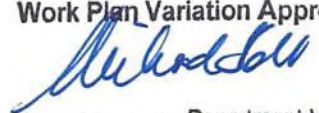


**ANNEXURE B-2 –
APPROVED WPV 2015 VOL 2**

MINERAL RESOURCES
 (SUSTAINABLE DEVELOPMENT) ACT 1990
 Tenement No MIN 5189
Work Plan Variation Approved

 Department Head
 Date: 30.11.15



Loy Yang Work Plan Variation
 Mining Licence 5189
 Volume 2 Appendices

Date: 16 September 2015



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 (Sustainable Development) Act 1990



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Appendix 1 – Loy Yang Mine Risk Management Framework



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AGL Risk Management & Assessment
Framework

AGL Energy Limited
August 2011



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Document Revision History

Date	Version	Author	Comment
06/02/09	1	Bec Hunt	
19/01/2010	1.1	Bec Hunt	Minor revision
17/06/10	2.0	Bec Hunt	<p>Major revision to integrate ISO 31000 Principles and reflect business feedback and requirements – including the requirement to assess all consequences in relation to a risk and clarity regarding the assessment of likelihood.</p> <p>Major revision in consequence descriptors to Environment & Community and People & Safety categories as approved by the June 2010 sitting of the SSCR.</p> <p>Minor addition to Customer impact descriptions.</p>
5/08/11	3.0	Barb Cole	<p>Revision to:</p> <ul style="list-style-type: none"> > Further integrate ISO 31000 principles; and > Incorporate enhancements based on business feedback and requirements.
5/08/11	3.1	Vikki Shizas	Minor revision



1. Risk Management at AGL

Risk is inherent in all business operations. Simply put, risk is the effect of uncertainty on objectives.

AGL is committed to an integrated risk management approach, whereby each business area is responsible for meeting their objectives, and for identifying and managing the risks in relation to those objectives. Effective risk management can:

- > Inform decision making;
- > Aid the identification of priority areas for the allocation of resources;
- > In order to meet objectives, take advantage of opportunities and minimise downside threats.

It is important to note that risk is not a stand alone discipline – risk management is embedded in strategy setting; operational processes; the audit function; and, integrated with issues and compliance management.

The generic approach adopted within this Framework, and which is intrinsic within ISO 31000 is that ANY form of risk should be managed in a systematic, transparent and credible manner within ANY scope and context.

2. Objective of the Risk Management & Assessment Framework

The primary objective of the framework is to embed risk management principles and practices into strategy development and day to day business processes in order to informing decision making and achieve robust and proactive commercial outcomes.

AGL's approach to Risk Management is modelled on ISO 31000. The standard has been adapted to reflect AGL's specific requirements for identifying, assessing and managing risk.

The overall objectives of the AGL Risk Management & Assessment Framework are to:

- a) Provide guidance to AGL employees on how to conduct risk assessments;
- b) Ensure consistency and simplicity in approach to risk identification, evaluation and management; and
- c) Establish a common 'risk' language.

A standardised approach across the business will:

- > Enable risks to be identified, managed and communicated consistently;
- > Provide a solid platform to meaningfully compare and prioritise enterprise wide risk;
- > Enable the establishment of AGL's risk profile and input to risk appetite; and
- > Comparison between bottom-up and top-down risk assessment.



3. The nature of Risk and Risk Management

3.1. Risk

Risk is the effect of uncertainty on objectives. That is, the chance that an outcome might differ from that which is expected.

In the majority of instances risk is speculative, in that outcomes consist of upside (opportunity) and downside (threat).

Risk is constantly evolving depending on a variety of internal and external factors, including control structures. It is important to be aware that the introduction of controls to manage one risk may have the effect of creating a new risk.

3.2. Risk Management

Risk management refers to coordinated activities to direct and control an organisation with regard to risk. This consists of the policies, processes and controls that are put in place to identify the risks and reduce the uncertainty of outcomes.

Optimised risk management aims to effectively manage downside whilst remaining flexible enough to capture upside.

The aim of risk management at AGL is not to eliminate risk; rather it is:

- > To manage risk to a commercially acceptable level;
- > To assess and manage the risk in a consistent and effective manner;
- > That appropriate management, reporting, approvals and escalation guides are followed so that risk can:
 - » be monitored and managed appropriately;
 - » be appropriately incorporated into management decisions and strategy; and
 - » focus attention on business and process improvement.



4. Risk Management Methodology

The following methodology is an adaptation of ISO 31000.

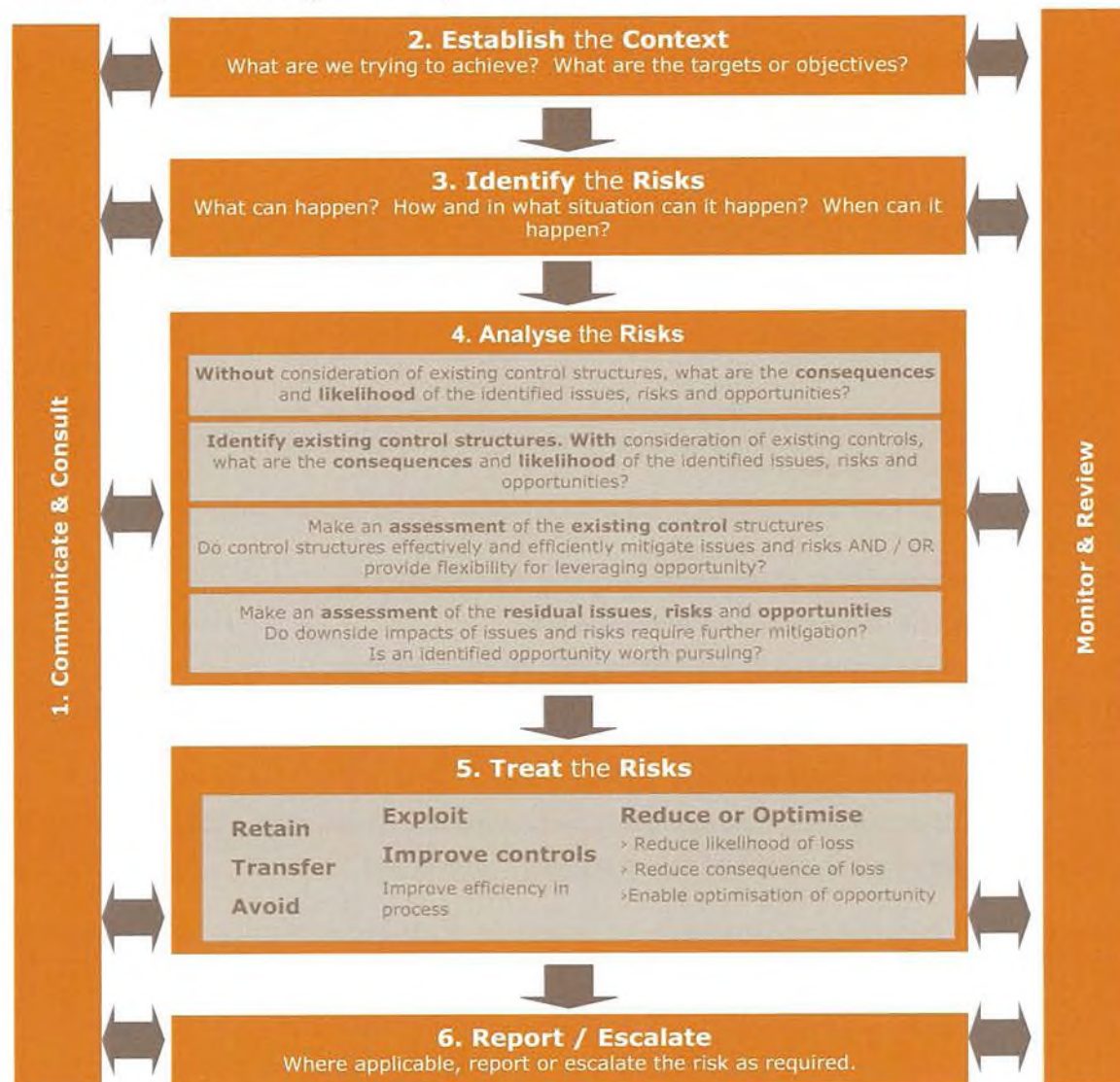


Figure 1: Risk Management Methodology

4.1. Communicate & Consult

Key stakeholders should be identified in the initial stages of the risk management process. It is important that stakeholders are communicated with, as applicable, at each stage of the risk management process.



4.2. Establish the Context

Defining the context is pivotal to the risk management process. The context includes the criteria against which risk is to be identified and assessed and the boundary within which the analysis and evaluation will take place. The context can be internal and / or external and as broad or as narrow as the objective of the assessment requires.

Examples of context and related risk identification might include:

Context	Risk Identification
Business Unit Objectives	All risk elements that may impact business unit objectives being met.
Health & Safety Process Objectives	The health and safety risk elements of a particular process being undertaken.
Project outcome expectations	The risk exposures that may prevent desired project outcomes from being met.

4.3. Identify the Risks

The context provides the framework or boundaries within which the risks are identified. Depending on the context, they can be risks of a business unit, a process or a project and can be as broad as all risks or limited to a category of risk (such as health & safety, reputation, legal etc).

The identification process involves identifying when, where, why and how events can affect the achievement of objectives. Stakeholders that should be included in the risk assessment are those who are in a position to contribute to the identification of uncertainties with regard to the achievement of objectives.

Robust identification and description of the risk is important to ensure that meaningful analysis and assessment can be undertaken and so that appropriate action plans or mitigations can be identified and / or developed. Risks should be identified in terms of cause, risk, effect i.e.

Due to... there is a risk that... resulting in...

4.4. Analyse the Risk

AGL has developed the Fully Integrated Risk Management (FIRM) matrix to aid in the risk analysis and assessment process. The matrix considers a number of consequence categories and likelihood descriptors. The matrix also provides guidance on how to assess the impact of the consequence and the likelihood of it occurring. This is important to ensure consistency in evaluation and comparison across all AGL business units.

All identified risks must be assessed in accordance with all relevant consequence categories (within FIRM) in order to enable a complete risk profile to be obtained. This will enable effective decisions to be made in relation to priority and appropriate mitigation.

Assessment Guide:

- > Each applicable FIRM consequence category should be assessed in relation to the risk;
- > The risk rating is to be assessed as the likelihood of the risk occurring AND its highest consequence.



Accordingly, the risk rating is derived from the highest consequence score multiplied by its likelihood.

$$\text{Risk Rating} = \text{Consequence Weight} \times \text{Likelihood Weight}$$

Simple Example 1:

A risk is identified that relates to asset failure. Consequences of this risk typically considered are commercial and business interruption; however the risk may also have health & safety and environmental consequences. In the example below, the consequence category with the highest score is Health & Safety – the likelihood of this consequence is then assessed and multiplied by the consequence score to determine the risk rating.

Risk Description	Consequence Scores							Likelihood	Risk Rating
	\$	BI	C	L/R	R	E&C	H&S		
Asset failure	1	1	-	-	-	1	1.5	3	4.5

Simple Example 2:

A risk is identified that relates to contracting vendor services for a retail campaign. Risks typically relate to commercial outcomes and customer impact; however they risk may also have legal/regulatory or reputational consequences. In the example below, the consequence category with the highest risk score is Legal/Regulatory – the likelihood of this consequence is then assessed and multiplied by the consequence score to determine the risk rating.

Risk Description	Consequence Scores							Likelihood	Risk Rating
	\$	BI	C	L/R	R	E&C	H&S		
Asset failure	1	1	-	4	0.5	-	0.5	2	8

Note:

As mentioned earlier, the clearer the risk description, the easier and more reflective the assessment will be and appropriate treatment recommended.

Please see appendix A for further information and the matrix detail.

Identify and assess the Raw Risk level

Without consideration of existing control structures:

- > What are the consequences of the risk?
- > What is the likelihood of the identified risks occurring?

The analysis should consider the potential range of consequences and how they could occur. Each grouping of consequences and likelihood should be assigned a risk rating according to the FIRM matrix. The grouping with the highest risk level is the one to be assigned as the Raw Risk level.



4.4.1. Identify and assess the controls

Identify all relevant existing control structures. Make an assessment of the effectiveness of those controls:

- > Are they effective or are they flawed?
- > Do they achieve their objective?
- > Do they effectively reduce the level of risk by themselves or are further mitigating actions required?
- > Do they provide flexibility for leveraging opportunity or are they overly constrictive?
- > Are they too cumbersome or too stringent for what is required?
- > Are they cost effective?

4.4.2. Assess the Current Risk level

With consideration of existing control structures and the assessment of their effectiveness:

- > What are the consequences of the risk?
- > What is the likelihood of the identified risks occurring?

Again, the analysis should consider the potential range of consequences and how they could occur. Each grouping of consequences and likelihood should be assigned a risk rating according to the FIRM matrix. The grouping with the highest risk level is the one to be assigned as the Current Risk level.

4.4.3. Evaluate the Current Risk

Evaluation of the Current Risk level should result in a determination as to whether that risk level is commercially acceptable or not. Appendix B Risk Level Approvals and Appropriate Action provide a guide as to who can determine an acceptable risk level as well the risk reporting hierarchy.

Key questions to consider during the risk evaluation process are:

- > Do downside impacts of issues and risks require further mitigation?
- > Is an identified opportunity worth pursuing?

A comparison of the Raw Risk and the Current Risk level is a good guide as to the effectiveness of the existing controls and of whether controls can be adapted or further controls introduced to manage the risk to an acceptable level.

4.5. Treat the Risks

Where the level of risk is deemed unacceptable it should be treated further. There may be a number of options that can be considered and the most appropriate and cost effective should be the one which is implemented.

It is important to note that treatment options are not always available or cost effective. In these instances the acceptance of the current risk level will need to be reviewed and will require approval as per Appendix B.

Where treatment options are available, they should be closely examined to ensure that they do, in fact, lower the risk levels. With any treatment options, action plans which include responsibility, timing and costs should be drawn up and continuously monitored through to completion.

Appendix C includes a number of Risk Treatment Options to determine the desired, or after treatment, risk level.



4.6. Monitor & Review

As with any business process, it is important that all steps in the process are monitored and reviewed. This helps to ensure continuous improvement.

It is also important that any defined actions are monitored to ensure:

- > They are in fact actioned, and steps can be put in place where they are not; and
- > The defined actions remain relevant to the business. This is particularly important during periods of internal and external change.

5. Guide to Consequence & Likelihood Matrix

Consequence and Likelihood should usually be considered:

1. Regularly over the course of a year in regard to risks relating to business as usual objectives. This enables risks to be evaluated for immediate priority and also recognises that the risk process should be applied continuously. If the risk level does increase over time, this should be captured and escalated as appropriate in accordance with 'Risk Level Approvals & Required Action' (refer Appendix B).
2. Regularly over the project duration in relation to a particular project.
3. Regularly over the contract duration in relation to a particular contract.

Where risk has been assessed otherwise than as above, the detail should be recorded in the risk assessment document.

5.1. Consequence Table

The consequence table recognises that there are many categories of consequences across AGL as a whole, and also that a single risk event may itself have a number of consequences. It is recognised that consequences of risk may include a number of categories and it may be appropriate to assess each of these categories separately.

Consequence groupings within the table are:

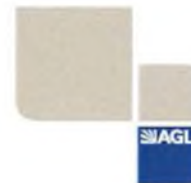
- > Commercial / profitability / assets. This category is measured quantitatively in dollar figures.
- > Business Continuity. This category recognises both immediate business continuity / business interruption impacts as well as future growth objectives that may be delayed.
- > Customer. This category recognises impact to the customer that may result in churn. This impact is measured quantitatively in terms of short and long term customer loss.
- > Regulatory / Legal. This category recognises the qualitative impacts to AGL as a result of dealings in, or impacts on, the regulatory environment as well as contractual and other legal exposures.
- > Reputation. This category recognises the qualitative impacts to AGL as a result of media interest. Often, negative press will not have a dollar or customer impact (in terms of churn). Recognising the importance of reputation, and monitoring media scrutiny may also help to focus attention on areas that may not have been identified by other means.
- > Environment & Community. AGL has a substantial environmental and community footprint. This category is measured qualitatively.
- > People & Safety. Our people and their safety are a vitally important consequence consideration in risk assessment. Consequences are measured qualitatively.



5.2. Likelihood Table

Likelihood should be assessed in relation to each assessment of consequence. There are three means of assessing the likelihood of a risk occurring using the Likelihood table.

- > Complexity. This is a qualitative assessment relating to the level of difficulty of a task, process or project.
- > Susceptibility / Exposure. This is a qualitative assessment of vulnerability of an event occurring or the level of exposure to the risk.
- > Probability. Probability is the most common approach used to determine likelihood. This measure relates to knowledge or evidence of the risk having occurred either internally or externally to AGL.



6. Risk Registers

The fields below are generally expected within risk registers. These fields enable the collection and use of information such that risk can be managed in an operational sense, and also allow meaningful management reporting.

Minimum mandatory fields are marked with an astrix. Completion of these fields enables meaningful comparison and profiling within and across business units.

Category	Field	Description
Administrative Detail*		All registers are to contain the following: <ul style="list-style-type: none"> > Date of risk assessment; > Detail as to who participated in the risk assessment; > Business unit / area > Any other information considered pertinent from an audit perspective.
Summary Detail	Risk ID*	Unique risk identifier.
	Risk Description*	A description of the risk event and its context. The risk must be fully described in order to be evaluated. The risk must relate to a business objective.
	Risk Category	If certain risk categories are applicable within the business; or if risk categories are used to aid risk identification these can be included in the risk category section.
	Risk Raiser	Who raised the risk?
	Risk Owner*	Who owns the risk?
Raw Risk Detail	Consequence Evaluation	If the risk occurs, what is the reasonable expectation of consequence without consideration of controls?
	Likelihood Evaluation	What is the reasonable expectation of the risk event and consequence occurring without consideration of controls?
	Risk Score	A function of likelihood X consequence.
Current Risk Detail*	Current controls	Current controls in place to mitigate the likelihood and or consequence associated with the risk.
	Consequence Evaluation	If the risk occurs, what is the reasonable expectation of consequence with consideration of controls?
	Likelihood Evaluation	What is the reasonable expectation of the risk event and consequence occurring with consideration of controls?
	Risk Score	A function of likelihood X consequence.
	ALARP	Is the risk managed to a level considered 'As Low As Reasonably Practical'?
	Escalation	A function of the risk score.
Target Risk Detail	Target Controls	If the risk is not at ALARP, what further activities / controls can be put in place to mitigate the risk?
	Action Owner	Who is responsible for implementing the actions?
	Due Date	What is the due date for action implementation?
	Consequence Evaluation	If the risk occurs, what is the reasonable expectation of consequence with consideration of target controls?
	Likelihood Evaluation	What is the reasonable expectation of the risk event and consequence occurring with consideration of target controls?
	Risk Score	A function of likelihood X consequence.
	Action Status	Is the action new; open; closed or overdue.
Risk Status*	Risk Status	Indicated whether the risk status is Accepted, Under Action, Transferred (i.e. insured) or Closed. Other status criteria may also be added as the business requires.

BaU risk assessment would typically consider Raw, Current and Target risk levels. Risk Registers maintained for project purposes should consider assessment levels appropriate to the project.



7. Risk Management Guiding Principles

#	Business Rule
1	Each business unit with material risk exposure is to assign a risk champion / risk officer.
2	Each business unit with material risk exposure is to maintain a consolidated register which considers relevant categories of risk.
3	A full risk assessment to be conducted at least once per year with output feeding into strategy; process and resource allocation decisions; and, budget process.
4	All identified risks are to be assessed in accordance with all relevant FIRM consequence categories.
5	In order to maintain register quality, risks must not be assessed by one person only. A peer review process must be established – this can be established through the communication / reporting / escalation process.
6	Minimum expected risk information requirements must be met.
7	A review of the risk register and associated action plan is to occur regularly, in accordance with business needs.
8	Business Unit Head, GM and GGM cannot over-ride a 'current' risk assessment of High or above without the agreement of the BU risk officer and relevant stakeholder / risk raiser.
9	When considering the consequence, the most reasonably practicable scenario should be considered rather than worst case. When in doubt, it is preferable to conduct a 'worst case' and 'typical case' assessment.
10	Likelihood is ordinarily assessed against the highest rated consequence category using the "probability" methodology to calculate how likely it is the risk will occur. In certain cases however, it may be appropriate to assess likelihood either: <ul style="list-style-type: none"> • Against each consequence category; or • Via conducting a 'worst case' and 'typical case' assessment.
11	For all risks that do not meet ALARP (ie an acceptable level of risk) an appropriate treatment must be determined and documented accordingly.
12	Principles contained within this table and the overall AGL Risk Management and Assessment Framework are to be adhered to.

Appendix A: Fully Integrated Risk Management (FIRM) Assessment Matrix

Consequence Rating Guide

Consequence Definitions								
Score	Descriptor	Commercial / Profitability / Assets	Business Continuity	Customer	Regulatory / Legal	Reputation	Environment & Community	People & Safety
0.5	Level 1	Maximum risk less than \$100k.	Minor business interruption. Temporary delay in operations with little effect; business would return to normal immediately.	May impact or lose a small number of domestic or small commercial customers.	Once off minor breach. Notification of relevant authority may be required, but negligible possibility of prosecution or breach of license.	Issue resolved in day to day management. Small local publicity.	Negligible and short term environmental impact to localised area of negligible environmental value. No impact beyond AGL's operational area. No interest by local community.	Injury or illness that may require medical treatment or first aid resulting in no lost time.
1.0	Level 2	Maximum risk between \$100k and \$1M.	Business interruption causes problems to either internal or external customers however business as usual achieved after several hours; AND / OR Growth options put off for up to 3 months.	Some loss of third party confidence AND impact to or loss of small number of Industrial & Commercial OR Major customers OR hundreds of domestics.	Multiple minor breaches. Regulator may express concern. Possible breach of licence or regulation requires notification to relevant authority / regulator, but unlikely to be associated with financial penalty.	Managed locally, some publicity in local and state press.	Small scale and short term environmental impact to localised area of low environmental value. No impact beyond AGL's operational area. No/minor interest by local community.	Injury or illness that temporarily impairs a person's life. Return to work with rehabilitation to same role.
1.5	Level 3	Maximum risk between \$1M and \$25M.	Business interruption causes impact to internal or external customers that last up to 5 business days; AND / OR Growth options are delayed for between 3 and 6 months.	Impact to or loss of several Industrial & Commercial OR Major Customers OR thousands of domestics.	Systemic breaches small to medium breaches or 1 large breach. Breach of regulatory / license requirements with likely action by regulatory authorities, resulting in tightening of licence and permit conditions and financial penalties or fines. Enforceable undertakings possible. Unfavourable policy outcomes.	Sustained regional/State coverage.	Moderate, short to medium term environmental impact that may extend beyond AGL's operational area and/or may result in local community complaint(s).	Injury or illness that permanently impairs a person's life. Return to work with rehabilitation and alternate role.
4	Level 4	Maximum risk between \$25M to \$100M.	Business interruption causes impact to internal or external customers that last for between 1 and 2 weeks; AND / OR Growth options are delayed for between 6 months and 12 months.	Impact to or loss of a large number of Industrial & Commercial OR Major Customers OR tens of thousands of domestics	Civil prosecution Unfavourable tariff outcomes. Unfavourable policy outcomes impact commercial position. Unable to secure necessary permits for growth / developments. Incident could result in revocation of licence/permits; large fines and prosecutions.	Sustained national press coverage.	Significant medium term impact on important environment/habitat and/or widespread local community complaints.	Injury or illness that results in a fatality or permanently impairs a person's life. No return to work.
5	Level 5	Risk may exceed \$100M.	Business interruption causes impact to internal or external customers that last for more than 2 weeks; AND / OR Growth options are delayed for more than 1 year.	Impact to, or long term loss of many Industrial & Commercial OR Major Customers OR hundreds of thousands of domestics.	Civil / criminal prosecution Unfavourable tariff outcomes put commercial Loss of operating licences. Loss of licenses and possible closure of facility, significant fines and/or jail penalties could result.	Continuous national and/or international coverage.	Severe long term damage to the environment and/or sustained widespread local community complaints over time. Any loss or damage to listed or protected environment/habitat.	Injury or illness that results in more than 1 fatality or permanently impairs more than 1 person's life. No return to work.



Likelihood Rating Guide

		Likelihood Description		
Score	Descriptor	Complexity	Susceptibility/ Exposure	Probability
5	Almost Certain	Can only be performed after specialist training and education, years of knowledge required, very advanced technology, extreme inter dependencies between tasks	Extremely susceptible – large numbers of new people and/or new to AGL, attractive to most people with ready access, newly implemented, a lot of changes, new system, untried processes	Knowledge/evidence either within AGL or externally suggests this event/risk occurs almost all of the time. The occurrence of this risk is common and expected – greater than 1 in 2 chance (greater than 50%)
4	Likely	Advanced training, education and specialist knowledge, a significant number of variables and interrelated tasks and dependencies	Highly susceptible – many new people, item is attractive, a lot of changes to the systems and procedures, the item is aging or otherwise becoming susceptible, the event is likely to occur sooner rather than later.	Knowledge/evidence either within AGL or externally suggests this event/risk occurs at regular intervals – between 1 in 10 and 1 in 2 chance (10% to 50%)
3	Possible	High level skill required, usually secondary studies necessary, detailed knowledge needed, advanced technology, a number variable tasks or steps	Quite a few people involved, audit trail difficult to follow, requires 'specialist' knowledge and skills, newly introduced staff and/or procedures, one would expect the event to occur at intervals	Occurs either within AGL or known environment on an irregular basis but frequently enough to be more than a remote possibility – between 1 in 100 and 1 in 10 chance (1% to 10%)
2	Unlikely	Requires basic training but can be quickly mastered by most people, few variations or steps involved	Recent changes, attractive but difficult to obtain, new people, some new processes or procedures, quite a few people involved, one would expect the risk to occur occasionally.	Aware that the event has occurred occasionally either within AGL or externally. However, it is not something that would be classed as a common occurrence and would only occur in certain remote circumstances – between 1 in 10000 and 1 in 100 (0.01% to 1%)
1	Rare	Straight forward singular tasks requiring little or no training	Has a minimum degree of susceptibility, been around for years, tried and true, well known and understood, can't conceive the risk occurring.	Either is not known to have occurred or has not occurred in many 'exposures' to the potential risk – greater than 1 in 10000 (less than 0.01%)



Consequence & Likelihood Risk Evaluation Matrix

L i k e l i h o o d	Almost Certain (5)	2.5 Moderate	5 High	7.5 High	20 Extreme	25 Extreme
	Likely (4)	2 Moderate	4 Moderate	6 High	16 Very High	20 Extreme
	Possible (3)	1.5 Low	3 Moderate	4.5 High	12 Very High	15 Very High
	Unlikely (2)	1 Low	2 Moderate	3 Moderate	8 High	10 Very High
	Rare (1)	0.5 Low	1 Low	1.5 Low	4 Moderate	5 High
		Level 1 (0.5)	Level 2 (1.0)	Level 3 (1.5)	Level 4 (4)	Level 5 (5)
		Consequence				

Figure 2: Likelihood and consequence evaluation table



Appendix B: Risk Level Approvals & Required Action

Risk Score	Severity	Required Action
20 to 25	Extreme	<p>This level of current risk requires the immediate attention of:</p> <ul style="list-style-type: none"> • The Chair of the ARMC; • Executive; and • Group Risk. <p>Solutions need to be developed and actioned immediately. Action plans must be approved by appropriate Executive and may require close attention by appropriate senior management (General Management and / or Executive Management) until the risk is managed to the desired level.</p> <p>Do not proceed with any current (controlled) risk in this category without specialist assistance to further treat/reduce risk including the development of contingency plans and / or transference strategies.</p> <p>Only the Board can accept current risk at this level.</p>
10 to 16	Very High	<p>This level of current risk requires the immediate attention of:</p> <ul style="list-style-type: none"> • Relevant Executive Management; • Relevant Group General Management; and • Group Risk. <p>Action plans must be approved by appropriate Executive.</p> <p>Do not proceed with any treatment option without clear and timely action plans identified to reduce the risk.</p> <p>Only the relevant Group General Manager can accept current risk at this level. The ARMC must be notified of acceptance at the next committee meeting.</p>
4.5 to 8	High	<p>This level of current risk requires, with a degree of priority, the attention of:</p> <ul style="list-style-type: none"> • Group General Management (or equivalent). <p>Remedial action should be approved by the appropriate General Manager (or equivalent). Remedial action should be identified and implementation commenced with appropriate priority.</p> <p>Only the relevant Group General Manager (or approved delegate) can accept current risk at this level.</p>
2 to 4	Moderate	<p>This level of current risk requires the attention of:</p> <ul style="list-style-type: none"> • Management. <p>Management should determine whether further remedial action is required and can be cost effectively implemented.</p> <p>This level of current risk may be considered unacceptable in certain circumstances, such as in a small project where 'moderate' by AGL criteria is extreme in terms of the project overruns.</p> <p>Only the relevant General Manager or their approved delegate can accept current risk at this level.</p>
0 to 1.5	Low	<p>This level of current risk may require the attention of:</p> <ul style="list-style-type: none"> • Management. <p>Management is expected to review the assessment and controls; and, where controls are not satisfactory, remedial action should be identified and implemented where practical.</p> <p>While control issues may exist at this level, their impact is deemed low.</p> <p>Where controls are effective and the untreated risk level is low, there may be opportunities to gain efficiencies through 'relaxation' of some controls – such action should only be taken in consultation with either Group Risk or Group Audit.</p>



Appendix C: Risk Treatment Options

A guide to risk treatment options is provided below:

Option	Description
Avoidance	This is achieved usually by deciding not to engage in the particular activity that presents the risk. While this may at times be a viable option, such a decision should be made with due recognition of the potential benefits to be gained from the activity and the extent to which alternative risk treatment processes can reduce the expected risk level.
Reduction	<p>Can be achieved by either reducing the likelihood of occurrence or by reducing the impact or consequences should the risk eventuate.</p> <ul style="list-style-type: none"> > Actions to reduce or control likelihood can include: audit and compliance programs; quality assurance, training, policies and control procedures; maintenance. > Actions to reduce or control consequence can include: contingency planning; disaster recovery plans; public relations; contract terms and conditions; continuous robust monitoring and as with likelihood, training and policies (e.g. a policy to cease supply for non payment after say the second bill will reduce consequence).
Enhancement of Existing Controls	Technically this is a sub set of a risk reduction strategy. When initially determining the effectiveness of controls and the extent to which they were working, it may have been that sufficient controls existed but they weren't being effectively managed. It may be that by ensuring existing controls work all of the time, risk can be reduced without extending the controls in place.
Transfer	<p>Transfer involves another party bearing or sharing some part of the risk. This includes via contractual arrangements, use of contractors, joint ventures, partnerships etc and insurance arrangements.</p> <p>Where this option is used, it must be recognised that a new risk has been created, that is, the risk that the third party will not affectively manage that risk. For example, the use of contractors may help reduce AGL's exposure but will not eliminate it. If the contractor fails to manage the risk AGL may still face some, albeit perhaps reduced, consequence. Similarly, while insurance may cover the losses, future premiums may increase and other consequences outside of the \$, such as loss of customer confidence, may still also occur</p>
Retain and/or Acceptance	As previously stated, low risks can be chosen to be accepted. Further, after risks have been treated and/or transferred, there may be some residual risk which is either at an acceptable level or cannot be readily (cost effectively) dealt with. These risks are retained by the organisation. Plans should be put in place to manage the consequences of these risks should they occur. These risks should also be subject to close monitoring and may still require management planning such as 'exit strategies'.
Exploit/Take on More Risk	This option requires an advanced understanding of the risk/reward scenarios and of any portfolio affect that may exist within the organisation. For example, there are risks associated with electricity generation. However, by increasing our generation capacity we are reducing our energy trading exposure (i.e. forming a natural hedge). Very often taking on more risk may be a strategic move to gain economies of scale, to defend from potential takeover or to allow a step change to occur.



Appendix D: Glossary

Term	Description
ALARP	ALARP refers to whether a risk has been mitigated to a level considered 'As Low As Reasonably Practical'. Note that this is a subjective assessment which must be peer-reviewed, in accordance with the 'Guiding Principles' (refer section 8).
Consequence	The outcome or impact of an event.
Control	Process, policy, device, practice or other action that is in place to mitigate the consequence or likelihood of a negative event, optimise an opportunity or create stability in outcomes.
Event	Occurrences of a particular set of circumstances.
Hazard	A source of potential harm.
Likelihood	A general description of probability or frequency.
Monitor	To check, supervise, observe critically or measure the progress of an activity, action or system on a regular basis in order to identify change from the performance level required or expected.
Probability	A measure of the chance of occurrence expressed as a number between 0 and 1.
Raw Risk	The Raw Risk is the risk without controls. The Raw Risk level is assessed prior to any mitigation strategies or controls and is calculated by multiplying the risk Consequence score by the risk Likelihood score.
Current Risk	The Current Risk is the risk with controls (also known as Controlled Risk). The Current Risk level is determined by re-appraising the Consequence and the Likelihood levels taking into account the known controls, i.e. Consequence X Likelihood.
Residual Risk	Risk remaining after implementation of controls or treatment.
Risk	The effect of uncertainty on objectives
Risk Analysis	A systematic process to understand the nature of and to deduce the level of risk.
Risk Assessment	The overall process of risk identification, risk analysis and risk evaluation.
Risk Evaluation	The process of comparing the level of risk against risk criteria.
Risk Management	Coordinated activities to direct and control an organisation with regard to risk.
Risk Rating	The risk rating is the overall relative score of a risk once it has been analysed and is derived from the highest consequence score multiplied by its likelihood score.

Definitions largely derived from ISO 31000



Appendix E: Risk References

1. ISO 31000
2. Enterprise Risk Management – Integrated Framework (COSO)



Appendix 2 - Loy Yang Mine Hazard Register (at December 2014)



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Summary Detail					Current Risk Detail				Target Risk Detail			
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station	Dams	Power	External			
External Risks												
59	Traralgon Bypass and associated development - impact of Mine on Road. Ground movement impacting on integrity of road. Large scale and batter scale.	Significant ground movements, strains, subsidence, potential post mining uplift. Major mine batter instability. Add detail regarding geotech conditions and hydrogeology. Fire impacts.	Increased design and construction costs (drainage, erosion potential, strain/ground movement resistance), Substantial damage to bypass, long term impacts to road, public impact, increased maintenance requirements, increased monitoring and management costs for both AGL and VicRoads.	Excessive strains and movements against design and predictions (0.6% general strain limit for payments), cracking, ingress of water.	*				GCMP - pin surveys including calculation of strain along radial survey lines. Plan progressive rehabilitation with consideration to potential freeway alignment. Update of rehabilitation plan with assumption that freeway will be in place (Dec 2014). Subsidence predictions along area of current alignment. Additional detail to add.	10		5
16	HL storage dam and settling pond	Seismic event. Extreme rainfall event leading to overtopping. Differential land subsidence. Deterioration of dam structure. HL storage dam only - fault line (differential settlement either side affected by aquifer depressurisation). Settling pond - situated upon joints.	Flooding of Traralgon Creek, potentially impacting mine. Settling pond has potential to recharge M2B aquifer. Potential loss of generation due to loss of water		*	*	*	*	Dam break study, Emergency Management Plan and TARP's with alert levels. Dams are risk rated as per ANCOLD and appropriate management / monitoring plans in place	8		8
60	Traralgon Creek - change of grade	Change in creek due to land subsidence resulting from mining activities. Could be a result of stress relief movement and/or aquifer depressurisation.	Localised flooding, impact on local land holders, impact on service owners.	Existing stream bed grade is between 1:5000, 1:8000. Significant flattening of creek grade triggering community complaints, directly attributable to mining.	*			*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. Flood levy on Western Batters to protect North Western corner of mine.	8		3
10	High pressure natural gas to LYB	Potential for stress relief ground movement in Stage F mining. Subsidence due to groundwater extraction, horizontal movement due to block movement.	Inducing strains in the pipeline causing damage. Loss of services to Loy Yang B site (start-up fuel) / Snowy Hydro site. Risk of fire, explosion.	Alarms, remote pressure monitoring, odour detected, explosion, pin survey results may indicate excessive movement.			*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance inspections and pipe pressure monitoring. Need details regarding owners controls.	5	Develop strain contours to identify risk areas. Understand allowable strains for underground assets.	5
15	Low pressure distribution gas line to LYA	Subsidence due to groundwater extraction, horizontal movement due to batter instability	Inducing strains in the pipeline causing damage. Loss of services to Loy Yang A site (ignition fuel). Risk of fire, explosion.	Alarms, remote pressure monitoring, odour detected, explosion, pin survey results may indicate excessive movement.	*	*	*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance inspections and pipe pressure monitoring. Need details regarding owners controls.	5	Develop strain contours to identify risk areas. Understand allowable strains for underground assets.	5





Summary Detail									Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Power Station	Dams	External				
40	Rural Grazing Properties - flooding and drainage	Subsidence due to groundwater extraction.	Localised or more frequent flooding, impacts on local drainage, impact on stock management.	Localised flooding events. Landowner response. Results of regional pin survey.	*			*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network.	4.5		4.5
41	Low Quality Water Supply - twin PCP (RRJ) / MSCL (welded)	Subsidence due to aquifer depressurisation. Horizontal ground strain.	Pipe strains, potential damage to pipe & leakage.	Horizontal ground strain exceeding 0.20% (general limit for pipe works). Observation of pipe leakage, settlement (pin survey data), telemetry to Power Station.	*	*	*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance inspections and pipe water pressure monitoring. Telemetry to Power Station to indicate pipe breach. Cathodic protection on metal components.	4.5		3
49	Hot Spot - deterioration of batter integrity, cavity formation. Introduction of water to batter.	Spontaneous Combustion, external source (cigarette etc)	undermining of batters and berms. Localised generally single batter scale	observed fire activity, surface deformation elevated temperatures	*	*	*	*	Inspections and temperature monitoring. Monitoring of cracks and recording via database. Suppression and sealing techniques under trial	4.5		3
24	Traralgon Bypass and associated development impacting on mine.	Drainage and construction impacts. Exposure of geological structures leading to potential ingress. Road embankments resulting in loading of batter crest. Change in drainage conditions. Inappropriate drainage design.	Batter instability or failure. Increased horizontal ground movement. Potential impact back onto bypass.	Increased groundwater levels in monitoring bores, cracking, visual observation of run off and drainage conditions. Pin line survey results.	*			*	GCMP - pin surveys including calculation of strain along radial survey lines. Plan progressive rehabilitation with consideration to potential freeway alignment. Update of rehabilitation plan with assumption that freeway will be in place (Dec 2014). Subsidence predictions along area of current alignment. Need details regarding VicRoads controls for this specific project.	4	Increase education of pit personnel on the impact of water. Investigation the Introduction of water discharge notification system for volumes above a determined criterion. Investigate telemetry systems based on pressure / flow to give alarm	4
52	Sewer - ground movement exceeding design criteria (Traralgon township)	Subsidence due to regional groundwater extraction, horizontal movement due to stress relief in northern batters and mine batter instability.	Change in grade / hydraulics of pipe impacting on performance. Pipe failure resulting in potential contamination of public areas or storm water systems (black water), loss of service to parts of Traralgon.	Horizontal ground strain 0.2%. Change of grade to be determined. eg... Sewer failure entering Traralgon area (via stormwater?), short term to medium environmental impact, may extend beyond AGL area. Community complaints.	*			*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. Latrobe residential planning scheme.	4		4
53	High Quality Water - reticulation in Traralgon.	Horizontal movement due to stress relief in northern batters and mine batter instability.	Pipe failure is possible resulting in potential temporary loss of service to parts of Traralgon.	Horizontal ground strain 0.2%. eg... Undetected pipe burst, upsetting supply.	*			*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. Latrobe residential planning scheme.	4		4





Summary Detail					Current Risk Detail				Target Risk Detail			
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station	Dams	External				
55	Transmission Towers/Lines	Horizontal ground movement.	Direct damage to overhead line, pylons, loss of power transmission, cessation of generation, loss of revenue. Safety incident, fire. Reputation impact, regulatory involvement.	Visual observation, loss of service (alarms on plant, remote monitoring). Routine inspections by SP Ausnet.	*	*	*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. No further mining planned for Stage A.	4	Increased ground movement monitoring (frequency and coverage) in areas of high or rapid movement.	4
58	Overburden Dump Instability – large scale failure of permanent batter.	Poor strength and/or wet materials placed in dump causing instability. Ground movement, poor drainage, over height dumping. Seismic event - liquefaction potential.	Material flow that would impact infrastructure ie. treatment ponds, road, settling pond. May extend past ML on the western side.	Visual inspection - cracking subsidence. Stability modelling results.			*	*	Groundwater monitoring. Stability modelling and assessment using observed groundwater conditions including seismic loading. Visual inspections of operating faces daily by operators and fortnightly inspection by Geotechnical Engineer. Permanent batters inspected as part of Land Management. External dump finalised 2025. Surface drainage system on dump including capping layer on each level that is graded to shed water. Dump construction procedure in place. Clay used to stabilised poor quality materials.	4		4
61	Large plant travel within mine; i.e. transfer of BWE or head end unit between transport levels, or stacker transfer into mine from external dump.	Proximity to crest or open edge, unstable or susceptible ground, poor planning of travel path. Insufficient bearing capacity (failed material). Operating outside operational limits.	LTI or worse. Asset Damage or loss.	Machine/plant tilting, alarms/readouts within plant. Foundation failure. Rilling of material from crest/batter.	*			*	Geotechnical analyses/assessment carried out as required. Including CPT testing where appropriate. GCMP - stability assessment of batter including loading surcharge completed prior to travel. Stand off distance from crest. Visual inspection of travel route. Use of suitably experienced spotter where appropriate.	4		4
68	Traralgon Creek - horizontal ground strain leading to cracking and creek water recharge of coal joints	Mining Activities. Seismic event.	Block movement or failure on Western Batters, loss of T'gon Creek Rd, closure of miner's view (lookout), flooding of mine impacting internal dump operations & infrastructure (power & water) on batters and at base of mine.	Horizontal ground strain exceeding 0.20%. eg. cracking in clay OB, allows ingress of water into coal impacting western batters stability.	*			*	GCMP - rainfall and pin monitoring. Surface drainage maintenance (including clay capping), horizontal drains, regular stability assessment and modelling using current groundwater levels (TARP).	4	Develop strain contours to identify risk areas. Understand allowable strains for assets.	4
2	Overhead Power - local supply (SP Ausnet)	Horizontal ground movement, mine batter instability, significant block movement rather than ground strain.	Direct damage to overhead line, poles, loss of power, loss of production. Safety incident, fire. Impact on aquifer depressurisation pumping system subsequently impacting mine stability.	Visual observation, loss of service (alarms on plant, remote monitoring). Routine inspections by SP Ausnet.	*			*	GCMP - rainfall and pin monitoring, ground water monitoring and TARPS. Horizontal drainage program. No further mining planned for Stage A and GW levels well below target (>20m).	3	Determine allowable strain. Assess against known strains (strain contour model).	3





Summary Detail							Current Risk Detail		Target Risk Detail			
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Power Station	Dams	External				
4	Extensive Fire resulting in damage to assets and infrastructure (monitoring equipment, power supply, communications) Damage to horizontal drain holes	Fire through a number of sources (external, spontaneous combustion, hot works, plant, vehicle)	Asset damage requiring repair or replacement, loss of power, lack of information regarding geotechnical conditions potential unknown change in stability conditions (movement, water levels), change in access limits.	Visual observations (widespread smoke), external reports, initiation of fire response, failure of remote monitoring system (telemetry failure)	*	*	*	*	Hard Stand and/or vegetation clearance around infrastructure. Fire fighting system Hot Spot Management Procedure. Coal exposure management for mine floor and benches. Use of clay capping. Vegetation management within mining area. Emergency Response Plan. Enhanced procedures post Hazelwood Fire. Testing of Fire Service System for provision of coverage, management of water and geotechnical response (groundwater, ground movement, shear movement). Target levels for batter stability, aquifer and groundwater levels have safety margin.	3		3
12	FSR tunnel	Differential subsidence.			*	*	*	*	Additional information required - check design docs for allowable strains. Runs perpendicular to crest. Tunnel containing various sections of pipework.	3		3
19	OB treatment ponds	Large scale failure of OB dump western batters	Inundation of treatment system by debris causing environmental impacts, property damage.		*		*	*	Dam management program, Emergency Management Plan and TARPs with alert levels. Dams are risk rated as per ANCOLD and appropriate management / monitoring plans in place	3		3
47	Rural Grazing Properties - dwellings and outbuildings	Horizontal movement due to stress relief and mine batter instability. Subsidence.	Damage to building footings, walls, potential for buildings to be uninhabitable.	Horizontal ground strain exceeding 0.25% (general limit for brick buildings)	*			*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network.	3	Additional survey to confirm design dump height is not being exceeded. Develop work instruction for construction of dump including surcharging / loading as standard practice. Carry out auditing against instruction.	3
63	Hyland Highway (Bartons Lane)	Subsidence due to groundwater extraction. Stress relief ground movement and /or horizontal block movement due to Stage F mining.	Deformation of pavement due to subsidence, cracking of pavement due to horizontal ground movement, rendering road non trafficable, impacting on accessibility. Potential for traffic incident. Potential increase in road maintenance. Reputation impact.	Flexible pavements - 0.6% horizontal ground strain. eg.. Horizontal movements deforming pavement contributing to cracking of road, requiring repairs. Regulatory breach.	*	*		*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. Monitoring program to be established prior to Stage F mining operations.	3		3
66	SWOP system - Within mining licence area	Subsidence due to groundwater extraction, substantial instability/failure of overburden dump	3rd party impact (Hazelwood & Yallourn waste disposal impact). Environmental discharge issue (saltwater contamination of land).	Alarms, remote pressure monitoring, visual observation of leakage on natural surface, pin survey results may indicate excessive movement.	*		*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance inspections and pipe pressure monitoring. Need to check owner's controls.	3		3
27	High quality Water Supply - leak resulting in increase in groundwater levels and batter instability.	Infrastructure age, pipe damage.	Induce unfavourable groundwater pressures impacting on block stability in the Western and Southern Batters. Impact on service to whole of Loy Yang site.	Pipe failure. eg.. Undetected pipe leak, water reaching coal joints, recharging groundwater, potential batter instability.	*	*	*	*	Gippsland Water pressure monitoring, pipeline inspection and maintenance program (specifics TBC). Groundwater monitoring program.	2		2





Summary Detail								Current Risk Detail		Target Risk Detail		
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station	Dams	External				
31	Traralgon Creek Road South	Potential for stress relief ground movement due to mining. Subsidence due to groundwater extraction, horizontal movement due to block movement.	Deformation of pavement due to subsidence, cracking of pavement due to horizontal ground movement, rendering road non trafficable, impacting on accessibility. Potential for traffic incident. Potential increase in road maintenance. Reputation impact.	Flexible pavements - 0.6% horizontal ground strain. e.g.. Horizontal movements deforming pavement contributing to cracking of road, requiring repairs. Regulatory breach.			*	*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. No further mining planned for Stage A.	2	geotech assessments during planning stage of these activities	2
34	Communications Cables - SEC cable, Mattingley Hill Road and Bartons Lane	Subsidence due to groundwater extraction, horizontal movement due to block movement. Potential for stress relief ground movement in Stage F mining.	Inducing strains in the cable causing damage. Loss of services to Loy Yang site. Potential for external impacts	Ground strain or shear. Reported system failure.	*			*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance checks by service provider - need to confirm ownership and practices.	2		2
42	Communications Cables - Optic Fibre , Traralgon Creek Road and Bartons Lane	Subsidence due to groundwater extraction, horizontal movement due to block movement.	Inducing strains in the cable causing damage. Loss of communication services to Loy Yang site from Traralgon South through to Mt Tassie	Ground strain or shear. Reported system failure.	*			*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Ground movement modelling on Northern Batters. Maintenance checks by service provider.	2	Perform new ground movement modelling when new ground data available, or for planned change in mine plan	2
45	Fire - restricted access to monitoring and fire fighting points (survey, obs bores, pump bores, visual)	Fire through a number of sources (external, spontaneous combustions, hot works, plant, vehicle)	Lack of information regarding geotechnical conditions potential unknown change in stability conditions (movement, water levels), change in access limits for fire fighting.	Visual observations (widespread smoke), external reports, initiation of fire response, failure of remote monitoring system (telemetry failure)	*	*	*	*	Regular groundwater monitoring (stability bores) to determine groundwater levels compared to Trigger Levels. Horizontal drain hole monitoring pre and during fire. Potential to use remote ground movement monitoring techniques. Infrared scanning of batters to identify hot spots and fire conditions.	2	Drill site establishment risk assessment process. Batter scaling etc	2
62	Rupture of High Quality Water Supply - 225ID DI and 225ID AC (from Clarkes Road (AC), and along Traralgon Creek Road (DI)).	Subsidence due to groundwater extraction, horizontal movement/strain due to stress relief or block movement. Maybe compounded by poor pipe condition.	Pipe failure resulting in hydraulic driver for increased groundwater levels, loss of service to whole of Loy Yang site. Potential impact on stability of Western Batters.	Horizontal ground strain 0.2%. Note different pipe materials. eg.. undetected pipe burst, water reaching coal joints, recharging groundwater, potential batter instability.	*	*	*	*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. Latrobe residential planning scheme. Gippsland Water pressure monitoring, pipeline inspection and maintenance program (specifics TBC).	2	Increased frequency of surveys for critical survey pins. Additional focus on batter change in alignment (at domain boundary location between N7 and N8). Undertake updated modelling (numerical) of northern batter conditions, performance and ground movement expectations - consider enhanced geotechnical model. Enhanced internal and external GCMP audit processes	2
18	Sewer - ground movement exceeding design criteria (alongside Traralgon Creek Rd)	Subsidence due to groundwater extraction, horizontal movement due to block movement.	Change in grade / hydraulics of pipe impacting on performance. Pipe failure resulting in potential contamination of Traralgon Creek (black water), loss of service to whole of Loy Yang site.	Horizontal ground strain 0.2%. Change of grade to be determined. eg.. Sewer failure entering Traralgon Creek, short term to medium environmental impact, may extend beyond AGL area. Community complaint.	*			*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group.	1.5		1.5





Summary Detail					Current Risk Detail				Target Risk Detail			
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains				Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Power Station	Dams	External				
37	SWOP system - External to mining licence area (power station area)	Subsidence due to groundwater extraction, substantial instability/failure of overburden dump	3rd party impact (Hazelwood & Yallourn waste disposal impact). Environmental discharge issue (saltwater contamination of land). Impact on all Loy Yang sites, immediate impact on generation due to inability to store waste.	Alarms, remote pressure monitoring, visual observation of leakage on natural surface (including public feedback), pin survey results may indicate excessive movement.		*	*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance inspections and pipe pressure monitoring. need to confirm ownership and practices.	1.5	Investigate remote ground movement monitoring techniques.	1.5
44	Traralgon Creek Road - subsidence or horizontal ground movement	Subsidence due to groundwater extraction, horizontal movement due to block movement.	Deformation of pavement due to subsidence, cracking of pavement due to horizontal ground movement, rendering road non trafficable impacting on accessibility. Potential for traffic incident. Potential increase in road maintenance. Reputation impact.	Flexible pavements - 0.6% horizontal ground strain. eg. horizontal movements deforming pavement contributing to cracking of road, requiring repairs. Regulatory breach.		*		*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group.	1.5	Enhanced procedures post Hazelwood Inquiry	1.5
5	Hyland Highway (Traralgon Creek Road)	Potential ground movement (block) due to Stage A mining. Subsidence due to groundwater extraction.	Deformation of pavement due to subsidence, cracking of pavement due to horizontal ground movement, rendering road non trafficable, impacting on accessibility. Potential for traffic incident. Potential increase in road maintenance. Reputation impact.	Flexible pavements - 0.6% horizontal ground strain. eg. . Horizontal movements deforming pavement contributing to cracking of road, requiring repairs. Regulatory breach.		*		*	GCMP - rainfall and pin monitoring. Regional subsidence model for prediction - LV Regional Groundwater Group. No further mining planned for Stage A.	1	Continue development of suppression and sealing techniques. Procedure for response to 'hot spots'	1





Summary Detail						Current Risk Detail			Target Risk Detail				
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains	Internal	Station	Dams	External	Current Controls	Risk Score	Target Controls	Risk Score
Mine site risks													
23	Coal block sliding or overburden slump/slip – mine permanent Southern Batters.	Water levels elevated (ponded water bodies, inflow source, drilling induced water injection, interconnection of aquifers etc.), strain-softening (progressive weakening), progressive failure, creep movements, low shear-strength interseam and / or coal contact, structural complexities (e.g..., continuous and unfavourably oriented fault / interconnecting structures). Excavation at the toe of the batters and vertical development, coupled with erosion and piping / excessive undercutting of thicker interseam exposures to east, poor ground conditions associated with Sheepwash Creek. Seismic Event.Small scale event resulting in water inflow thus leading to a larger scale failure.M1A increasing in thickness as mine progresses east (thickness to be confirmed) - check FoS for circular/slip failure in overburden/interseam.Impact of fire on above points (conveyors).	Mine infrastructure (including conveyor network - trunk and outlet conveyors; FS pipelines, dirty water pump station and main, power supply, monitoring network)Coal deliveryStakeholder infrastructure (e.g. SP Ausnet to LYS)Future collection pipes from groyne. Depressurisation pump bores.Surface drainage system.Secondary impact of failure of infrastructure (stage instability).Effect of alignment of remnant Sheepwash Creek on batter stability.	TARP's for groundwater level, movement rates. Surface movements (magnitudes, rates, trends). Visual inspections / observations (operations personnel and routine inspections), shear monitors, groundwater levels (trends and relative to targets).Report of misalignment on conveyor belt - also reported during end extension.Change in tension of power lines.	*				GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (installation, monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Seismic event TARP in conjunction with Dams triggered events.Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events. Frequency reading is immediately compared to "expected" reading to determine if there is an issue, if so additional calculations completed as priority.Field readings are undertaken with reference to previous levels (this allows immediate identification of changes)Interseam sampling and testing for material properties (ongoing program).Stability analysis and batter design, overall ground movement modelling (predictions). Need to check if reported against ultimate - TBC.Excavate to design profile using BWE Digging Charts, check of actual versus design.Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations.Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.Analysis included flood event of Sheepwash Creek diversions planned as mine progresses (post 2020).350m standoff between Dam and pit crest. Currently uncertain standoff between diversion and pit crest - TBC.	15	Calculate subsidence required to cause material change of grade of creek bed and likely future subsidence. Subject to assessment and, if required, construct new levees.	10	
54	Stackers and dump Conveyors - damage or collapse	Slope collapse. Insufficient bearing capacity (failed material, ingress of water). Operating outside operational limits.	Instability of stacker, damage of machine, outside of operational limits, overbalance and collapse. Loss of production. Damage to stacker and conveyor system. LTI or worse.	Visual observation, internal indicators and alarms.	*				Fortnightly inspection and reporting of operating areas.GCMP defines dump design limits, these are communicated through dump design drawings and set out by survey personnel.Operator training in geotechnical hazards.Inclusion of the overburden dump in statutory reporting including stability analysis along two lines.	12	Internal Overburden Dump construction to buttress Western, North West Batters.	8	





Summary Detail						Current Risk Detail		Target Risk Detail		
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Power Station				
11	Mine dewatering system, fire service, artesian pipeline - intentional discharge of water	Intentional discharge of water in mine (wash-down, dust suppression, firefighting, overflows during maintenance activities)	Increase of water in the mine resulting in increased water levels in coal joints and increased risk of block movement.	Increase in groundwater levels and surface water, increased horizontal drain flow rates. Observation of discharge event.	*		GCMP and TARPS for groundwater and ground movement. Fortnightly inspections including the observation and tracking of surface cracking repairs. Horizontal drain hole flow monitoring. Attendance of Geotech team at operations team meetings. Training of pit personnel in geotechnical hazards and the potential geotechnical issues caused by water. Target groundwater levels specified in TARPs allow for short term pump system outages for both artesian and mine dewatering systems to allow for scheduled and unscheduled maintenance. Awareness of impact of water discharge means related activities are planned and geotech support provided	8		4
17	Large-scale coal block sliding or coal mass / pseudo-circular failure/complex structural controls; overburden slump/slip – mine permanent north-eastern batters (area of current / future development).	One or more of - steep batters, water levels elevated (ponded water bodies, inflow source, drilling induced water injection, interconnection of aquifers etc.), strain-softening (progressive weakening), progressive failure, creep movements, low shear-strength interseam and / or coal contact, structural complexities (eg..., continuous and unfavourably oriented fault / interconnecting structures), northern strata dip impedes groundwater drainage into the mine. Excavation at the toe of the batters and vertical development, coupled with erosion and piping / excessive undercutting of thicker interseam exposures to east. Seismic Event.	Mine infrastructure (including DWPS, FS pipelines, power supply, aquifer depressurisation and collection system) Coal delivery Public infrastructure	TARP. Surface movements (magnitudes, rates, trends). Visual inspections / observations (operations personnel and routine inspections), shear monitors, groundwater levels (trends and relative to targets).	*		GCMP - rainfall and pin monitoring. Progressive piezometer installations and monitoring during vertical and lateral mine development. Sub-surface ground movement monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (installation, monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Interseam sampling and testing for material properties (ongoing program). Stability analysis and batter design, ground movement modelling (predictions). Excavate to design profile using BWE Digging Charts - batter angles checked against design fortnightly. Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations. Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into batter performance reports. Stability analysis including modelling for seismic loading as per AS, 1 in 500 year event (0.1g) Flood alert system developed that includes checks and production input.	8		8





Summary Detail							Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Power Station				
22	Large-scale coal block sliding or coal mass / pseudo-circular failure; overburden slump/slip – mine permanent north-western batters.	One or more of - steep batters, water levels elevated (ponded water bodies, inflow source, drilling induced water injection, interconnection of aquifers etc.), strain-softening (progressive weakening), progressive failure, creep movements, low shear-strength interseam and / or coal contact, structural complexities (eg..., continuous and unfavourably oriented fault / interconnecting structures), northern strata dip impedes groundwater drainage into the mine.	Mine infrastructure (including DWPS, FS pipelines, power supply, aquifer depressurisation and collection system)Coal deliveryPublic infrastructure	TARP. Surface movements (magnitudes, rates, trends). Visual inspections / observations (operations personnel and routine inspections), shear monitors, groundwater levels (trends and relative to targets).	*		GCMP - rainfall and pin monitoring. Sub-surface ground movement monitoring (shear-monitor bores) and piezometer monitoring. Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (installation, monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Interseam sampling and testing for material properties (ongoing program).Stability analysis and batter design, ground movement modelling (predictions).Excavate to design profile using BWE Digging ChartsPerform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations.Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into batter performance reports.	8		8
26	Smaller scale failure impacting on light vehicles, personnel, horizontal drill rig, localised failure of coal lump etc.	Degradation; e.g. erosion, weathering, etc. Lack of scaling of mine batter after BWE (i.e. Transition of operating face to permanent batter)	LTI or worse. Damage to plant and equipment,	Rilling of loose material. Visual observation of material on ground. Audible observation.			Site inspection prior to commencement of work. (Prestart Inspection, drilling site inspection). Wash down and excavator scaling of loose material. Use of Dig charts to ensure no overhang. Ned to source incident and investigation findings. Pit personnel training. Fortnightly inspections of pit including drill sites.	8		4
32	Undermining / fire holes etc as a consequence of burnt or eroded material	Areas of fire leaving burntout voids leading to subsidence or instability	Small scale batter / block movements. Introduction of hazards to personnel and vehicles	Sinkholes, washouts, surface subsidence, interruption to drainage path / systems	*		Coal Quality Drilling and Modelling. Targeted face mapping and drilling.	8	Maintain buffers and offsets to private infrastructure.	4
35	Coal block sliding or toppling; overburden slump/slip – mine operating faces (batter to double-batter scale).	Unfavourably oriented (daylighting / intersecting low angle structures for planar or wedge sliding; or steep joint sets striking sub-parallel to face and dipping into batters) structures, or significant overburden depth.Ponded water behind crest area.Intense and / or sustained rainfall events.Over-steepening / undercutting of batters.	PersonnelMine plant	Signs of excessive cracking, fretting of the face or localised slumping of materials.TARPs.Rainfall events.	*		Stand-off distance instructionsExcavate to design profile using BWE Digging Charts. Pre-strip over height areas to standard face height (overburden and coal) Pre-strip areas to reduce face height where geotechnical conditions are known to be unfavourable compared with standard (overburden and coal)Direct surface water runoff away from areaMaintain area adjacent to operating faces clear of infrastructure and personnelPerform fortnightly geotechnical inspections and implement resulting recommendationsCarry out mine inspections following significant / trigger rainfall eventsCarry out mine inspections following significant / trigger seismic eventsInstallation and measurement of direct monitoring points (eg..., either side of tension crack development) to gauge ground movement magnitudes and ratesPhysical demarcation - barriers or flagging off areas identified as susceptible or unstableOperator pre-start / work area checks and inspections. Stability analysis using seismic loading, 0.1g loading as per AS 1 in 500 year event.	8	Further investigate landfill management practices and construction history. Water quality monitoring of LCC landfill? Original landfill management / design? Investigate geology to understand potential for groundwater recharge through coal joints.	8



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Summary Detail									Current Risk Detail		Target Risk Detail		
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains					Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station	Dams	Power	External				
67	Old LCC Landfill / Transfer Station - ground movement exceeds tolerance limits	Subsidence due to groundwater extraction, tensile strains due to stress relief and additional strains due to block movement.	Failure of natural liner and clay cap, redistribution of waste materials, exposure of hazardous materials. Environmental impacts. Potential groundwater contamination.	Cracking of natural clay liner, horizontal ground strain of 0.20%. e.g. Remedial work in old LCC Landfill / Transfer Station	*					Pin line and water level monitoring; regular (12-month reporting) assessment of strain levels. Horizontal drain holes. LCC landfill monitoring and management practices - TBC.	6	Develop strain contours to identify risk areas. Understand allowable strains for underground assets.	6
9	Mine dewatering system, fire service, artesian pipeline - failure in pipeline resulting in release of water	Failure in pipeline integrity causing uncontrolled release of water.	Increase of water in the mine resulting in increased water levels in coal joints and increased risk of block movement.	Increase in groundwater levels and surface water, increased horizontal drain flow rates. Observation of failure and resulting discharge.	*					GCMP and TARPS for groundwater and ground movement. Fortnightly inspections including the observation and tracking of surface cracking repairs. Horizontal drain hole flow monitoring. Training of pit personnel in geotechnical hazards and the potential geotechnical issues caused by water. Target groundwater levels specified in TARPs allow for short term pump system outages for both artesian and mine dewatering systems to allow for scheduled and unscheduled maintenance. Pipeline is exposed allowing for visual inspection and/or casual observation.	5	Increase monitoring regime. Ensure spares available and repair methods are appropriate.	5
25	Mine dredgers - damage or collapse	Significant heave, batter collapse above or below. Insufficient bearing capacity (failed and/or unsuitable material, ingress of water through cracks).	Instability of dredger, damage of machine, outside of operational limits, overbalance and collapse. Loss of production. Damage to dredger and conveyor system. LTI or worse.	Visual observation, internal indicators and alarms.						DCP testing and other geotechnical assessment on maintenance pads, travel routes and non routine excavations. Assessments also completed as requested by production personnel. 12 monthly operating face stability assessment which includes face mapping. Fortnightly inspection and reporting of operating areas. GCMP defines mine design limits. Excavation plans (dig charts) used to communicate design limits and potential hazards to production personnel. Operator training in geotechnical hazards.	5	Horizontal Ground movement modelling of Stage F, Southern Batters in order to understand total strain values.	5
29	Loy Yang "A"	Ground movement - horizontal (stress relief or block movement) or subsidence (aquifer depressurisation or stress relief)	Potential damage to power station structures and/or damage to sensitive items of plant causing loss of generation.	Annual Surveillance of Structures Survey. Alarms, indicators and cut-off on sensitive plant in station eg. Turbine.				*		Design of power station allowed for development of mine in vicinity. Surface water drainage system in place.	5		5
33	Loy Yang "B"	Ground movement - horizontal (stress relief or block movement) or subsidence (aquifer depressurisation or stress relief)	Potential damage to power station structures and/or damage to sensitive items of plant causing loss of generation.					*		Design of power station allowed for development of mine in vicinity. Surface water drainage system in place. Regional pin survey.	5		5
38	Snowy Hydro (Valley Power)	Ground movement - horizontal (stress relief or block movement) or subsidence (aquifer depressurisation or stress relief)	Potential damage to power station structures and/or damage to sensitive items of plant causing loss of generation.					*		Regional pin survey.	5		5

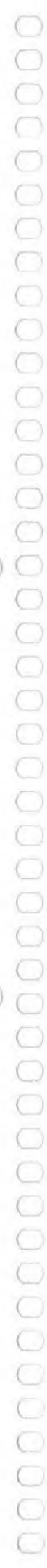




Summary Detail						Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains	Current Controls	Risk Score	Target Controls	Risk Score
					Internal Power Station Dams External				
39	Fire Fighting impacts - fire fighting water, increase in water level in coal joints	Fire through a number of sources (external, spontaneous combustions, hot works, plant, vehicle)	Trigger batter instability, block slide or structurally controlled instability. Trigger large batter movements damaging infrastructure (including mine and geotech).Crack formation (new and old opening) cutting across open drains, compounding problem. Safety and access issues due to cracking.	Flow rates of horizontal drain holes, increased coal levels in monitoring bores, visual observation of cracking, water from open joints, bedding planes, ground movement monitoring (if possible)	*	Horizontal drain holes including regular monitoring program to establish baseline conditions.Surface drainage management systems including clay capping, grading, cross drains on permanent and operating batter.Testing of Fire Service System including monitoring of groundwater response.GCMP - batter stability assessment using current and trigger groundwater levels and implementation of TARPS.	5		4
69	Mine dewatering system, fire service, artesian pipeline - Ground movement resulting in pipe failure	Stress relief ground movement, mine batter instability, heave, localised differential movement.	Increased stresses on pipelines, potential failures. Water may recharge coal joints and cause instability. Potential flooding of areas of mine leading to loss of production.	Horizontal ground strain (>0.2%)	*	Doglegs in pipelines traversing batters are designed to withstand strains greater than 0.2%. Target groundwater levels specified in TARPs allow for short term pump system outages for both artesian and mine dewatering systems to allow for scheduled and unscheduled maintenance.Horizontal borehole drainage program to dewater mine batters.Pipeline is exposed allowing for visual inspection and/or casual observation.	5	Increase monitoring regime. Ensure spares available and repair methods are appropriate.	5

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Summary Detail						Current Risk Detail		Target Risk Detail		
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station				
20	Overhead Power - Loy Yang mine	Horizontal ground movement, mine batter instability, significant block movement rather than ground strain.	Direct damage to overhead line, poles, loss of power, loss of production. Safety incident, fire. Impact on aquifer depressurisation pumping system subsequently impacting mine stability.	Visual observation, loss of service (alarms on plant, remote monitoring). Routine inspections.	*		GCMP - rainfall and pin monitoring, ground water monitoring and TARPS. Horizontal drainage program. No further mining planned for Stage A and GW levels well below target (>20m).	4.5	Develop strain contours to identify risk areas. Understand allowable strains for assets.	3
28	Drainage - main drain.	Potential for stress relief ground movement. Subsidence due to groundwater extraction, horizontal movement due to Stage F movement.	Damage or failure may limit ability to discharge stormwater. Discharge may recharge existing joints or accelerate block failure. Additional dirty water management at bottom of mine.	Visual observation of drainage water escaping, flooding of Barton's Lane or Traralgon Creek Road.	*	*	GCMP - pin survey monitoring program including mine and grass level survey. Maintenance inspections and pipe monitoring.	4.5	Develop strain contours to identify risk areas. Understand allowable strains for assets.	4.5
50	Internal dump	Slope collapse. Insufficient bearing capacity (failed material, ingress of water). Operational outside operational limits. Optimistic design. Lower strength material placed compared to design assumptions.	Instability of stacker, damage of machine, outside of operational limits, overbalance and collapse. Loss of production. Damage to stacker and conveyor system. Safety incident. Damage to in pit infrastructure including trunk conveyors, FS pipeline, power lines, dirty water pipeline.	Visual observation of cracking, material run, geotechnical monitoring results, movement surveys(?), loss of function of infrastructure.	*		Design process with geotechnical assessment.	4.5	Develop strain contours to identify risk areas. Understand allowable strains for assets.	3



Summary Detail							Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station				
57	Coal delivery area - Raw Coal Bunker, crusher house, rising conveyors, etc.	Ground movement - horizontal (stress relief or block movement) or subsidence (aquifer depressurisation or stress relief). Future Stage F mining impacts.	Potential damage to structures, impact ability to transfer coal, impact on coal supply. Impact on underground services.	Pin Survey Results, structural damage to RCB or crusher house. Misalignment of conveyors - visual, auto stop	*		Currently area is outside of GRZ, however, Stage F mining will reduce distance. GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (installation, monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Seismic event TARP in conjunction with Dams triggered events. Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events. Frequency reading is immediately compared to "expected" reading to determine if there is an issue, if so additional calculations completed as priority. Stability analysis and batter design, overall ground movement modelling (predictions). Need to check if reported against ultimate. Annual and 6 monthly survey of pin lines - data incorporated into geotechnical performance reports. Risk assessments and action plan previously developed to cover loss of coal transport and storage in this area.	4		4
1	Low Quality Water Supply - twin PCP (RRJ) / MSCL (welded)	Infrastructure age, pipe damage.	Induce unfavourable groundwater pressures impacting on block stability in Stage A. Impact on service to whole of Loy Yang site.	Horizontal ground movement and strain exceeding 0.20% (general limit for pipeworks). Increase in groundwater level in batter. Possible increased flow in horizontal boreholes. Telemetry to Power Station to indicate pipe breach.	*	*	GCMP - pin monitoring, groundwater monitoring and TARPS check on groundwater level. Routine inspections by AGL LY including pressure monitoring. Telemetry to Power Station to indicate pipe breach. Cathodic protection on metal components.	3	Mock exercise to evaluate effectiveness of controls. Early warning system.	3
3	Large plant maintenance within mine or dump - jacking loads on coal and dumped overburden resulting in foundation failure and significant machine damage or loss.	Insufficient bearing capacity (failed material, lack of suitable site preparation). Rilling of material from batters.	Asset Damage or Loss. LTI or worse.	Machine/plant tilting, alarms/readouts within plant. Foundation failure. Rilling of material from crest/batter.	*		Geotechnical analyses of jacking loads carried out as required (including DCP). Risk assessment of site carried out to determine safety measures required - measures may include buffer distance, rock fall protection, etc.	3		3
6	Mine drainage system failure	Mine ground movements, deterioration & silting up of drains, differential movements. Significant rainfall event. Leaking or failed water pipe within the mine.	Deterioration of drainage effectiveness, exacerbates situation (discharge may recharge existing joints or accelerate block failure). Water may recharge coal joints and cause instability. Potential flooding of areas of mine leading to loss of production.	Observation, increased ground water levels, surface run off, horizontal drain flows.	*		Recently upgraded system including increased capacity, inbuilt redundancy, allowance for minor ground movement, pump and flow monitoring. Ground movement and groundwater levels monitored as part of GCMP and TARPS.	3		3

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Summary Detail							Current Risk Detail		Target Risk Detail			
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains			Current Controls	Risk Score	Target Controls	Risk Score	
					Internal	Power Station	Dams	External				
7	Mine conveyors to interchange (Jungle)	Stress relief ground movement, mine batter instability, heave, localised differential movement.	Misalignment of conveyor through to direct damage. Loss of production. Includes drive units. More repair / longer recovery.	Belt tracking incorrectly. Auto shutdown. Visual inspection. Pin survey results.	*				<p>GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP).</p> <p>Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events.</p> <p>Field readings are undertaken with reference to previous levels (this allows immediate identification of changes). Stability analysis and batter design, ground movement modelling (predictions).</p> <p>Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations.</p> <p>Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.</p>	3	<p>Consideration of greater density of pin survey monitoring including installation of pin lines ahead of operation (currently pin lines are installed after overburden is removed).</p> <p>Ground movement modelling to predict rate of and ultimate horizontal movement, ensure data has a time component based on mine plan/schedule.</p> <p>Additional geotechnical investigation specifically for Highway.</p> <p>Analysis to determine extent of potential block slide - distance from crest, including consideration of potential structures (drainage paths and failure planes)</p> <p>Implementation of an enhanced secondary drainage system.</p> <p>TBC: Management by VicRoads to manage risk to public and infrastructure.</p>	3
8	Fire service reservoir	Horizontal ground movement.	Insignificant, group considered not necessary to assess.			*	*		Dam break study, Emergency Management Plan and TARPs with alert levels. Dams are risk rated as per ANCOLD and appropriate management / monitoring plans in place	3		3
13	Sheepwash Creek retention basin and external mine cut off drainage	Significant ground movements, strains, subsidence. Major mine batter instability.	Impacts upon functional performance. Uncontrolled water flows (localised flooding in mine, ponding in areas not intended, contribution to groundwater). Batter instability issues. Loss of production.		*				Dam inspection as per ANCOLD guidelines and risk rating Geotech design provides for offset and future subsidence predictions External drainage system has been modelled for high return interval events	3		3
14	Ash pond	Seismic event. Extreme rainfall event leading to overtopping. Differential land subsidence. Deterioration of dam structure. Dump failure into ash pond.	Loss of production. Environmental impact on local area. Potential property/3rd party damages. Impact on dump stability	ref dams RA	*	*	*		Dam break study, Emergency Management Plan and TARPs with alert levels. Dams are risk rated as per ANCOLD and appropriate management / monitoring plans in place	3		3

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Summary Detail							Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station				
21	Coal block sliding or overburden slump/slip – mine permanent southern batters Stage A.	Water levels elevated (ponded water bodies, inflow source, drilling induced water injection, interconnection of aquifers etc.), strain-softening (progressive weakening), progressive failure, creep movements, low shear-strength interseam and / or coal contact, structural complexities (e.g. continuous and unfavourably oriented fault / interconnecting structures), erosion and piping. Insufficient resources to manage geotechnical hazard.	Mine infrastructure (including main PS at top; intermediate PS; pump bore; aquifer system; FS pipelines, power supply)Coal deliveryPublic infrastructure	TARP. Surface movements (magnitudes, rates, trends). Visual inspections / observations (operations personnel and routine inspections), shear monitors, groundwater levels (trends and relative to targets).	*		GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events.Field readings are undertaken with reference to previous levels (this allows immediate identification of changes).Stability analysis and batter design, ground movement modelling (predictions).Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations.Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.Trained and suitably experienced technical personnel available to manage issue.	3		3
30	Mine Floor Heave.	Excessive aquifer pressures possibly due to: loss of power, pump outage, fire, loss of bore, poor planning.	Floor Heave. Destabilisation of batters, aquifer pressure increase above target levels. Damage to infrastructure including conveyors, pipelines, pump bores, obs. bores.	Aquifer monitoring, visual observation, misalignment of conveyors. Telemetry on pump bores.	*		Model hydrogeological conditions Depressurise aquifers beneath mine floor Monitor aquifer pressures Monitor aquifer depressurisation system performance Carry out mine inspections following significant rainfall event Plan and implement new or replacement aquifer pumping bores in line with mine development Annual and 6 monthly survey of pin lines – data incorporated into batter performance reports Redundancy in bore pumping system to allow for pump outages. Targets levels for aquifer pressure are set 10m below weight balance.	3	Geotechnical Study of variable material properties, pore water pressure profile and final batter angle that will provide guidelines for construction and final design.	3
46	Fire - damage to or loss of power to pumping infrastructure resulting increase in aquifer pressure, or discharge of water from bores to dirty water system. Increase in water in mine floor due to fire fighting water.	Fire through a number of sources (external, spontaneous combustions, hot works, plant, vehicle)	Floor heave, destabilisation of batters, aquifer pressure increase above target levels.Excess water in dirty water system - inability to manage large volume of dirty water resulting in flooding of pump station, and possible failure of groyne.	Visual observations (widespread smoke), external reports, initiation of fire response, failure of remote monitoring system (telemetry failure).Overloading of dirty water system triggers alarms/telemetry.	*		Hard Stand and/or vegetation clearance around infrastructure.Fire fighting systemHot Spot Management Procedure.Coal exposure management for mine floor and benches. Use of clay capping.Vegetation management within mining area.Emergency Response Plan.Enhanced procedures post Hazelwood Fire.Testing of Fire Service System for provision of coverage, management of water and geotechnical response (groundwater, ground movement, shear movement).Target levels for batter stability, aquifer and groundwater levels have safety margin.High Level transfer pipe in groyne to reduce the risk overtopping.	3	Domain based monitoring program based on risk profile: increased frequency of surveys for critical survey pins. Installation of inclinometer bores at critical locations. Additional focus on batter change in alignment (at domain boundary location between N7 and N8; but also inflexion point at N10-N11), but early construction of horizontal drains and increased monitoring (effectiveness of draining of water from batters). Undertake further investigation and modelling (numerical) by June 2015 of northern batter conditions, performance and ground movement expectations - consider enhanced geotechnical model. Treatment / protection through stabilisation of thicker exposed interseam layers (M1A and M1B) in the final batters.Consider flattening overall permanent batters.	3





Summary Detail							Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station				
56	Overburden Dump Instability – Operating Face. Slumping of toe, slips on backside dump.	Poor strength and/or wet materials placed in dump causing instability. Ground movement, poor drainage, over height dumping.	Instability of stacker, damage of machine, outside of operational limits, overbalance and collapse. Loss of production. Damage to stacker and conveyor system. Impact access, ash dumping activities. LTI or worse.	Visual inspection by operators.	*		Follow overburden dumping procedure (maximum dumping height, minimum standoff distances, appropriate use of capping material, buffer areas for personnel access) Perform fortnightly geotechnical inspections and implement resulting recommendations Carry out mine inspections following significant seismic event	3	Increased frequency of surveys for critical survey pins. Set-up field monitoring such that immediate comparisons with target levels can be undertaken. Training for operators to increase awareness of geotechnical hazards, causes and triggers. Implementation of standardised designs for drainage systems based on modelling of primary and secondary flow paths with redundancy built into the design. Built in failsafe systems to allow for batter movement. Increased system capacity. Auto shut down of dewatering pump system based on flow meter monitoring to include aquifer dewatering collection lines and fire service system. System is alarmed. Identify sites of remnant creek beds and dams then adjust batter design to meet conditions. XX Define mitigating controls - contingency plans. Compare to Risk Assessment for Southern Batters (QRA 2011)	3
65	Coal block sliding or overburden slump/slip – mine permanent western batters.	Water levels elevated (ponded water bodies, inflow source, etc.), strain-softening (progressive weakening), progressive failure, creep movements, low shear-strength interseam and / or coal contact, structural complexities (e.g., continuous and unfavourably oriented fault / interconnecting structures), erosion and piping.	Mine infrastructurePublic infrastructure	TARP. Surface movements (magnitudes, rates, trends). Visual inspections / observations (operations personnel and routine inspections), shear monitors, groundwater levels (trends and relative to targets).	*		GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events. Field readings are undertaken with reference to previous levels (this allows immediate identification of changes). Stability analysis and batter design, ground movement modelling (predictions). Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations. Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.	3		3
43	Communications Cables - Telephone around Loy Yang site, local services	Subsidence due to groundwater extraction, horizontal movement due to batter instability	Inducing strains in the cable causing damage. Loss of services to Loy Yang site.	Ground strain or shear. Reported system failure.	*	*	Regional subsidence modelling. LV Regional Groundwater Committee to collaborate on depressurisation program. GCMP - pin survey monitoring program including regional pin network. Maintenance checks by service provider - need to confirm ownership and practices.	2	Assess potential for liquefaction.	2





Summary Detail						Current Risk Detail		Target Risk Detail				
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score		
					Internal	Power Station	Dams	External				
48	Mine Floor/Operating Face Power Cabling	Cable damage caused by ground movement, batter failure, floor heave,	Direct damage to cable on ground, loss of power, loss of production. Safety incident, fire. Impact on aquifer depressurisation pumping system subsequently impacting mine stability.	Visual observation, loss of service (alarms on plant, remote monitoring). Routine inspections.	*				Aquifer depressurisation and monitoring	2		2
51	Coal production area (mine administration and workshop areas)	Ground movement - horizontal (stress relief or block movement) or subsidence (aquifer depressurisation or stress relief)	Peripheral damage to buildings, structures, loss of services, potential loss of plant control / control centre, impact on production, workshop crane activity impacted due to differential ground movement (cranes on rails).	Pin Survey Results, visual observation of structural damage to buildings.	*				Area is outside of GRZ - Stage A mining completed.GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (installation, monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Seismic event TARP in conjunction with Dams triggered events.Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events. Frequency reading is immediately compared to "expected" reading to determine if there is an issue, if so additional calculations completed as priority.Stability analysis and batter design, overall ground movement modelling (predictions). Need to check if reported against ultimate - TBCAnnual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.Risk assessments and action plan previously developed to cover loss of coal transport and storage in this area.	1.5	Training and guidance material for onsite personnel and combating agencies.	1.5
64	Conveyor Galleries	Stress relief ground movement, mine batter instability, heave, localised differential movement.	Misalignment of conveyor structures through to direct damage. Loss of production.	Belt tracking incorrectly. Auto shutdown. Visual inspection. Pin survey results.	*	*			GCMP - rainfall and pin monitoring. Sub-surface monitoring (shear-monitor bores). Surface drainage maintenance (including clay capping) to minimise surface water inflows to coal joints, horizontal drains (monitoring and maintenance), regular stability assessment and modelling using current groundwater levels (TARP). Key stability monitoring bores have been identified and are monitored at regular intervals and in association with trigger rainfall events.Field readings are undertaken with reference to previous levels (this allows immediate identification of changes).Stability analysis and batter design, ground movement modelling (predictions).Perform thorough fortnightly geotechnical inspections, formally report and communicate outcomes and implement resulting recommendations.Carry out mine inspections following significant rainfall events (consistent with TARP) or other defined trigger events including ground movement episodes and seismic events. Annual and 6 monthly survey of pin lines – data incorporated into geotechnical performance reports.	1.5		1.5





Summary Detail							Current Risk Detail		Target Risk Detail	
Risk ID	Risk Description	Causes	Potential Impacts	Triggers / Indicators	Domains		Current Controls	Risk Score	Target Controls	Risk Score
					Internal	Station				
36	Fire in Overburden Dump resulting in damage to geotechnical monitoring equipment	Fire through a number of sources (external, spontaneous combustion, hot works, plant, vehicle)	Asset damage requiring repair or replacement, loss of power, lack of information regarding geotechnical conditions potential unknown change in stability conditions (movement, water levels), change in access limits.	Visual observations (widespread smoke), external reports, initiation of fire response, failure of remote monitoring system (telemetry failure)	*		Fire fighting system Hot Spot Management Procedure. Use of clay capping. Vegetation management plan. Emergency Response Plan. Enhanced procedures post Hazelwood Fire.	1	Training and guidance material for onsite personnel and combating agencies.	1





Appendix 3 – Stakeholder Register (summary only)



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Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Landholders potentially affected by mining (see Table 8.3.1)	Neighbours	30	1
Traralgon Lions Club	Business/Community Leaders	2	3
Advance Morwell	Business/Community Leaders	2	3
Traralgon Chamber of Commerce & Industry Inc.	Business/Community Leaders	1	3
Gippsland Regional Executive Forum	Business/Community Leaders	1	3
Regional Development Australia (VIC)	Business/Community Leaders	1	3
Traralgon South and District Association	Business/Community Leaders	1	3
Traralgon Rotary Club	Business/Community Leaders	2	3
Traralgon Neighbourhood Learning House	Business/Community Leaders	1	3
Traralgon & District Historical Society	Business/Community Leaders	1	3
VicRoads	Business/Community Leaders	1	3
Vline	Business/Community Leaders	1	3
Latrobe Regional Hospital	Business/Community Leaders	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
APEX	Business/Community Leaders	1	3
Latrobe Regional Hospital	Business/Community Leaders	1	3
Latrobe Community Health Service	Business/Community Leaders	1	3
Lifeline Gippsland	Business/Community Leaders	1	3
Latrobe City Basketball Association	Business/Community Leaders	1	3
Quantum Support Services	Business/Community Leaders	1	3
Australian Paper, Maryvale Mill	Business/Community Leaders	2	3
Call Centres - Centrelink	Business/Community Leaders	1	3
DHS Public Housing Call Centre	Business/Community Leaders	1	3
Committee for Gippsland	Business/Community Leaders	8	3
Baw Baw Latrobe Local Learning and Employment Network	Business/Community Leaders	1	3
Gippsland Water	Business/Community Leaders	1	3
Anglicare	Business/Community Leaders	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Maryvale Private Hospital	Business/Community Leaders	1	3
Church Street Post Office	Business/Community Leaders	1	3
Traralgon Post Office	Business/Community Leaders	1	3
Westpac, Traralgon	Business/Community Leaders	1	3
Bendigo Bank, Traralgon	Business/Community Leaders	1	3
ANZ, Traralgon	Business/Community Leaders	1	3
Bank of Melbourne, Traralgon	Business/Community Leaders	1	3
NAB, Traralgon	Business/Community Leaders	1	3
Commonwealth Bank, Traralgon	Business/Community Leaders	1	3
HVP Plantations	Business/Community Leaders	1	3
Branstrans	Business/Community Leaders	1	3
Willaton Transport	Business/Community Leaders	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Victoria Farmers Federation	Business/Community Leaders	1	3
Gippsland Asbestos Related Disease Support (GARDS)	Community Support Partners	1	3
Latrobe Theatre Company	Community Support Partners	1	3
Lifeline Gippsland	Community Support Partners	1	3
Traralgon Tennis Association	Community Support Partners	1	3
Strzelecki Showtime	Community Support Partners	1	3
The Smith Family	Community Support Partners	1	3
Traralgon & District Cricket Association	Community Support Partners	2	3
Traralgon City Band	Community Support Partners	1	3
Traralgon Little Athletics Centre	Community Support Partners	1	3
Traralgon RSL Men's Bowls	Community Support Partners	1	3
Traralgon Swimming Club	Community Support Partners	1	3
The Smith Family	Community Support Partners	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Transfield Worley Power Services	Contractors	1	2
RTL	Contractors	1	2
Lend Lease	Contractors	1	2
Siemens	Contractors	1	2
Belle Banne	Contractors	1	2
Veolia	Contractors	1	2
Birdon	Contractors	1	2
GHD	Contractors	1	2
MSS Security	Contractors	1	2
Deanmac	Contractors	1	2
Diamond Power	Contractors	1	2
Traralgon Auto Group	Contractors	1	2
ODG Haden	Contractors	1	2
Nilsen	Contractors	1	2
Assetlink Services	Contractors	1	2



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Claxton Design	Contractors	1	2
EDR	Contractors	2	2
Drilltec	Contractors	1	2
Optimum Drafting	Contractors	1	2
Progility Pty Ltd	Contractors	1	2
Conco	Contractors	1	2
Konecranes	Contractors	1	2
BMC Welding and Construction	Contractors	1	2
Transpacific Industrial Solutions	Contractors	1	2
Gippsland lifts and Cranes	Contractors	1	2
SGS Australia	Contractors	1	2
Silvertec	Contractors	1	2
Boom Logistics	Contractors	1	2



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Pro Draft	Contractors	1	3
Sage Technologies	Contractors	1	3
HRL	Contractors	4	3
Mecrus	Contractors	2	3
Traralgon College	Education	1	3
Kurnai Precinct Campus	Education	2	3
Kurnai Morwell Campus	Education	1	3
Federation University	Education	1	3
Traralgon South Primary School	Education	1	3
Hazelwood North Primary School	Education	1	3
Liddiard Road Primary School	Education	1	3
Flinders Christian Community College	Education	1	3
Gormandale & District Primary School	Education	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Federation Training	Education	1	3
Lavalla Catholic College	Education	1	3
Federation University	Education	1	3
Kurnai College	Education	1	3
Department of Education and Early Childhood Development	Education	2	3
Federation University	Education	1	3
Victoria Police	Emergency Services	1	3
Ambulance Victoria	Emergency Services	2	3
St Johns Ambulance	Emergency Services	2	3
VicRoads	Emergency Services	3	3
Country Fire Authority - Morwell	Emergency Services	1	3
Country Fire Authority - Traralgon	Emergency Services	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Country Fire Authority Sale Hq - Gippsland Headquarters - District 10	Emergency Services	1	3
Victoria Police	Emergency Services	2	3
Victoria State Emergency Services	Emergency Services	1	3
Flynn Farm Discussion & Landcare Group	Environmental Groups	1	1
Flynn Farm Discussion & Landcare Group	Environmental Groups	1	1
Voices of the Valley	Environmental Groups	2	3
Friends of Tarra Bulga National Park	Environmental Groups	1	3
Agribusiness Gippsland	Environmental Groups	1	3
ERC	ERC Members	7	1
West Gippsland Catchment Management Authority	Government Agencies	1	3
EPA	Government Agencies	1	2
Victorian WorkCover Authority	Government Agencies	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Wellington Shire Council	Government Agencies	1	3
Coal Resources Victoria, DEDJTR	Government Agencies	1	2
Bass Coast Shire Council	Government Agencies	1	3
CarbonNet	Government Agencies	1	3
AusIndustry	Government Agencies	1	3
Department of Industry	Government Agencies	1	3
DEDJTR	Government Agencies	7	3
DTPLI	Government Agencies	1	3
EPA Gippsland	Government Agencies	1	3
Department of Human Services	Government Agencies	2	3
DEPI	Government Agencies	2	3
Regional Development Victoria	Government Agencies	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Department of Economic Development, Jobs, Transport and Resources	Government Agencies	1	2
Department of Transport, Planning and Local Infrastructure	Government Agencies	1	3
Southern Rural Water	Government Agencies	2	3
Wellington Shire Council	Government Agencies	1	3
WGCMA	Government Agencies	2	3
Energy Supply Association of Australia (ESAA)	Industry Associations	2	3
Minerals Council of Australia (MCA)	Industry Associations	1	3
VECCI	Industry Associations	1	3
Brown Coal Innovation Australia	Industry Associations	1	3
Latrobe City Council	Latrobe City	17	2
Energy Australia	Latrobe Valley Generators	3	2
GDF Suez Loy Yang B	Latrobe Valley Generators	2	2



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
GDF Suez	Latrobe Valley Generators	1	2
Energy Australia Yallourn	Latrobe Valley Generators	2	2
GDF Suez Hazelwood	Latrobe Valley Generators	1	2
GDF Suez	Latrobe Valley Generators	4	2
AJ & MM Bolton Pty Ltd	Leaseholders	1	1
R&H and R&T EDGAR	Leaseholders	1	1
Riverview Pastoral Pty Ltd	Leaseholders	1	1
GWF Enterprises Pty Ltd	Leaseholders	1	1
Hodgson Agricultural Contracting	Leaseholders	1	1
Millring Pastoral Pty Ltd	Leaseholders	1	1
Coal Valley Seeds	Leaseholders	1	1
AF Sheridan & Partners	Leaseholders	1	3
Latrobe City Council	Leaseholders	1	3
HVP Plantations	Leaseholders	1	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Traralgon Motorcycle Club	Leaseholders	1	3
The Nationals	Local Politicians	2	3
Liberal Party	Local Politicians	1	3
Latrobe Valley Express	Media	2	3
Southern Cross Ten	Media	1	3
ABC Gippsland	Media	1	3
WIN TV	Media	1	3
Latrobe Valley Express	Media	1	3
TRFM	Media	1	3
ABC Radio, Gipps	Media	1	3
Latrobe Resources Pty Ltd	Project Partners	2	3
CSIRO	Project Partners	2	3
Kawasaki Heavy Industries	Project Partners	2	3
Shanghai Electric Australia Power and Energy Development	Project Partners	2	3



Organisation	Contact Group	Individual Contacts	Impact level 1 = High 2 = Medium 3 = Low
Victorian District Mining & Energy Division (CFMEU)	Unions	2	3
Electrical Trade Union	Unions	1	3
Australian Services Union	Unions	1	3
GTLC	Unions	2	3



Appendix 4 – Technical References



Technical References

Section Reference	Filename	Description
3.4.12	LYPM-Stage 6 CHMP final.pdf	Andrew Long & Assoc – Cultural Heritage assessment (Stage 6) January 2011
4.4.1 & 4.4.3	194690 Groyne design Report rev 1.pdf	GHD Report – Development of Groyne at Base of Mine design report. October 2011
4.2	164426.pdf	GHD Report - Northern Batters Waste Du. Construction Geotechnical Assessment. April 2009
4.4.6	FW Ash dredging trial – AGL Loy Yang.msg	Email – Ash Dredging trail December 2013
4.4.8	Sheepwash Ck Diversion – works_on_waterways_application.pdf	West Gippsland Catchment Authority – Works on Waterways Application Form
4.4.8	Sheepwash Creek stakeholder feedback.pdf	Minutes of meeting November 2008 SMEC Urban – advice to Southern Rural Water – April 2009 Email - SMEC Urban – further advice to Southern Rural Water – April 2009
6.3	238842.pdf	GHD Report Mine Lake Water Balance Modelling – March 2015
6.4.1	192317.pdf	GHD Report – External Overburden Dump material parameter review – June 2011