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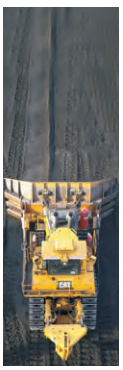
Part of the Yancoal Australia Group

Stratford Extension Project
Environmental Impact Statement





APPENDIX Q

PRELIMINARY HAZARD ANALYSIS

STRATFORD EXTENSION PROJECT

PRELIMINARY HAZARD ANALYSIS

PREPARED BY
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1 INTRODUCTION

The Stratford Mining Complex comprises the Stratford Coal Mine (SCM) and Bowens Road North Open Cut (BRNOC), two open cut mining operations located some 10 kilometres (km) south of Gloucester and approximately 100 km north of Newcastle, New South Wales (NSW) (Figure 1). The Stratford Mining Complex is owned and operated by Stratford Coal Pty Ltd (SCPL), a wholly owned subsidiary of Yancoal Australia Limited.

The SCM commenced operations in 1995 and is approved to produce up to approximately 2.1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The BRNOC has been in operation since 2003 and is approved to produce up to approximately 1 Mtpa of ROM coal. The proposed Stratford Extension Project (the Project) would involve the continuation and extension of open cut coal mining and processing activities at the Stratford Mining Complex. The Project would extend the life of the current open cut operations to 2024, and would facilitate a ROM coal production rate of up to 2.6 Mtpa. A description of the Project is provided in Section 2 in the Main Report of the Environmental Impact Statement (EIS).

SCPL is seeking approval for the Project from the NSW Minister for Planning and Infrastructure in accordance with Division 4.1, Part 4 of the NSW *Environmental Planning and Assessment Act, 1979*.

This Preliminary Hazard Analysis (PHA) has been conducted as part of the EIS to evaluate the potential hazards associated with the Project in accordance with the general principles of risk evaluation and assessment outlined in the then NSW Department of Planning (DoP) (now Department of Planning and Infrastructure [DP&I]) *Multi-Level Risk Assessment* (DoP, 2011a). This PHA addresses the requirements of *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* (SEPP 33) and has been assessed in general accordance with *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis* (DoP, 2011b).

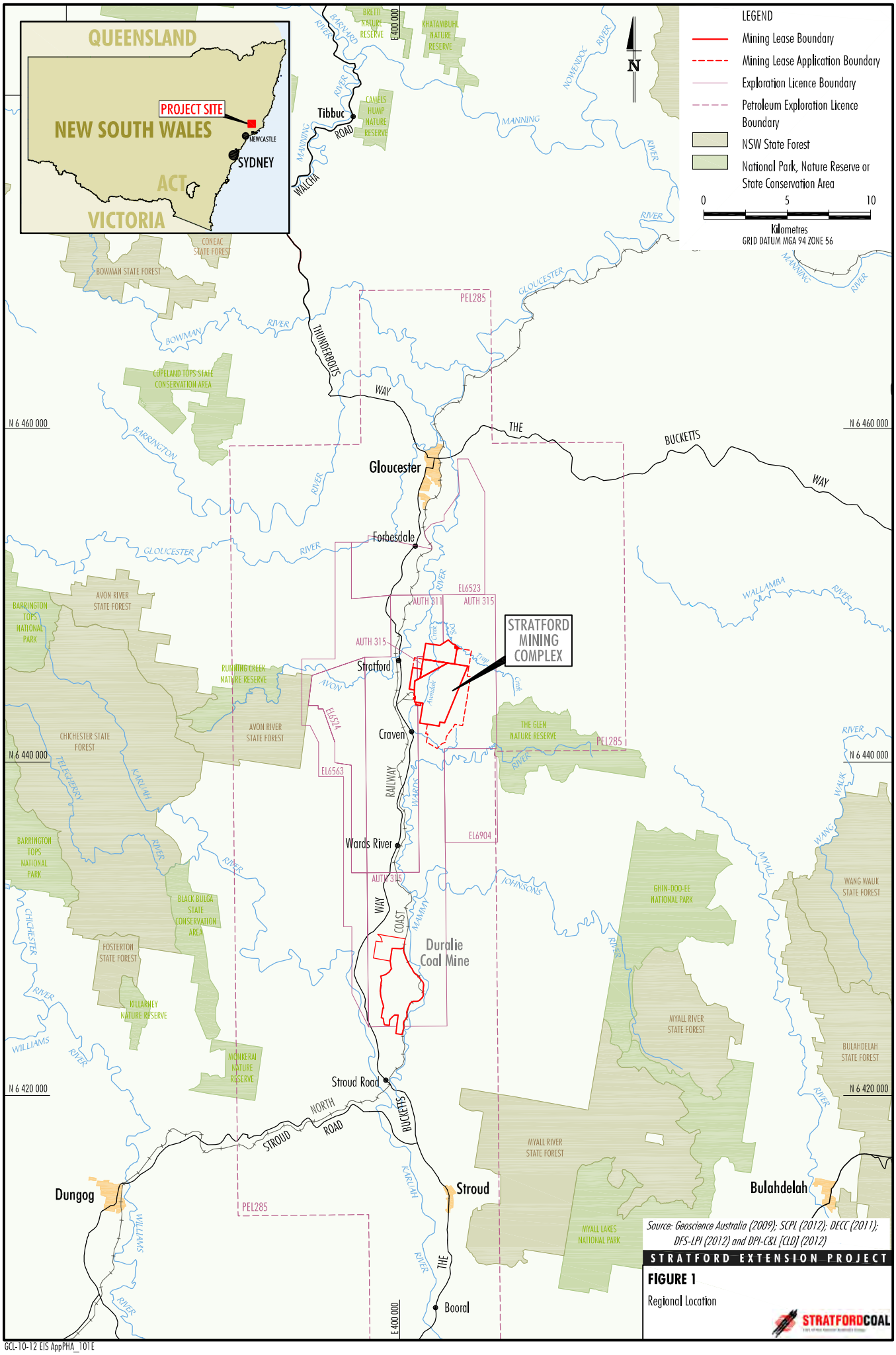
Assessed risks are compared to qualitative risk assessment criteria developed in accordance with Australian Standard/New Zealand Standard (AS/NZS) International Organisation for Standardisation (ISO) 31000:2009 *Risk Management – Principles and Guidelines* (AS/NZS ISO 31000:2009). Further, this PHA considers the qualitative principles provided in *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011c) and guidance provided on the purpose of a PHA in *Applying SEPP 33* (DoP, 2011d).

A Preliminary Risk Assessment was conducted for the Stratford Coal Project EIS (SCPL, 1994) by the Australian Nuclear Science and Technology Organisation (1998) and a PHA was conducted for the Bowens Road North Project EIS (SCPL, 2001a) by SCPL (2001b). Relevant hazard prevention and mitigation measures from these assessments have been implemented at the Stratford Mining Complex.

1.1 OBJECTIVE AND SCOPE

The objective of this PHA is to identify the off-site risks posed by the Project to people, their property and the environment and assess the identified risks using applicable qualitative criteria. In accordance with *Multi-level Risk Assessment* (DoP, 2011a), this assessment specifically covers risks from fixed installations and does not encompass transportation by pipeline, road, rail or sea.

Proposed mining operations would, in some cases, be located in proximity to public roads. Therefore some additional risks relating to mining operations (e.g. blasting, open pit slumping and uncontrolled mobile plant excursions off-site) were also identified and included in this PHA. In addition, potential risks relating to the Gloucester Gas Project and TransGrid's 132 kilovolt (kV) electricity transmission line were also identified.



Source: Geoscience Australia (2009); SCPL (2012); DECC (2011); DFS-LPI (2012) and DPI-C&L [CLD] (2012)

STRATFORD EXTENSION PROJECT

FIGURE 1

Regional Location

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This PHA therefore considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events). This assessment does not consider risks to SCPL employees or SCPL-owned property, or risks that are not atypical or abnormal (e.g. long-term effects of typical dust emissions). For the purposes of this PHA, the site is defined as the Development Application area which is similar to the existing SCPL Mining Leases and the three Mining Lease Application areas for the Project (Figure 2).

On-site environmental risks and potential long-term expected off-site impacts are considered in the Environmental Risk Assessment (Appendix R to the EIS) and, where relevant, the following studies conducted for the EIS:

- Groundwater Assessment (Appendix A to the EIS).
- Surface Water Assessment (Appendix B to the EIS).
- Noise and Blasting Assessment (Appendix C to the EIS).
- Air Quality and Greenhouse Gas Assessment (Appendix D to the EIS).
- Flora Assessment (Appendix E to the EIS).
- Terrestrial Fauna Assessment (Appendix F to the EIS).
- Aquatic Ecology Assessment (Appendix G to the EIS).
- Aboriginal Cultural Heritage Assessment (Appendix I to the EIS).
- Non-Aboriginal Heritage Assessment (Appendix J to the EIS).
- Agricultural Assessment (Appendix K to the EIS).
- Geochemistry Assessment (Appendix L to the EIS).
- Land Contamination Assessment (Appendix M to the EIS).
- Road Traffic Assessment (Appendix N to the EIS).
- Visual Assessment (Appendix O to the EIS).
- Socio-Economic Assessment (Appendix P to the EIS).

1.2 PRELIMINARY SCREENING PROCESS

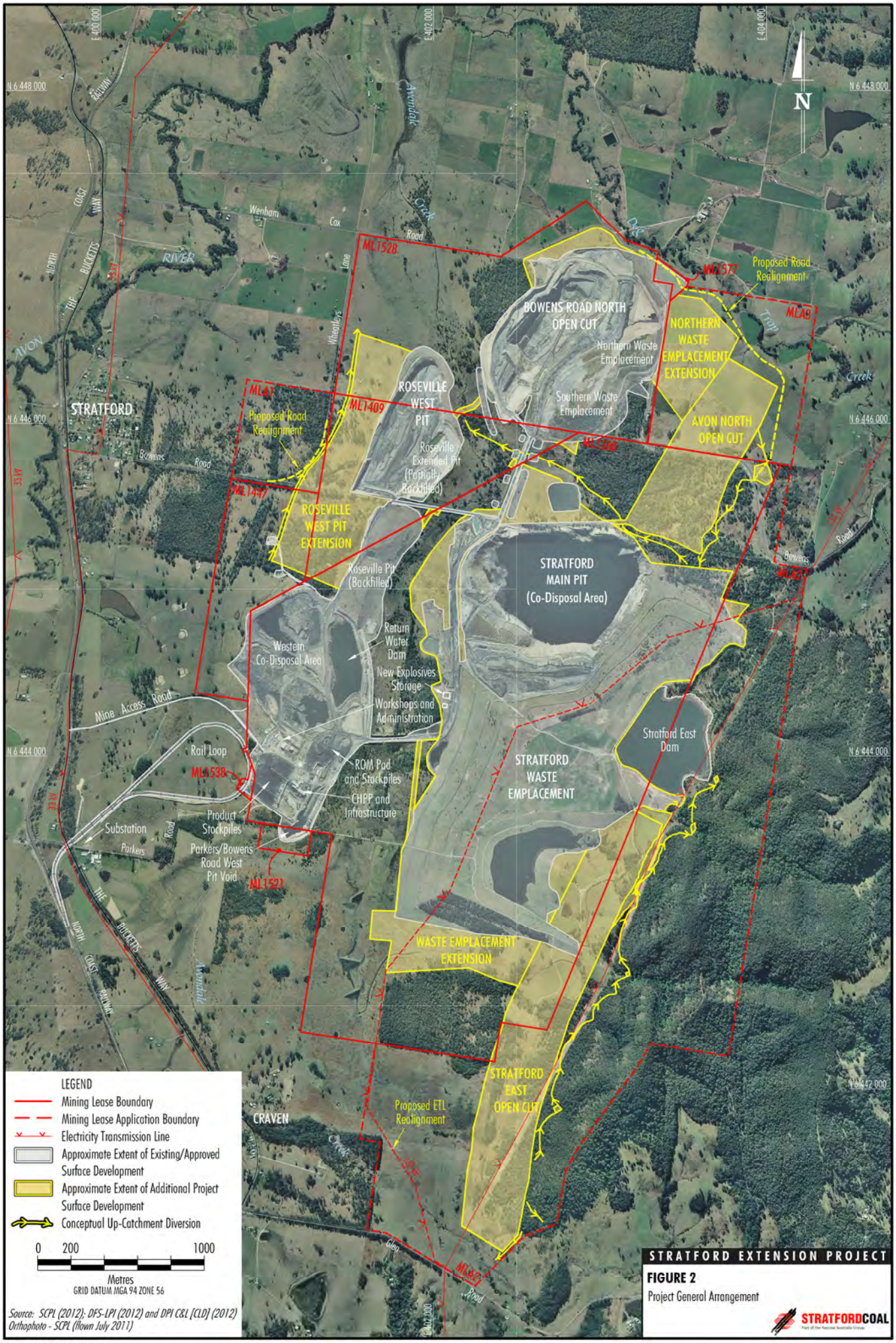
Preliminary screening to determine the requirement for a PHA was undertaken for the Project, taking into account broad estimates of the possible off-site effects or consequences from hazardous materials present on-site and their locations. Potentially hazardous industry is defined in the DoP *Multi-Level Risk Assessment* (2011a) as having *potential for significant injury, fatality, property damage or harm to the environment in the absence of control*.

In accordance with *Multi-level Risk Assessment* (DoP, 2011a), it was determined that the Project would be potentially hazardous as the PHA review team could not discount the possibility of harm to the off-site environment in the absence of controls.

According to *Multi-level Risk Assessment* (DoP, 2011a), a Level 1 assessment can be justified if the analysis of the facility demonstrates that there are no major off-site risks, if the technical and management controls are well understood and where there are no sensitive surrounding land uses.

The PHA review team (Section 1.3.1) reviewed the screening process and concluded that there was limited potential for scenarios with significant off-site consequences; existing controls were in place at the existing Stratford Mining Complex; and that there are no sensitive surrounding land uses.

Accordingly, the team implemented a Level 1 assessment (qualitative analysis) for this PHA.



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1.3 STUDY METHODOLOGY

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

(i) Identify the hazards associated with the Project.

(ii) Analyse the consequence of identified hazardous events.

(iii) Qualitatively estimate the likelihood of hazardous 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 the risk criteria outlined in *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011c).

(vi) Recommend further risk treatment measures, if necessary.

(vii) Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

1.3.1 Preliminary Hazard Analysis Review Team

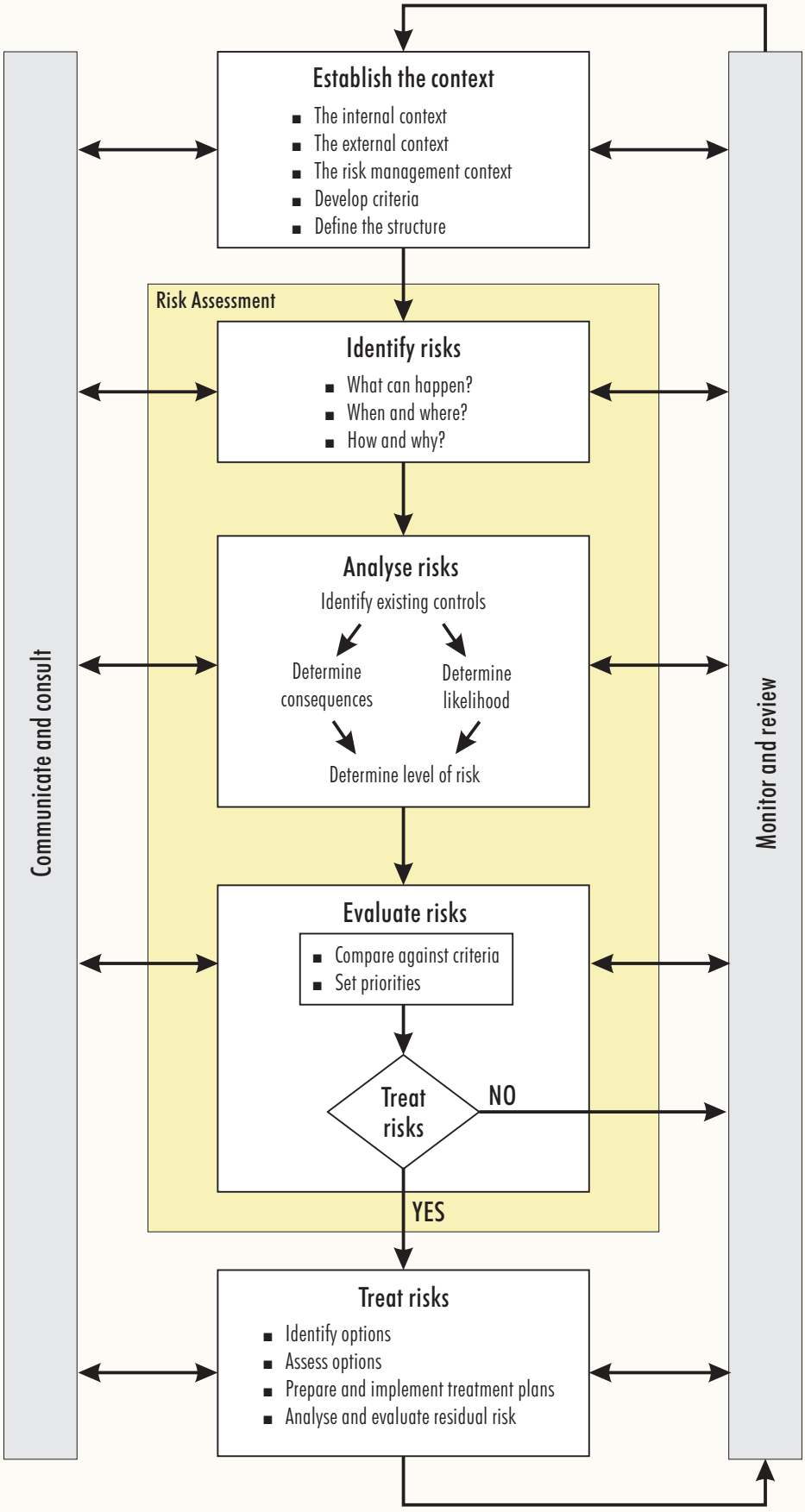
The above methodology was implemented during a PHA multi-disciplinary team-based risk review in December 2011. The review participants included technical advisors from SCPL including:

- SCPL – Manager – Environment and Approvals;
- SCPL – Technical Services Manager; and
- SCPL – Safety Manager/Superintendent.

1.3.2 Risk Management Process

This PHA has been undertaken with regard to the risk management process described in AS/NZS ISO 31000:2009 *Risk Management – Principles and Guidelines.* The risk management process is shown schematically on Figure 3 and includes the following components:

- Establish the context – Sections 1 and 2.
- Identify risks – Section 3.2 and Attachment A.
- Analyse risks – Section 4 and Attachment A.
- Evaluate risks – Section 4 and Attachment A.
- Treat risks – Section 3.2.4 and Attachment A.



Source: AS/NZS ISO 31000:2009 Risk Management - Principles and Guidelines

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FIGURE 3
Risk Management Process

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1.3.3 Qualitative Risk Principles and Criteria

This PHA considered the following qualitative principles (DoP, 2011c):

(a) All 'avoidable' risks should be avoided. This necessitates investigation of alternative locations and technologies, wherever applicable, to ensure that risks are not introduced in an area where feasible alternatives are possible and justified.

(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. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible measures (including alternative locations) should be adopted so that the likelihood of such an incident occurring is made very low. This necessitates the identification of all contributors to the resultant risk and the consequences of each potentially hazardous incident. The assessment process should address the adequacy and relevance of safeguards (both technical and locational) as they relate to each risk contributor.

(c) The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) 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.

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. Risk assessment criteria were developed during the 'Establish the Context' component of the Risk Management Process (Section 1.3.2) in accordance with AS/NZS ISO 31000:2009.

In accordance with AS/NZS ISO 31000:2009, Tables 1, 2 and 3 were reviewed by SCPL and were considered to be consistent with the specific objectives and context of this PHA.

Table 1
Qualitative Measures of Probability

Event	Likelihood	Description
A	Almost Certain	Happens often
B	Likely	Could easily happen
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Hasn't happened yet but could
E	Rare	Conceivable, but only in extreme circumstances

Source: Safe Production Solutions (2009).

Table 2
Qualitative Measures of Maximum Reasonable Consequence

	People	Environment	Asset/Production
1	Multiple fatalities	Extreme environmental harm (e.g. widespread catastrophic impact on environmental values of an area)	More than $1 billion (B) loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (e.g. widespread substantial impact on environmental values of an area)	$100 million (M) to $1B loss or production delay
3	Major injury or health effects (e.g. major lost workday case/permanent disability)	Serious environmental harm (e.g. widespread and considerable impact on environmental values of an area)	$5M to $100M loss or production delay
4	Minor injury or health effects (e.g. restricted work or minor lost workday case)	Material environmental harm (e.g. localised and considerable impact on environmental values of an area)	$250 thousand (k) to $5M loss or production delay
5	Slight injury or health effects (e.g. first aid/minor medical treatment level)	Minimal environmental harm (e.g. minor impact on environmental values of an area)	Less than $250k loss or production delay

Source: Safe Production Solutions (2009).

Combining the probability (Table 1) and consequence (Table 2), Table 3 provides qualitative risk rankings to assess risk levels.

Table 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 (2009).

The hazard identification table (Attachment A) illustrates the systematic application of the above risk assessment criteria for the Project.

2 PROJECT OVERVIEW

The main activities associated with the development of the Project would include (Figure 2):

- ROM coal production up to 2.6 Mtpa for an additional 11 years (commencing approximately 1 July 2013 or upon grant of all required approvals), including mining operations associated with:
  - completion of the BRNOC;
  - extension of the existing Roseville West Pit; and
  - development of the new Avon North and Stratford East Open Cuts;
- exploration activities;
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of mine waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- progressive development of new haul roads and internal roads;
- coal processing at the existing Coal Handling and Preparation Plant (CHPP) including Project ROM coal, sized ROM coal received and unloaded from the Duralie Coal Mine and material recovered periodically from the western co-disposal area;
- stockpiling and loading of product coal to trains for transport on the North Coast Railway to Newcastle;
- disposal of CHPP rejects via pipeline to the existing co-disposal area in the Stratford Main Pit and, later in the Project life, the Avon North Open Cut void;
- realignment of Wheatleys Lane, Bowens Road and Wenham Cox/Bowens Road;
- realignment of a 132 kV power line for the Stratford East Open Cut;
- continued use of existing contained water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures;
- development of soil stockpiles, laydown areas and gravel/borrow areas, including minor modifications and alterations to existing infrastructure as required;
- monitoring and rehabilitation;
- all activities approved under DA 23-98/99 and DA 39-02-01; and
- other associated minor infrastructure, plant, equipment and activities, including minor modifications and alterations to existing infrastructure as required.

A description of the Project is provided in Section 2 in the Main Report of the EIS.

3 HAZARD IDENTIFICATION

3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The major potentially hazardous materials required for the Project include hydrocarbons, explosives and chemicals. A brief description of these materials is presented below.

In addition, the stockpiling of coal has also been considered in this PHA.

3.1.1 Hydrocarbons

Hydrocarbons used at the Stratford Mining Complex include fuels (diesel and petrol), oils, greases, degreaser and kerosene.

Diesel

Diesel is classified as a combustible liquid by Australian Standard (AS) 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids* (AS 1940:2004) (Class C1) for the purpose of storage and handling, but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code (National Transport Commission, 2007). In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if ignited (flash point 61 to 150 degrees Celsius).

The risks associated with the Project include diesel storage and usage. Existing diesel storage facilities at the mine site includes an 110,000 litre (L) above ground tank stored within a Fuel Farm facility (adjacent to the workshop [Figure 2]). A concrete bund surrounds the tank whereby rainfall and any spilt fuel within the bunded area is directed to a collection sump where it is pumped to a reclaimer system located in the lube bay. SCPL has a Dangerous Goods Licence for the Fuel Farm and participates in WorkCover NSW's dangerous goods notification system in accordance with the *Occupational Health and Safety Regulation 2001*. In addition, a 10,000 L above ground diesel tank is located adjacent to the CHPP (Figure 2).

The existing diesel storage facilities would continue to be operated in accordance with the requirements of AS 1940:2004, as would any upgrades to these facilities over the Project life. Additional hydrocarbon storage (e.g. diesel and oils) would also be required by the Project. Construction and/or upgrades of storage facilities would be undertaken in accordance with AS 1940: *The Storage and Handling of Flammable and Combustible Liquids* and the *Operational Health and Safety Act, 2000*.

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. On-site petrol usage would be minor and petrol engine vehicles would be fuelled off-site at local service stations.

Oils, Greases, Degreaser and Kerosene

Oil is classified as a combustible liquid (Class C2) by AS 1940:2004.

Used engine oils (lubricating oils) and hydraulic oils are recovered during plant and vehicle servicing in the workshop and in the field. Within the workshop area, a separate bunded area holds an 18,000 L waste oil tank and oil/grease drums. Oil for gearboxes and lubrication at the CHPP is stored in drums in a concrete bunded area.

All contractors are required to manage and remove from site all waste oil generated during their operations. Waste hydrocarbons and oil filters are currently collected, stored and removed from site by licensed contractors.

Small quantities of grease, degreaser and kerosene would also be required. Procedures developed at the Stratford Mining Complex for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases, degreaser and kerosene) in accordance with AS 1940:2004 would continue to be implemented for the Project.

3.1.2 Explosives

Explosives required for the Project would include initiating products and detonators, ammonium nitrate fuel oil and emulsion explosives. Explosives would be transported and used in accordance with the existing safety and operational procedures at the Stratford Mining Complex.

Detonators, bulk explosives and explosive products (e.g. emulsion, prill) would be stored at a new explosives storage (Figure 2) in accordance with the requirements of AS 2187: *Explosives – Storage, Transport and Use*.

3.1.3 Chemicals

The management and storage of chemicals at the Stratford Mining Complex would continue to be conducted in accordance with SCPL's prescribed management procedures and Australian Standards and codes.

All chemicals brought on-site for use at the Stratford Mining Complex would be recorded in the existing inventory registers at the CHPP and Ditchfield Workshop. A list of the existing Material Safety Data Sheet (MSDS) registers is provided in Attachment B. No chemicals or hazardous materials would be permitted on-site unless a copy of the appropriate MSDS is available on-site or, in the case of a new product, it is accompanied by a MSDS.

The Project would not introduce any new hazardous materials to the Stratford Mining Complex. The Project would involve an increase in the amount of process consumables used at the Stratford Mining Complex due to the increased CHPP processing tonnages. However, no changes to the existing on-site handling, storage or management of these reagents would be required for the Project and all materials would continue to be stored and used in accordance with the relevant MSDSs.

3.2 HAZARD IDENTIFICATION PROCESS

The Project hazard identification table (Attachment A) provides a summary of the potential on-site hazards identified for the Project by the PHA review team and a qualitative assessment of the risks posed.

3.2.1 Project Components

As this assessment specifically covers risks from fixed installations (in accordance with DoP [2011a] [Section 1.1]), the main focus of this assessment was on-site storages, coal stockpile areas, the CHPP, train loading and unloading infrastructure and water management structures. In addition, some additional risks relating to mining operations (e.g. blasting, open pit slumping and uncontrolled mobile plant excursions off-site) were identified and included in this PHA.

Consideration was also given to potential interactions with the Gloucester Gas Project fixed installations that are within the proximity of the Project, as described below.

3.2.2 Potential Interaction with the Gloucester Gas Project

Infrastructure associated with Stage 1 of the approved Gloucester Gas Project overlays and is adjacent to the existing mining and exploration tenements at the Stratford Mining Complex.

Stage 1 of the Gloucester Gas Project includes (Figure 4):

- development of 110 gas wells and associated infrastructure between Gloucester and just south of Stratford;
- development of a Central Processing Facility (at one of two potential locations); and
- construction and operation of a high pressure gas transmission pipeline from Stratford to a delivery station at Hexham in NSW.

Each gas well site comprises an underground well, an above-ground well head, and a buried low pressure gas pipeline that connect via spine lines to a Central Processing Facility. From the Central Processing Facility gas will be transferred via a buried high pressure gas transmission pipeline to a delivery station at Hexham, NSW. The Central Processing Facility will condition, compress and meter the gas provided by the field gathering system (Sherpa Consulting, 2009). Two options are proposed, however the nearest location to the Project (i.e. Site 7 adjacent to the existing rail loop at the Stratford Mining Complex) (Figure 4) has been considered for this PHA as it would provide a worst case scenario.

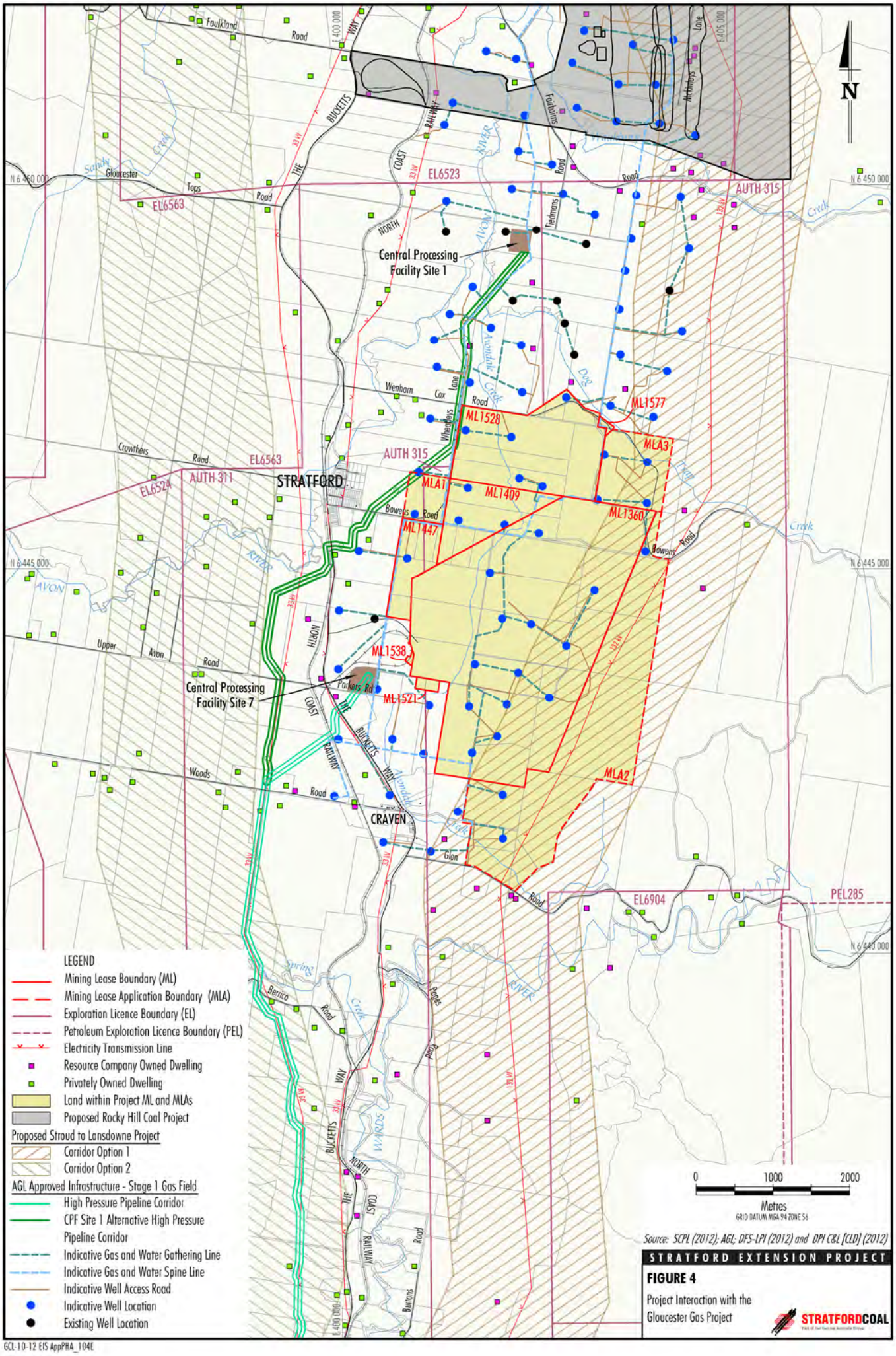
Sherpa Consulting (2009) completed a PHA for the Gloucester Gas Project that assessed risks associated with the well sites, gathering lines, spine lines, Central Processing Facility and High Pressure Pipeline. The PHA assessed components of the Gloucester Gas Project against the NSW land use planning individual fatality risk criteria for residential, commercial, active open space and industrial land uses.

The individual fatality risk criteria assessment concluded for the well sites (Sherpa Consulting, 2009):

- *The 0.5 x 10-6 per year individual fatality risk contour (sensitive land-use) was found to extend by about 40m from the centre of the well site. This will not extend to any sensitive land-uses.*
- *The 1 x 10-6 per year individual fatality risk contour (residential areas) was found to extend by about 38m from the centre of the well site. This will not extend to any residential areas as well sites will be located to provide a minimum exclusion zone.*
- *The 5 x 10-6 per year individual fatality risk contour (commercial areas) was found to extend by about 20m from the centre of the well site and will not extend to any commercial land-uses.*
- *The 10 x 10-6 per year individual fatality risk contour (active open spaces) was found to extend by about 15m from the centre of the well site and will not extend to any active open spaces.*
- *The 50 x 10-6 per year individual fatality risk contour (industrial areas) was not generated by the well-site hazard scenarios.*

The individual fatality risk criteria assessment concluded for the gathering and spine lines (Sherpa Consulting, 2009):

> *…risk levels near the gathering and spines lines do not reach levels which would exceed the risk criteria for all land use types considered by the NSW DoP.*



Source: SCPL (2012); AGL; DFS-LPI (2012) and DPI C&L [CLD] (2012)

STRATFORD EXTENSION PROJECT

FIGURE 4

Project Interaction with the Gloucester Gas Project

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The individual fatality risk criteria assessment concluded for the Central Processing Facility (Site 7) (Sherpa Consulting, 2009):

- *The 0.5 x 10-6 per year individual fatality risk contour (sensitive land-use) was located within the boundary of the site and does not extend to sensitive land uses.*
- *The 1 x 10-6 per year individual fatality risk contour (residential areas) was located within the boundary of the site and does not extend to residential areas.*
- *Risk levels for other land use types (commercial, active open spaces, industrial) were located within the boundary of the site and do not extend to the relevant land use types.*

The assessment concluded (Sherpa Consulting, 2009):

> *The PHA found that the off-site risk of fatality, injury and accident propagation posed by the GCSG project meets the requirements of the NSW Department of Planning Risk Criteria for Land-Use Safety Planning…*
>
> *The effects of an accidental emission of methane gas are unlikely to threaten the longterm viability of the ecosystem or any species within any sensitive natural environmental areas which may exist near the proposed development. The potential biophysical effects of produced-water are evaluated in the EA…*

Project impacts on Gloucester Gas Project gas well sites, low pressure and high pressure gas pipeline and Central Processing Facility that may result in off-site impacts have been considered in this PHA (Attachment A). AGL Gloucester LE Pty Ltd (AGL) and SCPL are currently negotiating a co-operation agreement in respect of the coordination and safe implementation of each parties respect operations. Further, pursuant to planning approval for the Gloucester Gas Project, AGL needs to have various plans in respect of infrastructure location approved by DP&I. Given this in this PHA it has been assumed that AGL will locate infrastructure or delay installation of infrastructure where AGL cannot demonstrate to SCPL's satisfaction that compliance with DP&I land use planning individual fatality risk criteria for residential, commercial, active open space and industrial land uses can be achieved in the context of SCPL's open cut mining operations, including blasting.

Hazardous events at the Gloucester Gas Project facilities that may lead to Project on-site events have also been considered (Attachment A).

3.2.3 Incident Classes

The following generic classes of incident were identified:

- leaks/spills;
- fire;
- explosion;
- theft;
- excessive vibration; and
- unplanned movement off-site.

3.2.4 Project Risk Treatment Measures

A number of hazard control and mitigation measures are described in the existing environmental management documents for the Stratford Mining Complex, as shown on Figure 5.

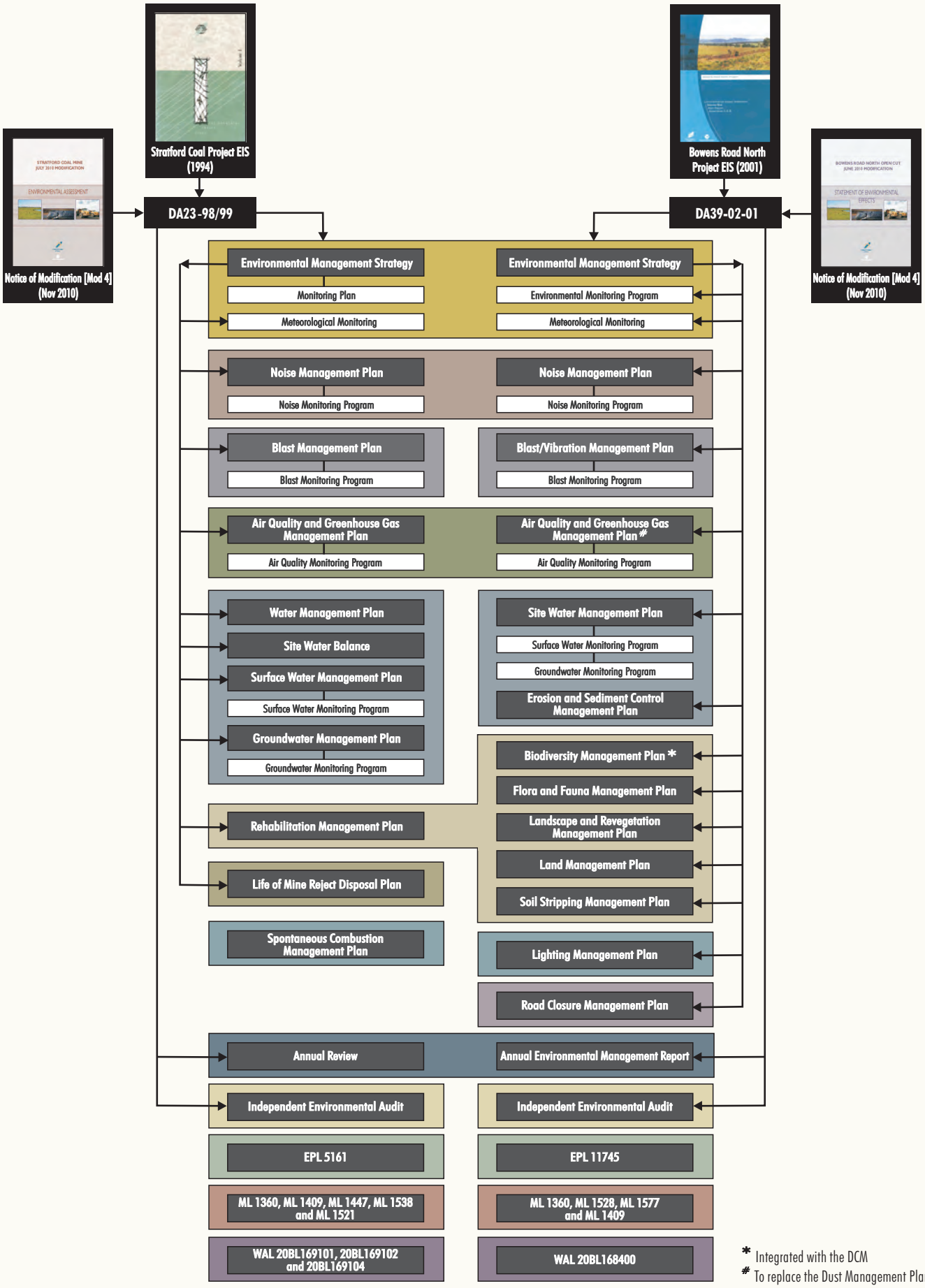

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FIGURE 5
Integrated Environmental Management Systems

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A number of hazard control and mitigation measures would be incorporated into existing management plans or new management plans where required for the Project. In addition, the following hazard treatment measures would be adopted for the Project:

- **Engineering Structures** – Mining and civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards. Where applicable, SCPL would obtain the necessary licences and permits for engineering structures.
- **Contractor Management** – All contractors employed by SCPL would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- **Storage Facilities** – Storage and usage procedures for potentially hazardous materials (i.e. fuels and lubricants) would be developed in accordance with Australian Standards and relevant legislation.
- **Emergency Response** – Emergency response procedures manuals and systems would continue to be implemented.

4 RISK MANAGEMENT AND EVALUATION

Attachment A presents a qualitative assessment of risks associated with the construction and operation of the Project. As described in Section 1.1, the assessment evaluates the off-site risks of the Project with potential to impact on the environment, members of the public and their property.

For this PHA, the 'site' was considered to be consistent with the Development Application area which is similar to the existing SCPL Mining Leases and the three Mining Lease Application areas for the Project (Figure 2).

Hazard treatment measures have been proposed, where required, to produce a 'low' level of risk in accordance with the risk assessment criteria described in Section 1.3.3. Proposed treatment measures are identified in Section 3.2.4.

In accordance with *Multi-level Risk Assessment* (DoP, 2011a) and *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011c), the results of the PHA indicate:

- residual risk levels are tolerable with respect to surrounding land uses and do not preclude approval of the Project; and
- societal risk (based on a Level 1 assessment) is negligible.

5 REFERENCES

Australian Nuclear Science and Technology Organisation (1998) *Preliminary Risk Assessment of the Stratford Coal Project.*

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ATTACHMENT A

STRATFORD EXTENSION PROJECT HAZARD IDENTIFICATION TABLE

Stratford Extension Project Hazard Identification Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage Hydrocarbons (i.e. fuels [diesel and petrol], oils, greases, degreaser and kerosene), explosives and chemicals	Leak/Spill	Failed tank or associated fittings, pump or pipework or operator error leading to off-site impacts including chemical or fuel contamination.	• Design of structures/tanks/pipes to relevant standards and legislation. • Storage tanks located to minimise potential impacts of leaks/spills. • Bunds designed to divert spills to containment structures. • Regular inspections and maintenance. • Spill management equipment (i.e. spill kits) located on-site. • Spill management procedures and training. • Operator induction and ongoing training. • Operational procedures. • Material safety data sheet (MSDS) register and MSDSs kept on-site at the coal handling and preparation plant (CHPP) and Ditchfield Workshop. • Signage.	C	4	18(L)
		Failed storage vessel due to mechanical impact or corrosion leading to off-site impacts including chemical or fuel contamination.	• Design of structures/tanks/pipes to relevant standards and legislation. • Bunds designed to divert spills to containment structures. • Protection of storage facilities (e.g. bollards). • Spill management equipment (i.e. spill kits) located on-site. • Spill management procedures and training. • Operator induction and ongoing training. • Operational procedures. • MSDS register and MSDSs kept on-site at the CHPP and Ditchfield Workshop. • Signage.	C	4	18(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Cont.) Hydrocarbons (i.e. fuels [diesel and petrol], oils, greases, degreaser and kerosene), explosives and chemicals	Fire or Explosion	Poor maintenance, poor design, collision or human error leading to off-site fire/explosion/ fume related impacts.	• Design of structures/tanks/pipes to relevant standards and legislation. • Appropriate storage of all chemicals, fuel and dangerous substances in accordance with relevant Australian Standards and legislation. • Housekeeping activities – site would be kept clean and tidy and fire hazards removed where practicable. • Availability of fire fighting equipment. • Regular inspections and maintenance of fire fighting equipment and storage areas, where required. • Site policies, management plans and procedures. • Protection of storage facilities (e.g. bollards). • Operator induction and ongoing training. • Location of explosive storage minimises interaction with off-site people and property.	D	4	21(L)
	Theft	Theft or malicious act/sabotage resulting in off-site impacts.	• Restriction of access to storage areas, including securing storage facilities. • Provision of adequate lighting around storage facilities. • Signage (i.e. unauthorised entry warning and information signs). • Police would be notified as soon as possible.	C	5	22(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Cont.) ROM Coal and Product Coal	Explosion	Coal dust explosion at coal stockpiles or coal handling infrastructure leads to off-site explosion related impacts.	• Housekeeping activities – site would be kept clean and tidy and fire hazards removed where practicable. • Water sprays of coal stockpiles to prevent generation of dust. • Fire fighting equipment and spill kits located in on-site vehicles and infrastructure (where appropriate). • Regular inspections and maintenance of fire fighting equipment and storage areas, where required. • Site policies, management plans and procedures. • Operator induction and ongoing training. • Stratford Coal Pty Ltd (SCPL) operates in accordance with Gloucester District Bush Fire Management Plan Operations.	E	3	20(L)
	Fire	Spontaneous combustion or fire at coal stockpiles or coal handling infrastructure leads to off-site fume related impacts.	• Design of coal stockpiles. • Avoid wherever practicable long-term storage at coal stockpiles. • Housekeeping activities – site would be kept clean and tidy and fire hazards removed where practicable. • Water sprays on coal stockpiles. • Fire fighting equipment and spill kits located in on-site vehicles and infrastructure (where appropriate). • Regular inspections and maintenance of fire fighting equipment and storage areas, where required. • Site policies, management plans and procedures. • Employee environmental awareness training on spontaneous combustion management. • Spontaneous Combustion Management Plan. • SCPL operates in accordance with Gloucester District Bush Fire Management Plan Operations.	C	5	22(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Interaction with Gloucester Gas Project	Leak/spill	SCPL blast vibration impacts on AGL gas pipelines, well sites, Central Processing Facility or related infrastructure resulting in fire or explosion with off-site impacts.	• AGL above ground infrastructure to be located at suitable off-set distances from SCPL mining operations to achieve Department of Planning and Infrastructure (DP&I) land use fatality risk criteria as described in Sherpa Consulting, 2009. • AGL to ensure design of pipelines (i.e. wall thickness and stress relief), well sites, Central Processing Facility and related infrastructure is to relevant standards and legislation. • AGL to install loss detection systems. • AGL to conduct regular inspections, maintenance and testing of equipment. • AGL procedures and systems. • AGL operator induction and ongoing training. • SCPL operational procedures. • SCPL Blast and Vibration Management Plan.	D	4	21(L)
		SCPL flyrock impacts on high pressure and low pressure gas pipelines, well sites, Central Processing Facility or related AGL infrastructure resulting in fire or explosion with off-site impacts.	• AGL above ground infrastructure to be located at suitable off-set distances from SCPL mining operations to achieve DP&I land use fatality risk criteria as described in Sherpa Consulting, 2009. • Central Processing Facility will be greater than 500 metres (m) from the Stratford Mining Complex's blasting activities. • AGL to ensure design of pipelines (i.e. wall thickness and stress relief), well sites, Central Processing Facility and related infrastructure is to relevant standards and legislation. • AGL to install loss detection systems. • AGL to conduct regular inspections, maintenance and testing of equipment. • AGL procedures and systems. • SCPL operational procedures. • SCPL Blast and Vibration Management Plan.	E	4	23(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Interaction with Gloucester Gas Project (Cont.)	Fire	Fire at AGL infrastructure leads to a fire at Stratford Mining Complex with offsite fire or fume impacts.	• AGL to ensure design of pipelines (i.e. wall thickness and stress relief), well sites, Central Processing Facility and related infrastructure is to relevant standards and legislation. • AGL to install loss detection systems. • AGL to conduct regular inspections, maintenance and testing of equipment. • AGL to implement corrosion protection on pipelines. • AGL procedures and systems. • AGL operator induction and ongoing training. • Maintenance of fire breaks to slow the progress of bushfires. • Routine hazard reduction burns. • SCPL fire fighting equipment located in on-site vehicles and infrastructure (where appropriate). • SCPL to conduct regular inspections and maintenance of fire fighting equipment, where required. • SCPL operates in accordance with Gloucester District Bush Fire Management Plan Operations.	D	4	21(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Interaction with Gloucester Gas Project (Cont.)	Fire/Explosion	Fire at Stratford Mining Complex results in damage to AGL infrastructure and fire or explosion with off-site impacts.	• AGL to ensure design of pipelines (i.e. wall thickness and stress relief), well sites, Central Processing Facility and related infrastructure is to relevant standards and legislation. • AGL to install loss detection systems. • AGL to conduct regular inspections, maintenance and testing of equipment. • AGL procedures and systems. • SCPL to ensure design of structures/tanks/pipes to relevant standards and legislation. • SCPL operator induction and ongoing training. • Maintenance of fire breaks to slow the progress of bushfires. • Routine hazard reduction burns. • SCPL fire fighting equipment and spill kits located in on-site vehicles and infrastructure (where appropriate). • SCPL to conduct regular inspections and maintenance of fire fighting equipment and storage areas, where required. • SCPL operates in accordance with Gloucester District Bush Fire Management Plan Operations.	D	3	17(L)
		Fire or explosion at AGL infrastructure results in fire at Stratford Mining Complex with off-site fire or fume impacts.	• AGL to ensure design of pipelines (i.e. wall thickness and stress relief), well sites, Central Processing Facility and related infrastructure is to relevant standards and legislation. • AGL to install loss detection systems. • AGL to conduct regular inspections, maintenance and testing of equipment. • AGL procedures and systems. • AGL to implement corrosion protection on pipelines. • AGL operator induction and ongoing training. • Maintenance of fire breaks to slow the progress of bushfires. • Routine hazard reduction burns. • SCPL fire fighting equipment and spill kits located in on-site vehicles and infrastructure (where appropriate). • SCPL to conduct regular inspections and maintenance of fire fighting equipment and storage areas, where required. • SCPL operate in accordance with Gloucester District Bush Fire Management Plan Operations.	D	4	21(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Other infrastructure and supporting systems	Leak/Spill	Spill of waste oil or sewage wastes leading to off-site impacts.	• Waste oil stored in accordance with Australian Standards. • Sewage treatment facilities registered with Gloucester Shire Council. • Storage tanks located to minimise potential impacts of leaks/spills. • Licensed contractor to remove waste oil from site for disposal. • Spill management equipment (i.e. spill kits) located on-site. • Spill management procedures and training. • Operator induction and ongoing training. • MSDS register and MSDSs kept on-site at the CHPP and Ditchfield Workshop. • Induction on recycling and disposal methods used at the site.	D	4	21(L)
		Leak or spill from water management system (e.g. transfer pipeline) leading to off-site impacts associated with water quality.	• Regular inspections of water containment structures for structural integrity, effectiveness and for maintenance to maintain their function. • Regular inspections of erosion and sediment control structures for structural integrity, effectiveness and for maintenance to maintain their function. • Operator induction and ongoing training. • Water Management Plan (includes Site Water Balance, Surface Water Management Plan and Groundwater Management Plan).	C	4	18(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Other infrastructure and supporting systems (Cont.)	Leak/Spill	Spill from coal reject pipeline between CHPP and Stratford Main Open Pit leading to off-site impacts.	• Design of pipelines to relevant standards and legislation. • Loss detection systems. • Regular inspections and maintenance. • Spill management equipment (i.e. spill kits) located on-site. • Spill management procedures and training. • Operator induction and ongoing training. • Operational procedures. • Signage. • Life of Mine Rejects Disposal Plan.	C	4	18(L)
	Fire	Malfunction of on-site power reticulation resulting in off-site fire.	• Power reticulation designed to Australian Standards and legislation – including security measures. • Maintenance of fire breaks to slow the progress of bushfires. • Housekeeping activities – site would be kept clean and tidy and fire hazards removed where practicable. • Power usage monitoring and alarms. • Fire fighting equipment located in on-site vehicles and infrastructure (where appropriate). • Regular inspections and maintenance of fire fighting equipment where required. • Operator induction and ongoing training. • Maintenance of fire breaks to slow the progress of bushfires. • Routine hazard reduction burns. • SCPL operates in accordance with the Gloucester District Bush Fire Management Plan Operations.	D	4	21(L)
Mining Operations	Unplanned movement off-site	Mobile plant or equipment parts move off-site in an uncontrolled manner.	• Operational activities undertaken by appropriately licensed and competent personnel. • Planning of activities to minimise potential for off-site impacts. • Supervision by appropriately qualified persons (e.g. Open Cut Examiner).	D	4	21(L)

Stratford Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Mining Operations (Cont.)	Unplanned movement off-site	Blasting flyrock impacts on public roads.	• Blast Management Plan. • Blasting undertaken by appropriately licensed and competent personnel. • Planning and design of blast events to minimise potential for off-site impacts. • Site-specific blast design included in blast planning. • Monitoring to validate blast design and performance. • Closure of public roads during blasting events within 500 m of the road.	D	4	21(L)
	Unplanned movement off-site	Slump or collapse of open pit walls resulting in damage to road infrastructure.	• Open pit walls designed to appropriate geotechnical standards. • Establishment of appropriate buffer zones from open pits. • Slope Stability Management Plan. • Regular geotechnical inspections and maintenance (as required).	D	4	21(L)
	Excessive vibration	Vibration causing damage to 132 kV electricity transmission line.	• Re-alignment of the electricity transmission line to reduce potential blasting effects. • SCPL operational procedures. • SCPL Blast and Vibration Management Plan.	D	3	17(L)
Exploration (Exploration within Development Application area)	Leak/Spill	Exploration activities result in large gas leakage which results in movement of gas plume off-site.	• SCPL exploration activities to be undertaken cognisant of AGL gas development/production activities. • Health and safety requirements for SCPL exploration activities. • Separation distances between exploration activities and nearby receivers.	D	4	21(L)

[1] Refer to Table 1.

[2] Refer to Table 2.

[3] Refer to Table 3.

ATTACHMENT B

EXISTING CHPP AND DITCHFIELD MSDS REGISTERS

Table B-1
CHPP MSDS Register

Chemical	Manufacturer of Supplier
Cleaning	
Careclean Lime	Castrol
Citric Acid	
Cleaning Acid 5032	Nalco
Exaderm	Chemsearch Australia
Hydrochloric Acid	Glendale Chemical Products
Hygiclean	Castrol
Spray 'n' Wipe	Colgate-Palmolive
Vitaclean CFS	Castrol
Windex	Johnson and Johnson Pty Ltd
Gases	
Acetylene	BOC
Entonox	BOC
Nitrogen	BOC
Oxygen – Industrial	BOC
Oxygen – Medical	BOC
Sulphur Hexafluoride	BOC
Oils and Greases	
APXT Grease	Castrol
Bio RD Oil 100	Castrol
EPX 80W-90 Gear Oil	Castrol
Hyspin AWS 68	Castrol
Meropa 220	Caltex
Meropa 320	Caltex
Molybond G1700 – Molygear 320	ITW Polymers and Fluids
Molybond G2800	ITW Polymers and Fluids
Molybond G900	ITW Polymers and Fluids
Molybond GA10	ITW Polymers and Fluids
Perfecto T32	Castrol
RX Super	Castrol
Saw Chain & Bar Lube	Castrol
TQ Dexron III	Castrol
Paints	
Chelade	Chemsearch Australia
Galmet Cold Galvanising Paint	ITW Polymers and Fluids (Galmet/Epirez)
Galmet Fluoro Paint – Aerosol	ITW Polymers and Fluids (Galmet/Epirez)
Galmet Rust Paint – Aerosol	ITW Polymers and Fluids (Galmet/Epirez)
Process Consumables	
Ground Limestone	Unimin Australia Limited
Hydrated Lime	Unimin Australia Limited
Magnetite	Unimin Australia Limited
Meadow Lime	Unimin Australia Limited
Nalflote 9836 (Collector)	Nalco
Nalflote 9843 (Frother)	Nalco
Optimer 83336 (Flocculent)	Nalco
Scaleguard 84611	Nalco

Table B-1 (Continued)
CHPP MSDS Register

Chemical	Manufacturer of Supplier
Wear Coatings	
Interseal 670 HS – Part A	International
Interseal 670 HS – Part B	International
Green Patch Part A	Greenbank Terotech
Green Patch Part B	Greenbank Terotech
Polythane AB3009 – Part A	Supreme Polymer Technologies Pty Ltd
Polythane AB3009 – Part B	Supreme Polymer Technologies Pty Ltd
Wulfwear 1008 – Part A	CUMI
Wulfwear 1008 – Part B	CUMI
Workshop	
Aquablock	Multi Mist
Butyl Mastic	Selleys Chemical
CRC 2-26 Aerosol	CRC Industries
CRC 5-56 Aerosol	CRC Industries
CRC CO Contact Cleaner	CRC Industries
CRC 2017NF Contact Cleaner	CRC Industries
Densolen Tape	Denso Australia
Devcon Plastic Steel Putty Hardener	ITW Polymers & Fluids
Devcon Bronze Putty Hardener	ITW Polymers & Fluids
Lectra Clean – CRC2018 Aerosol	CRC Industries
Loctite 243 Threadlocker	Loctite Australia
Loctite 262 Threadlocker	Loctite Australia
Loctite 567 Thread Sealant	Loctite Australia
Loctite 767 Anti-seize	Loctite Australia
Loctite 7649 Primer	Loctite Australia
Megapoxy PF – Part A	Vivacity Engineering Pty Ltd
Megapoxy PF – Part B	Vivacity Engineering Pty Ltd
Megapoxy PM – Part A	Vivacity Engineering Pty Ltd
Megapoxy PM – Part B	Vivacity Engineering Pty Ltd
NC-123 Extra	Chemsearch Australia
Plumb-weld	Bostik
Quick Penetrene	Quick Smart Products
RTD Metal Cutting Compound	Rocol Advanced Lubricants
Rapp-it Pipe Bandage	Marine & Industrial Marketing
Silastic 732	Dow Corning Australia
Silastic 747	Dow Corning Australia
Silastic 1080	Dow Corning Australia
Thread-eze Ultra	Chemsearch Australia
Miscellaneous	
Bodyguard	Septone

Source: SCPL (2009)

Table B-2
Ditchfield Workshop MSDS Register

Chemical	Manufacturer of Supplier
5-56 Lubricant	Blackwoods
A/C POE Oil	Gough and Gilmour
AFTWE Work Cream	Castrol
Aircol SR46	Castrol
Acetylene (040)	BOC
Anti-seize compound	Gough and Gilmour
APX-T Grease	Castrol
Araldite Super Strength	Blackwoods
Barrier Cream	Castrol
Belt Grip	Blackwoods
Biotrans QB	Castrol
Bosswash	Castrol
Brake fluid	Castrol
Brake fluid Dot 4 Shell	Blackwoods
BTX Grease	Castrol
Careclean Lime	Castrol
Careclean Plus	Castrol
Caterpillar – 11C106A – Yellow Enamel	Gough and Gilmour
Co Contact Cleaner	Blackwoods
Diesel Automative Fuel	BP
Diesel X	Castrol
Enduron S	Castrol
EPX 80W-90 Gear Oil	Castrol
Galmet Rustpaint Aerosol	Blackwoods
Gasket Stripper	Blackwoods
Glass and Chrome Cleaner	Castrol
GRRB Grease	Castrol
GTX3	Castrol
Hair and Body Cleaner	Castrol
Hydraulic Fluid CRD 10	Castrol
Hygiclean Skin Wash	Castrol
K-C Hair and Body Shower Gel	Blackwoods
Lectra Clean	Blackwoods
Lectra Shield	Blackwoods
Liquid Detergent	Castrol
Liquid Nitrogen	BOC
Loctite 222	Loctite Australia
Loctite 262	Loctite Australia
Loctite 290	Loctite Australia
Loctite 401	Loctite Australia
Loctite 515	Loctite Australia
Loctite 567	Loctite Australia
Loctite 569	Loctite Australia
Loctite 680	Loctite Australia
LSX 90	Castrol
LYT Grease	Castrol

Table B-2 (Continued)
Ditchfield Workshop MSDS Register

Chemical	Manufacturer of Supplier
Molybond G1700	Molybond
Molybond TPG Grease	Molybond
Multiclean Blue	Castrol
Multirax	Castrol
Nitrogen Dry (032) (033)	BOC
Oxygen, Compressed (020)	BOC
Premium Cool Plus	Castrol
Premium Cool Plus 50	Castrol
R134AS-Air Con Gas	BOC
R134A + UV – Air Con Gas	BOC
Reodorant Lemon	Castrol
Rocol Flaw Finder Developer	Blackwoods
Roundup Original ® Herbicide	Home Hardware
SBX1 Extreme Pressure Grease	Castrol
Seal-ZIT	Bridgestone
SHC 629 – Mobil Oil	Mobil
Silastic ® 732	Blackwoods
Soft Seal	Blackwoods
Signet Spot Marking Paint	Blackwoods
Spray ‘n’ Wipe – Ajax	Blackwoods
Suprega Plus	G E Envirosolution
TFC 430 Transmission Fluid	Castrol
TFC 460 Transmission Fluid	Castrol
Toilet Fresh	Castrol
TQ Dexron 111	Castrol
Trans Wash	Castrol
Ultra Stop Brake Fluid	Castrol
Vitaclean CFS	Castrol
Viton-CAT Seal Wheel Groups	Caterpillar
Vinyl Guard	Castrol
Wellar Butana Gas Refill	Blackwoods

Source: SCPL (2009).