

APPENDIX I

**NEWCASTLE COAL INFRASTRUCTURE GROUP
COAL EXPORT TERMINAL**



APPENDIX I
PRELIMINARY HAZARD ANALYSIS

NEWCASTLE COAL INFRASTRUCTURE GROUP

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11 INTRODUCTION

The proposed Newcastle Coal Infrastructure Group (NCIG) Coal Export Terminal (CET) (the Project) is located in Newcastle, New South Wales (NSW), within the Newcastle City Council local government area (Newcastle LGA). The Project includes the construction and operation of a 66 million tonnes per annum (Mtpa) CET, including associated rail and coal handling infrastructure and wharf/shiploading facilities on the south arm of the Hunter River.

This Preliminary Hazard Analysis (PHA) has been conducted as part of the Environmental Assessment to evaluate the hazards associated with the Project in accordance with the general principles of risk evaluation and assessment outlined in the NSW Department of Urban Affairs and Planning (DUAP) *Multi-Level Risk Assessment* (DUAP, 1999). This PHA also addresses the requirements of State Environmental Planning Policy (SEPP) No. 33 (Hazardous and Offensive Development) and has been documented in general accordance with *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6* (DUAP, 1992a).

Assessed risks are compared to the qualitative risk assessment criteria developed in accordance with Australian Standard/New Zealand Standard (AS/NZS) 4360:2004 *Risk Management* (AS/NZS 4360:2004). Further, this PHA considers the qualitative criteria provided in *Risk Criteria for Land Use Planning: Hazardous Industry Planning Advisory Paper No. 4* (DUAP, 1992b).

11.1 OBJECTIVE AND SCOPE

The objective of this PHA is to identify the risks posed by the Project to people, property and the environment and assess the identified risks using applicable qualitative criteria. This assessment considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (ie. equipment failure, operator error and external events). The assessment does not consider risks to NCIG employees or property.

This report should be read in conjunction with the following studies conducted for the Environmental Assessment:

- Construction, Operation and Road Transport Noise Impact Assessment (Appendix A).
- Air Quality Impact Assessment (Appendix B).
- Road Transport Assessment (Appendix C).
- Land Contamination and Groundwater Assessment (Appendix D).
- Flora Assessment (Appendix E).
- Fauna Assessment (Appendix F).

In accordance with the Newcastle Development Control Plan, this PHA has been prepared with regard to the *Newcastle and Kooragang Island Area Risk Assessment Study* (NSW Department of Planning [DoP], 1992). The Newcastle Development Control Plan requires that development applications within the Kooragang port and industrial area include an assessment under SEPP 33. This PHA has been prepared in accordance with the various SEPP 33 guidelines and requirements.

In regards to new development on Kooragang Island, the *Newcastle and Kooragang Island Area Risk Assessment Study* also notes that:

“The existing risk levels from the Incitec facility and the proximity to sensitive environmental areas would tend to constrain activities with far field effects or significant potential to harm the biophysical environment.”

The above potential constraint was also considered in the risk assessment (refer to Section 14).

11.2 STUDY METHODOLOGY

The methodology employed during the preparation of this PHA was as follows:

- (i) Identify the hazards associated with the Project.
- (ii) Examine the maximum reasonable consequence¹ of identified events.
- (iii) Qualitatively estimate the likelihood of events.
- (iv) Propose risk treatment measures.
- (v) Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events and compare these to applicable qualitative criteria.
- (vi) Recommend further risk treatment measures if considered warranted.
- (vii) Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

11.2.1 Preliminary Hazard Analysis Workshop

The above methodology was implemented during a PHA workshop in May 2006. The workshop participants (ie. the risk assessment team) included technical advisors from NCIG, BHP Billiton Limited and Connell-Hatch including:

- NCIG Operations and Engineering Managers.
- BHP Billiton Environment Manager.
- Connell-Hatch Project and Engineering Managers.

Representatives of Resource Strategies Pty Ltd facilitated the workshop.

11.2.2 Risk Management Process

This PHA has been undertaken with regard to the risk management process described in AS/NZS 4360:2004 *Risk Management*. The risk management process is shown schematically on Figure I-1 and includes the following components:

- Establish the context – Section I1.2.4.
- Identify risks – Section I3.2 and Attachment IA.
- Analyse risks – Section I4 and Attachment IA.
- Evaluate risks – Section I4 and Attachment IA.
- Treat risks – Section I3.2.3 and Attachment IA.

11.2.3 Risk Criteria

This PHA considered the following qualitative criteria (summarised from DUAP, 1992b):

- (a) All 'avoidable' risks should be avoided. This necessitates investigation of alternative locations and technologies where applicable.
- (b) The risks from a major hazard should be reduced wherever practicable, irrespective of the value of the cumulative risk level from the whole installation.
- (c) The consequences (effects) of the more likely hazardous events should, wherever possible be contained within the boundaries of the installation.
- (d) Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.

¹ Definition of Maximum Reasonable Consequence – The worst-case consequence that could reasonably be expected, given the scenario and based upon the experience of the workshop participants.

11.2.4 Qualitative Measures of Consequence, Likelihood and Risk

To undertake a qualitative risk assessment it is useful to define (in a descriptive sense) the various levels of consequence of a particular event, and the likelihood (or probability) of such an event occurring. As noted in Section I1, risk assessment criteria were developed in accordance with AS/NZS 4360:2004. AS/NZS 4360:2004 allows the risk assessment team to develop risk criteria during the *Establish the Context* phase.

In accordance with AS/NZS 4360:2004, Tables I-1, I-2 and I-3 were reviewed by the PHA workshop team (Section I1.2.1) at the commencement of the workshop as part of establishing the context. The tables were considered to be consistent with the specific objectives and context of the PHA.

Table I-1
Qualitative Measures of Probability

Event	Likelihood	Description	Probability
A	Almost Certain	Happens often	More than 1 event per month
B	Likely	Could easily happen	More than 1 event per year
C	Possible	Could happen and has occurred elsewhere	1 event per 1 to 10 years
D	Unlikely	Hasn't happened yet but could	1 event per 10 to 100 years
E	Rare	Conceivable, but only in extreme circumstances	Less than 1 event per 100 years

Source: Safe Production Solutions (2006)

Table I-2
Qualitative Measures of Maximum Reasonable Consequence

	People	Environment	Asset/Production
1	Multiple fatalities	Extreme environmental harm (eg. widespread catastrophic impact on environmental values of an area)	More than \$500k loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (eg. widespread substantial impact on environmental values of an area)	\$100 to \$500k loss or production delay
3	Major injury or health effects (eg. major lost workday case/permanent disability)	Serious environmental harm (eg. widespread and significant impact on environmental values of an area)	\$50 to \$100k loss or production delay
4	Minor injury or health effects (eg. restricted work or minor lost workday case)	Material environmental harm (eg. localised and significant impact on environmental values of an area)	\$5 to \$50k loss or production delay
5	Slight injury or health effects (eg. first aid/minor medical treatment level)	Minimal environmental harm (eg. interference or likely interference to an environmental value)	Less than \$5k loss or production delay

Source: Safe Production Solutions (2006)

Combining the probability and consequence, Table I-3 provides a qualitative risk analysis matrix to assess risk levels.

**Table I-3
Risk Ranking Table**

Consequence	Probability				
	A	B	C	D	E
1	1 (H)	2 (H)	4 (H)	7 (M)	11 (M)
2	3 (H)	5 (H)	8 (M)	12 (M)	16 (L)
3	6 (H)	9 (M)	13 (M)	17 (L)	20 (L)
4	10 (M)	14 (M)	18 (L)	21 (L)	23 (L)
5	15 (M)	19 (L)	22 (L)	24 (L)	25 (L)

Notes: L – Low, M – Moderate, H – High
Rank numbering: 1 – highest risk; 25 – lowest risk

Legend – Risk levels:

	Tolerable
	ALARP – As low as reasonably practicable
	Intolerable

Source: Safe Production Solutions (2006)

Risk acceptance criteria for the Project have been formulated following consideration of the *Hazardous Industry Planning Advisory Paper Number 4* (DUAP, 1992b) and AS/NZS 4360:2004 *Risk Management* guidelines, viz.:

Qualitative Risk Acceptance Criteria:

The risk posed by an event is at a level where the residual risk levels are considered tolerable, following consideration of the proposed risk mitigation and minimisation measures.

The hazard identification summary table (Attachment IA) illustrates the systematic application of the above criteria for the Project.

I2 PROJECT OVERVIEW

The main activities associated with the development of the CET would include:

- foundation preparation/capping of a rail corridor traversing the existing Kooragang Island Waste Emplacement Facility (KIWEF) for the development of the rail spurs, rail sidings and rail loops;
- construction of rail spurs, rail sidings and rail loops, rail overpass, train unloading stations and connecting conveyors;
- re-use of dredged materials from the south arm of the Hunter River as preload and engineering fill for construction of the coal storage area, rail corridor and wharf facilities;
- construction of a coal storage area including coal stockpiles, conveyors, transfer points and combined stacker/reclaimers;
- construction of wharf facilities, shiploaders, conveyors and buffer bins;
- development of water management infrastructure including site drainage works, stormwater settlement ponds, primary and secondary settling ponds, site water pond, water tanks and stockpile spray system;
- installation of electricity reticulation and control systems;
- development of access roads and internal roads;
- construction of administration and workshop buildings;
- other associated minor infrastructure, plant, equipment and activities; and
- operation of the CET up to a capacity of 66 Mtpa, including the unloading of coal trains, the stockpiling of coal, and the loading of coal to ships via the wharf facilities and shiploaders.

Figure I-2 illustrates the general arrangement of the Project.

I3 HAZARD IDENTIFICATION

I3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The major potentially hazardous materials required for the Project are limited to diesel, petrol, hydrocarbons (oil) and gas cylinders. A brief description of these materials is presented below. It should be noted that for the purposes of this assessment, blasting was not included because it would be conducted in accordance with the existing Development Consent (DA 134-3-2003-i) held by the NSW Waterways Authority for the Hunter River (South Arm) dredging operations (ie. is not part of the Project).

I3.1.1 Diesel

Diesel is classified as a combustible liquid by AS 1940-2004 *The Storage and Handling of Flammable and Combustible Liquids* (AS 1940-2004) (Class C1) for the purposes of storage and handling but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code. In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if it is ignited (flash point 61-150°C).

Use of diesel at the Project would be managed in accordance with the requirements of AS 1940-2004 and the proposed use of diesel at the Project does not include usage at elevated temperatures, therefore fires from conventional use are unlikely. Electronically controlled refuelling systems would be installed for the Project.

The risks associated with the Project include diesel storage and usage. The proposed aboveground diesel storage facility would have a capacity of up to 12,000 litres (L). Annual diesel usage would be up to approximately 200,000 L during operations at 66 Mtpa and up to 500,000 L during construction.

I3.1.2 Petrol

Petrol is classified as a flammable liquid (Class 3) by AS 1940-2004 and as such is classified as a dangerous good by the criteria of the ADG Code.

Petrol would be stored in a 30,000 L aboveground tank in accordance with AS 1940-2004. Annual petrol consumption would be up to approximately 75,000 L during operations and up to approximately 100,000 L during construction.

I3.1.3 Hydrocarbons

Oil is classified as a combustible liquid (Class C2) by AS 1940-2004. An oil storage facility would be installed comprising 1,000 L oil storage pods with dispensing pumps and flow meters. Hydrocarbon storage facilities would be designed, located, constructed and operated in accordance with AS 1940-2004 *The Storage and Handling of Flammable and Combustible Liquids*. Annual oil usage would be up to approximately 45,000 L.

A waste oil storage facility would also be installed comprising a 12,000 L oil tank. Waste hydrocarbons would be collected, stored and removed by licensed waste transporters on a periodic basis.

I3.1.4 Liquid Petroleum Gas

Liquid Petroleum Gas (LPG) is classified as a flammable gas (Class 2.1) by the ADG code. A limited number of LPG cylinders would be on site (up to 15 during construction). During operations, approximately three cylinders would be stored on-site. Gas cylinders would be stored in accordance with AS/NZS 1596:2002 *The Storage and Handling of LP Gas*.

13.2 HAZARD IDENTIFICATION PROCESS

The Project hazard (or risk) identification summary table (Attachment IA) was formulated during the PHA workshop discussed in Section I1.2.1. It provides a summary of the potential off-site risks and hazards identified for the Project and a qualitative assessment of the risks posed.

13.2.1 Project Components

For the purposes of hazard identification and assessment, the Project was subdivided into the following areas:

- construction;
- rail spurs, loops and train unloading station;
- coal stockpiles and administration area; and
- shiploading and wharf facilities.

13.2.2 Incident Classes

The following generic classes of incident were identified:

- fire;
- explosion;
- toxic release; and
- theft.

These incident classes were applied to the Project component areas to identify scenarios for which treatment measures were developed.

13.2.3 Project Risk Treatment Measures

A number of hazard treatment and mitigative measures would be described in management plans for the Project, including the following:

- **Emergency Response Plan (ERP)** – the ERP would describe the procedures to be followed in emergency situations; including fires.
- **Construction Management Plan (CMP)** – the CMP would detail environmental management initiatives that relate to construction activities; such as erosion and sediment control, waste management and materials handling procedures.
- **Spontaneous Combustion Management Plan (SCMP)** – the SCMP would detail stockpile management principles and procedures to respond to spontaneous combustion events at the CET.
- **Site Water Management Plan (SWMP)** – the SWMP would present the particulars of the site drainage network, groundwater controls and erosion and sediment control measures and monitoring programmes.
- **Contractor Management Plan** – the Contractor Management Plan would, in particular, detail specification of transport routes to site, based on nature of load, site specific requirements and communication thereof.
- **Traffic Management Plan (TMP)** – the TMP would detail measures to be undertaken to minimise the potential for accidents in the vicinity of entry/exit points at the CET. The TMP would also include the details of road closures in the event of fire at the CET.

In addition, the following hazard treatment measures would be adopted for the Project:

- **Maintenance** – Ongoing and timely maintenance of all mobile and fixed plant and equipment in accordance with the manufacturer's recommended maintenance schedule, and consistent with the maintenance schemes required by relevant standards. Only vehicles permitted to carry dangerous goods would be used for transport of hazardous materials.
- **Staff Training** – Operators and drivers would be trained and (where appropriate) licensed for their job descriptions. Only those personnel licensed to undertake skilled and potentially hazardous work would be permitted to do so.
- **Engineering Structures** – Civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards.
- **Contractor Management** – All contractors employed by NCIG would be required to operate in accordance with the relevant Australian Standards, NSW Legislation and NCIG's Contractor Management Plan.
- **Storage Facilities** – Storage and usage procedures for potentially hazardous materials (ie. fuels and lubricants) would be developed in accordance with Australian Standards and relevant legislation.

I4 RISK MANAGEMENT AND EVALUATION

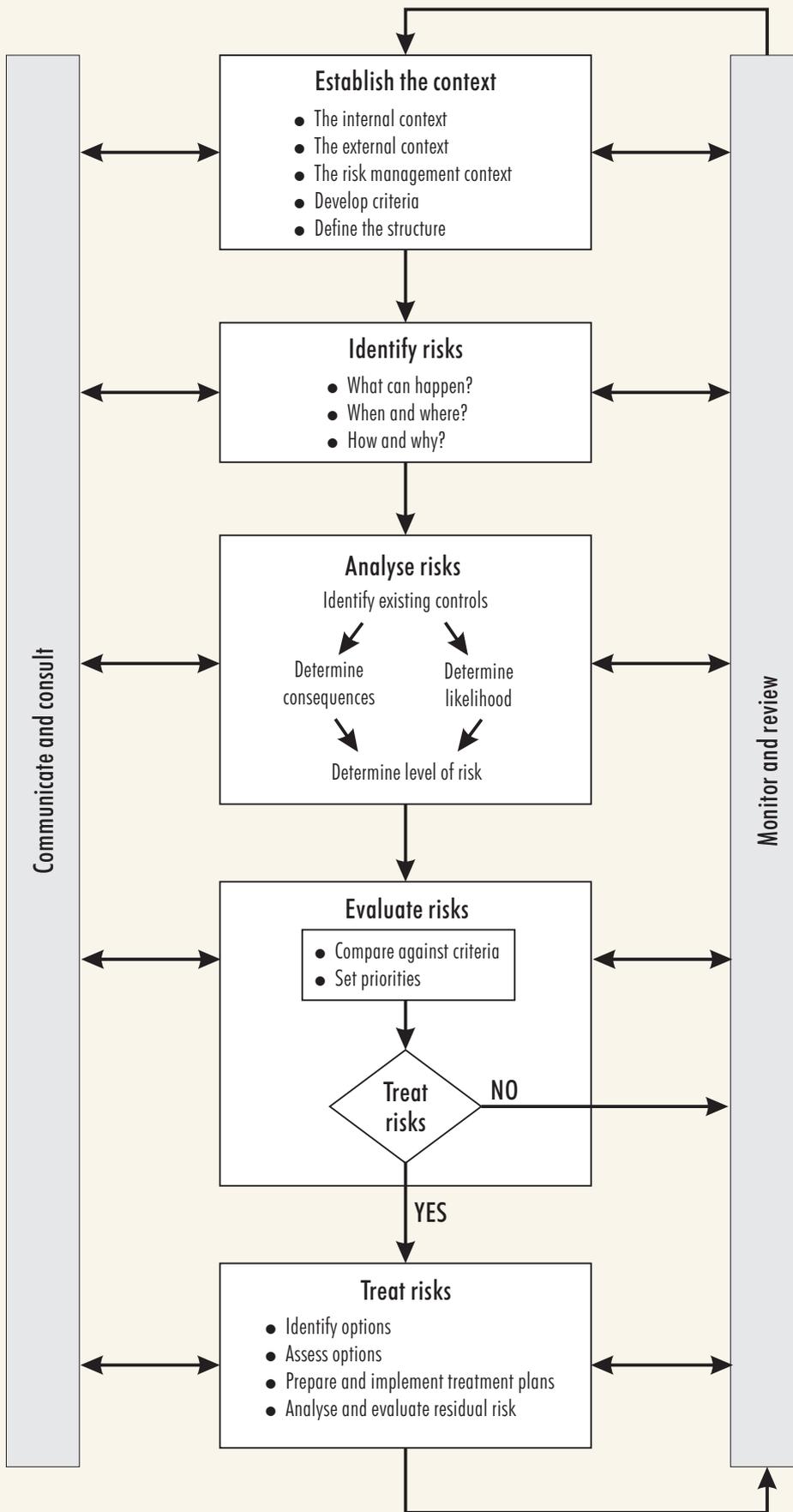
Attachment IA presents a qualitative assessment of risks associated with the construction and operation of the Project. The assessment evaluates the risk of the Project impacting on the environment, members of the public and their property. Hazard treatment measures have been proposed, where required, to produce a 'low' level of risk in accordance with the risk acceptance criteria described in Section I1.2.4. Proposed treatment measures are identified in Section I3.2.3.

Given that the Project complies with the risk acceptance criteria and that no significant far field effects or effects on the bio-physical environment were noted, it is considered that the constraints noted in the *Newcastle and Kooragang Island Area Risk Assessment Study* (DoP, 1992) (Section I1.1) are not relevant to the CET.

I5 REFERENCES

- Department of Planning (DoP) (1992) *Newcastle and Kooragang Island Area Risk Assessment Study*.
- Department of Urban Affairs and Planning (DUAP) (1992a) *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6*.
- Department of Urban Affairs and Planning (DUAP) (1992b) *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No 4*.
- Department of Urban Affairs and Planning (DUAP) (1999) *Multi-Level Risk Assessment*. Revised Edition.
- Safe Production Solutions (2006) *Newcastle Coal Export Terminal Environmental Risk Assessment*.

FIGURES

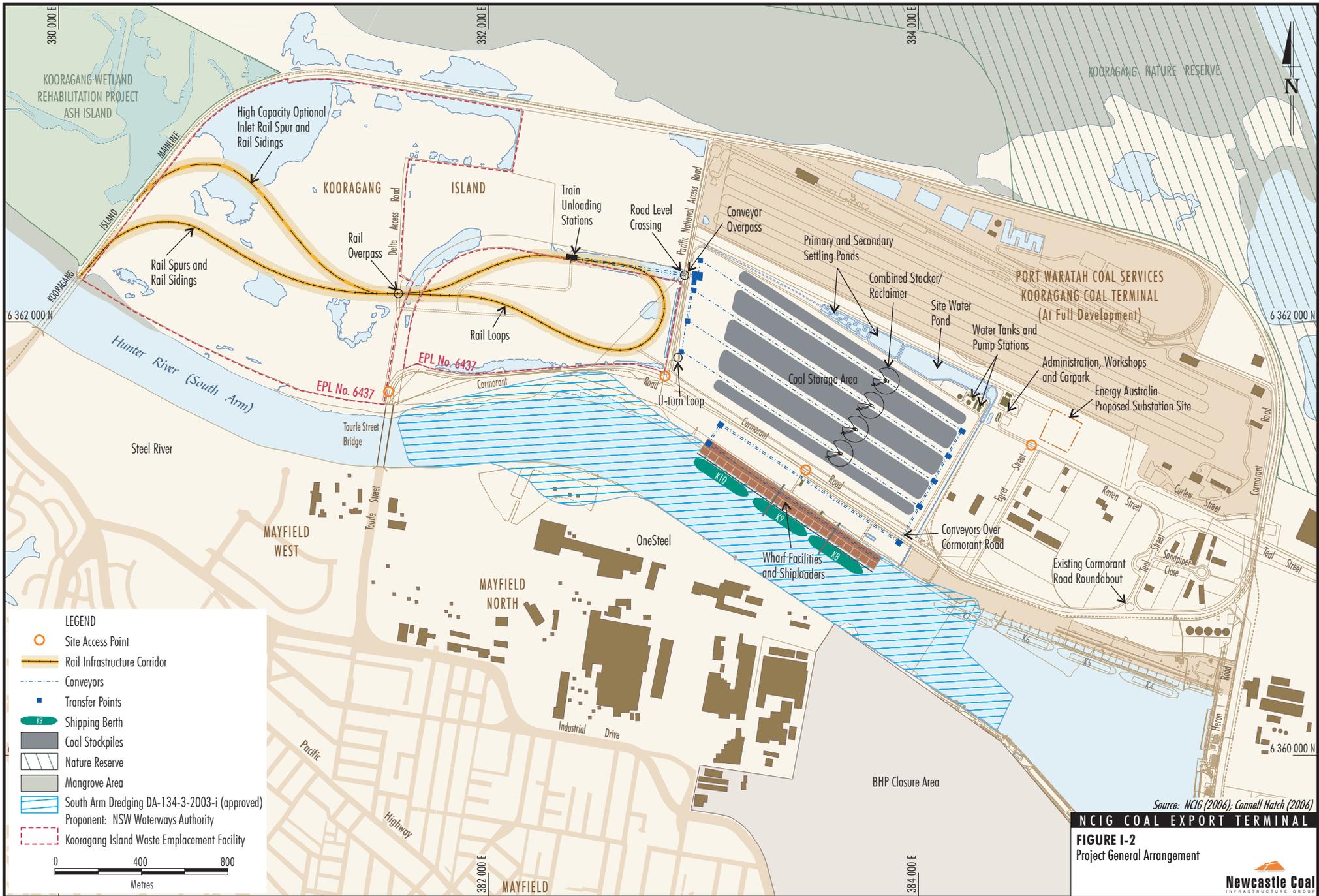


Source: AS/NZS 4360: 2004 Risk Management

NCIG COAL EXPORT TERMINAL

FIGURE I-1
Risk Management Process





ATTACHMENT IA
COAL EXPORT TERMINAL
HAZARD IDENTIFICATION TABLE

Coal Export Terminal Hazard Identification Table

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Construction	Toxic Release	Spill of diesel, oils, lubricants, solvents or construction materials leading to impacts on nearby watercourses.	<ul style="list-style-type: none"> Fuel, oils and lubricants stored in accordance with Australian Standards and NSW Legislation. Spill response equipment and training. Emergency Response Plan. Dangerous goods register (MSDS) (for each contractor). Site construction runoff control (drains and sumps). Silt curtain around berth construction area. 	C	5	22(Low)
	Fire	Vehicle fire, fuel storage fire, electrical fire (power-up) resulting in off-site impacts. Smoke causing distraction of road users and accident.	<ul style="list-style-type: none"> 24 hour manned fire station on Kooragang Island. Emergency Response Plan. Fire control equipment on site vehicles. Vehicle communications (GPS). Staff training (including drills) and induction. WorkCover requirements (green card). 'Hot work' permits. Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. Construction Management Plan. Road closure procedures in case of fire. 	D	4	21(Low)
	Explosion	Explosion involving fuel, gas cylinders or oxy acetylene causing off-site impacts.	<ul style="list-style-type: none"> Construction Management Plan. Fuel and gas cylinders stored in accordance with Australian Standards and NSW Legislation. Emergency Response Plan. 24 hour security monitoring and security fencing. 	E	5	25(Low)
	Theft	Theft of construction materials and equipment leading to an off-site accident causing injury.	<ul style="list-style-type: none"> 24 hour security monitoring and security fencing. Emergency Response Plan. Fuel and gas cylinders stored in accordance with Australian Standards and NSW Legislation. Vehicle immobilisation. Police would be informed ASAP. 	D	4	21(Low)

1

2

3

Refer to Table I1
Refer to Table I2
Refer to Table I3

Coal Export Terminal Risk Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Rail Spurs, Loops and Train Unloading Station	Toxic Release	Coal, diesel or hydrocarbon spill into adjacent waterway.	<ul style="list-style-type: none"> Staff training (including traffic) and induction. 24 hour security monitoring and security fencing. Emergency Response Plan. Spill response procedures. Drainage controls. 	D	5	24(Low)
	Fire	Train derailment causing fire leading to off-site impact (bushfire). Train accident leading to interaction with vehicles on Delta access road. Fire in loading station/conveyor leading to off-site impacts.	<ul style="list-style-type: none"> Staff training and induction. 24 hour security monitoring and security fencing. Emergency Response Plan. Spill response procedure. Drainage controls. Rail contractor licensing. Train speed controller. Adequate design of Delta access road crossing. 	E	4	23(Low)
	Explosion					
	Theft	Theft of train leading to off-site impacts.	<ul style="list-style-type: none"> 24 hour security monitoring and security fencing. Emergency Response Plan. Rail contractor licensing; rail operators (Pacific National and Queensland Rail) maintain appropriate security. Train derailleurs installed at junction to main line. 	E	4	23(Low)
Coal Stockpiles and Administration area	Toxic Release	Unplanned discharge from water management system, failure of water management component or rupture of fuel tank (diesel and petrol) leading to impacts on adjacent waterway.	<ul style="list-style-type: none"> Appropriate design and operation of water management system – designed as a zero discharge site. Site Water Management Plan. Monitoring and control of waters. Spill response procedure. Staff training and induction. Fuel, oils and lubricants stored in accordance with Australian Standards and NSW Legislation. 	E	5	25(Low)

¹ Refer to Table 11
² Refer to Table 12
³ Refer to Table 13

Coal Export Terminal Risk Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
	Fire/ Explosion	Spontaneous combustion event leading to off-site impacts.	<ul style="list-style-type: none"> • Low potential due to known coal type (based on typical Hunter Valley coal). • Appropriate stockpile management – Spontaneous Combustion Management Plan. • Availability of dozer for rapid stockpile management. • Emergency Response Plan. • Staff training and induction. • 24 hour manned fire station on Kooragang Island. 	D	4	21(Low)
Shiploaders and Wharf Facilities	Toxic Release	<p>Coal, diesel, ballast water spillage, transformer and gearbox oil or garbage into river leading to impacts on adjacent waterway.</p> <p>Discharge from water control structures leading to impacts on adjacent waterway.</p> <p>Vehicle accident leading to oil/fuel leading to impacts on adjacent waterway.</p>	<ul style="list-style-type: none"> • Spill response. • Staff training (including traffic) and induction. • AQIS (Aust Quarantine Inspection Service) permitting requirements (ballast water). • Site Water Management Plan. • Pumping of sumps back to water management system. • Dribble conveyor on shiploader boom. • Controlled washdown procedures. • Licensed garbage contractor to collect garbage from ship. • Consideration of 'dry type' transformers. • Wharf curbing and access controls review prior to operations. 	D	4	21(Low)
	Fire/ Explosion	Friction from conveyor belts or other infrastructure causing fire with off-site impacts.	<ul style="list-style-type: none"> • Design of conveyor system to consider potential for fire. • 'Hot work' permits. • Staff training and induction. • Road closure procedures in case of fire. • Emergency Response Plan. • 24 hour manned fire station on Kooragang Island. 	D	4	21(Low)

1 Refer to Table 11
 2 Refer to Table 12
 3 Refer to Table 13