

CHAPTER 7

PUBLIC SAFETY



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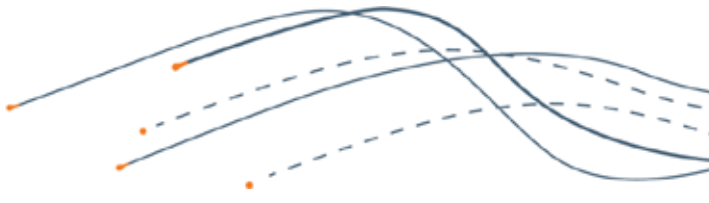
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7 Public Safety

This chapter provides an overview of the existing environment relevant to public safety including a review of the chemical composition of the iron concentrate and waste material, fire hazards and the prevalence of known geohazards.

Construction, operation and closure of the proposed mine has the potential to create hazardous situations for the public through increased traffic movements, the introduction of additional ignition sources and alterations to the existing landform through the establishment of the mine pits and integrated waste landform. The scale of effects on public safety is discussed and, where relevant, management and/or mitigation measures that would minimise impacts and risks are identified.

7.1 Applicable Legislation and Standards

The relevant legislation relating to public safety at the proposed mine is as follows:

- *Mine and Works Inspection Act 1920*
- *Work Health and Safety Act 2012*

Further information regarding the requirements and relevance of the legislation is provided in Chapter 4. Specifically, the following standards provide a range of criteria relevant to public safety:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999*
- *National Environment Protection (Ambient Air Quality) Measure 2003*
- AS 2187.2-2006: Explosives: Storage and use – Use of explosives
- AS 1692-2006: Steel tanks for flammable and combustible liquids
- AS 1940-2004: The storage and handling of flammable and combustible liquids
- AS 1725-2003: Chain-link fabric security fences and gates

The National Environment Protection Council's (1999) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM) was established to provide a nationally consistent approach to identifying and managing site contamination. The NEPM refers to three different types of investigation levels: Ecologically-based Investigation Levels (EILs), Health-based Investigation Levels (HILs) and Groundwater Investigation Levels (GILs) which provides criteria (concentrations of contaminants) to guide the assessment of risks to human health and the environment. This approach ensures sound environmental management practices are adopted by all stakeholders when managing site contamination.

The *National Environment Protection (Ambient Air Quality) Measure 2003* outlines the ambient air quality standards adopted at the proposed mine for PM₁₀ and PM_{2.5} emissions. Predicted levels of emissions and the implications to air quality are discussed in detail in Chapter 15.

The nominated Australian standards each specify specific design criteria that will be incorporated into the design of the mine to protect the key environmental and stakeholder values relevant to public safety.

7.2 Assessment Method

A desktop review of existing public safety hazards was undertaken to determine positive or negative affects resulting from the construction, operation or closure of the mine. The desktop investigations were supplemented with site-based investigations undertaken by various technical investigations to verify findings. The following information sources were utilised:

- Historical significant fire events recorded by the Country Fire Service (CFS)
- Anecdotal evidence of fire events provided by local landowners
- Geological logging of drilling cores
- Geochemical analysis of iron concentrate and waste material
- The South Australian Seismology Report and Earthquake Hazard Zones (Love et al. 2010)

A detailed overview of the existing traffic environment, including the expected impacts and implications for public safety is provided in Chapter 8. Similarly, impacts to air quality, including any implications for public safety are discussed in Chapter 15. As such, public safety issues associated with altered traffic conditions, or a reduction in air quality are not discussed in this chapter.

Impacts and risks to public safety will occur during construction, operation and closure of the mine and are considered to represent a social issue. The criteria outlined in Chapter 6 Assessment Methodology, Table 6-2 have been utilised for categorising the level of impact to public safety.

7.3 Existing Environment

This section provides an overview of the existing environment within the area covered by the proposed mining lease (the mine site) in relation to public safety. The chemical composition of the iron concentrate and waste material is discussed, as well as fire and geological hazards.

7.3.1 Geochemical Composition of Iron Concentrate and Waste Material

A detailed overview of the geochemical composition of the iron concentrate and waste material is provided in Section 2.2.2 of Appendix S. Of relevance to public safety, it should be noted that:

- Background radioactivity readings for the area surrounding the mine site are 0.2 uSv/hr. Analysis of core samples resulted in an average radioactivity of 0.18 uSv/hr, with no single result above background levels. As such, there are not sufficient concentrations of radionuclides at the mine to represent a hazard to public safety.
- Respirable silica will be present at very low concentrations in the fine tailings (0.07 per cent by weight).
- An analysis of composite samples from the proposed mine site for naturally occurring asbestos and other fibres was undertaken in accordance with AS4964-2004 for qualitative identification of asbestos in bulk samples. No asbestos was detected.
- Elemental analysis of mine waste material indicated that no elements exceed health investigation levels outlined in DEC (2010) or NEPC (1999) and do not represent a hazard to public safety.

7.3.2 Fire Hazard

South Australia's climatic conditions provide an ideal environment for bushfires. Typically, incidences of bushfire are more frequent in dry summer conditions. To protect people and property, fire bans are implemented annually during high risk months. Fire bans within the Eastern Eyre Peninsula, Lower Eyre Peninsula and West Coast districts (the location of the CEIP) were applied from 1 November to 30 April during the 2013-14 fire danger season (CFS 2014a). Remnant vegetation coverage on the Eyre Peninsula is patchy, predominately limited to designated conservation areas, with the majority of the region cleared for agricultural purposes. As such, there are predominately low fuel loads, resulting in quick burning, low intensity grass fires in the agricultural regions.

Historically, research indicates that South Australia can expect serious fires within the State in six or seven years out of 10. A summary of known historical significant fires on the Eyre Peninsula is provided in Table 7-1 (CFS 2014b).

Table 7-1 Historical Significant Fire Events on Eyre Peninsula

Date	Location	Area Affected
1933-34	Eyre Peninsula	Unknown
1938-39	Eyre Peninsula	Unknown
1943-44	Eyre Peninsula	Unknown
1959	Wudinna	76,000 Ha
1968-69	Murdinga	8,000 Ha
February 2001	Tulka	14,000 Ha
2002	Gawler Ranges	15,000 Ha
January 2005	Wangary	78,000 Ha
January 2009	Port Lincoln (Proper Bay)	252 Ha
December 2009	Port Lincoln	650 Ha
January 2014	Ceduna (Yumburra Conservation Park)	46,000 Ha

A variety of ignition sources exist within the area of the mine site based on the current land use (predominately agricultural activity). These ignition sources include (CFA 2007):

- Harvester fires through material collecting on hot engine parts
- Hay cutting and carting through hot exhaust on dry grass or spontaneous combustion
- Cutting, welding and grinding equipment
- Powerlines not appropriately cleared of vegetation
- Electric fencing in the presence of dry vegetation
- Burn offs

7.3.3 Geohazards

The mine site is located within an area not considered to be at significant risk of earthquakes. The majority of earthquakes in South Australia are centred around the Mount Lofty Ranges and the Flinders Ranges (up to Cleve). The Earthquake Hazards Zones Map for South Australia (Government of South Australia 2014) shows that the mine is located within an area of the state that has a hazard factor of less than 0.11 (i.e. not subject to earthquake loads in accordance with AS1170.4). Seismic events are rare and typically small in nature. The South Australian Seismology Report (Love et al. 2010) indicates that no seismic events were recorded in proximity to the mine site in 2010, as previously indicated in Chapter 2 Existing Environment, Figure 2-13.

7.3.4 Summary of Key Environment Values

The mine is located within a region considered to be geologically stable and not at significant risk of earthquakes or other geohazards. The area of the mine site and surrounding region is relatively clear of vegetation, resulting in low fuel loads. As such, no significant fire events have been recorded at the location of the mine. Bushfires are however considered to be a significant risk on the Eyre Peninsula, with six significant fire events on the Peninsula since 2000.

The mineral and geological composition of the iron concentrate and waste material indicates that it is largely inert (87%) and does not include elemental concentrations in excess of the health investigation levels outlined in NEPC (1999). Surficial calcrete materials which will be removed during early pre-stripping of the mine pit will be utilised in an acid neutralisation capacity where required for the approximate 2% of waste material (by volume) considered potentially acid forming (MWH 2015).

7.4 Context and Views of Affected Parties

Stakeholders relevant to public safety include the local landowners and community, Wudinna DC, SafeWork SA, CFS, DPTI and DSD. Stakeholders are seeking the following outcomes in relation to public safety:

- No adverse impacts to public health as a result of any contaminated material from the proposed mining lease (PIM_07_19, PIM_07_20)
- No public injuries and or deaths as a result of fires originating in the proposed mining lease that could have been reasonably prevented (PIM_07_21)

Impacts and risks relevant to each of the existing environmental values and issues identified by stakeholders are discussed in Section 7.7 below.

All issues raised by stakeholders across the entire project are presented in Chapter 5 Stakeholder Consultation and summarised in Table 5-8. Impacts and risks relevant to each of the existing environmental values associated with public safety and potential issues identified by stakeholders are discussed below and summarised in Table 7-3. Impact events across the entire project are presented in the Impact and Risk Register in Appendix C.

7.5 Potentially Impacting Events

Considering the views and contexts of affected parties and the issues identified during technical studies, an assessment of Source Pathway Receptor (SPR) has been undertaken, as per the methodology outlined in Chapter 6, to determine which potential impact events are considered applicable to this project. Potential impact events associated with the construction, operation and closure of the mine that have a confirmed SPR linkage that affects public safety include:

- A member of the public falling into the pit or pit lake (IM_07_00)
- Unauthorised access to mine site causes injury or fatality to member of public (IM_07_01, IM_07_14, IM_07_15)
- Collapse of integrated waste landform causes injury or fatality to member of public (IM_07_02 to IM_07_11)
- Collapse of mine viewing platform causes injury to member of the public (IM_07_12, IM_07_13)
- Fire originating from the mine site results in injuries or fatalities to members of the public (IM_07_18)
- Health impacts to local community as a result of disturbance of contaminated land (IM_07_16)
- Health impacts to local community as a result of contamination of soils and/or groundwater (IM_07_17)
- Provision of additional emergency services facilities/vehicles (IM_07_19)

The impact and risk register presented in Appendix C provides confirmation of a source pathway and receptor for each of the potential impact events (PIMs) considered above and therefore follows each through as actual impact events (IMs) with a complete impact and risk assessment.

For public safety, a number of potential impact events (listed below) are not considered further as there is no confirmed linkage between source, pathway and receptor, as demonstrated in Appendix C.

These include:

- The integrated waste landform (IWL) representing a hazard to light planes – The integrated waste landform represents a distinctive feature in the landscape and presents no greater hazard than any other similar landform (e.g. Darke Range) (PIM_07_03).
- A member of the public injured by fly rock or air blast from blasting – The assessment of mine blasting shows that any impacts from air blast would meet Australian Standards at the nearest sensitive receivers. Flyrock management will be necessary to ensure in pit conveyors are not damaged. Modelling indicates flyrock is not likely to travel more than 50 m. As the open pit is at least 500 m from the proposed Mining Lease (ML) boundary, there is a considerable margin of safety. In addition, blasting would not occur until after overburden removal meaning the pit wall will also act as a partial barrier (and increasingly so as the pit deepens). Consequently, no harm would occur to a receptor (PIM_07_22).
- Several individuals from within the local community have identified concerns about the potential presence of carcinogenic free silica or undisclosed concentrations of heavy metals, uranium or associated radionuclides in material to be excavated from the mine site. As previously outlined (and further discussed in Chapters 13 and 17 and Appendix S), there are no contaminants and hazardous metals in topsoils, sub-soils, overburden or the ore body that represent a risk to public safety (PIM_15_14).

Specifically, the potential public exposure to respirable crystalline silica (RCS) was assessed. There is no South Australian standard for public exposure to RCS and the most applicable standard is set in the Victorian State Environment Protection Policy (Air quality management) Protocol for Environmental Management (EPA Victoria 2007). This sets a criteria for RCS as $PM_{2.5}$ of $3\mu\text{g}/\text{m}^3$ based on an annual average, including background levels.

Air quality modelling indicates $PM_{2.5}$ will be no greater than $8\mu\text{g}/\text{m}^3$ (including background) based on an annual average, at the nearest sensitive receptor, of which, a portion will be RCS. This portion is expected to be the highest in the fine tailings. X-ray diffraction analysis of the total tailings undertaken by Iron Road found that 2.1 per cent of the PM_{10} fraction was RCS. This analysis was not undertaken for $PM_{2.5}$ but it is expected to be similar. If so, RCS concentration would be $0.168\mu\text{g}/\text{m}^3$ based on an annual average, substantially below the Victorian EPA limit of $3\mu\text{g}/\text{m}^3$.

There is some uncertainty in this calculation as it is possible that the percentage of RCS in the $PM_{2.5}$ component may be higher than that in the PM_{10} component. However, even if it was 10 times higher, which is highly improbable, it would still be well below the EPA criteria.

Consequently, it is not considered that RCS generated by mining will represent a hazard to the public.

7.6 Control Measures to Protect Environmental Values

This section identifies design measures and management or control strategies which will be implemented to mitigate the level of impact and risk associated with public safety such that it is considered as low as reasonably practicable (ALARP).

7.6.1 Design Measures

The following design control measures have been incorporated to minimise impacts and risks to public safety as a result of the construction, operation and closure of the mine:

- A security gatehouse will be installed at the main entrance to the mine.
- Direction and warning signage will be established at various locations surrounding the mine to identify hazards and dangerous items/areas during construction, operation and closure.
- Facilities/vehicles suitable for responding to onsite emergencies will be established within the area of the mine site. If required, the onsite emergency services have capacity to respond to events outside of the area of the mine site to support the local community.
- The explosives magazine will be constructed and operated in accordance with AS 2187.2-2006. The magazine will be fenced within a separate security compound with access restricted to authorised persons only.
- Hydrocarbon and chemical storage facilities will be designed in accordance with Australian Standards, relevant legislation and best practice guidelines.
- Fuel and lubricant storage and dispensing facilities will be designed and installed in accordance with:
 - AS 1940-2004: The storage and handling of flammable and combustible liquids
 - AS 1692-2006: Steel tanks for flammable and combustible liquids
 - Relevant South Australian legislation
- Fencing and earth bunds will be constructed to restrict pedestrian and light vehicle access to the mine pits following closure.
- Depending on stakeholder views and regulatory requirements at the time, the haul road into the pit may be removed.
- The design parameters for the integrated waste landform will ensure it is geotechnically stable and safe.
- Bushfire prevention and suppression measures such as firebreaks, irrigated grassland and storage dams will be established at various locations throughout the area of the mine site.

7.6.2 Management Strategies and Commitments

In order to minimise and mitigate impacts to public safety during construction, operation and closure activities, control and management strategies would be incorporated into the PEPR and implemented for relevant project phases. Key control and management strategies are outlined below in Table 7-2.

Table 7-2 Control and Management Strategies: Public Safety

Control and Management Strategies	Project Phase
<p>Develop and implement an infrastructure monitoring programme, incorporating:</p> <ul style="list-style-type: none"> • Periodic inspection and maintenance of site fencing, signage, security cameras and fence controls. • Regular monitoring of landform structures for failures or faults. • Ongoing consultation with the local community to facilitate a two-way flow of information to inform the community of ongoing mining activities and management measures that may need to be implemented to maintain public safety. • Community reporting of public safety issues (e.g. trespassing on mine site property). • Regular auditing of site security, explosives storage and use and the use of flammable and combustible liquids. 	<p>Construction, Operation, Closure</p>
<p>For appropriate storage and handling of hydrocarbons and chemicals, the following measures will be implemented:</p> <ul style="list-style-type: none"> • Develop and implement chemical and fuel storage, handling and emergency response procedures in accordance with AS 1940-2004. • Develop and implement a regular inspection programme to audit and monitor fuel and chemical storage areas to ensure integrity, housekeeping and correct use. • Maintain appropriate spill kit/clean up material, as required by the developed procedures. 	<p>Construction, Operation</p>
<p>Implementation of a construction and operation air quality compliance monitoring programme as detailed in Chapter 15 to monitor dust emissions from the proposed mine.</p>	<p>Construction, Operation</p>
<p>Develop and implement fire management procedures in consultation with the CFS and the relevant District Bushfire Prevention Committee(s) that will, as a minimum, include:</p> <ul style="list-style-type: none"> • Emergency response procedures. • Construction schedule restrictions with regard to fire weather warnings (e.g. total fire ban days). • On-site vegetation maintenance including fuel management zones. • Access requirements for emergency equipment, vehicles and machinery. • Induction and training of on-site personnel. • Provision of firefighting equipment at construction sites and at the operating mine. • Maintenance of all machinery on site in good condition, including exhaust systems. • Provision of all requested information to the CFS, including construction schedules, maps identifying the location of infrastructure and access roads, keys to gated areas and the location of available water supplies. • Availability and capacity of Iron Road's emergency response facilities to support the broader community in the event of an emergency (originating from outside the area of the mine site). 	<p>Construction, Operation, Closure</p>
<p>Prior to mine completion, arrangements will be put in place to the satisfaction of regulators and in consultation with stakeholders to transfer liability for the ongoing maintenance of fences, bunds or any facilities needed to ensure the risk to public safety from the open pit and any other residual hazards on the mine site is as low as reasonably practicable.</p>	<p>Closure</p>
<p>Programme of validation, optimisation, investigation and ongoing data gathering and refinement for IWL design to be detailed in the PEPR and implemented during the life of mine. Indicative programme is provided in section 5 of Appendix S.</p>	<p>Construction, operation, closure</p>

7.7 Impact and Risk Assessment

This section identifies and assesses impact and risk associated with public safety as a result of the construction, operation and closure of the mine. Impact events (confirmed by presence of a source, pathway and receptor) are those which are predicted to occur as a result of the development, whilst risk events would not be expected as part of the normal operation of the project, but could occur as a result of uncertainty in the impact assessment process. Although the risks may or may not eventuate, the purpose of the risk assessment process is to identify management and mitigation measures required to reduce the identified risks to a level that is as low as reasonably practicable. This assessment has been undertaken in accordance with the methodology outlined in Chapter 6.

Impact and risk events were identified through technical studies and stakeholder consultation. Impact events can include multiple sources, pathways or receptors and where practical have been grouped together to minimise duplication of information. Risks are events that would not be expected as part of the normal operation of the project, but could occur as a result of either uncertainties with the impact assessment, or as a result of faults, failures and unplanned events. A summary of impact and risk events relating to public safety is presented in Table 7-3 at the end of this section (with Impact IDs) and a complete register of impact and risk events by source, pathway and receptor is provided in Appendix C.

Impacts and risks are assessed following the application of the design measures outlined in Section 7.6. Where required, management measures are proposed to reduce the impact to a level that is considered ALARP. Through the adoption of design modification or specific mitigation measures, all identified impacts and risks were categorised as negligible. Risks ranged from low to high as a result of the significant consequences should an injury or fatality occur to a member of the public. The likelihood of any of these events occurring was reduced as much as possible, as such, the risks are considered ALARP. The key environmental risks would be monitored through the environmental management framework.

7.7.1 Unauthorised Access to Mine Site

During construction and operation, the mine will be fully fenced with access limited via secure gate houses. Personnel will be on site at all times to identify any potential unauthorised access. Following closure, the mine pits will be secured through the construction of earthen bunds and stock fencing. The earthen bunds will restrict vehicle access and the fence will restrict pedestrian access to the mine pits. Warning signage regarding the presence of the mine pits and potential hazards will also be installed. Appropriate arrangements for the ongoing maintenance of these facilities will be finalised during closure. As such, unauthorised access to the mine site is not expected to occur and is considered to represent a **negligible impact**.

If unauthorised access is obtained despite the implementation of control measures such as warning signage, the consequences in the worst case could result in death and are therefore considered to be **major**. As personnel will be on site at all times during construction and operation, unauthorised access to the mine during construction or operation is not considered likely to occur. Once the site has been vacated following closure, unauthorised access to the mine site could occur. The likelihood this will result in death or serious injury is considered to be **rare** given the measures to be implemented to restrict access to hazardous areas. As such, the risk of unauthorised access to the mine is considered to be **medium**.

7.7.2 Failure of Integrated Waste Landform

The integrated waste landform is proposed to be located on the southern boundary of the mine site, adjacent to a number of agricultural properties. Given the extent of alterations to the landform resulting from the mine pits and integrated waste landform, failure of the final landform could result in a hazardous situation for Iron Road employees or the local community. Failure could occur as a result of erosion, poor consolidation of materials or poor geomorphological design. The integrated waste landform and mine pits are designed using the physical properties of the existing landscape in accordance with standard industry practice. Modelling of the landform during construction, using conservative assumptions, concluded it will be geotechnically stable (Section 3.2.4 of Appendix S). Long-term erosion modelling using SIBERA found low erosion rates and no fatal flaws in the landform design, even without a vegetation cover. Sediment remains on site due to the use of benches and the predicted maximum gully depth was of the order of 2 m, being within the outer capping layer (Section 3.2.5 of Appendix S). A regular inspection programme will be implemented to identify any faults of failures within the structures. As such, a significant structural failure or collapse of embankment is not anticipated to occur and is therefore considered to represent a **negligible impact**.

Despite the implementation of control measures, the consequences in the worst case could result in death and are therefore considered to be **major**. The likelihood of structural failure of the integrated waste landform resulting in a major consequence is considered to be **rare** and could only occur in exceptional circumstances. As such, the overall risk to public safety associated with a structural failure of the integrated waste landform is considered to be **medium**.

7.7.3 Collapse of mine viewing platform

Given the likely public interest in mining operations, Iron Road plans to build a viewing platform at an appropriate location. As an engineered and maintained structure, it is not expected to fail. Consequently, there is expected to be a **negligible impact** on public safety. If the facility is not maintained, it could conceivably collapse resulting in serious injuries to members of the public, which is considered a **major** consequence. The likelihood of such an event is considered **rare**, resulting in a **medium** risk.

7.7.4 Disturbance of Contaminated Land

The presence of any existing site contamination has not been confirmed anywhere within the mine site and, as outlined in Chapter 13, is considered unlikely to be encountered. Therefore, the disturbance of existing site contamination is not anticipated to occur and is considered to be a **negligible impact**.

Pre-existing site contamination can represent a threat to public safety if not appropriately managed. If site contamination is encountered, the consequences will be **minor** and may require medical attention. Based on the current and historical use and development of the mine site (and its immediate surrounds) the potential for significant site contamination to be present is considered to be low (refer Chapter 13 for further information). As such, the likelihood of disturbing existing site contamination is considered to be **unlikely**. Therefore the disturbance of existing site contamination is considered to represent a **low risk** to public safety.

7.7.5 Contamination of Soil or Groundwater

The overarching objective in the storage and handling of hydrocarbons and chemicals is to prevent spills from occurring and as such, spillage is not planned as part of the project (refer Chapter 13 for further information). Therefore, the spillage of hydrocarbons or chemicals is considered to be a **negligible impact**.

Given the design or control measures described in Chapter 13, the consequences of spill or leakage are considered to be **minor** and may require medical attention. Despite the range of hydrocarbons and chemicals to be stored and used at various locations across the mine site, control strategies will limit use to the area of the mine site. Therefore it is considered **unlikely** that a spill or leak will occur and affect public safety. As such, the uncontrolled release of hydrocarbons and chemicals is considered to represent a **low risk** to public safety.

7.7.6 Fire Originating from the Area of the Proposed Mine Site

As previously identified in Section 7.3, the area of the mine site is currently utilised for agricultural purposes and as such there are a range of potential ignition sources currently present. Construction and operation of the mine will introduce a range of additional ignition sources to the site, including (but not limited to):

- Construction activities (e.g. welding and hot-works)
- Use of engines (e.g. vehicles) and on site generators
- Blasting and use of explosives within the mine pits

Fire management procedures will be established, including stop work provisions for high risk activities proposed to be conducted during days of 'Catastrophic' or 'Extreme' fire danger ratings (as declared by the CFS). Staff will be trained to respond to a variety of emergencies including the ignition of a fire. Firefighting equipment will be readily available at the mine at all times. With control and management strategies implemented it is anticipated that any fire event will be readily identified and addressed upon discovery. Mineral extraction has been undertaken on the Eyre Peninsula for many years with no records of a significant fire event originating from mining operations. There is minimal native vegetation within the area of the mine site, resulting in low fuel loads in the event of ignition. As such, a fire that is ignited and escapes from the area of the mine is not expected to occur and is considered to represent a **negligible impact** to public safety.

Nevertheless, if a significant fire event were ignited and escaped from the area of the mine site, the consequences could (in the worst case) be **catastrophic**; potentially resulting in public fatalities and widespread damage to third party property. It is considered **rare** that an uncontrolled fire would originate from within the area of the mine site given the control measures to be implemented and the track record of historical mining operations in the region. Nevertheless, the overall risk associated with an uncontrolled fire escaping the area of the mine site is considered to be **high**.

7.7.7 Onsite Emergency Services

As previously outlined, a range of facilities and vehicles will be located within the area of the mine site as a first line of response for any emergencies that may arise. All staff will be trained to respond to a variety of emergencies and firefighting equipment will be readily available at all times and mounted on appropriate four wheel drive vehicles.

If required, the onsite emergency services have capacity to respond to events outside of the area of the mine site to support the local communities. The provision of additional local emergency services represents a long-term positive for communities, providing additional capacity and training to respond to emergencies for the life of the mine and is considered to represent a **medium benefit**.

7.7.8 Summary of Impacts and Risks

With the implementation of design and management measures, all residual impacts have been categorised as negligible. Risks ranged from low to high as a result of the significant consequences should an injury or fatality to a member of the public occur. The likelihood of any of these events occurring was reduced as much as possible. The impacts and risks were considered to be ALARP and not warrant further specific control measures other than the environmental management controls and measures outlined here. A summary of each of the identified impacts and risks associated with public safety at the mine site are presented in Table 7-3.

Table 7-3 Impact and Risk Summary: Public Safety

Impact ID	Impact Event	Level of Impact ¹	Level of Risk ²
IM_07_00 IM_07_01 IM_07_14 IM_07_15	Unauthorised access to the mine site causes injury or fatality to a member of the public.	Negligible	Medium
IM_07_02 - IM_07_11	Collapse of integrated waste landform causes injury or fatality to member of public.	Negligible	Medium
IM_07_12, IM_07_13	Collapse of mine viewing platform causes injury to member of the public	Negligible	Medium
IM_07_16	Health impacts to local community as a result of disturbance of contaminated land.	Negligible	Low
IM_07_17	Health impacts to local community as a result of contamination of soils and or groundwater.	Negligible	Low
IM_07_18	Fire originating in mine site results in injuries or fatalities to members of the public.	Negligible	High
IM_07_19	Provision of additional emergency services facilities/vehicles.	Medium Benefit	-

¹ Impact events are expected to occur are part of the project. Level of impact is assessed post control strategies, as per the impact assessment methodology provided in Chapter 6.

² Level of risk reflects the risk that the assessment of impact is incorrect due to uncertainties in the assessment method, the control strategies, or in assumptions used. Risk is assessed post control strategies, as per the risk assessment methodology provided in Chapter 6.

7.7.9 Justification and Acceptance of Residual Impact and Risk

With the implementation of design and operational management measures, all impacts associated with public safety are considered to be **negligible**. Risks ranged from low to high as a result of the significant consequences should an injury or fatality to a member of the public occur. The only risk rated as high was that from the potential for fires to originate from the proposed mining lease. Given proposed fire prevention and control measures, the likelihood of a fire from the proposed mining lease resulting in several fatalities was considered to be rare (greater than 1:100 years) meaning further reduction in the risk rating is not achievable. The likelihood of any of these events occurring was reduced as much as possible and as such, is considered ALARP.

7.8 Proposed Outcomes

In accordance with the methodology presented in Chapter 6, outcomes have been developed for all impact events with a confirmed linkage between source, pathway and receptor. Each outcome is supported by measureable assessment criteria that will be used to assess compliance against the proposed outcomes during the relevant phases (construction, operation, closure) of the mine. Proposed outcomes and measurement criteria have been developed for each of the impact events identified with a confirmed linkage and these are presented in Table 7-4.

Table 7-4 Outcomes and Measurement Criteria: Public Safety

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
Unauthorised entry to the proposed mining lease during construction, operation and closure does not result in public injuries and or deaths that could have been reasonably prevented.	IM_07_00	Member of public falls into pit.	Independent investigation of all incidents that result in injury or death to a member of the public are completed in 14 days, or as agreed with the Director of Mines and demonstrate that the mine operator could not have reasonably prevented the incident from occurring.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.
	IM_07_14	Unauthorised access to IWL results in injury to member of public.		
Post mine completion, risks to the safety of the public from the open pit are as low as reasonably practicable.	IM_07_01	Member of public falls into pit or pit lake.	Independent audit of the physical stability of the pit and physical barrier, post closure, demonstrates risks to the public are as low as reasonably practicable.	None proposed
No loss of stability in the IWL during construction, operation and closure that results in public injuries and or deaths that could have been reasonably prevented.	IM_07_02 – IM_07_06	Collapse of IWL causes injury or fatality to member of the public.	Independent investigation of all incidents that result in injury or death to a member of the public are completed in 14 days, or as agreed with the Director of Mines and demonstrate that the mine operator could not have reasonably prevented the incident from occurring.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.
Post mine completion, risks to the safety of the public from loss of	IM_07_07 – IM_07_11	Collapse of IWL causes injury or fatality to member of the public.	Ecosystem Function Analysis at representative sites on rehabilitated areas demonstrates that	None proposed

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
stability in the IWL are as low as reasonably practicable.	IM_07_15	Unauthorised access to IWL results in injury to member of public.	rehabilitation will achieve sustainability thresholds. Landform modelling based on established IWL material parameters and geometry confirm alignment with outcomes from conceptual modelling.	
Use by the public of the authorised mine viewing platform during construction, operation and closure does not result in public injuries and or deaths that could have been reasonably prevented.	IM_07_12	Mine viewing platform fails causing injury to member of public	Independent investigation of all incidents that result in injury or death to a member of the public are completed in 14 days, or as agreed with the Director of Mines and demonstrate that the mine operator could not have reasonably prevented the incident from occurring.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.
Post closure, risks to the public from use of the mine viewing platform are as low as reasonably practicable.	IM_07_13	Mine viewing platform fails causing injury to member of public.	Evidence that arrangements are in place for the ongoing maintenance of the facility. Report by suitably qualified engineer prior to handover of responsibility demonstrates facility is structurally sound.	None proposed
No adverse impacts to public health as a result of any contaminated material from the proposed mining lease.	IM_07_16	Health impacts to local community as a result of disturbance of contaminated land.	Existing contaminated sites are remediated or treated to EPA standards within 14 days of their identification, or within a timeframe agreed by the Director of Mines.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.
	IM_07_17	Health impacts to local community as a result of contamination of soils and or groundwater.	All chemical and hydrocarbon spills greater than 20 L are remediated to meet EPA standards within 48 hours of the spill, or a longer time agreed by the Director of Mines.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
No public injuries and or deaths as a result of fires originating in the proposed mining lease that could have been reasonably prevented.	IM_07_18	Fire originating in proposed mining lease results in injuries or fatalities to members of the public.	Independent investigation of all incidents that result in injury or death to a member of the public are completed in 14 days, or as agreed with the Director of Mines and demonstrate that the mine operator could not have reasonably prevented the incident from occurring.	Annual safety audit does not identify additional actions that could reasonably be taken to reduce risks to the public.

7.9 Findings and Conclusion

Construction, operation or closure of the mine is not expected to impact public safety. A range of facilities and vehicles will be established within the area of the mine site as a first line of response to any emergencies that may arise. If required, the onsite emergency services have capacity to respond to events outside of the area of the mine site to support communities and are considered to represent a benefit to the local study area.

Affects to public safety will only occur as a result of risk events that would not be expected as part of the normal operation of the project, but could occur as a result of project uncertainties such as faults, failures and unplanned events.

Identified risks to public safety could occur as a result of unauthorised entry to the mine site, the ignition and escape of a significant fire event from the area of the mine site, or the structural failure of the integrated waste landform. Each of these identified risks are considered to be medium or high as a result of the significant worst case scenario consequences (potential public fatality) associated with each risk. Design and management controls have been applied to reduce the likelihood of any risk event occurring such that they are only considered likely to happen in extraordinary circumstances and the risks are therefore considered ALARP.