EIS Volume 1 Chapter 18

Hazards and Risk Management

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project energy connect

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18. Hazards and Risk Management

This chapter provides an overview of hazards and risk management for the Project. It evaluates a range of potential and perceived hazards and outlines the Project's risk management framework.

18.1. Key Findings

- The level of risk associated with fires during construction and operation can be appropriately managed with the implementation of risk treatment and mitigation measures.
- The transmission line will be designed and operated in accordance with Australian and International Standards to minimise the risk to electricity supply and infrastructure from lightning, flooding, winds and sabotage.
- The Project is not in an area of elevated seismic hazard and will be designed in accordance with Australian and International Standards to ensure seismic hazard is appropriately addressed.
- Electric and magnetic field levels directly below the transmission line will be within established exposure limits. There are no receptors in close proximity to the alignment.
- The transmission line will be designed and operated in accordance with Australian and International Standards to protect the public against the risk of electric shock.
- Suitable buffer distances will be implemented between towers and associated infrastructure adjacent public roads to maintain public and road safety.
- Consultation with landholders and detailed design will address safety considerations for landholder activities.
- ElectraNet's Health, Safety and Environment (HSE) Management System and Emergency Response Procedure, along with specific plans and procedures developed for the Project, will provide a robust framework for effective risk management and emergency response.

18.2. Setting the Context

This section provides information to explain the context within which the assessment is undertaken. It describes:

- relevant EIS Guidelines
- relevant requirements in legislation and other standards
- views of stakeholders and the environmental and social outcomes they would like the Project to meet
- the assessment methodology used to assess potential or perceived hazards.

18.2.1. EIS Guidelines

The EIS Guidelines (Assessment Requirement 10) require evaluation of 'a range of general and specific risks' as listed in Table 18-1.

This chapter deals with the risks identified by this assessment requirement, with the exception of requirement 10.3 (hazardous material storage, use, handling and disposal) which is addressed in Chapters 7 Project Description and 10 Physical Environment; requirement 10.4 (risks to farming and horticultural practices) which is addressed in Chapter 9 Land Use and Tenure; and requirement 10.8 (bird strike management) which is addressed in Chapter 11 Flora and Fauna.

Table 18-1: EIS Guidelines addressed in the Hazards and Risk Management Chapter

EIS Guidelines and Assessment Requirements	Assessment level
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.	Medium
• 10.2: Evaluate the risk to electricity supply and infrastructure from fires, lightning, flooding, winds, sabotage etc.	Medium
• 10.5: Examine presence of towers and associated infrastructure adjacent public roads to investigate potential impacts on public and road safety.	Medium
• 10.6: Identify any safety risk associated with the use or transport of farming machinery and other equipment in the vicinity of towers, guy wires and power lines.	Medium
• 10.7: Describe risk minimisation, management and response requirements.	Medium
Effect on Communities: *Assessment Requirement 9*: the proposed development has the potential to affect the local community during construction and through the establishment of a large linear structure.	
• 9.5: Address any potential effects of electromagnetic fields, corona discharge and electric shocks on public health.	Medium
Construction, Operation and Maintenance Effects *Assessment Requirement 15*: The construction and operation of the proposal would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework.	
• 15.8: Address the implications of seismicity in the area in relation to both the construction and operation of the transmission line.	Standard
Specialist reports and details 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.	

Aspects of assessment requirements identified in Table 18-1 above which are not addressed in this chapter are listed in Table 18-2 together with the applicable chapter.

Table 18-2: Aspects of assessment requirements addressed in other chapters

Assessment Requirement	Chapter
10.1 Fire risk of power line and construction / maintenance equipment / vehicles and timing of maintenance to avoid fire danger season in relation to flora and fauna.	Chapter 11 Flora and Fauna
9.5 Effects of corona discharge on public health.	Chapter 15 Noise and Vibration

18.2.2. Requirements in legislation and other standards

The *Fire and Emergency Services Act 2005* provides for the prevention, control and suppression of fires and for the handling of certain emergency situations. It includes a duty to prevent or inhibit the outbreak of fire on land, create and maintain firebreaks and trim vegetation. Permits may be required under the Act in relation to fire bans and undertaking hot works (e.g. welding on days of total fire ban).

The *Electricity (Principles of Vegetation Clearance) Regulations 2010* aims to minimise the risk of bushfires, damage to power lines and electrical shocks without imposing excessive vegetation clearance. They set out vegetation clearance standards in accordance with Part 5 of the *Electricity Act 1996*.

Other relevant standards and guidelines that are relevant to management of hazard and risks include:

- State Bushfire Management Plan (SBCC 2021)
- Murray Mallee and Flinders Mid North Yorke Bushfire Management Area Plans (GoSA 2017)
- Bookmark Mallee Bushfire Management Plan (DEH 2009)
- South Australian Firebreaks, Fire Access Tracks and Sign Standards Guidelines (CFS 2018)
- Code of Practice for Fire Management on Public Land in South Australia (GoSA 2018)
- National Electricity Network Safety Code
- relevant Australian Standards including:
  - AS 3959 *Construction of buildings in bushfire prone areas*
  - AS/NZS 1170.2 *Structural design actions – Wind actions*
- Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz) (ICNIRP 2010).

18.2.3. Views of stakeholders

Stakeholder and community engagement for the Project commenced in late 2018 and continued throughout 2019 and early 2020. Matters raised relating to hazards included the question of whether there were impacts on human health arising from powerlines, and the perception that transmission lines attract lightning strikes and may cause a bushfire.

Details of community consultation are set out further in Chapter 6 Stakeholder Engagement.

18.2.4. Assessment method

The potential and perceived hazards associated with the construction and operational phases of the Project were evaluated with consideration of the existing environment and the anticipated type of activities that would take place within the vicinity of the easement. The evaluation of fire risk is based on the assessment undertaken in Appendix S (Fire Hazard Management Plan).

18.3. Evaluation of Hazards

18.3.1. Bushfire

The level of risk associated with fires during construction and operation can be appropriately managed with the implementation of risk treatment and mitigation measures.

Bushfires are a natural occurrence in the region, as discussed in Chapter 11 Flora and Fauna. They often result from lightning, especially between September to December when dry lightning storms occur frequently (DEH 2009), but bushfires can also occur as a result of other causes such as reignition or escape of prescribed burns, improperly extinguished or out of season campfires or arson.

Construction and operation of the transmission line involves a number of potential ignition sources. During construction, these include sparks from 'hot works' such as welding, ignition of dry grass by vehicle exhaust or vehicle collisions. During operation, potential sources of ignition include contact between vegetation and conductors, contact between conductors or damage to transmission lines during extreme weather events, bird strike or ageing or poorly maintained equipment.

In landscapes such as the Riverland region where dry thunderstorms are common, the presence of a transmission line may actually assist in reducing lightning fire start risks. Being the tallest structures in the landscape, transmission towers can attract and dissipate lightning strikes thereby reducing fire start potential. Transmission lines are designed with high levels of lightning protection with earthwires located above the conductors offering shielding from lightning strike, and every transmission structure is earthed.

Risk reduction measures

ElectraNet undertakes a range of risk reduction measures in the design, maintenance and operation of its transmission network in accordance with the ElectraNet Bushfire Risk Management Guideline, which would be implemented for the Project. These measures include:

- design of transmission lines to Australian and International Standards with particular attention to minimising the risk of fire start
- use of earth wires, optical ground wires and dampers to avoid electrical faults and damage to conductors, and increased conductor spacing to eliminate risk of 'conductor clashing'
- use of fire protection systems which will cut off the supply in the event of a fault
- vegetation management to maintain appropriate clearance in accordance with the Electricity (Principles of Vegetation Clearance) Regulations
- asset inspection and maintenance via routine maintenance tasks
- scheduling of maintenance activities with elevated fire risk to avoid days of high fire danger where possible
- operation of the transmission system to lower the fire start risk
- monitoring network performance and investigating fault events to determine root cause.

Experience elsewhere on the ElectraNet network indicates that transmission lines similar to the design proposed have not resulted in the ignition of bushfires.

Bushfire risk assessment – Fire Hazard Management Plan

The Fire Hazard Management Plan (FHMP) (Appendix S) provides overarching guidance to manage and mitigate potential bushfire impacts to life, property and environment assets during both construction and operation of the Project.

The FHMP that has been prepared for the Project evaluates a range of bushfire scenarios including the potential impact on the Project of a bushfire occurring within the wider area, and the potential impact of a bushfire ignited by construction and / or operational activities on the Project or on surrounding life, property and environmental assets. It undertakes bushfire risk assessment using methodology based on Australian and New Zealand Standard AS/NZS ISO 31000:2018 *Risk Management – Principles and Guidelines* that has been tailored towards assessing and mitigating bushfire risk.

The bushfire risk assessment in the FHMP concluded that if risk treatment and mitigation measures are not implemented, the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets (i.e. without the implementation of risk treatment and mitigation measures, the levels of risk were identified as Extreme and High). Following implementation of the recommended mitigation and management 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, than at the operational stage of the Project.

Mitigation strategies that will be implemented to manage bushfire risk associated with construction and operation of the Project include:

- vegetation management adjacent to property and life assets
- adoption of bushfire construction standards for habitable buildings
- asset inspections and maintenance
- restrictions on activities during Total Fire Bans
- portable water supplies and firefighting equipment at construction sites

- pre-emptive de-energisation of the power network (in consultation with the Australian Energy Market Operator (AEMO)) where appropriate
- 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.

These strategies are outlined in more detail in the FHMP. Site and stage specific plans will be prepared at the relevant stages of Project in consideration of the principles and mitigation measures documented within the plan.

With the mitigation strategies outlined in the FHMP in place, the fire risk can be reduced to an acceptable and manageable level.

18.3.2. Weather events

The transmission line will be designed and operated in accordance with Australian and International Standards to minimise risks to electricity supply and infrastructure from lightning, flooding and winds.

The transmission line will be designed to Australian and International Standards, including AS/NZS 1170.2 *Structural design actions – Wind actions.* Lightning protection will include an earth wire to offer shield protection and earthing of all structures. As discussed in Chapter 10 Physical Environment, towers will not be located in areas where they could alter surface water flows or be damaged by flooding (e.g. in close proximity to the Burra Creek channel). Disruption of power supply is not anticipated to occur, except during exceptional events.

Physical systems that will limit interruptions to electricity supply will be installed, for example systems such as a reactive maintenance system where failures of infrastructure are immediately rectified and fitting conductors with automatic reclose functions that allow line function to only be disrupted for a short period of time.

18.3.3. Sabotage

The transmission line will be designed and operated to minimise the risk to electricity supply and infrastructure from sabotage.

Public access to the relevant infrastructure will be restricted along the transmission line alignment, and on tower structures through incorporation of anti-climb barriers, which will minimise the risk associated with sabotage. Security fencing will be installed around the Bundey Substation. Monitoring and appropriate fault management along the transmission line alignment will be implemented, together with passive surveillance by landholders and general public.

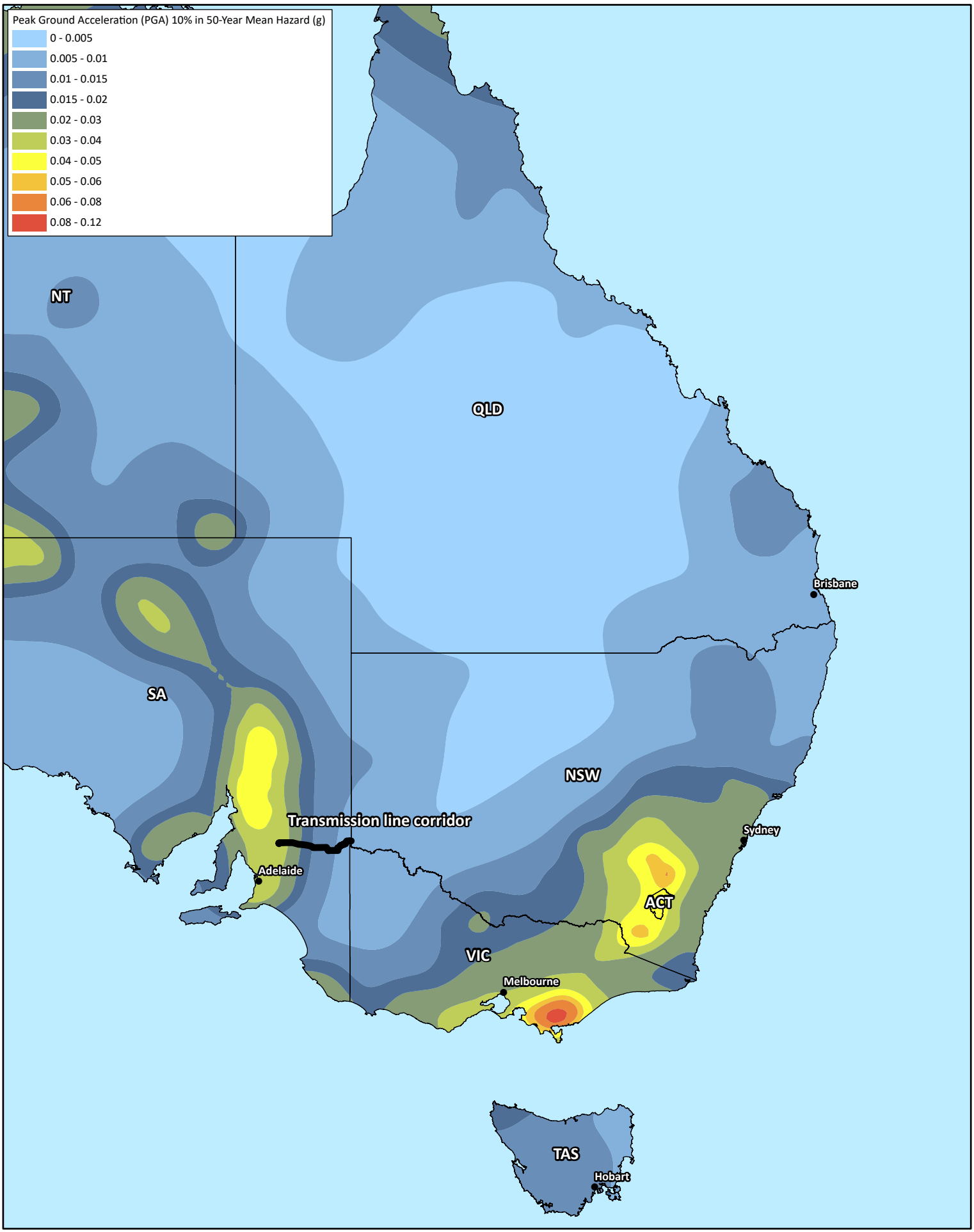
The Emergency Response Management Plan will include procedures relevant to sabotage events including coverage of interruption and re-initiating of power supply while the damaged area is isolated.

18.3.4. Seismicity

The Project is not in an area of elevated seismic hazard and will be designed in accordance with Australian and International Standards to ensure seismic hazard is appropriately addressed

National Seismic Hazard Assessment mapping (Geoscience Australia 2018) indicates that the Project is not in an area of elevated seismic hazard (see Figure 18-1). Seismic hazard is equivalent to or below levels for the Adelaide region. Seismic hazard during construction is not a significant concern.

The design of structures in Australia is governed by Australian Standard, AS 1170.4 *Structural design actions, Part 4: Earthquake actions in Australia*. The Project will be designed in accordance with the requirements of AS 1170.4 to ensure that seismic hazard is appropriately addressed.



Transmission line corridor
States
Transmission line corridor
Cities

Figure 18-1
Seismic hazard map of eastern Australia

0 500
Kilometres

N

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18.3.5. Electromagnetic fields and electric shocks

Electric and magnetic field levels directly below the transmission line will be within established exposure limits and there are also no receptors in close proximity to the alignment

Electric and magnetic fields (EMF) exist wherever electricity is generated, transmitted or distributed in power lines or cables, or used in electrical appliances. EMF reduce rapidly with distance from their source. For transmission lines, electric and magnetic fields are between approximately four to eight times lower for every doubling of distance from a line.

EMF induce internal electric fields and currents in the body. If the external fields are strong enough, these induced electric fields can interfere with the body's nervous system causing nerve and muscle stimulation and changes in nerve cell excitability in the central nervous system. These effects occur at field strengths well above field strengths found below a transmission line.

Exposure limit guidelines for EMF have been developed by International Commission for Non-Ionizing Radiation Protection (ICNIRP). These guidelines are recommended for use by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which is the Commonwealth Government agency charged with the responsibility for protecting the health and safety of people, and the environment, from EMF. The limiting thresholds for the general public set by the ICNIRP guideline are widely accepted as providing complete protection against all known adverse health effects of electric and magnetic fields (BECA 2020).

Detailed modelling was undertaken to assess the EMF for the western NSW section of EnergyConnect (BECA 2020), which encompasses the proposed 330 kV transmission line connecting the Project at the SA-NSW border to the Buronga Substation in NSW. The design of the Project will be very similar to the western NSW section.

Magnetic field levels directly under the proposed lines were shown to be well below the ICNIRP general public exposure reference limit of 2,000 milligauss (mG) in all cases, including during the contingency case of one circuit in service with increased load and the other circuit out of service.

The electric field levels directly under the proposed lined lines were also shown to meet the ICNIRP general public basic restriction of 0.02 kV, based on the minimum ground clearance for the proposed lines. The minimum clearance typically occurs at the middle of the span between towers where the conductor is at its lowest, and the majority of the line is well above this clearance.

In addition, it is noted that there are no receptors (e.g. residences) in close proximity to the proposed alignment, and very few areas where the public will be able to access the easement, resulting in a very low likelihood of any public exposure to EMF generated by the Project.

Detailed design will ensure that the Project satisfies ICNIRP guideline limits for magnetic and electric fields.

The transmission line will be designed and operated in accordance with Australian and International Standards to protect the public against the risk of electric shock

The transmission line will be designed and operated in accordance with Australian and International Standards to protect the public against the risk of electric shock. The height of the towers and conductors and the protection systems that will be in place will ensure that this does not occur.

18.3.6. Infrastructure adjacent to public roads

Suitable buffer distances will be implemented between towers and associated infrastructure adjacent public roads to maintain public and road safety

The proposed alignment is predominantly isolated from public roads, with very few road crossings, particularly in the central section of the proposed alignment. At the western end, it parallels Powerline Road for approximately 27 km (with three crossings) and crosses Goyder Highway and several unsealed

roads. In the east, it parallels Wentworth-Renmark Road for approximately 35 km. With the exception of Goyder Highway, these roads carry relatively low volumes of traffic, as discussed in Chapter 16 Traffic and Transport.

The design and construction of the transmission line at crossings of public roads (including offset distances for structures and conductor heights) will be undertaken in accordance with Department for Infrastructure and Transport or local council requirements. Suitable offsets will be implemented between towers and associated infrastructure where paralleling public roads (in consultation with Department for Infrastructure and Transport and local councils). This will ensure that public and road safety is appropriately protected.

18.3.7. Transport of farming machinery and other equipment near the transmission line

Consultation with landholders and detailed design will address safety considerations for landholder activities

As discussed in Chapter 9 Land Use and Tenure, farming machinery and vehicles which would potentially be subject to height restrictions related to transmission lines include trucks carrying baled hay, two deck cattle trailers and cropping machinery moving across a property. Due to the anticipated height of the transmission line towers and conductors it is considered extremely unlikely that mandatory height restrictions relating to clearance will be relevant.

Many properties at the western end of the transmission line corridor already safely accommodate the presence of the smaller 132 kV transmission line which will be paralleled by the Project, and will therefore be unaffected by clearance heights for the new transmission infrastructure.

The process of determining the location of the easement and the micro-siting of the towers will be undertaken in consultation with landholders and will take into consideration safety and landholder activities, such as vehicle access and movements across the property.

18.4. Risk Minimisation, Management and Emergency Response

Hazards and risks will be managed in accordance with ElectraNet's HSE Management System (HSEMS), policies and guidelines. This will seek to avoid, to the greatest extent possible, risks to public safety and achieve the desired outcomes in relation to the hazards identified in this chapter.

18.4.1. ElectraNet's HSE Management System Framework

ElectraNet's HSEMS Framework establishes the commitments and expectations for decisions, activities and behaviours concerning the management of health, safety, environment and sustainability (as discussed in Chapter 20 Environmental Management Framework). The HSE Management Framework documents systems and processes for identifying and managing hazards and risks during planning, construction and operation activities.

It describes ElectraNet's suite of procedures, policies and frameworks in place to ensure activities are managed safely, protect the environment and comply with applicable legislation, regulations and standards. These include a Safety in Design Procedure, which must be applied throughout the project lifecycle to prevent injury to people and damage to assets and the environment, and a Hazard Management Procedure, outlining the processes and responsibilities for the prevention, identification, assessment, control and reporting of hazards on ElectraNet sites. Specific identified hazard control procedures related to hazardous chemicals, driving, site attendance, site inspection, substation and asset inspection are also described.

ElectraNet's approach to risk management is detailed in the HSEMS Framework. The approach includes four key steps; identifying hazards, assessing risks, controlling risks and reviewing control measures. Risk management is further detailed in ElectraNet's Risk Management Policy which describes the

requirements of all workers in relation to the management of risk. ElectraNet's approach to risk assessment is then detailed in the Risk Assessment and Treatment Guidelines. This guideline provides a general approach for the assessment and treatment of all types of risk, for all situations, projects and activities, across all areas, with medium to high severity consequences.

18.4.2. Safety and sustainability standards

ElectraNet's Safety and Sustainability Standards (S&S Standards) details minimum safety and sustainability requirements for contractors and sub-contractors undertaking construction works and asset maintenance at their sites in Australia.

The S&S Standards outline the information that ElectraNet must provide to contractors and sub-contractors relating to known or potential environmental aspects (hazards) and risks associated with the project.

It also describes the documents, including the Construction Environment Management Plan (CEMP) and Asset Maintenance Environmental Management Plan (AMEMP) and information that must be developed, implemented and maintained by the contractor.

An Aspect and Impact Register / Construction Risk Register (CRR) Development is required as part of the CEMP / AMEMP, with details including compliance obligations, a risk assessment of environmental aspects, applicable environmental operating requirements and associated actions and other control measures as instituted by the Contractor.

Chapter 20 Environmental Management Framework provides further details on ElectraNet's S&S Standards, the CEMP and AMEMP[1].

18.4.3. Bushfire management

As discussed in Section 18.3.1, a detailed Fire Hazard Management Plan (or Bushfire Management Plan) will be developed and implemented for each stage of the Project. This will be aligned with and used in conjunction with ElectraNet's Bushfire Risk Management Guideline. Contractors are required to mitigate bushfire start and manage the bushfire impact of the construction to the environment and its workforce in accordance with these documents.

18.4.4. Emergency preparedness and response

ElectraNet has an established emergency response system in place to effectively respond to any foreseeable emergency, and that in the event of an emergency, plans and capabilities are in place for dealing with such situations.

Emergency planning and response is carried out so that priorities in emergency situations are:

1. Safety and welfare of people
2. Protection of the environment
3. Preservation of the organisation's operations and reputation.

Emergency management procedures are in place to support ElectraNet personnel to manage emergency situations that have the potential to negatively impact on the operation of the transmission network or business activities.

[1] As noted in Chapter 20 Environmental Management Framework, the AMEMP performs the same function as the Operations Environmental Management Plan (OEMP) referred to in the EIS Guidelines. For consistency with the EIS Guidelines, the discussion in Chapter 20 of the plan addressing operational environmental management is referred to as the OEMP.

The processes and plans for responding to potential or actual emergency situations are documented in ElectraNet's Emergency Response Procedure (ERP). The ERP identifies a comprehensive set of instructions and activities which are aimed to achieve a prudent level of response in the event of an incident with community impact or a situation that has the potential to cause damage or risk to people, the environment and / or business operations.

The purpose of the ERP is to:

- provide instructions for managing emergency situations
- act as a resource in managing an emergency incident
- ensure emergency response instructions and personal contact details are reviewed and updated on a regular basis.

Training sessions and role playing scenarios are regularly deployed. These scenarios simulate an emergency and test overall response capabilities and the effectiveness of the controls in place. It also provides an opportunity to identify gaps that may exist between business requirements and current capability and to determine the best course of action to remediate such gaps. Usually, at least two training sessions are held per year, one for bushfire response and another to test corporate or network situations. Bushfire tests are performed annually.

A complete review of the ERP is undertaken bi-annually, or earlier if an emergency situation, incident or accident occurs, to maintain accuracy of the procedure and to ensure emergency communication details are up-to-date and relevant personnel are informed and competently understand their responsibilities as outlined.

ElectraNet's Emergency Response Procedure would provide the overarching framework for emergency response during construction and operation. Specific emergency response plans will also be developed for construction of the Project.

18.5. Conclusion

The range of potential and perceived hazards and risks associated with the Project will be adequately managed under the Project's risk management framework.