5. Identification and Prioritisation of Issues

This Section provides details of the environmental risk assessment undertaken for the project. This purpose of the risk assessment is to identify and prioritise environmental issues to be addressed in the EA documentation.

5.1 Identification and Prioritisation of Issues

A risk management culture has been adopted by the W2CP to effectively manage any adverse effects that the proposal may have on the environment and the community.

In order to identify and prioritise issues relevant to the W2CP, several risk assessments were carried out using a transparent process as described in the following sections. The assessment process commenced at the project inception in 1996 and will continue through the approval process, final design, construction, operation and ultimately closure of the mine. The latest risk assessment was carried out in October 2009 which included the final EARs issued by the Director-General of the Department of Planning.

An assessment of the W2CP under SEPP 33 – Hazardous and Offensive Development was also undertaken, as part of the identification of hazards. Details of the assessment are contained in Appendix O, and it was concluded that the project is not a potentially hazardous development.

In addition to internal risk identification, W2CP engaged the Central Coast Research Foundation to undertake both community and business attitude surveys which was added to the results of other consultation activities. The results of this work were used to identify issues of concern to both the local business sector, and the local community. Issues that were commonly reported as being of concern included:

- Impacts on groundwater;
- Impacts on surface water supply;
- Subsidence impacts on houses and structures;
- Changes to flooding;
- Noise;
- Increased vehicle movements;
- Increased number of trains; and
- The visual appearance.

These issues were taken into account in designing the W2CP and the assessment of potential impacts, as described in following chapters.

5.2 Objectives of the Risk Assessment Process

The objective is to employ a comprehensive risk assessment process of the potential environmental impacts of the W2CP and to identify the key issues for further assessment.

The process satisfies the EARs and involved a Risk Assessment Workshop which:

- Identified and quantified risks and determined the effectiveness of the controls and strategies contained within the EA documentation to date to eliminate or mitigate those risks.

- Assisted the team to finalise an EA which demonstrably fulfils the obligations under the EAR's.

- Provided the team with a documented Risk Assessment in accordance with the Scope and NZS 4360:2004, the Australian/ New Zealand Standard for Risk Management and HB 203: 203:2006 Environmental Risk Management – Principles and Process (Standards Australia).

- Provided a written report on the Risk Assessment findings. This report is provided as Attachment 3 within this volume of the EA.

The object of the overall risk assessment process is to achieve the following goals:

- A more confident and rigorous basis for decision-making and planning;
- Better identification of opportunities and threats;
- Pro-active rather than re-active management;
- More effective allocation and use of resources;
- Improved stakeholder confidence and trust; and
- Improved compliance with relevant legislation.

5.2.1 Risk Assessment Methodology

A flow diagram of the steps taken in the risk assessment process, including the key steps of assessment of risks (analysis and evaluation) is shown in Figure 5.1, and further defined in the following sections.

The W2CP risk assessment procedure has been adapted from AS/NZS 4360: 2004, for risk management, which includes the following steps:

- Communicate and Consult;
- Establish the Context;
- Hazard identification (referred to as Environmental Issues);
- Risk Analysis;
- Risk Evaluation; and
- Treating Risk.

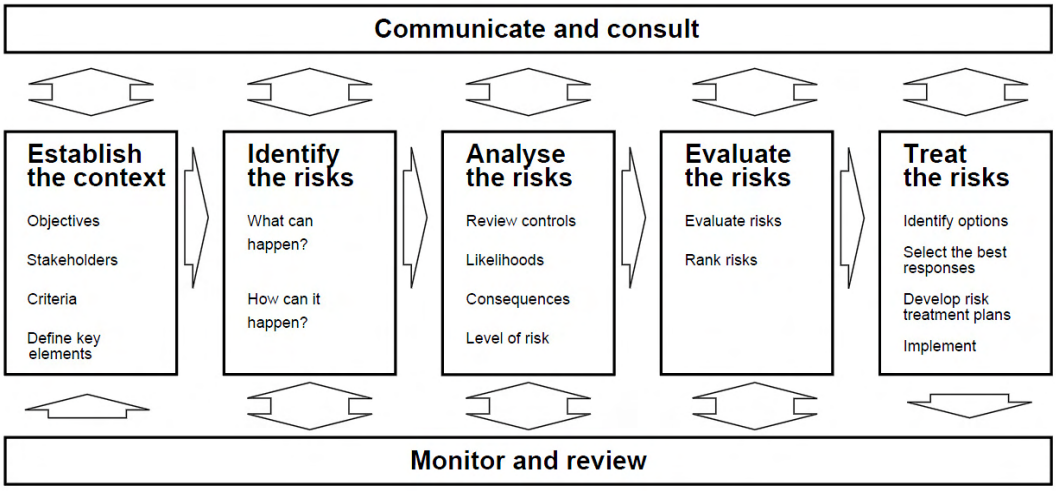

Figure 5.1 Risk Management Process

5.2.2 Communicate and Consult

This initial step in the risk assessment has been paramount and ongoing throughout the entire planning process, and will continue into the life of the W2CP should planning approval be granted.

Communication and consultation has involved various stakeholders, and is described in detail in Section 10.1.

5.2.3 Establish the Context

This component of the risk assessment involved identifying the relationship of the proposed W2CP to the external environment including operational, political, social, cultural, regulatory and legal aspects and public perception. This process was facilitated by the identification of, and communication with, stakeholders to the project, which are described in Section 10.1.

Establishing this strategic context was an important preliminary step because the objectives and perceptions of some of the external stakeholders were not always consistent with those of the project team, and have highlighted aspects of the project that required additional investigation through the planning and assessment processes.

5.2.4 Issue Identification

An environmental issue, for this purpose, was defined as follows:

> "*an environmental issue is the intrinsic potential for an agent, activity or process to lead to an incident, or ongoing condition".*

An incident, or ongoing condition, was regarded as any occurrence that has the potential to result in adverse consequences to people, the environment, property, or a combination of these. Consequences can result from the development of an incident over time, either immediately after or over a period of time.

In carrying out the various risk assessments for the project, it was recognised that a single hazard may be the cause of multiple incidents and in turn, any one incident can have multiple potential consequences.

Environmental Issue identification was the most important step in the risk assessment process for prioritisation of issues together with the identification of potential incidents. Once the environmental issues and potential incidents were identified, the assessment of the risks was carried out.

5.2.5 Risk Analysis, Evaluation and Treatment

Risk issues were defined as specific effects resulting from an incident and may be related to people, the environment, plant, or a combination of these.

Once the environmental issues and potential incidents were identified, the risk was assessed by determining:

- The severity of the potential consequences that could result from the potential incident; and
- The likelihood or probability of each consequence.

Based on these two inputs, the risk matrix shown Table 5.1 was used to qualitatively rank those issues of greatest potential importance to the W2CP.

Once the level of risk involved with each potential hazard was determined, the acceptability of that risk was assessed. In cases where the level of risk was assessed as being high or extreme, steps were taken in the design of the project to reduce the risk so the effect or impact would become as low as reasonably practicable. Therefore an essential part of the assessment process is the determination of risk reduction strategies and their potential effectiveness to control, reduce or eliminate the risk.

Given that the risk assessment process has been ongoing for 13 years, many of the issues have already been resolved. Mitigation strategies in all areas are well advanced. This enables the risk assessments to be continually reviewed and modified accordingly.

Table 5.1 Risk Ranking Table

LIKELIHOOD	CONSEQUENCE				
	1	2	3	4	5
A	1	2	6	10	15
B	3	4	9	14	19
C	5	8	13	18	22
D	7	12	17	21	24
E	11	16	20	23	25

The definition of the resultant risk rankings is provided in Table 5.2.

Table 5.2 Guidelines for Risk Control Measures & Barriers

Risk Ranking		Guidelines for Risk Control Barriers
1-5	Extreme	**Needs senior management attention - detailed action plan required** Critical Condition(s) Noted: Specific element of project proposal requires refinement/revision to improve project merits.
6-13	High	**Needs senior management attention – proactively manage & monitor** Significant potential impacts noted requiring additional control and/or project refinement; Needs senior management attention for urgent proactive action to consider the need for any project revision as well as to enhance management & monitoring proposals; Risk of adverse approval conditions if unsatisfactorily resolved.
14-20	Medium	**Specify management responsibility – actively monitor & manage** Medium level residual impacts identified which would benefit from additional attention to project refinement or enhanced control commitments or capability, at least during the ongoing assessment process (such as by PAC), to avoid the risk of unnecessarily stringent approval conditions.
21-25	Low	**Manage by routine procedures & monitor** Low risk level residual impacts considered to be adequately managed by routine design, construction and operational arrangements, including monitoring.

As mentioned previously, risk assessments undertaken in the early stages of the project identified several areas as having a high potential risk and therefore requiring the implementation of further mitigation measures to reduce the environmental impact of the project to acceptable levels.

Subsequent risk assessments, including the most recent one contained in Attachment 1, took account of the various project modifications and mitigation strategies which enabled the residual risk rankings to be significantly reduced. But it must be stressed that these residual risk rankings are not residual impacts but rather reflecting the level of ongoing management attention required.

For the W2CP, the current risk assessments have not resulted in any high scores because control measures have been incorporated into the design of the project. These control measures are now included in the project application and this EA to enable these controls to form part of the approved project. The remaining Medium scores are for those issues that will require ongoing management attention and to enable an adaptable approach during the life of the operation.

The Low scores also require ongoing management and monitoring but there is less likelihood of the proposed mitigation strategies requiring change.

Through the detailed risk assessment process, the WACJV and its consultants are confident that all of the relevant issues have been identified and accurately assessed.

5.2.6 Monitor and Reviewing the Issues

Throughout the planning stages of the W2CP the potential environmental, social, economic and political issues have been under constant review. Factors that may affect the likelihood and consequences of an issue may change, which in turn may alter the risk associated with the development. This will continue to be the case throughout the life of the project, should planning approval be granted.

Regular review of risk assessments is also important in verifying that the methodology, logic and predicted outcomes are in fact consistent with the reality of the project.

5.3 Summary of Risk Ranking and Results

Table 5.3 summarises the risk rankings for the identified environmental issues. The ranking method is described in **Attachment 3** along with the detailed spreadsheets for individual issues. The risk analysis process undertaken acknowledges that systematic environmental management will be required on an ongoing basis throughout the project to ensure that identified risks are suitably managed. Further, this systematic approach directs the project to allocate appropriate management resources and further actions so that any potential impacts and consequences stemming from these risks are minimised.

Table 5.3 Summary of Risk Analysis

System	Sub-system	Hazard	Hazards / Environmental Issue	Consequence	Likelihood	Residual Risk	Comment
1	H	1	Environmental effects to Cliffs or Pagodas • Cliffs are located within the unused quarry • Other cliffs identified are small and predicted not to be impacted	2	E	M	Cliff in unused quarry requires management plan to address safety and access issues when mining occurs.
2	H	1	Environmental effects to 330 kV transmission lines – suspension & tension towers **Note**: assessment based on assumption that putting supply at risk is not an option.	2	E	M	
1	T	1	Environmental effects to Acoustic Amenity (Noise)	3	C	M	

System	Sub-system	Hazard	Hazards / Environmental Issue	Consequence	Likelihood	Residual Risk	Comment
2	I	1	Environmental effects to Telecommunication Lines or Associated Plants • optic fibre cables • Copper underground services • Cellular Mobile Telephone Services (CMTS) sites • GSM Tower	3	D	M	
9	A	1	Environmental effects to houses	3	D	M	Note: While a moderate risk technically, due to the potential for public concern, senior management must be involved in pro-actively manage this issue.
1	B	1	Subsidence effects to the mining area, associated with subsiding areas in the vicinity of: • Wyong River • Jilliby Jilliby Creek • Little Jilliby Jilliby Creek • Hue Hue Creek • Minor tributaries Effects can include Increased levels of ponding, flooding or scouring; changes to stream alignment; fracturing of the bedrock in the floors of valleys; surface water flow diversions to the shallow sub-strata; changes to water quality and release of strata gas.	4	B	M	
1	A	1	Environmental effects to Catchment Areas or Declared Special Areas. • Mine is located within the Wyong River catchment area (supply to Mardi Dam)	4	E	L	
1	Q	2	Environmental effects to Natural Vegetation / Ecology from Surface infrastructure. Population of squirrel gliders has been identified along Wallarah Creek in the past (1995) but has not been re-recorded since. • see OzArk ecology report	4	D	L	
1	S	1	Environmental effects to Air quality	4	D	L	
1	V	1	Environmental effects from excessive energy usage	4	D	L	Conduct an energy efficiency audit each three years after the commencement of mining
1	W	1	Environmental effects from greenhouse gas emissions	4	D	L	Monitor greenhouse emissions & mitigation measures Coal mine methane & utilisation strategy to be developed within 3 years of longwall operations following monitoring experience
2	C	1	Environmental effects to bridges	4	D	L	
2	C	2	Environmental effects to bridges	4	D	L	
2	E	1	Environmental effects to culverts	4	D	L	
2	F	1	Environmental effects on: • Gosford-Wyong Water Supply Scheme (Mardi Dam, Wyong Weir, Proposed Mangrove Creek Pipeline)	4	E	L	
2	F	2	Environmental effects to Water supply infrastructure within the mining area	4	D	L	
2	F	5	Environmental effects to on site waste water systems (No public sewage infrastructure to be impacted)	4	D	L	
2	H	3	Environmental effects to Local overhead lines	4	D	L	

System	Sub-system	Hazard	Hazards / Environmental Issue	Consequence	Likelihood	Residual Risk	Comment
2	J	1	Environmental effects to Water Tanks, Water or Sewage Treatment Works • Treelands Drive Reservoir tanks (located just inside the eastern extent of the general Study Area)	4	D	L	
2	L	1	Environmental effects to air strips	4	D	L	
3	M	1	Environmental effects to visual impacts of infrastructure	4	D	L	
4	B	1	Environmental effects to farm Buildings or Sheds	4	D	L	
4	G	1	Environmental effects to Irrigation Systems	4	D	L	
4	H	1	Environmental effects to Fences	4	D	L	
4	I	1	Environmental effects to Farm Dams	4	D	L	
4	J		Environmental effects to Wells or Bores • 12 bores within subsidence zone	4	D	L	
5	D		Environmental effects to minor Gas or Fuel Storages associated with rural properties	4	D	L	
6	A	1	Environmental effects to Aboriginal heritage: • Six known archaeological sites and more expected to exist above mining area. • No specific heritage surveys were undertaken for this EA, however certain areas were identified as having potential for sites to be present.	4	D	L	Site Aboriginal Heritage Management Plan to be prepared prior to construction commencing.
8	A	1	Environmental effects to Permanent Survey Control Marks	4	D	L	
9	E	1	Environmental effects to Associated Structures such as Workshops, Garages, On-Site Waste Water Systems, Water or Gas Tanks, Swimming Pools or Tennis Courts	4	D	L	Review and manage as part of Property Subsidence Management Plans
1	B	2	Environmental effects to • Wallarah Creek • Buttonderry Creek • Small unnamed creeks	4	C	M	
1	K	1	Environmental effects to Land Prone to Flooding or Inundation • Yarramalong Valley floodplain • Dooralong Valley floodplain	4	C	M	• SMP to contain specific management strategies for structures that are deemed to be at risk • Prepare & implement individual property subsidence management plans
1	K	2	Environmental effects to Land Prone to Flooding or Inundation • Yarramalong Valley floodplain • Dooralong Valley floodplain	4	C	M	Further specific measures may be identified and agreed during consultative negotiations for individual property subsidence management plans.
1	S	2	• Environmental effects to odour	4	C	M	
2	B	1	Environmental effects to Roads (All Types • Local roads above mining area – sealed and unsealed	4	B	M	
5	C		Environmental effects to Business or Commercial Establishments or Improvements Disused quarry, Turf farms, equestrian establishments, cattle properties, nursery, forestry operations, etc.	4	C	M	

System	Sub-system	Hazard	Hazards / Environmental Issue	Consequence	Likelihood	Residual Risk	Comment
1	D	1	Environmental effects to springs Isolated springs. Geological dip is to southwest and springs expected to be most prevalent on south facing slopes mainly in hilly forested areas.	5	C	L	
1	E	1	Environmental effects to Seas or Lakes • Budgewoi Lake • Tuggerah Lake (outside subsidence area)	5	E	L	
1	I	1	Environmental effects to steep slopes within the subsidence area	5	C	L	
1	L	1	Environmental effects to Swamps, Wetlands or Water Related Ecosystems • Water related ecosystems within mining area	5	D	L	
1	L	2	Environmental effects to Swamps, Wetlands or Water Related Ecosystems • Unnamed wetland to north of Tooheys Road site	5	D	L	
1	M	1	Environmental effects to Threatened or Protected Species • No critically endangered ecological populations affected • No endangered ecological populations affected • one endangered, six vulnerable and three regionally significant flora species that have potential to be affected either directly or indirectly • 10 species of threatened and 3 species of regionally significant mammals, 1 species of regionally significant reptile, 2 threatened and regionally significant frogs and 2 threatened and 3 regionally significant species of birds recorded in the study areas, with a further 8 mammals, 3 birds, 2 frogs and 1 insect potentially present. • Four Endangered Ecological Communities above the mining area subject to changed flooding regimes	5	D	L	
1	M	2	Environmental effects to Threatened or Protected Species • No critically endangered ecological populations affected • No endangered ecological populations affected • one endangered, six vulnerable and three regionally significant flora species that have potential to be affected either directly or indirectly • 10 species of threatened and 3 species of regionally significant mammals, 1 species of regionally significant reptile, 2 threatened and regionally significant frogs and 2 threatened and 3 regionally significant species of birds recorded in the study areas, with a further 8 mammals, 3 birds, 2 frogs and 1 insect potentially present.	5	D	L	The project has been determined as a controlled action and therefore additional species are to be included in the EA for assessment in accordance with the bilateral agreement for approval under the EPBC Act.
1	Q	1	Environmental effects to Natural Vegetation / Ecology	5	C	L	
1	U	1	Environmental effects to soils due to subsidence	5	D	L	• detailed rehabilitation plans should they be required • Refinement of monitoring program in association with landholders (dependant on permission to access)
1	U	2	Environmental effects to soils from surface infrastructure	5	C	L	
2	F	3	Environmental effects to Hunter water supply pipeline	5	E	L	
2	F	4	Environmental effects to Gas Infrastructure	5	E	L	

System	Sub-system	Hazard	Hazards / Environmental Issue	Consequence	Likelihood	Residual Risk	Comment
2	H	2	Environmental effects to 132 kV Transmission lines	5	E	L	
	K	1	Environmental effects to Dams, Reservoirs or Associated Works • Mardi Dam (outside subsidence zone) • Mangrove Creek Dam (outside subsidence zone)	5	E	L	
3	C	1	Environmental effects to Schools Jilliby Public School in mining area.	5	E	L	
3	E	1	Scout Camp located in subsidence study area. Dooralong Hall and Wyong Creek Halls outside subsidence area.	5	E	L	
4	A	1	Environmental effects to agricultural Utilisation or Agricultural Suitability of Farm Land	5	E	L	
5	G		Environmental effects to Surface Mining (Open Cut) Voids or Rehabilitated Areas Disused Quarry: No significant impacts anticipated while quarry not operational.	5	D	L	
6	A	2	Environmental effects to Aboriginal heritage: • Two Sensitive Archaeological Landforms (SALs) present along Wallarah Creek in Tooheys Rd site • No sites identified in Buttonderry or Western Shaft areas	5	E	L	Site Aboriginal Heritage Management Plan to be prepared prior to construction commencing. The management plan will incorporate additional test excavation that will be undertaken prior to final project approval.
6	A	3	Environmental effects to European heritage: • 12 potential items in subsidence area; • 3 listed items in subsidence area.	5	E	L	Site European Heritage Management Plan to be prepared prior to construction commencing.
1	C	1	Environmental effects to aquifers and known groundwater conditions namely • regional hard rock strata, within which the coal seam provides limited groundwater storage and the overburden materials act as aquitards or acquicludes (flow rates within system very low: 0.036 – 3.6 mm/yr; brackish to saline). • shallow weathered rock (increased but limited groundwater transmission & storage capacity). • unconsolidated alluvial aquifers within valleys. Rainfall driven, with a shallow water table 2-10 m below ground surface (flow rates within alluvium typically 36 – 3600 mm/yr; fresh to saline).	5 5 5 5	A C B C	M L M L	Comment: Note that '5AM' relates to effects while '5CL' is the environmental consequence associated with this effect
2	B	2	Environmental effects to other roads • F3 Freeway • Wallarah Interchange • Motorway Link Rd / Tooheys Road intersection • Sparks Rd / Hue Hue Rd intersection • Local roads	5	B	M	