TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

4.1 INTRODUCTION

Waratah Coal has undertaken a preliminary hazard and risk assessment for the project. The preliminary hazard and risk assessment is consistent with Australian Standard/New Zealand Standard ISO 31000:2009: Risk Management – Principles and Guidelines. To date this standard has been adopted for Waratah Coal's preliminary hazard and risk assessment.

4.2 HAZARD AND RISK ASSESSMENT KEY PRINCIPALS

The key principals behind undertaking a safety and health hazard and risk assessment is to demonstrate how a proponent meets, or will meet, the requirements of the regulatory provisions relevant to the control of major accident event risks and the risks to the safety and health of site employees, contractors and visitors. This also includes how a proponent meets regulatory provisions in relation to personnel external to the company but affected by the companies activities.

Reducing potential risks to a level that is as low as reasonably practicable is the key objective of the risk assessment process. Determining whether risks have been reduced as low as is reasonably practicable involves an assessment of the risk to be avoided, and an assessment of the costs (in money, time and effort) associated in taking measures to avoid that risk, and a comparison of the two. For example, a risk may sit on a spectrum from very low (where it is very unlikely that it would be possible to reduce the risk further) through to levels of risk that are very high. The greater the initial level of risk under consideration, the greater the effort likely to be required to demonstrate that risks have been reduced to a level that is as low as reasonably practicable, however, just because the initial level of risk may be low doesn't mean it may not be reasonably practicable to reduce it further.

The basis on which the comparison is made involves the test of 'gross disproportion'. If a measure is practicable and it cannot be shown that the cost of the measure is grossly disproportionate to the benefit gained; then the measure is considered reasonably practicable and is to be implemented. Ideally, reducing risk to as low as reasonably practicable is achieved through applying the principles of prevention as a hierarchy. The typical risk mitigation hierarchy includes:

- elimination of risk by removing the hazard;
- substitution of a hazard with a less hazardous one;
- prevention of potential events;
- separation of people from the consequences of potential events;
- control of the magnitude and frequency of an event;
- mitigation of the impact of an event on people; and
- emergency response and contingency planning.

The reduction of a risk to as low as reasonably practicable also requires the implementation of a continuous improvement process. By continually reviewing its risk profiles Waratah Coal will be able to implement a systematic approach to managing the safety and health risks associated with the project. A schematic showing the adopted risk management hierarchy and continuous improvement process is shown at Figure 1.

Waratah Coal has adopted this hierarchical and continuous improvement model and commits to implementing these general principles where appropriate throughout the development and operation of the project.

4.3 LEGISLATIVE FRAMEWORK

Various Commonwealth and State Acts exist which are aimed at managing the associated risks for the proposed project, and in particular to protect and safeguard human safety and health, and the environment. Table 1 lists relevant safety and health related legislation applicable to the project. These regulatory obligations enforce compliance with respect to legislative strategies for both construction and operational phases across the project's life.

In addition, the *Queensland State Planning Policy 1/03, Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* also has relevance to the project. SPP 1/03 requirements for proposed developments are to mitigate and minimise potential adverse impacts of flood, bushfire and landslide on people, property, economic activity and the environment. SPP 1/03 has an effect where development applications are assessed, planning schemes are made or amended accordingly and / or land is designated for community infrastructure.

Figure 1. Risk Management Hierarchy and Continuous Improvement in Safety and Health

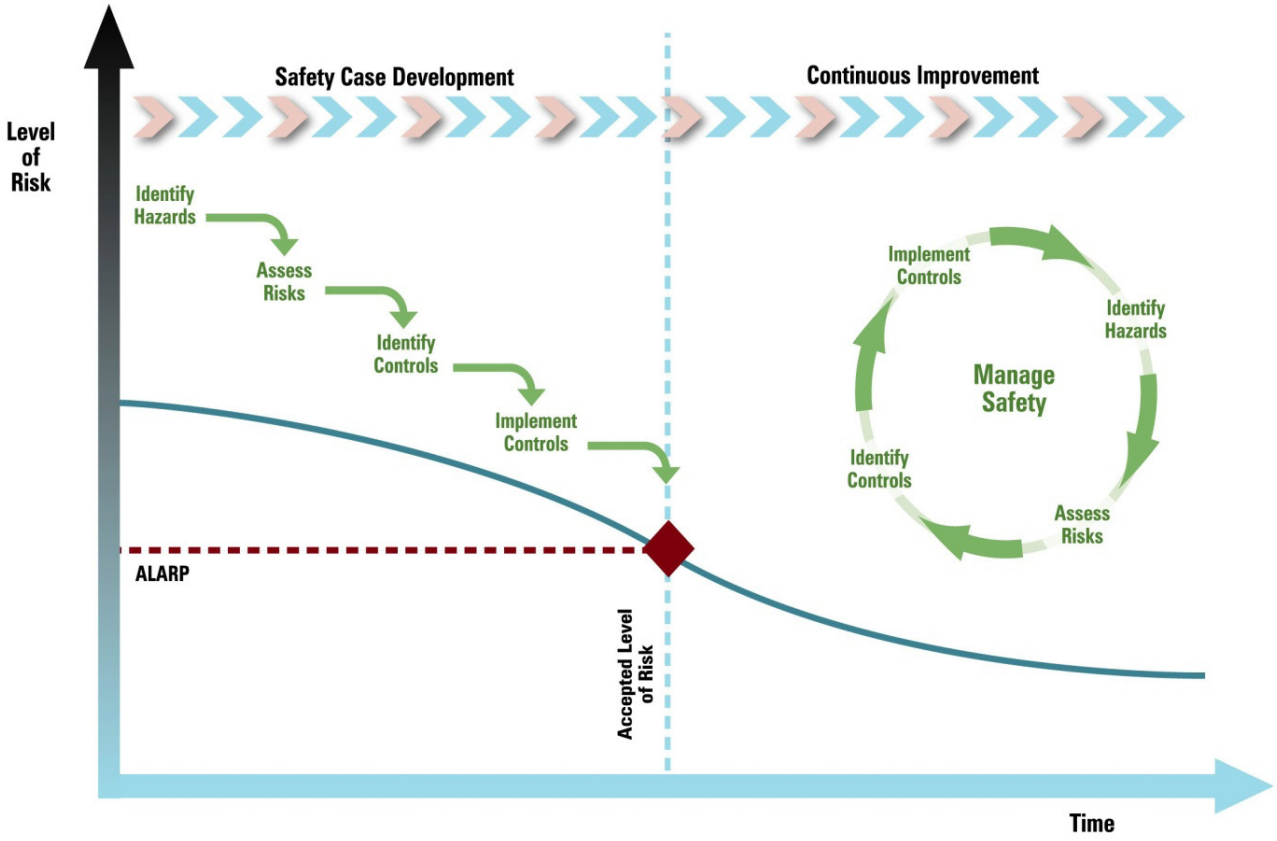

Table 1. Legislative Framework

APPLICABLE ACT	LEGISLATIVE OBLIGATION	COMPLIANCE STRATEGY
Coal Mining Safety and Health Act 1999	Establishes the obligations for personnel involved in the design, construction and operation of the mine. This act is included as the rail loading infrastructure is located within the proposed mining lease.	The development and operation of the mine will be undertaken in compliance with the obligations of this Act, the Regulation and relevant Standards in addition to applying due diligence and implementing precautionary principals.
Dangerous Goods Safety Management Act 2001	This Act relates to the safe management, storage and handling of hazardous materials, particularly dangerous goods and combustible liquids.	Coal mines are exempt from this Act. Where the *Coal Mining Safety and Health Act 1999* is not the applicable Act, work practices will comply with the *Dangerous Goods Safety Management Act 2001*.
Explosives Act 1999	This Act provides guidance for the handling, use, transport, storage and manufacturing of explosives.	An authority will be sought to undertake work using explosives. The storage of explosive and other related dangerous materials will be undertaken in accordance with this Act.
Radiation Safety Act 1999	This Act establishes requirements for the handling and storage of radioactive substances and the monitoring of persons exposed to the hazard.	The development and operation of the mine will be undertaken in compliance with the obligations of this Act.

APPLICABLE ACT	LEGISLATIVE OBLIGATION	COMPLIANCE STRATEGY
Workplace Health and Safety Act 1995	This Act establishes the obligations to prevent a person's death, injury or illness being cause by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.	The *Workplace Health and Safety Act 1995* (Div.2, s3) does not apply to a coal mine to which the *Coal Mining Safety and Health Act 1999* applies. Work practices associated with the rail line and infrastructure will comply with this Act when the *Coal Mining Safety and Health Act 1999* is not applicable .
Transport Infrastructure Act 1994	This Act is operated in conjunction with the *Transport Planning and Coordination Act 1994* and the *Transport Operations (Road Use Management) Act 1995*. The Act aims to provide a regime for the effective integrated planning and efficient management of a system of transport infrastructure.	It is likely the project will require approvals under this Act pertaining to transportation of oversized loads of plant, equipment and materials. These approvals will be obtained on a" as-needs" basis during the course of the Project's future design and construction phases. This will occur when the necessary design and construction information required for the permit applications is available.
Transport Planning and Coordination Act 1994	The objectives of this Act are to improve the economic, trade and regional development performance of Queensland, and the quality of life of Queenslanders, by achieving overall transport effectiveness and efficiency through strategic planning and management of transport resources.	Any activities associated with the development of the project that may impact on a public passenger service, active transport system or works on a local government road may require approval under this Act.
Fire and Rescue Service Act 1990	This Act and the *Fire and Rescue Service Regulation 2001* requires the operator to establish effective relationships with the Queensland Fire and Rescue Service to provide for the prevention of and response to fires and certain other incidents endangering persons, property or the environment and/or for related purposes or activities.	Emergency response procedures will be developed in consultation with the Emergency Services and other related Government agencies.

A range of Australian Standards, Codes of Practice and Guidelines which is also relevant to the protection of the health and safety of site works. These include:

- Australian Standard AS1692-1989: Tanks for flammable and combustible liquids. This standard specifies the design and construction requirements for tanks used for the purpose of storing flammable and combustible liquids;
- Australian Standard AS1940-2004: The storage and handling of flammable and combustible liquids. This standard sets out the requirements and recommendations necessary for the safe storage and handling of flammable and combustible liquids and includes minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection;
- Australian Standard AS2187-1988: Explosives – Storage, transport and use. This standard establishes the acceptable requirements for storage, transport and use of explosives and detonators to ensure security and safety;
- Australian Standard AS2958-1995: Earth-moving machinery – Safety. This standard prescribes specific requirements for brake systems on self-propelled

rubber-tyred vehicles. The objective of the standard describes relative design, manufactures, suppliers, employers and users of earth-moving machinery in minimizing the associated risks to the health and safety of persons required to work with or near earth-moving equipment;

- Australian Standard AS1170.4:2007: Structural design actions - Earthquake actions in Australia. This standard prescribes procedures to designers of earthquake actions and general detailing utilization requirements within the design phase of structures deemed to be subjected to earthquakes;
- Australian Standard AS4024: Safety of machinery. This standard outlines safety requirements for machinery and plant equipment and is typically associated with the design of machinery, rather than the applied use of the machinery;
- Australian / New Zealand Standard AS/NZS ISO31000:2009: Risk Management – Principles and Guidelines. This standard identifies the elements of risk management processes including risk assessment, risk analysis, evaluation and controls / treatment, review and system modification;
- Australian / New Zealand Standard AS/NZS4801 – 2001: Occupational Health and Safety Management Systems – specification with guidance for use. This standard specifies the requirements for an occupational safety and health management system to enable a proponent to formulate a policy and objectives that take into account legislative requirements and information about hazards or risks. The standard applies to hazards and risks over which the proponent exercises control over;
- Australian / New Zealand Standard AS/NZS1170.2:2002: Structural design actions - Wind actions. This standard prescribes technical data and provides procedures in as dynamic responses to wind actions and associated independent design requirements specified for a structure. Essentially, this standard describes procedures to designers of structures subject to varying wind actions;
- The Australia New Zealand Food Standards Code 2005. This code identifies the standards for food in Australia including processing for particular class of food hygiene; and
- Australian / New Zealand Standard AS/NZS1768:2007: Lighting protection. This standard prescribes to designers during planning phase's authoritative guidance on the principles and practices of lightening protection for various ranges of structures and systems. Recommendations in this Standard will reduce the probability of damage to a calculated acceptable level. Guidance is given on methods of enhancing the level of protection against lightening damage, if required.

Other direct sources of legislation that are relevant to the project include the following Commonwealth Standards, Codes of Practice and Guidelines:

- National Standard for Construction Work [NOHSC: 1016 (2005)];
- National Standard for Manual Tasks (2007);
- National Standard for Occupational Noise [NOHSC: 1007 (2000)];
- National Standard for Plant [NOHSC: 1010 (1994)];
- Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC: 1003 (1995)];
- Australian Code for the Transport of Dangerous Goods by Road and Rail, 7th Edition;
- Australian Code for the Transport of Explosives by Road and Rail, 3rd Edition;
- National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC: 2007 (1994)];
- National Code Of Practice for Induction for Construction Work, May 2007;
- National Code of Practice for the Prevention of Falls in General Construction, April 2008;
- The National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007);
- National Code of Practice for the Prevention of Occupational Overuse Syndrome [NOHSC:2013(1994)];
- Mobile Crane Code of Practice 2006;
- Plant Code of Practice 2005;
- Risk Management Code of Practice 2007;
- Traffic Management for Construction or Maintenance Work Code of Practice 2008;
- API RP 752, Management of hazards associated with location of process plant buildings; and
- API RP 753, Management of hazards associated with location of process plant portable buildings.

4.4 HAZARD AND RISK ASSESSMENT METHOD

Waratah Coal has undertaken a risk assessment for each component of the project in order to meet its obligations to identify and manage potential impacts to safety and health associated with the project. In assessing the potential safety and health risks associated with this project, Waratah Coal followed the guidance provided in AS/NZS ISO31000.

The assessment outlines the implications for, and the impact on, the surrounding land uses. The risk assessment incorporates:

- establishing the context of each of the project's core components;
- consideration of potential hazards (minor and major) associated with each of the core components;
- the likely frequency of the potential hazard occurring;
- consideration of the cumulative risk to health and safety;
- the temporal extent of identified hazards;
- the effects and rate of usage of the hazardous substances to be used, stored, processed or produced by the project; and
- the type of infrastructure and plant and equipment to be used during the construction and operational phases of the project.

Potential incident scenarios from the project were identified through consideration of:

- the activities assumed to be carried out and facilities likely to be present during the construction and operation phases of the project; and
- the range of potentially hazardous incidents that might be associated with each of the activities / facilities identified at the project sites.

After identifying the range of hazards likely to cause an incident at each of the project sites, the following matters were considered for each hazard:

- design controls and mitigation measures identified for each hazard, including prevention and response measures;
- the consequences of each of the hazardous incidents if they were to occur, including direct impacts of incidents and the potential for propagation and secondary incidents;
- the probability of events occurring and leading to the hazardous incident;
- the probability of each hazardous incident occurring takes into consideration the proposed controls; and
- the extent to which hazard risk profiles are reduced as a consequence of implementing control and mitigation measures (residual risk).

4.4.1 ADOPTED DEFINITIONS

The following definitions have been adopted for the assessment of risks and hazards:

- a **Hazard** is something with the potential to cause harm. This can include hazardous substances, plant and equipment, work processes or other aspects of the environment;
- the **Likelihood** is the chance or probability of an event occurring;
- the **Consequence** refers to how much harm the hazard could do, how many people it could affect and whether the harm would be short or long term;
- the **Risk** is the **likelihood** that a harmful **consequence** might result when exposed to the **hazard**;
- "**Major Accident Event** (MAE)", means a sudden occurrence (including in particular a major emission, loss of containment, fire, explosion or release of energy) leading to serious danger or serious harm to persons, property, both the built or natural environment, whether immediate or delayed; and
- **Critical** is defined as "Performance that has the potential to result in:
  - a fatality;
  - serious environmental effects ;
  - ongoing significant social issues;
  - significant adverse attention from media, non-government organisation;
  - loss of licence;
  - loss of a customer;
  - loss of corporate image; and
  - loss of production or revenue.

This definition covers people, plant and equipment, production, quality as well as systems and procedures.

4.4.2 RISK ANALYSIS CRITERIA

The risk assessment used for the assessment is based on the model contained in AS/NZS ISO31000. This Standard establishes a method for identifying risk profiles through combining the "Likelihood" of a hazard occurring with the "Consequences" of a hazard or impact occurring, in terms of its effect on the health and safety of personnel. To identify a thorough list of the potential risks for each project component, Waratah Coal has undertaken the following steps:

- conducted risk assessment workshops for each component of the project which included involvement of personnel with specialist skills relating to each component;
- conducted a review of risks assessments associated with similar developments; and
- conducted a review of industry safety and health data and reporting.

The highest risk incidents are judged to have the highest priority for consideration of additional risk reduction options. Conversely, low risk profiles are typically controlled through standard operating procedures and controls and maintained through ongoing monitoring as part of the continuous improvement cycle.

Likelihood is a qualitative estimate of the frequency at which the issue or hazard may occur. Based on definitions shown in Table 2 an agreed estimate of the likelihood of occurrence was assigned to each identified hazardous incident. The contribution of the preventative and protective features were taken into account when assessing the likelihood of occurrence and potential consequence from each hazardous incident.

The assessment established the potential level of consequence to health and safety of the public in accordance with the definitions shown in Table 3. Where a hazardous incident may have multiple outcomes, each outcome was assessed individually.

The risk matrix shown in Table 4 was adopted for the assessment. The colour shading refers to the qualitative bands of risk level.

4.4.3 HAZARD AND RISK ASSESSMENT

Waratah Coal used the above approach, which is consistent with industry risk assessment practice, to identify and assess risks associated with the project. The assessments were undertaken for the two components of the project, being the mine and rail; and include the development and operational phases of the project. The hazard and risk assessment for each component are provided in Chapter 18, Volumes 2 and 3.

The Terms of Reference (ToR) requires that a risk assessment be undertaken that considers potential risks to the receiving environment associated with the project. This has been undertaken using the same principals as

Table 2. Likelihood of Occurrence Ratings

PROBABILITY RANKING	DESCRIPTOR	DESCRIPTION
A	Almost certain	Has happened within the last year
B	Probably will occur	Has happened in the last 1 to 5 years
C	Might occur	Has happened in the last 5 to 10 years
D	Could occur	Has happened in the last 10 to 30 years
E	Exceptional event	Has not happened in industry but theoretically could happen

Table 3. Consequence Ratings for Health, Safety and Environmental Losses

CONSEQUENCE RANKING	DESCRIPTOR	HEALTH AND SAFETY
1	Catastrophic	Multiple fatalities, significant irreversible effects to >50 people
2	Major	Single fatality, severe irreversible disability
3	Moderate	Moderate irreversible disability or impairment (Classified injury)
4	Minor	Reversible disability requiring hospitalization (Medical treatment case)
5	Insignificant	No medical treatment (First aid case)

Table 4. Risk assessment matrix

DEFINITIONS		CONSEQUENCE				
		Insignificant 5	Minor 4	Moderate 3	Major 2	Catastrophic 1
LIKELIHOOD	Almost certain A	Moderate A5	High A4	Extreme A3	Extreme A2	Extreme A1
	Probably will occur B	Moderate B5	High B4	High B3	Extreme B2	Extreme B1
	Might occur C	Low C5	Moderate C4	High C3	Extreme C2	Extreme C1
	Could occur D	Low D5	Low D4	Moderate D3	High D2	Extreme D1
	Exceptional event E	Low E5	Low E4	Moderate E3	High E2	High E1

for the safety and health hazard and risk assessment. The results of the environmental risks assessments for the mine and rail components are included in the Chapter 18, Volumes 2 and 3.

4.4.4 RELATIONSHIP TO ENVIRONMENTAL MANAGEMENT PLANS

Where risks were identified, mitigation measures were considered following the hierarchical approach shown in Section 4.3. Each mitigation measure was considered in relation to its effectiveness in reducing the risk profile and the test of 'gross disproportion' was applied. Those mitigation measures which were considered reasonably practicable will be adopted by the project and incorporated into the component EMPs. A number of mitigation measures are purely for safety and health reasons and as such will be included into Standard Operating Procedures (SOPs) as part of the project Safety and Health Management System (SHMS).

4.5 CONCLUSION

Waratah Coal has undertaken a preliminary hazard and risk assessment for each component of the project. The assessment has considered potential impacts to safety and health of onsite and offsite personnel, in addition to potential impacts to the receiving environment.

The risk assessments have been conducted following current industry practice and in accordance with relevant Australian Standards. A common systematic method towards identifying, assessing and managing potential risks was used during the assessment process and this enabled a consistent approach across the overall project. The adopted risk assessment method involved the following steps:

- establish the context of the two components;
- identify risks and hazards associated with each component;
- analyse and evaluate each of the risks;
- apply treatments to each of the risks; and
- reassess risk profiles after treatments are applied.

Mitigation measures adopted by the project as a result of the risk assessment process will generally be incorporated into the component Construction and Operational EMPs. Preliminary EMPs for both the mine and rail components are provided in Volume 1, Chapters 7 and 8.

Mitigation measures that are considered for safety and health reasons, will be included into Standard Operating Procedures (SOPs) as part of the project Safety and Health Management System (SHMS).