23 HAZARD AND RISK

23.1 INTRODUCTION

This chapter describes the hazards and risks that are associated with the construction, operation and decommissioning of the Wandoan Coal Project (the Project).

The focus of this chapter is the identification of hazards affecting natural environmental values and human health and safety, and the assessment of the risks arising from those hazards to identify those that might have the potential to adversely affect the Project, its stakeholders, the environment and the local community.

It is not the objective of this chapter to consider in any detail the risks to construction or mine workers arising from hazards that are largely inherent in projects of this sort and that are to be managed under the requirements of relevant workplace health and safety legislation, or to consider issues giving rise to nuisance issues such as noise and dust impacts relating to the amenity of surrounding land users. These matters are dealt with in specific sections of this EIS listed in Section 23.2.

The assessment considers the risks arising from the activities to be undertaken during construction, operation and decommissioning, focussing on the hazardous materials used, transported or stored during the life of the Project, and the potential for adverse effects on any members of the community and adjoining or nearby property-owners. The assessment does not consider project, business, legal or similar risk to which the Project and the Wandoan Joint Venture (WJV) might be exposed directly as a result of undertaking the Project.

Impacts on aspects of the natural environment resulting from the construction and operation of the Project are dealt with in the sections specific to those aspects, in particular Chapter 17 Ecology.

23.2 METHODOLOGY OF ASSESSMENT

The methodology used for this Chapter generally follows the Australian Standard AS/NZS 4360:2004 — Risk Management. This includes:

- setting the context for the assessment
- identifying hazards
- assessing risks, including a preliminary hazard analysis (PHA)
- deciding how to treat unacceptable risks.

The context for the risk assessment is set largely by the Terms of Reference for this Environmental Impact Statement (EIS), together with the controlling legislation and the WJV standards and practices relating to issues such as public safety and environmental protection.

The WJV has undertaken a project risk assessment and will continue to update it regularly as part of the Project planning process. This assessment draws on the relevant findings of that assessment in identifying hazards and assessing the resulting risks.

The objective of this risk assessment is to:

- qualitatively assess the risks posed to the human, social and biophysical environment in the locality by all activities associated with the Project
- determine whether any significant risk remains after the Project design factors (including all appropriate risk mitigation measures) are considered
- provide the relevant government decision-makers with sufficient information regarding the risks involved with this Project to enable them to assess this Project as part of the approvals process.

This risk assessment considers the risks arising from sudden and unexpected events such as accidents and the results of equipment failure, operator error and the results of external events. The assessment does not generally consider risks that are unrelated to a single event. These longer term issues (which typically consider matters such as long-term climate change, the amenity of neighbours during normal operation or any potential for chronic health issues) are generally treated in other chapters of the EIS, including Chapter 14 GHG and Climate Change, and Chapter 24 Health and Safety. In particular, the assessment does not address issues that are the direct and expected result of normal activities undertaken as part of the Project, as described in this supporting EIS, and that are undertaken in accordance with relevant permits and approvals.

The results of this assessment should be read in conjunction with other Chapters of the EIS including:

- Chapter 11 Water Supply and Management
- Chapter 12 Transportation
- Chapter 13 Air quality
- Chapter 14 Greenhouse Gases and Climate Change
- Chapter 15 Noise
- Chapter 16 Vibration
- Chapter 18 Waste management
- Chapter 24 Health and Safety.

23.2.1 LEGISLATIVE REQUIREMENTS

The principal legislative requirements relevant to hazard identification and risk assessment and applicable to the Project relate to:

- workplace health and safety legislation to protect the construction and mine workforce and members of the public who might be affected
- transport infrastructure legislation that governs the use of public roads
- dangerous goods legislation that ensures that dangerous goods are handled, stored and used safely.

Environmental protection legislation will apply to all activities that could potentially cause environmental harm.

Relevant legislation is:

- *Coal Mining Safety and Health Act 1999*
- *Workplace Health and Safety Act 1995*

- *Explosives Act 1999*
- *Dangerous Goods Safety Management Act 2001*
- *Transport Infrastructure Act 1994*
- Transport Infrastructure (State-controlled Roads) Regulation 2006
- *Environmental Protection Act 1994*
- *Petroleum and Gas (Production and Safety) Act 2004.*

Relevant guidelines under these acts have also been considered.

The health and safety of persons potentially affected by the mining operation (whether on or off the mining leases) is regulated under the *Coal Mining Safety and Health Act 1999* (CMSHA). The health and safety of workers building other parts of the Project may be regulated under the *Workplace Health and Safety Act 1995*, but construction and operation may also be subject to the CMSHA where the work is on land contiguous with the mining lease (CMSHA, s. 9).

The *Explosives Act 1999* (Explosives Act) and associated regulations establish the requirements for the safe handling, storage, transport and manufacture of explosives. The Australian Standard AS 2187: Explosives — Storage, Transport and Use is called up by the Coal Mining Safety and Health Regulations 2001.

The *Dangerous Goods Safety Management Act 2001* (DGSMA) does not apply to the construction and operation of the mine, which is explicitly excluded from the scope of the DGSMA by section 3 of that Act because it is a coal mine to which the CMSHA applies. The DGSMA is relevant to all other parts of the Project that are not contiguous with the mining lease, and to certain other parts of the Project despite them being contiguous with the mining lease if under section 10(2) of the CMSHA they involve activities that are declared to be non-'on-site activities'.

Because the mining operations and the MLA are not subject to the DGSMA, they are not required to be declared or registered as Dangerous Goods Locations, Large Dangerous Goods Locations, or Major Hazard Facilities under that Act, and the requirements for the operation of such facilities do not apply.

The *Transport Infrastructure Act 1994* (TI Act) provides for and encourages effective integrated planning and efficient transport infrastructure management. The TI Act provides for, amongst other things, the planning and management of road, rail, and air transport infrastructure.

The *Environmental Protection Act 1994* regulates the potential for environmental harm from accidents such as accidental discharges of fuels, oils, and contaminated water that might affect sensitive areas or result in land contamination.

The objectives of the *Petroleum and Gas (Production and Safety) Act 2004* include the regulation and promotion of the safety of persons in relation to operating plant (which would include the proposed gas pipeline and any activity using gas at 50 GJ/h or more). The gas pipeline and power station will both be subject to this Act.

23.2.2 HAZARD IDENTIFICATION AND ASSESSMENT

The hazard identification has covered the matters raised in the Terms of Reference, together with the results of a systematic process to identify all credible hazards for the Project, including the overall Project risk assessment undertaken and regularly reviewed by

the WJV. This has involved identifying all activities undertaken as part of the mining activity, rail spur and proposed 80 MW power station operation, proposed upgrade of the Wandoan water and wastewater treatment plants, the materials associated with each activity, and the hazard that might arise from these activities and materials within each of a series of classes of hazardous incidents.

The hazards considered in this assessment fall generally into the following categories:

- vehicles and moving equipment (physical hazards) including travel-related risks such as fatigue
- heights, depths and confined spaces
- structures and landforms or stockpiles of materials
- water storages
- storage and use of dangerous goods, including:
  - explosive materials
  - flammable and combustible materials
  - toxic materials
  - corrosive materials
  - biologically hazardous materials (e.g. wastewater treatment plant sludges)
  - radioactive materials.
- sources of extreme heat (or cold) and pressure
- high voltage
- wildlife (e.g. snakes).

These hazards may result in risks to, or impacts on, either human health and safety or the environment.

The risks that might arise from these hazards as a result of the activities associated with the Project can be classified as:

- physical injury
- suffocation/drowning/asphyxiation
- burns
- poisoning
- disease
- electrocution or shock
- environmental damage (habitat, ecosystems, populations or individuals)
- damage to property.

23.3 EXISTING ENVIRONMENT

The existing land uses on the site and the surrounding area are mainly grazing and cropping. The majority of the site has been cleared in the past for agricultural purposes. The township of Wandoan adjoins the Mining Lease Application (MLA) areas to the east. Individual residences and communities in the region are typically separated by significant distances.

The existing risk environment is therefore expected to be characterised by exposure to risks associated with agricultural and outdoor activities, and accidents related to long distance travel. Ecological assessments of the site have indicated that there is a significant existing risk from wildlife, in particular snakes (refer to Chapter 17 Ecology).

23.3.1 NATURAL DISASTERS

Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03) requires that the risk of bushfire, flood and landslip be considered.

Council mapping shows that the MLA areas is in an area of low bushfire risk (refer to Chapter 7 Climate). Small patches of land to the west and portions of land to the east of the Project area are classified as being 'medium bushfire hazard' due to shrub and tree cover. Overall, the existing risk to the MLAs and adjoining areas as a result of fire is expected to be low.

There is anecdotal evidence as well as records of flood events in the region in recent times.

The topographical relief across the MLAs and adjoining areas is generally relatively low, and the risk of landslides is therefore minimal (refer to Chapter 9 Geology, Mineral Resources and Soils).

23.4 DESCRIPTION OF PROPOSED DEVELOPMENT

23.4.1 HAZARDS ASSOCIATED WITH THE DEVELOPMENT

Based on the general categories of hazards considered in Section 23.2.2, the following credible (that is, realistic) sources of hazard and risk have been identified:

Early works (off-lease)

- transport of equipment and materials to sites off the MLA areas
- upgrade of existing infrastructure i.e. the potable water treatment plant and the wastewater treatment plant at Wandoan.

Construction phase

- transport of personnel, equipment and materials to site (including air travel)
- construction of infrastructure
- clearing vegetation, stripping and removal of soil
- transport, storage and use of dangerous goods on-site
- equipment maintenance.

Operational phase:

- transport of mine personnel, equipment and materials to site (including air travel)
- dangerous goods storage on-site
- equipment maintenance
- open-cut mining operations, including blasting
- excavation and management of voids
- coal handling, stockpiling and washing
- overburden management
- water management

- waste disposal
- power generation
- transport of coal and waste off-site.

Decommissioning phase:

Once mining operations have exhausted the targeted coal reserve, the mine and associated infrastructure will undergo a remediation program and will be decommissioned. Some of these rehabilitation activities will occur during the operating life of the mine where a section of the reserve has been mined out and post-mining activities can be commenced.

Activities undertaken during this phase will include:

- making final voids and other remaining landforms and agreed structures safe
- reshaping remaining spoil dumps to achieve the final agreed landform and vegetating those areas
- managing the site's water balance and any discharges of water from the site
- demolishing and removing mine infrastructure from the site, including conveyors, coal handling and preparation plant equipment and structures, coal loadout systems, rail spur, the power station and gas supply pipeline, and potable water and waste water pipelines to the Wandoan township plants.

23.4.2 HAZARDOUS MATERIALS STORAGE AND USE

Hazardous materials and dangerous goods are a source of risk for most projects, contributing to risks to both human health and safety and the environment through characteristics such as flammability, explosive or corrosive potential, toxicity or radioactivity.

Types of dangerous goods

Classes of materials that might give rise to, or be involved in hazardous incidents and that might be present during the various phases of the Project are:

- fuels (petrol, diesel, LPG, natural gas)
- lubricants
- other construction and maintenance-related materials (e.g. industrial gases, adhesives, paints and solvents)
- explosives and their constituents (ammonium nitrate, fuel oil and emulsion)
- coal
- tailings
- other wastes (such as lubricants, wastewater).

Only those materials with an allocated UN dangerous goods number fall within the formal definition of dangerous goods according to the DGSMA and Australian Code for the Transport of Dangerous Goods. Refer to the inventory of dangerous goods listed in Table 23-1.

Dangerous goods inventory

The full range of dangerous goods that may be handled, stored and used during construction and operation of the Project can not be determined in detail at this stage. However, an indicative list of dangerous goods that might be used at some time during the

Project, together with maximum likely inventories and storage locations for each, has been developed, is shown in Table 23-1. The list is based on the detailed dangerous goods inventory of similar mines operated by Xstrata. These materials have been subjected to a preliminary hazard analysis (PHA) based on a broad screening process.

Without specific materials being identified, it is not possible to list details such as the dangerous goods classifications, packaging groups or UN numbers of all dangerous goods that might be involved, but examples of dangerous goods stored and used at similar mines are given where possible.

Table 23-1 also shows relevant threshold quantities for each specific dangerous good or relevant class of dangerous goods under the DGSMA that would apply if not exempted by the action of section 3 of that Act. While these threshold values do not have any statutory effect, they are provided in order to indicate the relative significance of the types and quantities of materials likely to be stored and used during construction and operation of the Project. In addition, Table 23-1 shows selected threshold limits and distances applicable to the risk screening process required under the "NSW State Environment Protection Policy (SEPP) 33 Guideline for the assessment of potentially hazardous and offensive developments" (DUAP 1994), which is recommended as an assessment method in a number of jurisdictions in Australia (including many Queensland projects) and has been adopted as a suitable tool for this Project.

If the DGSMA applied to the Project, it would require appropriate emergency and safety management plans. The DGSMA does not apply to this Project, but an Emergency Management Plan and a Safety Management Plan will be prepared under the CMSHA and the Terms of Reference requirements.

With the exception of Class 5.1 materials (ammonium nitrate and emulsion), the quantities of material and separation distances involved are below the SEPP screening threshold, indicating that further quantitative assessment for public risk off site is not necessary.

The Class 5.1 materials that will be stored as part of the Project are the constituents of bulk explosives, and although they are not themselves classed as explosives until mixed or sensitized, under some specific and unlikely circumstances they may cause explosions. The estimated quantity of these Class 5.1 dangerous goods that will be stored on the site exceeds the SEPP 33 threshold. Under SEPP 33, a Preliminary Hazard Assessment would therefore be required. The separation distance of the storage area from protected places and the method of storage and handling of these materials will be in accordance with the relevant standards, and will reduce the likelihood and consequences of any explosion to very low levels. The "Manual for the classification and prioritization of risks due to major accidents in process and related industries" (IAEA 1996) recommended by SEPP 33 for preliminary hazard assessment does not address quantities in excess of 1,000 tonnes, but for quantities up to 1,000 tonnes the maximum effect distance is only 200 m. A separation distance of 1.7 km between the storage facility and the nearest MLA boundary is considered adequate to prevent any serious off-site consequences in the unlikely event of any explosion.

The preliminary screening of all dangerous goods and the preliminary hazard analysis of Class 5.1 goods in particular, demonstrates that no significant off-site impacts are likely to occur as a result of the expected dangerous goods inventory for the Project.

Table 23-1: Dangerous Goods Inventory

Dangerous goods class	Packaging group	UN number	Dangerous goods potentially stored (UN description in brackets)	Storage location	Maximum likely quantity in storage (aggregate)	DGSMA threshold quantities (DGL/ LDGL)[1]	Distance to nearest boundary/ protected works	SEPP 33 Screening threshold[2]
1.1B		e.g. 0029 or 0030	Detonators, primers, etc	Magazine	100 kg (net explosive quantity)	n/a	1.7 km to MLA boundary	Five tonnes at 255 m
1.1D		e.g. 0042 or 0065	Boosters, primers, detonating cord, etc	Magazine	Included above	n/a	1.7 km to MLA boundary	Five tonnes at 255 m
			Packaged emulsion explosives	Magazine	<5 tonnes	n/a	1.7 km to MLA boundary	Five tonnes at 255 m
1.1D 1.5D		e.g. 0082 or 0331	Bulk Explosive ANFO (Explosive, Blasting, Type B; Or Explosive, Blasting, Type B (Agent, Blasting, Type B))	Mixed on site as required – no storage	n/a	n/a		30 tonnes at 500 m
2.1	n/a	1971	Natural Gas (Methane, Compressed or Natural Gas, compressed with High Methane Content)	Pipeline (no storage).	n/a	500 L/ 5,000 L		1000 m^3 at STP at 50 m.
2.1	n/a	1075	LPG	Above ground tank at MIA	1,000	500 L/ 5,000 L	3 km to MLA boundary	16 m^3 (above ground)
2.1	n/a	e.g. 1001	Other than LPG e.g. Acetylene (Acetylene, Dissolved)	MIA workshop or store	Not more than 1 m^3	500 L/ 5,000 L	3 km to MLA boundary	1 m^3 (liquefied) 5 m^3 (pressurised)
3	PGII	1203	Petrol (Motor Spirit Or Gasoline Or Petrol)	n/a	n/a	250 L/ 2500 L		2 m^3, up to 2000 m^3 at 50 m
3	PG II or III	e.g. 1263	Solvents, paint thinners, etc, (e.g. Paint (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or paint related	Workshop/flammables store	Not more than 2,000 L	PG II: 250 L/ 2,500 L PG III: 1,000 L/ 10,000 L	3 km to MLA boundary	2000 L

Dangerous goods class	Packaging group	UN number	Dangerous goods potentially stored (UN description in brackets)	Storage location	Maximum likely quantity in storage (aggregate)	DGSMA threshold quantities (DGL/ LDGL)[1]	Distance to nearest boundary/ protected works	SEPP 33 Screening threshold[2]
			material (including paint thinning and reducing compound))					
3	PGIII	1202	C1 Combustible liquids – Diesel (Gas Oil Or Diesel Fuel or Heating Oil, Light (flashpoint not more than 60 °C)	Tank farm-above ground tanks, fully self bunded.	2,000 kL	10,000 L/ 100,000 L	3 km to MLA boundary	No threshold unless stored with Class 3.
3	PGIII	e.g. 1268	C2 Combustible liquids- lubricants, high flash point solvents (e.g. Petroleum Distillates, N.O.S. or Petroleum Products, N.O.S.)	Workshop or oil store	120 kL	n/a	3 km to MLA boundary	No threshold unless stored with Class 3 flammable materials.
3	PGIII	e.g. 1268	C2 Combustible liquids- waste oil (e.g. Petroleum Distillates, N.O.S. or Petroleum Products, N.O.S.)	Workshop	Not more than 50 kL	n/a	3 km to MLA boundary	No threshold unless stored with Class 3 flammable materials.
5.1	PGII	3375	Emulsion (Oxidising substances- Ammonium Nitrate Emulsion, suspension or gel, intermediate for blasting explosives, liquid)	Contractor's explosive storage area	1,500 tonnes	250 kg/ 2,500 kg	1.7 km to MLA boundary	5 tonnes (25 tonnes where stored on land zoned rural and used for rural industry, at least 50 m from boundary)
5.1	PGIII	1942	Ammonium nitrate (Ammonium Nitrate with not more than 0.2% total combustible material, including any	Contractor's explosive storage area	7,500 tonnes	250 kg/ 2,500 kg	1.7 km to MLA boundary	5 tonnes (25 tonnes where stored on land zoned rural and used for rural

Dangerous goods class	Packaging group	UN number	Dangerous goods potentially stored (UN description in brackets)	Storage location	Maximum likely quantity in storage (aggregate)	DGSMA threshold quantities (DGL/ LDGL)[1]	Distance to nearest boundary/ protected works	SEPP 33 Screening threshold[2]
			organic substance calculated as carbon, to the exclusion of any other added Substance)					industry, at least 50 m from boundary)
6			Toxic substances (e.g. pesticides, herbicides etc)	Workshop, amenities buildings	Minor quantities of miscellaneous materials possible Not more than 500 L	PG I: 50 L/500 L PG II 250 L/ 2,500 L PG III 1,000 L/ 10,000 L	3 km to MLA boundary	0.5 m^3 (6.1(a)) or 2.5 m^3 (6.1(b))
7			Radioactive substances	Various	n/a	n/a		Compliance with codes
8	- PGII	2794, 2796	Batteries and acid (Batteries, Wet, Filled With Acid, electric storage; Sulphuric Acid with not more than 51% acid or Battery Fluid, Acid)	Workshop, store	Spare batteries and battery acid. Minor quantities of other corrosives possible. Total not exceeding screening criteria.	PG II 250 L/ 2,500 L	3 km to MLA boundary	Batteries-no PG (PGIII- 50 tonnes). Battery acid PGII- 25 tonnes

Notes: 1 – provided for information only: the mine is not subject to the DGSMA.

2 – commonly referenced planning guideline under NSW legislation, provided for information only

Fuel

Fuel for mining equipment will be transported to the site by road and stored in a tank farm. It is expected that only diesel fuel would be stored on-site in significant quantities. The tank farm would be located in the Mine Infrastructure Area (MIA) and have a capacity of approximately 2,000,000 L. The fuel storage facilities will be designed in accordance with AS 1940-2004: The storage and handling of flammable and combustible liquids. In particular, the tank farm will be fully bunded to minimise the risk of leaks and spills. The tank farm will be approximately 3 km from the nearest MLA boundary. It is also proposed to locate up to three 92,000 L self-bunded relocatable refuelling stations for dispensing diesel at strategic locations, generally near coal ROM dump stations around the site, to minimise the distance haul trucks need to travel to refuel.

The total diesel fuel consumption during operation is estimated to be a maximum of approximately 50 ML in any one year, or an average of 140,000 L/d. This would require deliveries of up to three B-Double tankers per day.

Diesel will also be stored in small portable tanks at various locations during construction.

Gas from the Peat-Scotia lateral gas line to the optional on-site 30 MW or 80 MW power station is proposed to be supplied through a 25 km long, 600 mm diameter pipeline connected to the existing Peat-Scotia lateral pipeline. Gas supply pressure will be 10 MPa, giving a total pipeline volume of approximately 14,000 m^3 of gas at standard temperature and pressure. This section of pipeline would contain approximately 100 tonnes of conventional gas. The natural gas consumption to generate 80 MW will be approximately 300 tonnes/day. The construction and operation of the pipeline would be subject to the requirements of the *Petroleum and Gas (Production and Safety) Act 2004*.

Lubricants

Significant quantities of lubricants will be used during operation of the Project. It is proposed that facilities will be provided to store up to 120,000 L of lubricating oil and waste oil in bulk tanks. These tanks will all be located within a secondary containment bund. Some lubricants and similar materials such as engine coolant and detergents will be stored in semi-bulk tanks with a capacity of 1,000 L.

Only lubricants stored together with Class 3 flammable liquids are included in the dangerous goods screening process, as on their own they do not constitute dangerous goods. However, they pose a potential hazard to the biophysical environment if they spill or leak and are not properly managed.

Explosives

The mining operation will use bulk explosives, which consist principally of ammonium nitrate (AN), fuel oil and emulsion. AN and emulsion are classified as oxidising agents rather than explosives, although under certain circumstances they can explode. Bulk explosive will only be produced during the loading of blast-holes, therefore it is not considered that the Project includes explosive manufacturing facilities. Accordingly, there will be no storage of bulk explosives on the site. However, AN and emulsion will be stored on-site in the proposed explosives storage area shown in Figure 6-43-V1.3. Small quantities of packaged explosives for use in wet hole blasting applications may be required, and if necessary will be stored in the proposed explosives storage area. The quantities used are expected to be a maximum of 50,000 tonnes of AN, and 9,000 tonnes of emulsion per annum. The proposed storage is 7,500 tonnes of AN and 1,400 tonnes of emulsion.

Initiating explosives will be stored in one or more magazines on site. The proposed location of the magazine(s) is also in the proposed explosives storage area shown in Figure 6-43-V1.3, separated from the AN and emulsion storage by at least the minimum distance required and at least 1.7 km from the nearest MLA boundary, to meet the requirements of the Explosives Act and Regulations, AS/NZS 2187.1-1998: *Explosives-Storage, transport and use Part 1 (Storage)* and relevant codes. The transport of initiating explosives will be strictly in accordance with the Explosives Act and Regulations, and the relevant standards and codes.

Other dangerous goods

A wide range of other dangerous goods might be handled, stored and used at the mine during construction and operation. These will include materials such as welding gases, cleaning solvents, radioactive sources used in instruments and testing equipment, and corrosive items and materials such as batteries and battery acid.

Because the quantities of these miscellaneous materials will be relatively small in almost all cases, and all will be stored in accordance with relevant standards, including secondary containment where appropriate, no credible and significant risk is likely to arise for any of them. In addition to quantities being mostly quite small, separation distances will generally be quite large. Quantities are unlikely to be large enough to give rise to any serious environmental harm. Operation of the gas pipeline is not expected to involve any significant quantities of dangerous goods other than the gas itself.

Coal

Based on recent monitoring of the sample pit coal stockpiles, the coal is unlikely to exhibit a tendency to spontaneous combustion and stockpiles are therefore not likely to create a fire risk if appropriately designed and managed.

Wastes

Wastewater from the accommodation and MIA facilities will be treated at the Wandoan Town wastewater treatment plant, which will be upgraded. Potential re-use of 'greywater' from the MIA and accommodation facilities will be investigated during the detailed design phase of the Project. Mine and process water will be collected on site for reuse in the mining operation, with the objective of the site maintaining a no-planned-discharge status. This aspect is discussed in more detail in Chapter 11 Water Supply and Management.

Other materials used in the operation

Other materials that will be used on the site are not listed as dangerous goods and accordingly the potential to create a hazard is generally very small, and no credible (realistic) risks arise. Examples include materials used in washing the coal such as magnetite for separation of the coal and waste, and the flocculants used to settle fine material.

23.5 POTENTIAL IMPACTS

Following an assessment of the hazards outlined above, the following risks to the community and occupants of surrounding areas have been identified and will need to be appropriately managed. Risks to Project personnel are normally considered to be adequately managed by the relevant legislation and codes of practice.

In the following sections detailing possible impacts, the following broad descriptions of likelihood or frequency have been used:

- almost certain — occurring several times each year
- likely — typically occurring each year
- possible — occurring once in 10 years
- unlikely — occurring once in 100 years
- rare — likely to occur less than once in 100 years.

In addition to this assessment, cumulative risks to the surrounding land uses are considered in Chapter 26 Cumulative Impacts. Impacts on human health are also addressed in Chapter 24 Health and Safety.

The following sections detail activities and situations relevant to each phase of the Project that could involve significant hazards (that is, hazards that are considered realistic and non-trivial and that could therefore give rise to real risks).

23.5.1 CONSTRUCTION PHASE

Relevant construction phase activities and incidents that could involve hazards are:

- unauthorised access to the mine site during construction — falls, drowning, engulfment, contact with equipment or vehicles and proximity to blasting, resulting in injury/death. Considered to be unlikely or rare
- spills of dangerous goods, typically fuel from temporary storage tanks or during transport — loss of containment typically resulting in environmental impacts: soil contamination, pollution of surface waters, impact on water quality and beneficial use, impacts on aquatic ecosystems. While minor incidents are considered possible, significant impacts to the environment or the public are expected to be unlikely
- increased movements of heavy vehicles, deliveries, and traffic from construction work teams — increased risk of accidents and injury/death. Accidents involving injury are considered possible during construction; fatalities are considered unlikely
- encounter with venomous snakes and insects during clearing and construction works — potential to be bitten, resulting in illness or death. Incidents are considered possible, but fatalities are considered unlikely.

There will be an increased risk of traffic accidents as a result of increased movement of both heavy vehicles and the construction workforce on local roads that will need to be managed. The other risks detailed above are not expected to be significant or to need more than standard controls for proper management. No group outside the Project is expected to be particularly vulnerable to any increased level of risk from any source.

23.5.2 OPERATIONS

Relevant operations phase activities and incidents that could involve hazards are:

- spills of dangerous goods during transport, storage or use: fuel, explosives or other dangerous goods — risk of loss of containment typically resulting in environmental impacts: soil contamination, pollution of surface waters, impact on water quality and beneficial use, impacts on aquatic ecosystems. Events causing any serious impact are considered unlikely
- accident involving initiating explosives, bulk explosives or their components during transport, storage, mixing or loading — small risk of explosion. Incidents are expected to be unlikely or rare
- access to dangerous landforms, including dams, high walls, final voids, waste dumps and stockpiles by mine operators or unauthorised persons on the mine site — risk of falls, drowning, engulfment, resulting in injury/death. Incidents with serious outcomes expected to be unlikely for Project personnel, and rare for members of the public
- physical interaction with vehicles and moving equipment by mine operators or unauthorised persons on mine site — potential for serious injury/death without appropriate management. Incidents with serious outcomes expected to be unlikely for Project personnel, and rare for members of the public
- blasting — a risk of flyrock and air blast. Exposure of Project personnel during the life of the Project is considered likely, but exposure to dangerous levels is considered at most only possible, and to fatal levels unlikely
- misfires — a risk to mining personnel required to re-enter area of misfire. Misfires are considered likely to occur at some time during the life of the project
- loss of containment of potentially contaminated water from sources such as pits, tailings dams or stockpile runoff — environmental impacts: pollution of surface water, impact on water quality and beneficial use, impacts on aquatic ecosystems. The likelihood of impacts from loss of containment will be minimised by appropriate design of the secondary containment and water management systems. The water management plan does not include any off-site discharges under normal circumstances
- spontaneous combustion of coal or rejects highly unlikely — fire, smoke, with a low risk of fire spreading and causing property damage
- increased traffic on local roads from mine personnel — increased traffic is expected to increase the number of vehicle accidents and therefore the risk of injury/death. Serious accidents are considered possible, where not managed appropriately
- rupture of the gas pipeline — potential for a serious fire and/or explosion, possibility of injury/death. Failure is expected to be rare.

While some of the risks identified would have potentially significant consequences for the mine personnel concerned, the risks to the surrounding community and to the environment are expected to be limited to:

- increased traffic on local roads and the risk of accident and injury. Accidents (potentially involving injury) are considered possible during operation, but fatalities are considered unlikely

- a risk to the public from blasting in those pits that adjoin the MLA boundaries (for example, Frank Creek Pit) where these are close to publicly accessible areas including Wandoan township, individual residences and/or public roads, with potential for injury or damage to assets. Separation distances will be enforced to effectively eliminate any likelihood of this type of event, so injury and property damage are expected to be rare
- the possibility of unauthorised access to the mine site and potentially dangerous landforms and structures, and to injury from flyrock and airblast (as for mining personnel). This is considered unlikely.

Cumulative risks will be assessed in Chapter 26 Cumulative Impacts.

23.5.3 DECOMMISSIONING AND REHABILITATION

Decommissioning and post-decommissioning phase activities and incidents that could involve hazards are:

- unauthorised access to the mine site and dangerous structures and landforms such as high walls, voids, dams and spoil piles, during and after decommissioning — potentially causing falls, drowning, engulfment resulting in injury or death. Events are considered unlikely, and the risk of fatality is expected to be unlikely or rare
- loss of containment of contaminated water from final voids or tailings dams — potentially causing the following environmental impacts: pollution of surface water, impact on water quality and beneficial use, impacts on aquatic ecosystems. The likelihood of impacts from flooding will be minimised by appropriate design of the final landform and storages, and allowance for flood events. These are expected to make any loss of containment an unlikely or rare event.

The main risk remaining post-decommissioning is expected to result from access by individuals to any dangerous structures and landforms that will remain. No section of the local community is expected to be exposed to any significant risk — that is, the combination of the consequence of any adverse event and its expected frequency will not exceed generally acceptable community standards.

23.6 MITIGATION MEASURES AND STRATEGIES

23.6.1 CONSTRUCTION

The following mitigation measures will be implemented to limit the identified risks during construction:

- prevent unauthorised access to the mine site during construction by maintaining adequate security measures and ensuring through the public consultation process that the local population is aware of the risk that trespassing entails
- keep any works that can not be secured easily in a safe state with appropriate signage and/or guarding
- transport all dangerous goods during construction in accordance with the current Australian Code for the Transport of Dangerous Goods
- locate temporary fuel storage tanks away from watercourses and drainage paths, and provide secondary containment through self bunded tanks or with external bunding designed in accordance with AS1940-2004
- maintain appropriate procedures and equipment to manage leaks and spills of all dangerous goods used during construction

- develop awareness, an appropriate culture, and training programs for construction personnel. Monitor statistics to identify indications of inappropriate behaviour. Keep local communities informed of work in progress and provide awareness training for children especially regarding the danger of heavy vehicles
- educate work teams regarding the need to obey road rules and speed limits, including adapting driving to conditions such as wet weather and sunset. Include travel risks issues in site inductions and training programs
- provide workforce with awareness training regarding venomous snakes and biting insects, areas and times they are most likely to be encountered, how to react and provide first aid treatment. Provide work teams with appropriate first aid equipment to treat bites.

23.6.2 OPERATIONS

The following mitigation measures will be implemented to limit the identified risks during operation:

- transport all dangerous goods during operation in accordance with the current Australian Code for the Transport of Dangerous Goods
- locate the MIA, fuel farm, bulk lubricant storage area, dump station refuelling points and all other storages away from watercourses and drainage paths that might be contaminated in the event of a leak or spill
- design, construct and operate all storage for flammable and combustible liquids in accordance with relevant standards (e.g. AS 1940). For the dump station refuelling points, use modular units with self bunded tanks
- maintain emergency response procedures and equipment to manage leaks and spills of all dangerous goods used during operation
- ensure all transport, storage and use of explosives is in accordance with the Explosives Act, AS/NZS 2187.1-1998: Explosives-Storage, transport and use Part 1 (Storage) and the Australian Explosives Code requirements
- prevent unauthorised access to the site through appropriate security management
- develop and deliver relevant awareness and detailed training programs for all visitors to Project areas during operation, and implement systems to ensure that only appropriately trained visitors are able to access the site
- design blasting patterns and manage shots in accordance with relevant regulations, codes and best practice to minimise the risk of fly rock
- identify the safe extent of blasting for all pits close to MLA boundaries that will prevent risk of fly rock outside the MLAs, and enforce the limit for all blasting operations
- design all water management systems to handle the expected range of events without losing containment
- develop appropriate designs and operating procedures including emergency response and fire fighting plans for coal stockpiles to minimise the risk of spontaneous combustion

- develop awareness, an appropriate culture, and training programs for mining personnel. Monitor statistics to identify indications of inappropriate behaviour. Keep local communities informed of likely changes in traffic patterns. Provide awareness training for the community, and children especially, regarding the danger of heavy vehicles
- educate work teams regarding the need to obey road rules and speed limits, including adapting driving to conditions such as wet weather and sunset; include travel risk issues in site inductions and training programs
- enforce a limit on long travel times to and from work for all mining personnel through conditions of employment, to limit the risk of accidents being caused by fatigue and high speed
- minimise fatigue-related incidents caused by long-distance travel to site by providing on-site and off-site accommodation facilities as discussed in Chapter 6 Operations
- design, operate and maintain the gas pipeline in accordance with the relevant codes, provide warning markers along its length, and prevent unauthorised activity in its easement.

23.6.3 DECOMMISSIONING AND REHABILITATION

The following mitigation measures will be implemented to limit the identified risks once mining is complete and the site has been decommissioned:

- use suitable signage and barricades to provide adequate warning of hazards, or prevent access to areas of the site that can not be made safe following decommissioning
- make all remaining landforms safe in accordance with the Plan of Operations
- make all final voids safe once mining is complete in accordance with the Plan of Operations
- design and construct mine water management structures that, following decommissioning of the Project, can prevent the discharge of any water that does not meet relevant water quality guidelines or licence requirements to surface or groundwater systems.

23.7 RESIDUAL IMPACTS

It is considered that if the mitigation measures detailed above are followed, no residual risk will remain that exceeds generally accepted community standards.

23.8 EMERGENCY MANAGEMENT PLAN

For the Project, an Emergency Response and Action Plan (ERAP) that is consistent with the WJV's Crisis Management Plan will be developed in consultation with relevant stakeholders, in particular with each of the agencies of the Department of Emergency Services likely to be involved in any emergency: the Queensland Police Service, the Queensland Ambulance Service, the Queensland Fire and Rescue Service and the Rural Fire Service. The Dalby Regional Council (Council) will also be consulted. The local Counter Disaster Plan and State Planning Policy (SPP) 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide, will be considered in developing the ERAP, and Council will be advised of any implications for the plan that arise from the construction and operation of the Project. In addition, the local health service providers will be consulted to ensure that provision of emergency health care is included in the procedures. WJV will work with local health

service providers to ensure that appropriate resources are available in the local area to address the added demand that the Project is likely to generate. This aspect is discussed further in Chapter 21 Social.

The ERAP will address all relevant risks as identified in Section 23.5 and in the Risk Register that will be maintained and updated through the life of the Project.

The ERAP will be developed to include:

- Emergency Response Procedures
- Emergency Exercises and Drills Guidelines
- Site Incident Management Team Guidelines
- Emergency Assistance to the Community.

The ERAP will identify the primary roles and responsibilities and include provision for regular audit and review, in particular following any incident to confirm that the plan operated as intended or to identify deficiencies.

The Site Incident Management Team Guidelines (SIMT) will control Emergencies that have the potential to escalate to Crisis level and will be aligned to the Xstrata Coal Queensland Crisis Management Manual.

The Emergency Response Procedures will include:

- communication procedures (internal and external)
- duties in the event of an emergency for:
  - SSE/delegate of SSE
  - incident controller
  - persons discovering incident
  - first response controller
  - security gate attendant
  - occupational first aider
  - emergency response team
  - area supervisor/manager
  - mine worker
  - fire warden.

The risk posed by flooding will vary during the life of the Project as changes occur as part of the Project such as changes in landforms, catchment areas, storage areas, structures and creek diversions as required. However the likelihood of impacts from flooding will be minimised by appropriate design of the final landform and storages, and allowance for flood events. These are expected to make any loss of containment an unlikely or rare event (refer to Chapter 11 Water Supply and Management). Emergency response procedures will be developed and regularly reviewed throughout the Project in response to changes in the site hydrology, mining operations, assessed risk and available controls.

The risks of other natural disasters covered by SPP 1/03 are considered low for the Project, and the management of natural disasters will be adequately covered by the relevant ERAP procedures in collaboration with the emergency services.

Emergency plans to deal with spills of dangerous goods, including the provision of appropriate equipment and training for Project personnel, will be prepared prior to the commencement of each stage of the Project.

These plans and procedures will be reviewed regularly and practised in accordance with the ERAP previously discussed. These exercises would be expected to involve relevant agencies of the emergency services.

The ERAP will include communication arrangements with fire fighting and ambulance backup support from Wandoan, Taroom and Miles as required. Emergency response facilities will be constructed to address the risk of fire, as described below.

Emergency response facilities

A dedicated fire water ring main and hydrant system will be installed at the MIA. Fire water will be held in a raw water storage tank for delivery to the ring main, hydrants and hose reels by a dedicated electrically driven firewater pump set with diesel back up arranged in duty and standby mode. The fire fighting facilities will be approved by the local Queensland Rural Fire Brigade service. All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by certified personnel. All site personnel will be trained in basic fire fighting procedures with hand held extinguishers and selected fire response crews will be trained in more advanced fire control techniques.

The site will have a fire truck or suitably equipped water truck or trailer that can support fire response requirements. Site fire fighting capabilities also will be addressed in the Emergency Response Plan. Induction training will include fire response techniques.

Where appropriate, buildings will be fitted with approved and certified fire detection (smoke detectors) and sprinkler systems. First aid and fire fighting equipment (hand held extinguishers and fire hoses) will be installed at strategic points within each building. Fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.

First aid and emergency response points will be provided at strategic locations during both the construction and operational phases of the Project. An ambulance station will be located together with first aid and health facilities in the MIA with direct access to all parts of the mine and all MIA buildings and facilities.

Appropriately trained personnel will be present on-site throughout the life of the Project to provide first aid and response to on site emergencies. First aid response and provision will be included in the site induction training program that will be provided to all staff members. Outside assistance will be called upon where necessary, including local ambulance and fire services. Refer to the beginning of this section for details of the emergency plan and involvement of emergency services.

23.9 REFERENCES

AS 1940-2004: The Storage and handling of flammable and combustible liquids

AS/NZS 2187.1-1998: Explosives-Storage, transport and use Part 1 (Storage)

Department of Urban Affairs and Planning 1994, SEPP 33 guideline for the assessment of potentially hazardous and offensive developments.

International Atomic Energy Agency 1996, *Manual for the classification and prioritization of risks due to major accidents in process and related industries.*