CHAPTER 25

Health and safety (including hazardous materials)

ILLABO TO STOCKINBINGAL ENVIRONMENTAL IMPACT STATEMENT

ARTC | INLAND RAIL
An Australian Government Initiative

Contents

Figures

Tables

25. Health and safety (including hazardous materials)

This chapter provides an assessment of health and safety impacts for Inland Rail—Illabo to Stockinbingal (I2S) project (the proposal). It describes the existing environment, assesses the impacts of construction and operation of the proposal, and provides recommended mitigation and management measures. This chapter has been prepared using the Resilience and Hazards SEPP.

25.1 Overview

The potential for health and safety impacts have been avoided and/or minimised during the design development process by designing the proposal to minimise impacts to construction safety, operational safety, public safety, road safety interfaces and emergency response. This included reducing the bridge structure length to improve both operational and construction safety.

A hazard analysis would be undertaken during detailed design to identify risks to public safety from the proposal (during construction and operation) and how these can be mitigated.

During construction, the main potential impacts would be temporary and associated with:

- the use of low volumes of dangerous goods and hazardous substances
- increased risk of bushfire during clearing activities, and flooding where works modify the landscape within and around watercourses
- temporary outages through relocation of utilities
- community safety from air quality, and noise and vibration and risks to pedestrians and road users at new road–rail interfaces
- impacts to emergency vehicle movements from disruption of traffic and access.

To address these impacts, utility and service providers would continue to be consulted during detailed design to identify possible interactions and to develop procedures to minimise the potential for service interruptions and impacts on existing land uses. Emergency and incident response plans and procedures would also be developed and implemented, in consultation with emergency services, under the flood and emergency response plan.

During operation of the rail corridor, the hazards associated with the proposal site would generally remain the same. To address these impacts, there would be specifications for vegetation management/fire hazard reduction within the corridor. A safety awareness program would also be developed and implemented to educate landowners and the broader community regarding safety around trains.

Measures to control impacts to health and safety of workers, visitors and the public would be supported by measures proposed for the control of impacts associated with traffic, transport and access, water quality, noise and vibration, soils and contamination, and air quality.

25.2 Approach

A summary of the approach to the assessments is provided in this section, including the legislation, guidelines and/or policies driving the approach and the methodology used to undertake the assessments.

25.2.1 Legislative and policy context to the assessment

The assessment of health and safety included consideration of the following relevant legislation, policies and guidelines:

- *Rural Fires Act 1997* (NSW)
- Rail Safety National Law No 82a (NSW)
- *Work Health and Safety Act 2011 No 10* (NSW) (WHS Act)
- *Work Health and Safety Regulation 2017* (NSW) (WHS Regulation 2017)
- *Explosives Act 2003* (NSW)
- *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act)
- *Public Health Act 2010 No 127* (NSW)

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *State Emergency and Rescue Management Act 1989 No 165* (NSW)
- *Fire and Rescue NSW Act 1989* (NSW)
- *Heritage Act 1977 No 136* (NSW)
- Dangerous Goods (Road and Rail Transport) Regulation 2009 (NSW)
- *Planning for bush fire protection* (NSW Rural Fire Service (RFS), 2019)
- *Australian Code for the Transport of Dangerous Goods by Road & Rail* (National Transport Commission, 2020) (the Australian Dangerous Goods Code)
- *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) (formerly SEPP 33)
- *Hazardous and Offensive Development Application Guidelines: Applying State Environmental Planning Policy No 33* (now the Resilience and Hazards SEPP) (Department of Planning, 2011) (Applying SEPP 33).

25.2.1.1 Dangerous goods and hazardous materials

Hazardous materials are classified based on their health effects, while dangerous goods are classified according to their physical or chemical effects, such as fire, explosion, corrosion and poisoning, affecting property, the environment or people.

As the proposal is State Significant Infrastructure (SSI), the Resilience and Hazards SEPP does not apply (see section 3.4); however, applying SEPP 33 (still an applicable guideline despite the recent consolidation of SEPP 33 into to the Resilience and Hazards SEPP) provides a process of identifying a potentially hazardous development based on storage and transport screening thresholds. The thresholds represent the maximum quantities of dangerous goods that can be stored or transported without causing a significant offsite risk, while observing typical control measures such as adherence to standards and appropriate design.

Hazardous materials are defined by applying SEPP 33 as substances falling within the classification of the Australian Dangerous Goods Code. Dangerous goods are substances that, because of their physical, chemical (physicochemical) or acute toxicity properties, present a risk to people, property or the environment. Types of substances classified as dangerous goods include explosives, flammable liquids and gases, corrosives, chemically reactive or acutely (highly) toxic substances. Dangerous goods are defined by the Australian Dangerous Goods Code.

25.2.1.2 Preliminary risk screening against State Environmental Planning Policy (Resilience and Hazards) 2021

The Resilience and Hazards SEPP applies to proposals that fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. Certain activities associated with the proposal may involve handling, storing or processing a range of substances, which, in the absence of locational, technical or operational controls, may create an offsite risk or offence to people, property or the environment. Such activities would be defined as potentially hazardous or potentially offensive.

Dangerous goods will be used during construction of the proposal and to maintain infrastructure during operation. The transportation of dangerous good by freight also needs to be assessed.

25.2.2 Secretary's Environmental Assessment Requirements

There are no Secretary's Environmental Assessment Requirements (SEARs) directly relevant to the assessment of health and safety; however, the assessment of health and safety has included consideration of the general requirements, where relevant. The SEARs are provided in Appendix A.

25.2.3 Methodology

25.2.3.1 Study area

The study area for the health and safety assessment is defined as the proposal site, including permanent and temporary infrastructure, and the extent of area within which the proposal has the potential to impact people, environment and property. The extent of the impacts varies according to the nature and requirement of each health and safety risk identified during the preliminary risk assessment, including existing environmental conditions and natural events.

25.2.3.2 Key tasks

A desktop assessment was completed to assess potential impacts to health and safety from construction and operation of the proposal. The key tasks included:

- reviewing the legislative and policy context (discussed in section 25.2.1)
- reviewing construction and operational activities with the potential to cause health and safety impacts
- considering the potential impacts associated with hazardous materials, as defined by the guidelines, applying SEPP 33 (which remains applicable under the Resilience and Hazards SEPP) developed under the EP&A Act
- reviewing bushfire-prone land maps
- qualitatively assessing potential impacts to public health and safety
- demonstrating how the risk assessment process has been applied throughout the life of the proposal in accordance with *AS/NZ ISO 31000:2018 Risk Management—Guidelines* (Standards Australia, 2018)
- providing mitigation measures for implementation during construction and operation.

This assessment does not provide a detailed account of potential health and safety risks to onsite workers for the proposal. Potential risks to onsite workers are regulated by workplace health and safety legislation (including the WHS Act) and are not relevant to approval of the proposal. Site management would be the responsibility of the construction contractor, who would be required (under the WHS Act) to manage the site in accordance with relevant regulatory requirements.

The health and safety of employees and communities, along with risks to the environment and property, have been considered using the Resilience and Hazards SEPP. While the Resilience and Hazards SEPP will not be used in the context of compliance assurance, it is a useful tool to determine relevant hazards and risks that should be considered for the proposal.

25.2.3.3 Risk assessment methodology

The proposal is not a hazardous industry nor a hazardous storage establishment in the context of the Resilience and Hazards SEPP. The proposal may, however, involve the storage of hazardous chemicals during construction and maintenance, and the ongoing transport of freight, including hazardous chemicals. As such, assessment against the Resilience and Hazards SEPP criteria has been conducted.

To determine the appropriate level of risk assessment for the development, a preliminary hazard screening was carried out in accordance with applying SEPP 33. Both the storage and handling of hazardous chemicals at construction facilities during construction, and a consideration of potential freight transport, were considered. The evaluation of hazardous and dangerous goods as relevant to the Resilience and Hazards SEPP is detailed in section 25.4.1 and 25.5.1 for construction and operation, respectively.

Other risks to human health and safety are addressed under the standard risk assessment process used for the proposal, as documented in Appendix G.

25.2.3.4 Risks identified

The environmental risk assessment for the proposal (refer to Appendix G) included consideration of potential health and safety risks. Health and safety risks with an overall assessed rating of medium or above, as identified by the environmental risk assessment (pre-mitigated), included:

During construction:

- potential for environmental damage resulting from a bushfire passing through the site (e.g. explosion of fuel storages/tanks, vehicles and machinery)
- disruption to public from noise and vibration
- worker injury from fatigue and heat stress
- impacts from dust, respirable silica and other airborne contaminants
- road accidents caused by increased vehicles required for the proposal (e.g. traffic from construction, maintenance or decommissioning)
- pedestrian interactions at level crossings
- bridge collapse or falling object strikes
- worker injury from services strike at existing infrastructure, and underground and overhead utilities

- health impacts to workers and public, and environmental impact from contaminated land
- impaired emergency access resulting in escalation of incident
- loss of containment of dangerous goods during storage and handling
- damage to infrastructure or injury, or fatality caused by explosives incidents during blasting, during construction or by adjacent operators.

During operation:

- damage to infrastructure, injury to workers or public from bushfire
- damage to infrastructure, potential for impacts to freight goods caused by flooding events
- increased temperatures, leading to failure of infrastructure, caused by climate change (extreme weather events)
- disruption to public from noise and vibration
- rail accidents caused by increased rail movements
- rail interactions with farm equipment and travelling stock from adjacent stock routes/crossings
- road accidents caused by increased vehicles required for maintenance
- accidents due to increased number of road–rail interface
- pedestrian interactions at level crossings
- bridge collapse or falling object strikes
- worker injury from services strike at existing infrastructure, and underground and overhead utilities
- impaired emergency access resulting in escalation of incident
- loss of containment of freight dangerous goods and hazardous chemicals.

The health and safety assessment considered the potential risks identified by the environmental risk assessment, in addition to the potential risks and impacts identified by the scoping report and relevant guidelines and policies (see section 25.2.1).

25.2.4 How potential impacts have been avoided/minimised

The option development and assessment process for the proposal is summarised in Chapter 6: Alternatives and proposal options. The shortlist of route options was subject to a detailed assessment and the proposed alignment was refined based on evaluation of key considerations, including environmental impacts.

Potential environmental impacts were included in the list of selection criteria used for the analysis of options.

As a result of the route selection process, the potential for health and safety impacts has been avoided and/or minimised by:

- managing construction and operation activities in accordance with relevant legislative and policy requirements, as listed in section 25.2.1
- designing, constructing and operating the proposal to minimise impacts to construction safety, operational safety, public safety, road safety interfaces and emergency response. This included:
  - relocating the crossing loop and Rail Maintenance Access Road (RMAR) from the west side of the proposal alignment to east of Ironbong Road, to improve emergency fire access to the Bethungra ranges
  - reducing bridge structure length, improving both operational and construction safety
  - reducing amount of materials required to be handled.

25.3 Existing environment

Consideration of health and safety has generally included a 2-kilometre (km) buffer of the proposal site, referred to as the study area. Certain data, including bushfire and other extreme weather events, has been reviewed based on a regional scale, as this provides a more representative assessment of the risks at the proposal site.

25.3.1 Receivers

The proposal site is located in central north-west NSW. The proposal site crosses two local government areas (LGAs). The southern section is located in the Junee LGA and the northern section in the Cootamundra–Gundagai

Regional LGA. The Illabo and Stockinbingal townships are situated to the south and north of the proposal site, respectively, both of which are within a rural setting. At the 2016 census, Illabo and Stockinbingal had a population of 59 and 202 people, respectively (ABS, 2016).

Agriculture is the predominant land use within the study area and there is a relatively low density of sensitive receivers. The majority of residential, commercial and industrial receivers are located in excess of 200 metres (m) from the proposal site.

There is a total of 152 residential receivers located within 2 km of the proposal site. Most residential receivers are located in Stockinbingal, east of the proposal site, in low-density residential dwellings. South of Stockinbingal, residential receivers are typically present as isolated rural residential dwellings within open farmland.

Within the study area there is a total of 16 commercial and industrial buildings, with those closest to the proposal site being along Hibernia Street and Martin Street, towards the eastern end of Stockinbingal.

25.3.2 Dangerous goods and hazardous materials

An online search of the NSW EPA *Protection of the Environment Operations Act* 1997 (NSW) (POEO Act) register database was undertaken in February 2021 for records that lie within, or less than 250 m from, the proposal site. No environment protection licences, applications, notices, audits or pollution studies and reduction programs were identified within 250 m of the proposal site.

While minor quantities of dangerous goods and hazardous materials would be expected to be present within the study area, no land uses have been identified that would require licensing for the storage of large quantities of these materials.

25.3.3 Extreme weather events

25.3.3.1 Bushfire

Bushfires are a common occurrence within parts of Australia and can present a threat to public safety and environmental (biodiversity) values. Bushfires can occur from natural causes of ignition, such as lightning strikes, or as a result of human actions. Common sources of bushfire include:

- lightning (large storm cells, usually in the summer months)
- arson
- legal burning or campfires
- farm machinery (e.g. during harvest).

The risk of bushfire can be considered in terms of environmental factors that increase the risk of fire (fuel quantity and type, weather patterns and topography), as well as specific activities or infrastructure components that can exacerbate ignition risks.

Fires in the study area often move from west to east; therefore, firefighting units need to move in a similar direction. At present, fences can be cut during firefighting operations, keeping the access to the fire ground relatively open.

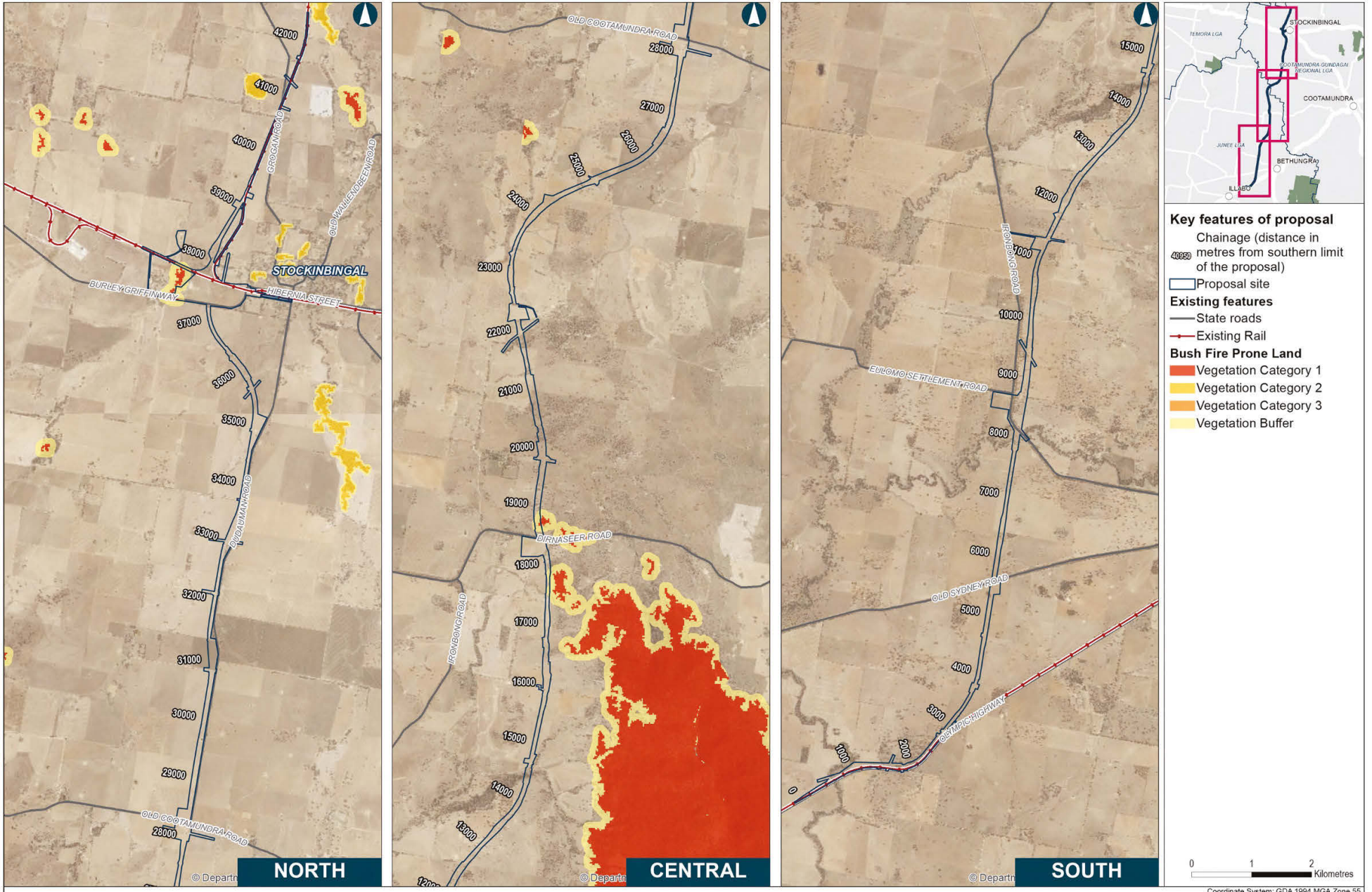
'Bushfire-prone land' comprises land that can support a bushfire or is likely to be subject to bushfire attack. Bushfire-prone land maps have been prepared by most local councils across NSW and certified by the Commissioner of the NSW Rural Fire Service (RFS). The maps identify vegetation within LGAs that has the potential to support a bushfire.

The NSW Bush Fire Prone Land dataset is a map prepared in accordance with the *Guide for Bush Fire Prone Land Mapping* (BFPL Mapping Guide) (NSW RFS, 2015) and owned by NSW RFS under purposes of Section 10.3 of the EP&A Act. It includes all bushfire-prone land maps for each LGA in NSW and has been used in this assessment.

The vegetation categories for bushfire-prone land are summarised in Table 25-1. Bushfire-prone land surrounding the proposal is shown on Figure 25-1, which shows that the proposal site intersects small areas of Vegetation Category 1 land near Burley Griffin Way and Dirnaseer Road (at chainages between 37000 and 38000, and at 18500, respectively).

TABLE 25-1: VEGETATION CATEGORIES FOR BUSHFIRE-PRONE LAND

Vegetation category	Description	Associated vegetation	Buffer
Category 1	Considered to be the highest risk for bush fire. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production.	Areas of forest, woodlands, heaths (tall and short), forested wetlands and timber plantations.	100 m
Category 2	Considered to be a lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. This vegetation category has lower combustibility and/or limited potential fire size due to the vegetation area shape and size, land geography and management practices.	Rainforests and lower risk vegetation parcels. These vegetation parcels represent a lower bushfire risk to surrounding development and consist of: ▸ remnant vegetation ▸ land with ongoing land management practices that actively reduce bush fire risk.	30 m
Category 3	Vegetation Category 3 is considered to be medium bushfire risk vegetation. It is higher in bushfire risk than Category 2 (and the excluded areas) but lower than Category 1.	Grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands.	30 m



25.1 Bushfire prone land surrounding the proposal

Data Sources: LPI, ARTC, IRDJV

220_0115_EIS_25_1_BushfireProneLand_r1v1.mxd

Vegetation

The vegetation within an area can influence the spread and intensity of a bushfire. Bushfires regularly occur in densely wooded areas due to fuel load. Grass fires can start easily and spread at a fast rate under dry conditions.

Vegetation within the majority of the study area has been cleared for agricultural land uses; however, several patches of remnant vegetation remain. Vegetation within, and in the vicinity of, the proposal site is described in Chapter 10: Biodiversity.

Topography

The slope of a site can also influence the rate of spread of fire, with a doubling of the rate of spread for every slope increase of 10 degrees. A bushfire hazard downslope of a site would pose a greater risk than upslope of a site, as the bushfire would travel upwards with a corresponding increase in flame height and intensity. The southern portion of the study area is situated within flat to generally sloping terrain at an average elevation of 280 m Australian Height Datum (AHD). The central portion of the study area passes through a saddle, with moderately undulating slopes with a maximum elevation of 480 mAHD. The topography of the study area is associated with the Bethungra Range located to the south-east, which is generally flat between Old Cootamundra and Stockinbingal.

25.3.3.2 Climate

Cootamundra Airport is the closest weather station to the proposal site, located 20 km from Stockinbingal. Typical climate information based on historical data for Cootamundra Airport is summarised below, based on the Bureau of Meteorology (BoM) (bom.gov.au/climate/averages/tables/cw_073142.shtml). Temperatures for the region range between an average minimum temperature of 1.1 degrees Celsius (°C) in July and average maximum temperature of 32.2°C in January. Temperatures frequently reach 40°C and above from December to February, when bushfire risk is highest. The average number of extreme heat days (above 35°C) is approximately seven days per year. Climate change projections show an increase of extreme heat days to 15–19 days per year by 2030. Refer to Chapter 22: Climate change risk for more information on climate change projections.

An average of 583 millimetres (mm) of rainfall occurs in the region each year, with the highest rainfall typically occurring during winter months. Prevailing winds are from a southerly direction.

Changes in climate conditions are anticipated for the future and are discussed in Chapter 22. Climate change risk will see an increase in average temperatures, increased intensity of extreme rainfall events, decrease in average rainfall, increase in extreme weather events and harsher fire conditions.

25.3.3.3 Flooding

The study area is located within the upper reaches of the Murrumbidgee River catchment and Lachlan River catchment. Watercourses within this area are predominantly ephemeral, flowing only during rainfall events. As such, the study area is subject to localised flooding but is not impacted by the regional floodplain for either catchment. Impacts from existing flooding at Dudauman Creek do occur within the township of Stockinbingal.

Flooding is discussed in further detail in Chapter 12: Hydrology and flooding.

25.3.4 Subsidence

The proposal site is not identified to be within a mine subsidence zone and risk of subsidence is considered to be negligible.

25.3.5 Contamination

There are no contaminated sites within 1 km of the proposal site listed under the EPA Contaminated Sites Register. Based on a review of the current and historical land uses across the study area (refer to Technical Paper 14: Contaminated Land Assessment), the potential for significant contamination was noted as a low to moderate risk; however, potential sources of contamination associated with historic rural and agricultural uses and rail activities were identified.

The broad-scale use of pesticides on agricultural land is considered unlikely to be of concern due to the high rate of dispersion; however, areas of pesticide, hydrocarbon and heavy metals contamination may be present where chemicals were stored, spray rigs were refuelled or maintenance activities took place. The contamination risks from operating railway activities include ash from historical steam trains, as well as hydrocarbons, pesticides and herbicides used in weed suppression and hydrocarbons, heavy metals and asbestos from rail infrastructure. Where the proposal site is close to existing roadways, or crosses gullies, agricultural land and draining easements, there may be increased presence of litter or dumped waste containing contaminants.

Overall, no areas within the proposal site have been identified to contain significant quantities of chemicals or materials indicating high risk of contamination. Contaminated land is discussed in Chapter 20: Soils and contamination and further detailed in Technical Paper 14: Contaminated Land Assessment.

25.4 Impact assessment—construction

25.4.1 Dangerous goods and hazardous materials

25.4.1.1 Construction chemicals

Potentially dangerous goods and hazardous substances are anticipated to be temporarily used, stored and transported during construction of the project. The potentially hazardous materials include diesel, greases, explosives, concreting materials, welding gases and pesticides. The method of storage would vary depending on the materials but would include drums of various sizes, small and intermediate bulk containers, cylinders in racks, bags/pallets and bunded areas, where appropriate.

Typically, low volumes of potentially hazardous materials, such as diesel and greases, would be stored onsite within construction compounds. The volume required to be stored onsite would largely depend on the anticipated rates of consumption, with deliveries of dangerous goods coordinated to match consumption rates.

The expected list of chemicals used throughout the proposal lifecycle, along with their purpose and dangerous goods details or status are presented in Table 25-2. The majority of chemical requirements are combustible liquids, such as diesel, which have the potential to cause fires or escalate the risk of bushfires; although, their high flash points (temperature at which the chemical will ignite in air) reduce the potential for small incidents to create significant consequences. Generally, low volumes of hazardous chemicals would be stored in laydown areas within the disturbance footprint for construction near to points of use. The quantities stored will be equivalent to the demand for activities within that area of the proposal.

TABLE 25-2: INDICATIVE LIST OF DANGEROUS GOODS AND HAZARDOUS SUBSTANCES

Chemical type	Typical chemicals	Design lifecycle stage	Purpose/use	Dangerous goods class	Packing group	Indicative rate of use	Expected storage method
Fuel oil	Diesel	Construction Operation	Fuel for mobile equipment	Combustible liquid (C1)[1]	III	40 kilolitres (k)L/2 weeks	40 kL bulk storage (fuel depots)
Grease	Rocol Rail Curve Grease	Construction Operation	Lubricate plant and equipment	Combustible liquid (C2)[2]	N/A	Limited	Package storage
	Caltex 904Grease	Construction Operation	Lubricate plant and equipment	Combustible liquid (C2)[2]	N/A	Limited	Package storage
	Shell GADUS Gauge Face Curve Grease	Construction Operation	Lubricate plant and equipment	Combustible liquid (C2)[2]	N/A	Limited	Package storage
	RS Claretech Biodegradable Grease	Construction Operation	Lubricate plant and equipment	Combustible liquid (C2)[2]	N/A	Limited	Package storage
Explosives	Ammonium Nitrate	Construction	Borrow pit operations	Oxidising substances (5.1)	III	As required for construction	Not stored for proposal
	Blast caps, detonators, boosters etc	Construction	Borrow pit operations	Explosives (1)	N/A	As required for construction	Not stored for proposal
Concreting	Concrete and Concrete Residue	Construction	Concreting for slab construction	N/A	N/A	As required for construction	Truck deliveries from Goondiwindi or Moree
	Concrete Curing Compound	Construction	Concreting for slab construction	N/A	N/A	As required for construction	Truck deliveries from Goondiwindi or Moree

Chemical type	Typical chemicals	Design lifecycle stage	Purpose/use	Dangerous goods class	Packing group	Indicative rate of use	Expected storage method
Welding gases	Oxygen	Construction	Welding	Non-flammable, non-toxic gases (2.2)/ Oxidising substances (5.1)	N/A	Cylinders and/or manifold packs as required for construction	Cylinder storage
	Acetylene	Construction	Welding	Flammable gases (2.1)	N/A	Cylinders and/or manifold packs as required for construction	Cylinder storage
Pesticides	Australian Pesticides and Veterinary Medicines Authority Approved Pesticides	Construction Operation	Pests and weeds control	Toxic substances (6.1) or Miscellaneous dangerous substances and articles (9)	II or III	As required	Not stored for proposal

1. Class C1—a combustible liquid that has a flashpoint of 150°C or less
2. Class C2—a combustible liquid that has a flashpoint exceeding 150°C

For the chemicals identified in Table 25-2, the screening assessment against the criteria of the Resilience and Hazards SEPP is presented in Table 25-3. The list of chemicals is compared to the storage and transport thresholds in the Resilience and Hazards SEPP. These thresholds represent the maximum amounts of dangerous goods that can be stored or transported to and from the proposal site without causing a significant risk to offsite receptors.

TABLE 25-3: HAZARDOUS CHEMICALS SCREENING ASSESSMENT

Chemical class	Storage scenario	Storage quantity	SEPP 33 thresholds	Potentially hazardous
C1	Bulk tank storage of diesel at fuel depots	40kL	N/A—If combustible liquids of class C1 are present onsite and are stored in a separate bund, or within a storage area where there are no flammable materials stored, they are not considered to be potentially hazardous	No
C2	Package storage of grease, oils and lubricants	Variable—package storage	N/A	No
Class 2.1	Acetylene and fuel gas cylinders used for welding/construction work	Variable—cylinder storage as required (<1 tonne)	50 m to sensitive land use	No
Class 2.2/5.1	Oxygen cylinders associated with welding works	Variable—cylinder storage as required	N/A	No
Class 6.1	Pesticide for construction and operational control of weeds	<1 tonne	2.5 tonne	No

The construction facilities where materials would be stored or used are typically located in remote areas and achieve the 50 m separation distance to sensitive land uses in the context of land-use safety planning; therefore, the construction facilities are not considered to be potentially hazardous based on the storage of dangerous goods and hazardous chemicals. Hazardous material and chemicals would be held in appropriately designed and safe storage within construction compounds when not in use

25.4.2 Extreme weather

25.4.2.1 Bushfire

The proposal may have the potential to ignite fires during construction. This would be anticipated to occur predominantly during clearing activities, where vegetation would be still present in the work area, or from working adjacent to vegetated areas. Potential ignition sources relevant to the proposal's construction include the discarding of cigarettes and domestic rubbish (such as glass bottles) by construction workers and the generation of sparks through hot works, such as welding or an excavator bucket making contact with rock or metal.

Fuel leaks and spills from plant and machinery, as well as the storage of flammable goods during construction, could also provide a fuel source if ignited, or worsen the impacts and spread of bushfire if impacted.

25.4.2.2 Flooding

The proposal would have the potential to impact flooding through increasing the flood levels and velocities at surrounding receivers during construction. Impacts are anticipated in areas involving works that will modify the landscape within and around ephemeral watercourses, resulting in altered surface water flow conditions.

High-flow velocities and/or deep flood waters could lead to safety risks and hazards to personnel and equipment. Flooding may cause inundation and damage to construction plant and equipment, resulting in risks from discharge of construction materials to the surrounding environment. There may also be restricted access to residential properties, ancillary construction areas and construction. Health risks associated with flooding include surface-water contamination if chemical storage areas are breached and hazardous chemicals migrate offsite.

25.4.3 Utilities

The relocation of utilities and services is required outside the proposal site, which could result in temporary outages to nearby receivers.

Construction of the proposal may have the potential to impact utilities, including previously unidentified utilities, from damage or severance during excavation. Damage to aboveground services may also occur from collision with construction plant and equipment. These scenarios could pose risks to public safety and result in short-term outages. In addition to service disruptions, potential impacts caused by utility strikes include:

- water pipeline interference leading to flooding (causing environmental damage and/or sink holes), health impacts or personal injury
- gas pipeline interference leading to property damage or flammable gas release causing immediate or delayed ignition, fatalities, or area evacuation
- dangerous goods pipeline interference leading to property damage, soil contamination, or flammable liquid release causing immediate or delayed ignition, fatalities or area evacuation
- electricity below or aboveground cable interference leading to electrocution and fatality.

Utility infrastructure that transports high-pressure dangerous goods, such as fuels or natural gas, have the highest risk of impact to health and safety. The release of these materials, if ignited, could result in a fire or explosion that impacts areas well beyond the proposal site.

The proposal crosses several utilities, including a high-pressure gas main, underground communication cables, water pipelines and overhead powerlines. Any utilities impacted by the proposal would be relocated or otherwise managed in accordance with the utilities management framework in Appendix F.

Health and safety impacts associated with encountering utilities would be minimised by undertaking further utilities investigations, including intrusive investigations, and consulting with service providers during detailed design.

25.4.4 Contamination

The risk of encountering contamination at the proposal site is considered to be low, with isolated areas of moderate risk, as discussed in Chapter 20: Soils and contamination. Notwithstanding, contaminants may be encountered during construction works. This could cause health and safety impacts to construction workers and the community through inhalation and/or direct contact, or impacts to the environment due to contamination of land. There are particular health risks associated with working in the rail corridor as excavation works may expose workers to asbestos or silica dust.

Health and safety impacts associated with potential exposure to contaminated and hazardous materials would be minimised through implementation of an unexpected finds protocol and waste management plan, which would be prepared as part of the CEMP. Soil investigations and geotechnical sampling of potentially contaminated Areas of Concern, identified in Chapter 20: Soils and contamination, would confirm the contamination status and potential risk to workers, which would be mitigated accordingly.

25.4.5 Emergency vehicle movements

Impacts to emergency vehicle movements may occur from disruption of traffic and access. These impacts are discussed further in Chapter 11: Traffic, transport and access. The proposal would result in disruption to traffic and access, due to construction vehicles utilising the local network. There would be temporary road closures and diversions at the location of road crossings, and as part of the realignment of Burley Griffin Way. The traffic and transport impact assessment concluded that with the implementation of appropriate mitigation measures (provided in Chapter 11 and Technical Paper 3: Traffic, Transport and Access Impact Assessment these impacts would be minor.

Impacts would be managed through implementation of a traffic, transport and access management sub-plan within the CEMP. Ongoing liaison with local councils, Roads and Maritime Services (RMS) and emergency services would be undertaken, as part of the detailed design, to identify additional measures to mitigate any potential impacts to emergency vehicle movements due to construction traffic.

At various stages of construction, the proposal may improve access for emergency services to areas through the use of construction access routes and work areas that would be made available to emergency vehicles if required.

25.4.6 Subsidence

Construction of the proposal may result in localised dewatering; however, the risk of subsidence is considered to be low. Further discussion of groundwater is provided in Chapter 14: Groundwater.

The proposal does not include any excavation of tunnels or other subsurface activities.

25.4.7 Community safety

All construction works carry with them a level of potential health and safety risks to the public, including landowners and road users. Air quality, vibration, noise and public health are key factors that may impact the health and safety of the local community.

Dust, particulate, odour and vapour is likely to be generated during construction, particularly in the vicinity of worksites, areas of surface works, road works and spoil transport offsite. Chapter 24: Air quality details the likely impact to the local air shed and mitigation measures that would be implemented to minimise potential impacts.

There is potential for noise and vibrational impacts on nearby communities during construction. These impacts are likely to occur through use of noise and/or vibration-intensive equipment, blasting activities and movement of construction vehicles and haulage trucks. The potential noise and vibration impacts have been assessed in Chapter 16: Noise and vibration, which also includes mitigation measures to alleviate noise and vibration impacts, and monitoring requirements.

Human and public health may be impacted during construction because of the transport, use and offsite disposal of hazardous substances, as well as waste generation disposal and treatment. Issues and mitigation strategies relating to handling, management and disposal of waste are described in Chapter 21: Waste.

25.4.8 Workplace safety

Health and safety risks associated with construction of the proposal that may impact site workers are limited to general risks or risks from environmental phenomena, including:

- operation of vehicles and construction equipment
- movement of excavated spoil and other material to and from the proposal site
- plant and equipment failures or incidents resulting in flooding, inundation or excavation collapse
- construction work during environmental and climatic conditions that may pose a hazard, including storms, flooding, heatwaves or bushfires.

These risks are generally considered to be common to all construction sites and managed through standard controls and mitigation in accordance with workplace health and safety requirements, including development of a work health and safety management plan, and work method statements for the proposal.

Health and safety impacts can be minimised when the construction workforce is exposed to, and use, safe construction practices. Safe construction practices are critical when the workforce is required to work in the vicinity of operating heavy machinery, within operating rail and road corridors, with electricity, with chemicals/dangerous goods, or at heights.

NSW workplace safety laws require construction sites to have adequate site security, which includes appropriate fencing. All construction work would be undertaken in isolation from the general public. The construction contractor would need to ensure that construction sites are secure at all times and take all possible actions to prevent entry by unauthorised persons.

25.5 Impact assessment—operation

25.5.1 Dangerous goods and hazardous materials

Minor quantities of dangerous goods would be required during operation of the proposal. No additional dangerous goods to those detailed in section 25.4.1 would be required.

Freight train movements would include transport of hazardous materials and dangerous goods. This would have the potential to cause impacts to the surrounding community and the environment through leaks and spills. The transport of hazardous materials and dangerous goods would be the responsibility of the freight operator/s and would be undertaken in accordance with relevant standards and regulatory requirements, including the Australian Dangerous Goods code and ARTC's standard operating procedures.

25.5.2 Extreme weather events

25.5.2.1 Bushfire

The operation of the proposal would not increase the likelihood of bushfires in the surrounding environment. The risk of operational activities resulting in ignition of a fire would be reduced from the clearing of vegetation during construction. Notwithstanding, rail maintenance activities, such as littering, rail grinding and welding, may ignite a fire if not adequately managed. Mechanical failure of trains and rail infrastructure may also result in the ignition of a fire.

25.5.2.2 Flooding

The construction of embankments as part of the proposal would act as a barrier to the movement of water from upslope to downslope areas. This would change the flooding regime upstream and result in the collection of flows into concentrated areas; however, the proposal has been designed to maintain existing surface water flow paths as much as possible.

The flood modelling for the proposal identified changes in flood depths and velocities, yet this is not predicted to impact the existing flood hazard for the majority of the proposal site. Flood hazard is highest at Stockinbingal due to the existing flooding issues and proximity to residential properties; however, the current hazard level for this area is not likely to change with the development of the proposal. This is due to the hydraulic controls provided by the existing Burley Griffin Way and Stockinbingal to Parkes Line, and the Lake Cargelligo Line to Cootamundra. The rural nature of the proposal means there are no formal flood emergency arrangements in place for most of the land around the proposal site. As such, with the development of the proposal, the management of the land surrounding the proposal site is not likely to change for a flood emergency.

Further detail on flood hazard is provided in Chapter 12: Hydrology and flooding and in Technical Paper 4: Hydrology and Flooding Impact Assessment.

25.5.3 Emergency vehicle movements

Access to all existing roads would be re-established during operation of the proposal and no disruption to access for emergency vehicles would occur.

The proposal includes the development or upgrade of six level crossings, which would result in minor delays during passing of freight trains. Consideration of traffic delay from level/grade separated crossings is discussed further in Chapter 11: Traffic, transport and access and is not considered to be significant.

The proposal includes the removal of an existing level crossing as part of the realignment of the Burley Griffin Way, improving access for emergency vehicles along this road.

To improve emergency fire access to the Bethungra ranges, following discussion with the RFS and Junee Shire Council, the crossing loop and RMAR was moved from the west side of the proposal alignment to east of Ironbong Road (in the vicinity of Ironbong Road) as part of design development.

Access to properties adjacent to the rail corridor may also be improved compared to existing conditions, through the development of an access road next to the rail line, which would be made available for emergency vehicles if required.

25.5.4 Community safety

During operation, impacts to the community from air quality, and noise and vibration are expected to be limited, but may result from freight services using the new rail line rail, or maintenance activities. Based on the noise assessment detailed in Chapter 16: Noise and vibration, noise emissions are expected to be low due to the distance between the rail line and sensitive receivers. Operation of the proposal would result in the introduction of air emissions from the diesel locomotives as they traverse along the proposal site; however, the air quality assessment discussed in Chapter 24: Air quality predicted pollutant ground level concentrations to be below, and therefore compliant with, the relevant NSW impact assessment criteria at nearby sensitive receivers.

The installation of the rail line may pose safety risks to pedestrians and road users as a result of increased road–rail interfaces. The proposal may also result in safety issues for train drivers and rail maintenance staff. The new rail line could lead to collisions with trains at stops and level crossings, and safety risks from unauthorised access. Due to the low frequency of trains using the new rail line, and the generally low road traffic volumes throughout the proposal site, traffic safety risks are considered to be low. The proposal will implement a variety of treatments (including signage and signalling at some crossings) to maintain the efficiency of the existing road network, while also reducing the overall number of level crossings to improve safety.

The proposal would be designed to maintain safety in accordance with relevant design standards and legislative requirements. This includes undertaking rail maintenance and repair works in accordance with ARTC's standard operating procedures.

Potential risks to health and safety may also occur from lack of knowledge within the community regarding the introduction of a new rail corridor. To mitigate this risk, community education programs would be implemented prior to and during operation to provide information about Inland Rail operation and safety, particularly at level crossings.

25.5.5 Subsidence

The proposal site is currently not within a mine subsidence zone. Potential future mining activities in the area would be governed by regulation preventing the development of mines within the easement of the rail corridor; therefore, likelihood of subsidence during operation of the railway corridor is considered to be unlikely.

25.5.6 Contamination

The main risk of contamination during operation of the proposal is from accidental spillage of petroleum, chemicals or other hazardous materials as a result of leakage or rail accidents, which could lead to pollution of the surrounding environment; however, no impacts are anticipated as existing ARTC procedures are to be implemented to manage potential leaks and spills.

25.6 Mitigation and management

25.6.1 Approach to mitigation and management

25.6.1.1 Approach to managing the key potential impacts identified

Bushfire prevention

In relation to management of fire risk, the flood and emergency response plan discussed below and in Chapter 12: Hydrology and flooding would include measures to minimise the potential for bushfire risks from construction activities. Possible measures to be detailed in this plan include all works involving potential ignition sources will be subject to a risk assessment or ban on total fire ban days. During operation, any maintenance activities that represent a bushfire risk would be undertaken in accordance with ARTC's standard operating procedures.

During detailed design, ARTC would undertake further consultation with emergency service providers and other relevant stakeholders to ensure the plan provides adequate measures.

Flood response

A flood and emergency response plan would be prepared and implemented as part of the CEMP. The plan would include measures, process and responsibilities to minimise the potential impacts of construction activities on flood behaviour as far as practicable. It would also include measures to manage flood risks during construction and address flood recovery during construction. The plan would be developed in consultation with TfNSW, local councils, emergency services and key affected landholders/managers.

Emergency response

During construction, the flood and emergency response plan would manage emergency responses, including:

- protocols and procedures to be followed in the event of an emergency
- roles and responsibilities
- traffic management/control systems in the case of emergency
- training and induction programs for construction staff
- measures to address the potential environmental impacts of an emergency.

The flood and emergency response plan would be developed in consultation with relevant state and regional emergency service providers, including:

- NSW Ambulance—for the provision of first aid, transport of injured, or establishment of Casualty Clearing Station if required
- NSW RFS—for control or negation of fire or explosive situations, rescue of trapped or injured persons, or control of chemical emergencies
- State Emergency Service—for provision of personnel and equipment, assistance with traffic and crowd control, evacuation of persons, construction of earth bunds, or other assistance
- Police—for traffic control, crowd control, evacuation of persons, or coordination of rescue of trapped or injured persons.

Management of dangerous goods and hazardous materials

Construction-site planning would ensure hazardous materials are stored appropriately and at an appropriate distance from sensitive receivers, in accordance with the thresholds established under Applying SEPP 33. Should the minimum buffers be unable to be maintained, a risk-management strategy would be developed on a case-by-case basis.

Environmental hazards and risks associated with the onsite storage, use and transport of chemicals, fuels and materials would be managed through the CEMP, which would include measures for the management of dangerous goods and hazardous materials, including:

- requirements for the storage, handling, and transport of dangerous goods and hazardous materials in accordance with relevant regulatory requirements and ARTC's standards
- a spill response procedure including notification and clean-up requirements in the event of a spill.

Mitigation and management during operation of the proposal would be undertaken in accordance with ARTC's existing Safety Management System and associated procedures.

Community safety

A safety awareness program would be developed and implemented to educate landowners and the broader community regarding safety around trains. This would focus on the community and rural property operators who cross the rail corridor to access their properties.

25.6.1.2 Approach to managing other impacts

Both the CEMP and ARTC's Operational Environmental Management Framework (EMF) will include requirements for managing hazardous substances and dangerous goods. These plans will cross-reference and/or be supported by other specific management plans that will be developed to further enhance health and safety values as the proposal progresses. Some of these may be sub-plans to the EMF and others may be standalone plans focusing on an aspect of proposed activities. Sub-plans to support EMFs will include but not be limited to:

- Air quality management sub-plan; refer to Chapter 24: Air quality
- Flood and emergency response sub-plan; refer to Chapter 12: Hydrology and flooding
- Construction noise and vibration management sub-plan; refer to Chapter 16: Noise and vibration
- Contaminated land and hazardous materials management sub-plan (including spill response plan); refer to Chapter 20: Soils and contamination.

25.6.2 Expected effectiveness

Health and safety objectives have been incorporated into the concept design and would be further refined during detailed design. A range of mitigation measures are provided. These measures, combined with implementing the hazardous substances and dangerous goods risk management strategy, would reduce the risk to the health and safety of employees and communities so far as practicable, along with risks to the environment and property within the proposal site and adjoining areas.

Audits and reporting of the effectiveness of environmental management measures is generally carried out to show compliance with management plans and other relevant approvals, and would be outlined in detail in the CEMP.

25.6.3 Interaction between measures

Mitigation measures to control impacts to health and safety of workers, visitors and the public may replicate mitigation measures proposed for the control of impacts associated with Chapter 11, Chapter 13, Chapter 16, Chapter 20 and Chapter 24.

All mitigation measures for the proposal would be consolidated and described in the CEMP. The plan would identify measures that are common between different aspects. Common impacts and common mitigation measures would be consolidated to ensure consistency and implementation.

25.6.4 Recommended mitigation measures

The measures outlined in Table 25-4 will be implemented to mitigate the potential impacts to health and safety for the proposal.

TABLE 25-4: MITIGATION MEASURES

Ref	Impact	Mitigation measures	Timing
HS-1	Public safety	A hazard analysis would be undertaken during detailed design to identify risks to public safety from the proposal and how these can be further mitigated through safety in design.	Detailed design/ pre-construction
HS-2	Utilities	Utility and service providers would continue to be consulted during detailed design to identify possible interactions, and to develop procedures to minimise the potential for service interruptions and impacts on existing land uses. Any relocations or requirements for access, diversion, protection and/or support would be in place prior to construction.	Detailed design/ pre-construction
HS-3	Bushfire	Detailed design and construction planning would maintain appropriate access during construction and operation, ensuring local roads allow emergency access, first-response firefighting, access to water supply for firefighting purposes and safe evacuation routes.	Detailed design/ pre-construction
HS-4	Flood and emergency response	A flood and emergency response plan would be prepared and implemented as part of the Construction Environmental Management Plan. The plan would include measures, processes and responsibilities to minimise the potential impacts of construction activities on flood behaviour and bushfire risk as far as practicable. It would also outline measures to manage emergency responses during construction.	Detailed design/ pre-construction
HS-5	Physical hazards	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.	Construction

Ref	Impact	Mitigation measures	Timing
HS-6	Bushfire	The construction contractor would develop procedures to manage hot work/high fire-risk activities, including observation of local fire authorities and emergency services directives, checking extent of worksite vegetation prior to hot work, and ensuring appropriate firefighting equipment and trained personnel are available. The construction contractor procedures would comply with the ARTC Safety Management System.	Construction
HS-7	Bushfire	The *ARTC Engineering (Track and Civil) Code of Practice—Section 17 Right of Way: Vegetation Management* (ARTC, 2013) would be implemented to minimise fire risk within the rail corridor, which includes specifications for vegetation management/fire hazard reduction within the corridor. Local fire authorities and local emergency services would be consulted to ensure appropriate operational actions are taken, such as providing feedback on the firefighting vehicles accessibility, fire prevention plans and cooperation on burning-off activities.	Operation

25.6.5 Managing residual impacts

Residual impacts are impacts of the proposal that may remain after implementation of:

- design and construction planning measures to avoid and minimise impacts (see section 25.2.4 and Chapter 8: Proposal description—construction)
- specific measures to mitigate and manage identified potential impacts (see section 25.6.4).

The key potential health and safety issues and impacts originally identified by the risk assessment (refer to Appendix G) are listed in Table 25-5. These include health and safety impacts with an assessed initial risk of medium or higher in the risk assessment. No risks were assessed as having a high residual risk ranking, with all remaining risks having either a low or medium residual risk ranking. Further information on the approach to the environmental risk assessment, including descriptions of criteria and risk ratings, is provided in Appendix G.

The potential issues and impacts identified by the environmental risk assessment were considered as part of the health and safety assessment, summarised in sections 25.4 and 25.5. The mitigation and management measures (listed in Table 25-4) that would be applied to manage these impacts are also identified. The significance of potential residual impacts (after application of these mitigation measures) is rated using the same approach as the original environmental risk assessment.

Provided the mitigation measures are implemented, the proposal poses a negligible-to-low risk of impacts to health and safety, as identified by the risk assessment in Table 25-5.

TABLE 25-5: RESIDUAL IMPACT ASSESSMENT—HEALTH AND SAFETY

Phase	Potential impacts	Pre-mitigated risk			Mitigation measures (refer to Table 25-4)	Residual risk			How residual impacts would be managed
		Likelihood	Consequence	Risk rating		Likelihood	Consequence	Risk rating	
Construction	Potential for environmental damage resulting from a bushfire passing through the site (e.g. explosion of fuel storages/tanks, vehicles and machinery).	Possible	Moderate	Medium	HS-3, HS-5	Unlikely	Moderate	Low	n/a
	Disruption to public from noise and vibration.	Likely	Minor	Medium	HS-1, NV-6 to NV-11	Possible	Minor	Low	n/a
	Worker injury from fatigue and heat stress.	Possible	Moderate	Medium	SE-2	Possible	Minor	Low	n/a
	Impacts from dust, respirable silica and other airborne contaminants.	Possible	Moderate	Medium	AQ-1	Possible	Minor	Low	n/a
	Road accidents caused by increased vehicles required for the proposal (e.g. traffic from construction, maintenance, or decommissioning).	Likely	Moderate	High	T-1, T-4 to T-5, T-8, SE-2	Unlikely	Moderate	Low	n/a
	Pedestrian interactions at level crossings.	Unlikely	Major	Medium	HS-1, LP-15	Rare	Moderate	Low	n/a
	Bridge collapse or falling object strikes.	Unlikely	Major	Medium	SE-2, HS-1, HS-4, HS-5	Unlikely	Moderate	Low	n/a
	Worker injury from services strike at existing infrastructure and underground and overhead utilities.	Possible	Major	High	HS-2	Unlikely	Moderate	Low	n/a
	Health impacts to workers and public and environmental impact from contaminated land.	Unlikely	Major	Medium	HS-1, SC-2 to SC-4	Unlikely	Moderate	Low	n/a
	Impaired emergency access resulting in escalation of incident.	Possible	Major	High	HS-3, T-6	Unlikely	Moderate	Low	n/a
	Loss of containment of dangerous goods during storage and handling.	Possible	Moderate	Medium	SC-10	Unlikely	Minor	Low	n/a
	Damage to infrastructure, or injury or fatality caused by explosives incidents during blasting, during construction or by adjacent operators.	Possible	Extreme	High	NV-3	Rare	Major	Low	n/a

Phase	Potential impacts	Pre-mitigated risk			Mitigation measures (refer to Table 25-4)	Residual risk			How residual impacts would be managed
		Likelihood	Consequence	Risk rating		Likelihood	Consequence	Risk rating	
Operation	▸ Damage to infrastructure, injury to workers or public from bushfire.	Possible	Major	High	HS-1, HS-3, HS-5 to HS-6, HS-7, LP-14	Unlikely	Moderate	Low	n/a
	▸ Damage to infrastructure, potential for impacts to freight goods caused by flooding events.	Possible	Moderate	Medium	H-4	Unlikely	Minor	Low	n/a
	▸ Increased temperatures, leading to failure of infrastructure, caused by climate change (extreme weather events).	Likely	Minor	Medium	H-4, CC-4	Unlikely	Minor	Low	n/a
	▸ Disruption to public from noise and vibration.	Likely	Minor	Medium	HS-1, NV-12, NV-13	Possible	Minor	Low	n/a
	▸ Rail accidents caused by increased rail movements.	Rare	Extreme	Medium	LP-15	Rare	Major	Low	n/a
	▸ Rail interactions with farm equipment and travelling stock from adjacent stock routes/crossings.	Possible	Extreme	High	LP-8, LP-15	Unlikely	Moderate	Low	n/a
	▸ Road accidents caused by increased vehicles required for maintenance.	Unlikely	Major	Medium	T-4	Unlikely	Moderate	Low	n/a
	▸ Accidents due to increased number of road–rail interface.	Possible	Major	High	LP-15	Rare	Major	Low	n/a
	▸ Pedestrian interactions at level crossings.	Possible	Extreme	High	HS-1, LP-15	Unlikely	Moderate	Low	n/a
	▸ Bridge collapse or falling object strikes.	Unlikely	Major	Medium	SE-3	Rare	Major	Low	n/a
	▸ Worker injury from services strike at existing infrastructure and underground and overhead utilities.	Unlikely	Extreme	Medium	H-2, SE-3	Unlikely	Moderate	Low	n/a
	▸ Impaired emergency access resulting in escalation of incident.	Possible	Major	High	H-3, T-6	Unlikely	Moderate	Low	n/a
	▸ Loss of containment of freight dangerous goods and hazardous chemicals.	Possible	Major	High	SC-10	Unlikely	Minor	Low	n/a