends through several environmental protection areas. In addition, given the nature of the towers being steel, and location of transmission lines well above the canopy line, a reduced APZ width may be warranted in some areas.

Laydown areas and accommodation camp sites

Laydown areas and accommodation camps will be located within existing cleared and low fuel areas. APZs should be installed around the perimeter of these sites to achieve BAL-12.5 in accordance with the Murray Mallee and Flinders Mid-North Yorke BMAPs.

Substations

The Robertstown substation is identified within the Flinders Mid-North Yorke BMAP as an existing asset requiring an APZ sufficient to achieve BAL-12.5 and is to be maintained as part of the Project.

The proposed new Bundey 330/275kV substation will also require an APZ to achieve BAL-12.5 in accordance with BMAP requirements. A Substation Fire Management Plan will be prepared in consultation with the CFS during the detailed design phase, and site familiarisation / fire fighting procedure review undertaken with local CFS brigade(s).

Asset Protection Zone management

APZs should be managed on a regular and ongoing basis in accordance with the specifications set out in Bushfire Management Zone Standard and Guidance for Use (SBCC 2017), including the following:

- reducing fine fuels (<6 mm diameter) to significantly reduce fire intensity.
- maintaining tree canopies at least 2 m apart.
- avoiding clumping of shrubs.
- removing dead vegetation and understorey.
- no heath or shrub understorey within 2 m of the asset.
- no branches overhanging buildings.
- grasses reduced to 100 mm nominal height.

Vegetation management may be carried out utilising the following methods:

- mechanical removal and/or thinning of vegetation tree/shrub vegetation.
- slashing or spraying of grasses and weeds.
- prescribed burning undertaken in consultation with CFS and DEW (suitability to be determined in consultation with CFS and DEW).

6.1.2. Bushfire construction standards

The proposed temporary construction camps will contain Class 3 residential buildings as classified under the Building Code of Australia (BCA). Class 3 buildings are residential buildings that are a common place of long term or transient living for a number of unrelated persons and are required to comply with the bushfire construction requirements of AS 3959 when located within a Bushfire Protection Area.

Murray Mallee and Flinders Mid-North Yorke BMAP require BMAP assets to have an APZ sufficient to achieve BAL-12.5, therefore the residential buildings are to be constructed to BAL-12.5. This construction standard is known to be readily achievable for temporary transportable buildings and involves measures such as sealing and screening of gaps, apertures and sub-floor spaces to prevent ember ingress into the building.

Non-residential buildings in the workers camps and laydown areas, such as mess halls, assembly buildings and offices would not be formally required to comply with AS 3959, however, it is strongly recommended that these buildings also adopt the construction standards of BAL-12.5 where practicable in order to increase the level of bushfire resilience for both property protection and life preservation.

Regular inspections and maintenance should also be carried out on buildings to be sure they meet the required standards.

6.1.3. Asset inspections and maintenance

Project assets should be regularly inspected to identify any potential fire ignition risks, such as infrastructure defects or poor vegetation management. A monitoring program should be established for the Project to ensure these inspections are carried out as required.

6.1.4. Investigations into network events

Network events such as power outages should be inspected to ensure that the event was not caused by something that has potential to ignite a fire.

6.1.5. Bushfire season controls

Total Fire Ban controls

CFS declare Total Fire Bans on days when a fire is likely to spread rapidly because of extreme fire weather or if there are already widespread fires and there are limited resources to fight additional fires.

Total Fire Ban controls include:

- no lighting of open-air fires or any other activity in the open air that is likely to cause a fire
- no movements of vehicles in bushland or paddocks will be permitted. All vehicle movements are to be contained to tracks or mineral earth breaks to avoid of combustible vegetation or designated roads/tracks
- no hot works (e.g. grinding, welding, thermal or oxygen cutting or heating etc. in the open air) to be undertaken
- no clearing of vegetation is permitted
- no use or operation of any engine, vehicle, plant, equipment or machinery in the area likely to cause a bushfire or contribute to the spread of a bushfire is not permitted.

A permit may be obtained under the FES Act where it is deemed appropriate for exemptions to be made to Total Fire Ban Controls.

Temporary de-energisation of power network

South Australian legislation allows network providers to de-energise the energy network as a fire mitigation measure. In accordance with ElectraNet's internal Bushfire Risk Management Guidelines, identified transmission lines may be de-energised if there is a risk of fire ignition, there is known damage / fault, due to adverse environmental conditions (i.e. elevated Fire Danger Levels), or at the request of emergency services.

ElectraNet's internal Guidelines include calculation of Fire Danger Levels (FDL) on days with Total Fire Bans as detailed in Section 1.7. The FDLs provide a trigger for specific actions to be carried out, including automated power disconnection on identified lines in FDL 2 or FDL 3 conditions.

6.1.6. Promotion of public awareness

ElectraNet engages in public awareness campaigns to inform the public of the benefits of vegetation management adjacent to transmission lines to enhance mitigation measures on private land. These strategies should be adopted for the Project as it extends through private and publicly owned land.

6.1.7. Security

Construction sites and Project assets should be appropriately secured to minimise the risk of arson both along the transmission alignment and adjacent to/within the substations, workers camps and laydown areas.

6.2. Preparedness

Preparedness strategies aim to build the capacity of the Project and surrounding life, property and environmental assets to cope with the consequences of a bushfire emergency, including routine maintenance, creating and testing plans and procedures, carrying out training, conducting audits and monitoring and sharing information to prepare for a bushfire should it occur.

6.2.1. Access provisions

Access roads along the transmission alignment should be capable of providing two-wheel drive access to ensure ease of evacuation as well as ease of access for firefighting appliances (including standard 34 units).

The SA standards for fire access tracks are 4-5 m wide for standard fire tracks and 7 m wide for major fire tracks (refer to Section 1.6.8). Consideration should be given to increasing the access road below the transmission line from 5 to 7 m and sufficiently clear of vegetation, although it is understood that this may not be possible due to environmental reasons. Where the road width is required to be less than 7 m wide (e.g. for environmental reasons), consideration should be given to installing turning areas or passing bays for fire appliances. Already cleared areas below towers may provide a suitable, turning destination.

Hardstand and turnaround areas should be provided adjacent to any firefighting water tanks positioned along the Project alignment or adjacent to other assets to facilitate firefighting access.

Any required statutory or strategic firebreaks should be established in accordance with the applicable requirements.

6.2.2. Development of bushfire emergency evacuation procedures

Site specific Bushfire Emergency Evacuation Plans (BEEPs) should be developed for the substations, proposed workers' camps, laydowns and the transmission alignment to address evacuation of workers during a bushfire emergency for the relevant stage of development.

Bushfire emergency arrangements also need to be specifically documented within ElectraNet's internal Emergency Management Plan for all stages and sites. It is recommended that bushfire evacuation plans are developed in consultation with CFS and an accredited bushfire practitioner for each stage of development.

The future BEEPs should:

- develop clear evacuation plans to relocate personnel from the Project area (depending on the direction of the fire threat), including evacuation routes and mode of transport.
- develop a complete off-site evacuation plan including:
  - identification of a primary egress route with several contingency egress routes (in different directions and with well separated travel paths to avoid a single bushfire event preventing use of multiple egress routes)
  - egress routes are to be suitable for proposed vehicular transport (e.g. suitable for 2WD or 4WD as required). Ongoing maintenance of the evacuation routes will be required on an ongoing basis especially prior to commencement of bushfire season
  - organise sufficient vehicular transport for all anticipated personnel required to evacuate, with some spare capacity to accommodate any vehicle breakdowns
  - consider progressive or staged off-site evacuation including removal of non-essential people or remote workers relatively early if possible and safe to do so. This early evacuation would permit the removal of people considered at risk including those with respiratory or other medical problems

- having a clear plan of how to evacuate personnel offsite in case of medical emergency which will likely be via vehicular travel.

6.2.3. Development of other procedures

Bushfire monitoring procedures

- develop procedures for monitoring local bushfire events, summarising information and issuing to all relevant stakeholders including:
- regular monitoring Digital Earth Australia (DEA) Hotspots (preferably twice daily) and forecast weather and FDI (and FDR). FDI may have to be calculated from local weather information
- creation of a summary report that includes the above information including a screenshot of DEA hotspots and any other bushfire related information (status of assets, fire appliances, fire systems, water supplies, access routes, etc)
- dissemination of report to all relevant stakeholders including the broader community network (e.g. transport subcontractors).

Communication procedures

Develop a clear communication plan (including contact information) for bushfire emergencies including when and how best to contact the following:

- relevant internal ElectraNet personnel such as the Emergency Management Team (EMT) and CFS, including when to ring '000' to log an emergency call
- remote workers including subcontractors
- adjacent landowners and pastoralists.

Given the potential for communication black spots along the transmission line corridor, it is recommended that a monitoring station is established within an area with stable phone and internet reception and an appropriate two-way radio communications protocol is developed to disseminate information.

Road closures

Develop procedure for road closures defining:

- how it is undertaken
- how this information will be distributed to staff, subcontractors, transport companies, etc.

Identification of critical assets

- review and define the relative importance of all assets within the Project area during construction and operation to provide greater clarity about which assets are deemed critical versus sacrificial
- ensure site inductions include a summary of the procedures and expectations of staff in the prevention, preparedness and response to bushfires
- appropriate evacuation procedures/locations are to be determined in conjunction with CFS or other emergency services and coordinated by an ElectraNet appointed fire warden
- on-site and off-site emergency assembly (muster) points will be designated prior to construction and all contractors, staff and visitors will be made aware of their location prior to entry into the development envelope.

Development of a site bushfire emergency map

Develop a GIS map specifically for use during bushfire emergencies depicting the following:

- critical assets and infrastructure
- nominated bushfire refuge buildings / safer place
- managed APZs
- fixed firefighting systems (hydrant, fire hose reel, monitors, bushfire water spray systems) protecting those identified assets / infrastructure
- vehicular access routes
- proposed off-site evacuation routes to ensure proximity of bushfire to these routes is clear
- bushfire water sources such as water tanks, quick refill points, fire hydrants, dams
- geofence cultural sites to limit impact on these sites.

Procedures responding to Total Fire Bans

ElectraNet has its own Fire Danger Rating controls in place within the internal Bushfire Risk Management Guideline (Section 1.7). The below additional controls/actions are also to be implemented during a Total Fire Ban to assist in the prevention of bushfire ignition or spread:

- no hot works (e.g. grinding, welding, thermal or oxygen cutting or heating, etc. in the open air) to be undertaken
- a portable water supply for firefighting purposes is to be present adjacent to bushland areas or potential ignition sources from construction activities
- basic firefighting equipment is to be on board all light vehicles and users trained in operation
- ensure CFS website is checked every half-hour to determine if a fire may impact the development envelope and keep up to date with any CFS bushfire alerts and instructions (i.e. Advice, Watch and Act, Emergency Warning and All Clear)
- if a fire is within 20 km of personnel within the development envelope and heading in that general direction, contact CFS for evacuation advice and consider self-evacuation.

Procedures responding to CFS Bushfire Warnings

CFS issues Bushfire Warnings through text messages during a bushfire event to all mobile phones within the potentially affected area. These alerts are Advice, Watch and Act, Emergency Warning, and All Clear (Table 6-1). The text messages provide instructions, however, site specific controls should be developed as part of future emergency management plans. These triggers will be particularly relevant for making decisions about evacuating the Project area.

Table 6-1: CFS bushfire warnings

CFS bushfire warnings	Description
Advice	A Bushfire Advice Message will be issued when bushfires pose a threat to property or public safety, or when: • a bushfire has been reported and CFS are attending but no further information is available (Incident notification). • a bushfire is producing smoke in an area that may cause concern to the public. • there is a need to advise of a specific event.
Watch and Act	A Bushfire Watch and Act Message is regularly issued for bushfires that pose a localised threat to property or public safety where: • a bushfire is threatening or is a potential threat to public safety in the immediate area of a fire.

CFS bushfire warnings	Description
	• a bushfire is producing smoke in an area that may cause concern to the public on a day of elevated fire danger. • there is a need to advise of a specific event.
Emergency Warning	Bushfire Emergency Warning Messages will be issued for wide area community impact when: • an uncontrolled bushfire is burning under Severe to Catastrophic Fire Weather conditions. • the risk of loss of life or threat to properties is almost certain or has occurred. • where special circumstances exist, for example when a life or house has been lost.
Reduced Threat	CFS will issue a Reduced Threat Message when the threat to the community has reduced.

Procedures responding to Fire Danger Ratings

FDRs provide advice about the level of bushfire threat on a particular day based on forecast weather conditions. FDRs are issued daily on the CFS website and can act as triggers for specific bushfire prevention, preparedness and response actions. Table 6-2 provides an example of triggers that could be applied at each FDR

Table 6-2: Example FDR actions

Fire danger rating	Action
Catastrophic	No works of any description to be undertaken by any personnel within the Project area, except in the instance of emergency works and in consultation with the CFS.
	Visitors, contractors and staff to be evacuated from the Project area if safe to do so.
Extreme, Severe and Very High	No hot works (e.g. grinding, welding, thermal or oxygen cutting or heating etc. in the open air) to be undertaken within 15 m of vegetated areas.
	A portable water supply for firefighting purposes (i.e. on the back of a light vehicle, trailer light firefighting or water tanker) with a minimum water carrying capacity of 450L and appropriate pump/hoses is to be present when working adjacent to bushland areas or potential ignition sources from construction activities.
	Basic firefighting equipment (e.g. rake, knapsack, shovel) to be on board all light vehicles and users trained in operation.
	Ensure CFS website is checked every half-hour to determine if a fire may impact the development envelope and keep up to date with any CFS bushfire alerts and instructions (i.e. Advice, Watch and Act, Emergency Warning and All Clear).
	If a fire is within 20 km of personnel within the development envelope and heading in that general direction, phone CFS and/or other emergency services for evacuation advice and consider self-evacuation.
Low-Moderate and High	Basic firefighting equipment (e.g. rake, knapsack, shovel) to be on board all light vehicles and users trained in operation.
	Fire extinguishers to be easily accessible within areas of hot works.
	Ensure CFS website is checked regularly to determine if a fire may impact the development envelope and keep up to date with any CFS bushfire alerts and instructions (i.e. Advice, Watch and Act, Emergency Warning and All Clear).
	If a fire is within 20 km of personnel within the development envelope and heading in that general direction, phone CFS and/or other emergency services for evacuation advice and consider self-evacuation.

6.2.4. Personnel training

All staff working within the Project area should be trained in responding to and managing all emergency incidents in accordance with the Project emergency management plan. A record of training must be kept up to date and debrief sessions held after all training exercises.

It is recommended that specific staff are trained or recruited in the detection and suppression of bushfires. This training should be undertaken in consultation with CFS and local brigades to develop relationships and ensure adequate training and knowledge is provided. The site Emergency Management Team (EMT) should be trained in incident management systems (e.g. Australasian Inter-Service Incident Management System [AIIMS] or similar).

Personnel that are at risk from smoke related respiratory problems or significant medical problems, should be identified before the bushfire season and trained on how to respond. These people should be seen as key personnel to remove from site early in a bushfire event to reduce the likelihood of respiratory problems and to limit burden on medical staff.

Staff information sessions should be conducted prior to the bushfire season to ensure familiarity with relevant emergency management procedures and evacuation strategies.

6.2.5. Routine maintenance and testing

Routine testing, maintenance and ongoing inspections should be carried out throughout the year on items such as bushfire suppression equipment designed to suppress fire, firefighting water tanks, buildings, access roads and evacuation tracks.

Scheduled maintenance programs for infrastructure, vehicles and power tools should developed and adhered to on an ongoing basis.

6.2.6. Pre bushfire season audits

Pre bushfire season audits of site readiness for bushfire emergencies should be carried out, including:

- alignment of APZs
- access tracks and roads, especially to critical assets and evacuation routes
- on-site refuge buildings (i.e. water and food storage, building maintenance)
- firefighting systems and fire water supplies
- fire appliances, civil equipment, medical vehicles and supplies
- firefighting PPE and equipment for personnel to protect from heat, embers, smoke, etc
- communications equipment and infrastructure (towers, phone lines, etc)
- review of site personnel to confirm suitable number of bushfire trained staff and appropriate spread between all rosters
- ensure proposed evacuation vehicles are maintained and ready for use prior to bushfire season
- ensure a bushfire emergency response plan has been created and reviewed.

6.3. Response

The Response phase focuses on the assistance and intervention during or immediately after a bushfire emergency. The focus is on saving lives and protecting property and environmental assets.

6.3.1. Fire brigade support

The CFS has numerous brigades located in townships along the River Murray, which are situated within 6-16 km of the Project area and additional firefighting support is expected to be provided by DEW Fire

Service crews. Aerial support from air tankers / fire bombers may be required for larger and more remote fires.

Due to the remote location of much of the transmission alignment and nature of volunteer fire and rescuer crews, response times have potential to exceed 30 minutes, depending on the point of ignition.

6.3.2. On-site firefighting resources

Due to the potential for a public suppression response to be delayed, consideration should be given to the provision of on-site fire suppression capabilities.

The risk assessment indicates that the risk of ignition is higher during the construction stage compared to the operational stage, therefore, provision of firefighting infrastructure may need to be prioritised for the construction stage of the development.

Firefighting resources could include mobile firefighting units and / or Project owned and operated dedicated water tanker / firefighting truck on permanent standby.

Firefighting water

Firefighting water supply for the transmission alignment may be provided by the following means:

- mobile firefighting unit/s (i.e. on the back of a light vehicle, trailer light firefighting or water tanker) with a minimum water carrying capacity of 450 L and appropriate pump/hoses positioned along the alignment during construction operations
- static water supply tanks strategically located along the transmission alignment to provide water for the mobile firefighting unit/s and CFS / local fire brigade services
- existing groundwater bores along the alignment subject to landholder approval, with appropriate permits in place.

Firefighting water is to be provided at the temporary workers' camps, laydown areas and substations in order to facilitate a direct fire suppression response at the property interfaces. The water supply will be confirmed during the detailed design stage in accordance with the site layout and occupancy levels and is expected to include on-site static water supply (water tanks with appropriate firefighting couplings) and firefighting hose reels.

Firefighting equipment

Mobile crews should be provided with basic firefighting equipment such as fire extinguishers, rakes, knapsacks and shovels and trained in their operation. This would help to restrict growth and spread of a small-scale fire during construction and operational activities at remote sites. Firefighting equipment should also be available at the substations, workers camps and laydown areas to enable an immediate fire suppression response by site personnel if required.

6.3.3. Understanding of bushfire behaviour

A brief summary of expected bushfire behaviour should be provided to EMT personnel to assist in understanding of anticipated fire behaviour in order to make decisions on appropriate actions to be carried out.

A calculator should be provided to allow personnel to quickly determine forecast FDI for the day based on forecast weather conditions and it would be useful include information on mechanisms of bushfire attack, including:

- primarily embers, radiant heat, direct flame contact, smoke and wind.
- bushfires tend to spread quickly where there is continuous fuel structure, especially continuous understorey/surface fuel.

- long fire runs can produce significantly elevated bushfire behaviour.
- changes in wind direction can create very large fire fronts when flank fires are converted to head fires.

This information can be provided to incoming CFS crews to allow for early planning and appropriate resourcing in the event of a bushfire emergency.

6.4. Recovery

The Recovery phase involves strategies to reconstruct physical infrastructure and assets and restoring physical, emotional, environmental, and economic wellbeing post bushfire events. Recommended recovery actions include the following:

- reenergisation of power supply once inspections have been carried out or weather conditions have become favourable
- staff to be made aware of the Employee Assistance Program
- a review of loss of availability of critical infrastructure is to be carried out
- a review of Insurance Policies is to be undertaken
- a review of any reputational harm is to be undertaken (from fires started or exacerbated by the construction or ongoing maintenance of the Project)
- a review of the cause of the bushfire, bushfire impact, firefighting response, and asset resilience to bushfire and emergency management processes are carried out following the bushfire event.

7. Implementation of FHMP

7.1. Works Program

This FHMP provides overarching bushfire mitigation measures to be considered and adopted at future stages of Project construction and operation. Aside from the continued maintenance of the APZ for the existing Robertstown substation, there are no specific works to be carried out at this time.

Future Bushfire Management Plans (BMPs) prepared at subsequent stages will include a works program to ensure the inherent and residual bushfire risks are appropriately managed.

7.2. FHMP Monitoring and Review

This overarching FHMP has been prepared to inform future stages of construction and operation. As the plan does not specifically address future assets associated with the Project, the effectiveness of the bushfire risk assessment process and recommended treatment strategies cannot be monitored until site-specific BMPs have been prepared and the Project has commenced.

Future site-specific BMPs should be monitored as required, or on an annual basis to ensure:

- implementation of the FHMP is assessed and corrective actions are applied in cases of non-compliance
- the effectiveness and impact of bushfire prevention work is assessed and any significant changes in management, infrastructure design or the surrounding environment are captured and re-evaluated in a revised FHMP.

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Attachment 1

Planning and Design Code Policy – Hazards (Bushfire) Overlays

Hazards (Bushfire – General Risk) Overlay

DO 1 Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.

DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Siting

PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Built Form

PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.

Habitable Buildings

PO 3.1 To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.

PO 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.

PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with *Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements*.

Vehicle Access – Roads, Driveways and Fire Tracks

PO 5.1 Roads are designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire-fighting and emergency personnel

(b) evacuation of residents, occupants and visitors.

Hazards (Bushfire- Outback) Overlay

DO 1 Development is located to minimise the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.

DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Habitable Buildings

PO 1.1 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Vehicle Access - Roads and Driveways

PO 2.1 Roads are designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire-fighting and emergency personnel

(b) evacuation of residents, occupants and visitors

Hazards (Bushfire – Regional) Overlay

DO 1 Development is located to minimise the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.

DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Siting

PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Built Form

PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.

Habitable Buildings

PO 3.1 To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.

PO 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.

PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated and accessible water supply available at all times for fire-fighting purposes.

Vehicle Access -Roads and Driveways

PO 5.1 Roads are designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire-fighting and emergency personnel

(b) evacuation of residents, occupants and visitors.

PO 5.2 Access to habitable buildings is designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire-fighting and emergency personnel

(b) evacuation of residents, occupants and visitors.

Hazards (Bushfire – Medium Risk) Overlay (Note: applies only to CR 5304/344)

DO 1 Development, including land division responds to the medium level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.

DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Siting

PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Built Form

PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.

Habitable Buildings

PO 3.1 To minimise the threat, impact and potential exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.

PO 3.2 Residential, tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.

PO 3.3 Residential, tourist accommodation and habitable buildings for vulnerable communities, (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation), has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with *Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements*.

Vehicle Access – Roads, Driveways and Fire Tracks

PO 5.1 Roads are designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire fighting and emergency personnel

(b) evacuation of residents, occupants and visitors.

PO 5.2 Access to habitable buildings is designed and constructed to facilitate the safe and effective:

(a) use, operation and evacuation of fire fighting and emergency personnel

(b) evacuation of residents, occupants and visitors.