

Appendix A4

Environmental & Community Risk Assessment

Appendix A4 – Environmental Risk Assessment

An environmental risk assessment has been undertaken for the 500kV Electricity Transmission Line (ETL) relocation and s.75W mine plan modification projects (the 'Projects') to identify the key issues which warrant further detailed assessment and discussion. The environmental risk assessment was undertaken in accordance with Mangoola Coal's Risk Management Standard GEN-HSE-STD-0005 Risk and Change Management, which is consistent with the principles outlined in Australian, New Zealand and the International Organization for Standardization (AS/NZS ISO) Standard 31000:2009 – Risk Management: Principles and Guidelines (formerly the AS/NZS 4360:2004 Risk Management Standard) (Standards Australia, 2009). The results of the risk assessment are included in **Attachment A**.

The method used for the environmental risk assessment encompasses the following key steps:

1. establish the context for the risk assessment process;
2. identify environmental risks;
3. analyse risks; and
4. evaluate risks to determine significant issues.

Each of these steps is discussed further below.

Establish the Context

The risk assessment undertaken for the Projects considers risks to the natural environment and members of the public. The Projects are considered to be the processes and activities described in **Section 3.0** of the Environmental Assessment (EA).

Risk Identification

Risk identification involves identifying the environmental risks to be managed, and in its simplest form involves the analysis of the severity and frequency of potential impacts and the operational processes underlying any impact.

In order to provide a systematic framework to identify environmental risks, the following basic process was used:

1. select a component of the surrounding environment that may be impacted by the Projects;
2. identify the activities, **Section 3.0** of the EA, that may affect the value; and
3. identify the potential environmental impacts (positive or negative, acute or chronic) for each value, as a result of these activities.

Risk Analysis

Risks are typically analysed by combining possible consequences and their likelihood, in the context of existing measures to control the risk. The consequence and likelihood of each risk determines the level of risk.

Each risk was assessed using a five level qualitative ranking of consequence (referred to as the maximum reasonable consequence (MRC)) and likelihood as listed in **Table 1** and **Table 2** respectively. This yields a five by five risk analysis matrix and results in three levels of risk: 'High Risk', 'Medium Risk' and 'Low Risk', as shown in **Table 3** and **Table 4**.

Table 1 - Qualitative Measures of Consequence

Severity Level	People	Property	Environment	Community
(1) Catastrophic Impact	Multiple Fatalities Major permanent negative impacts on a large number of people.	Unplanned mine closure Greater than \$10M	Disastrous environmental impact, with long term effect, requiring major remediation, regulatory intervention or premature closure of the operations.	Public international condemnation. Major breakdown of social order in affected community.
(2) Severe Negative Impact	Single fatality Severe irreversible disability or impairment (PDI).	Could cause major damage \$1M - \$10M	Serious environmental impact, with medium term effect, requiring significant remediation or resulting in prosecution.	Loss of community's economic viability. Significant damage to reputation of the operations.
(3) Major Negative Impact	Major injury to one or more persons Severe health impacts on a number of people.	Could cause major damage \$100K - \$1M	Moderate, reversible environmental impact with short term effect, requiring moderate remediation, such as a reportable incident not likely to result in prosecution, e.g. a minor water discharge.	Significant public criticism, e.g. community complaints. NGO or media 'taking up the issue'. Major negative impact on economic viability.
(4) Negative Impact	Significant reportable injury (MTI, or less than 5 days RWI or LTI) Major impact on health of several people.	Could cause moderate damage \$10K - \$100K	Minor, reversible environmental impact, requiring minor remediation such as a non reportable environmental incident, e.g. a minor oil spill.	Flare up of issues in affected communities. Media criticism.
(5) Minor Negative Impact	Minor injury Slight negative impact on individual health.	Could cause minor damage <\$10K	Negligible, reversible environmental impact, requiring very minor or no remediation.	Slight negative impact on individuals in local community.

Source: Mangoola Coal's Risk Management Standard GEN-HSE-STD-0005 Risk and Change Management, Risk Assessment Matrix Tool

Table 2 - Qualitative Measure of Likelihood

Level	Descriptor	Description	Guideline
A	Almost Certain	Consequence is expected to occur in most circumstances	Occurs daily/weekly
B	Likely	Consequence will probably occur in most circumstances	Occurs once every 1 month
C	Moderate	Consequence should occur at some time	Occurs once every 1 year
D	Unlikely	Consequence could occur at some time	Occurs once every 5 years
E	Rare	Consequence may only occur in exceptional circumstances	Occurs once every 25 years

Source: Mangoola Coal's Risk Management Standard GEN-HSE-STD-0005 Risk and Change Management, Risk Assessment Matrix Tool

Table 3 - Qualitative Risk Matrix

Likelihood of the Consequence	Maximum Reasonable Consequence				
	(1) Catastrophic Impact	(2) Severe Negative Impact	(3) Major Negative Impact	(4) Negative Impact	(5) Minor Negative Impact
(A) Almost certain	1	2	4	7	11
(B) Likely	3	5	8	12	16
(C) Occasionally	6	9	13	17	20
(D) Unlikely	10	14	18	21	23
(E) Rare	15	19	22	24	25

Source: Mangoola Coal's Risk Management Standard GEN-HSE-STD-0005 Risk and Change Management, Risk Assessment Matrix Tool

Although the risk rating gives no quantification of the actual value of the risk for a particular aspect, it does allow a relative comparison between issues to enable risks to be prioritised, facilitate informed decisions about treating risks and help identify whether a risk is acceptable.

Table 4 shows the risk classification that the qualitative values in **Table 3**, above, represent.

Table 4 – Risk Classification

High Risk (H)	1 – 10 (Red)
Medium Risk (M)	11 – 19 (Yellow)
Low Risk (L)	20 – 25 (Green)

Table 5 shows the format used for the Project environmental risk assessment contained in **Attachment A**.

Table 5 – Format for Project Environmental Risk Assessment

Activity	Environmental Value	Potential Impacts/ Consequences	Status and Proposed Control	Risk Assessment	Further Assessment required	Key Issue
Identifies the Projects' activities that may affect the Environmental Value.	Components of the surrounding environment that can be affected by the Projects.	This describes any change to the environment, whether adverse or beneficial, wholly or partly resulting from the Projects' activities.	Details current understanding of the existing environment and existing controls.	Assessment of likelihood, consequence and risk score. Assumes no controls.	Identifies potential impacts that warrant further assessment based on risk of potential impacts.	Highlights the key issues requiring further assessment.

Risk Evaluation

Risk evaluation concerns setting priorities for decisions about risk. The purpose of risk evaluation is to compare risks against significance criteria to determine the degree of assessment required. The application of significance criteria will reduce the number of activities that require specific management attention and provides an opportunity to prioritise environmental issues based on predetermined criteria.

Although guidelines and regulations provide great detail on risk identification and characterisation, there is less guidance on what constitutes an acceptable level of risk. This is because the development of risk acceptance criteria is quite subjective and is not an exact science or based on a complex formula. For each risk assessment process there is a degree of flexibility in defining its own criteria to determine which impacts are potentially "significant" and which are not. For the purposes of this Environmental Assessment, significant risks have been defined as those with a risk rating of high, as defined by **Table 3**.

It is important to note that certain impacts associated with the Projects' activities may be predetermined as significant by State or Federal legislation. These 'regulated' impacts, whilst not always rated as significant based on risk score alone, will also require further assessment to be undertaken.

Attachment A

Relocation of the existing 500kV ETL and s.75W modification

Environmental Risk Analysis

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
ELECTRICITY TRANSMISSION LINE											
Construction of relocated ETL	Noise	Degradation of noise amenity (cumulative)	4	D	Low	Potential for noise generation during construction phase. Current controls include: • Construction to occur in daytime hours only; • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>; and • Noise Management Plan (NMP).	5	D	Low	Further assessment to confirm minimal impact.	No

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Ecology	Loss of native flora and fauna	3	C	Med	Potential to impact on ecological values in areas outside of the approved project disturbance boundary. Some clearing will also be required. Current controls include: • Project design and constraints analysis to minimise impact; • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>; • Ground Disturbance Permits; • Sustainable Development Management System (SDMS); and • Rehabilitation and Offset Management Plan (ROMP).	4	C	Med	An assessment, including offsets, of the potential impacts of the Projects on ecological values will be undertaken.	Yes

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Cultural Heritage	Disturbance of Aboriginal places or objects	4	D	Low	Potential to impact on Aboriginal places and objects in areas outside of the approved project disturbance boundary. Current controls include: • Project design and constraints analysis to minimise impact; • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>; • Understanding construction and decommissioning methodology for towers and conductors; • Ground Disturbance Permits; • SDMS; and • Aboriginal Cultural Heritage Management Plan (ACHMP).	5	D	Low	A full assessment, including offsets, of the potential impacts of the Projects on cultural heritage will be undertaken.	Yes
	Historical Heritage	Disturbance of sites of historic value	4	D	Low	Potential to impact on heritage places and objects in proposed areas outside of the approved project disturbance boundary. Current controls include: • Ground Disturbance Permits; • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>; and • Controls specified in Project Approval original Environmental Assessment (Umwelt, 2006).	5	E	Low	A full assessment of the potential impacts of the Projects on historic heritage will be undertaken.	No

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Water Quality, Erosion and Sedimentation	Erosion and sedimentation of local waterways	4	D	Low	Potential to impact on local waterways and water quality. Current controls include: • Site Water Management Plan (SWMP); • Ground Disturbance Permits; • SDMS; • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>; and • Controls specified in original Environmental Assessment (Umwelt, 2006) (inside approved project disturbance boundary). Any additional controls will be designed and constructed in accordance with <i>Soils and Construction</i> (Landcom 2004).	5	D	Low	Water management assessment will be undertaken, which will include Project specific erosion and sediment controls will be developed.	No
	Visual Amenity	Aesthetics of cleared areas and exposed earthworks and construction works	5	B	Med	Potential to impact on visual amenity during the construction phase. Current controls include: • Visual control measures (e.g. vegetation screens); • Project design which optimises shielding behind natural landforms and mine; • SDMS; and • Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	5	C	Low	A full assessment of the potential visual impacts of the Projects will be undertaken.	Yes

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Electric and Magnetic Fields (EMF)	Human Health effects associated with high voltage transmission lines	5	E	Low	As the design of the relocated ETL has included the principles of prudent avoidance and the measured levels of EMF associated with the ETL are below relevant guideline limits, no specific environmental controls are proposed for EMF.	5	E	Low	An EMF assessment of the potential EMF impacts will be undertaken.	Yes
	Traffic	Supply of machinery and materials for construction resulting in increased traffic	2	D	Med	The project will result in an increase in traffic (including heavy vehicles) on the local road network. Current controls include: • Construction Traffic Management Plan (CTMP); • Development and implementation of an <i>ETL Construction Environmental Management Plan</i>.	4	D	Low	A traffic assessment of the potential impacts will be undertaken.	Yes
	Socio-economic	Impacts on services/local infrastructure	4	D	Low	The construction of the ETL will utilise approximately 50 people. Potential impacts to services and local infrastructure.	5	D	Low	Potential socio-economic impacts will be addressed.	No

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
MINING ACTIVITIES											
Operation of mine	Noise	Degradation of noise amenity (cumulative)	3	C	Med	Potential for significant impacts from noise generation during the operation of the mine and facilities. Current controls include: - Noise Management Plan; - SDMS; - Mining Operations Plan (MOP); - Noise Control Measures; and - Specific design revisions to limit noise (e.g. noise wall at the rail loop and splitting pits in Year 2 to limit noise).	4	D	Low	Further assessment to confirm minimal impact.	Yes
	Blasting	Vibration, dust and noise associated with blasting activities	2	E	Med	Potential for impacts from vibration, dust generation and noise generation during blasting activities associated with mining: - SDMS; - Blast Monitoring Plan; - Mining Operations Plan (MOP); - Noise Management Plan; and - Air Quality Management Plan.	4	E	Low	A blasting assessment will be undertaken.	No
	Traffic	Increased traffic on local roads associated with increased workforce	2	D	Med	The project will result in an increase in traffic (including heavy vehicles) on the local road network. Current controls include: - Traffic Management Plan (TMP); and - Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	4	D	Low	A traffic assessment of the potential impacts will be undertaken.	No

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Dust generation	Degradation of air quality	4	C	Med	Potential for significant impacts from dust generation during the operation of the mine and facilities. Current controls include: • Air Quality Management Plan; • SDMS; • MOP; • Contractor management; and • ROMP.	4	D	Low	Further assessment to confirm minimal impact.	Yes
	Ecology	Failure of rehabilitation efforts inside the approved project disturbance boundary	3	C	Med	Potential to impact on ecological values through rehabilitation failures e.g. weed infestation. Current controls include: • Mining Operations Plan (MOP); • SDMS; and • ROMP.	4	C	Med	An assessment of the potential impacts of the Projects on ecological values will be undertaken.	Yes
	Cultural Heritage	Disturbance of Aboriginal places or objects	2	E	Med	Potential to impact on Aboriginal places and/or objects associated with blasting. Current controls include: • Blast Monitoring Plan (BMP); • MOP; • SDMS; and • ACHMP.	4	E	Low	A full assessment of the potential impacts of the Projects on cultural heritage will be undertaken.	Yes

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Historical Heritage	Disturbance of sites of historic value	4	E	Low	Potential to impact on places and objects of historic heritage value outside of the approved project disturbance boundary. Current controls include: • MOP; • Blast management for Anvil Rock and The Book; • SDMS; and • Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	5	E	Low	A full assessment of the potential impacts of the Projects on historic heritage will be undertaken.	No
	Water Management, including tailings	Degradation of local waterways and groundwater	2	D	Med	Potential to impact on surface and ground water quality. Current controls include: • SWMP; • SDMS; • Environmental Protection Licence; and • MOP. Any additional erosion and sedimentation controls will be designed and constructed in accordance with <i>Soils and Construction</i> (Landcom 2004).	4	D	Low	Water management assessment will be undertaken, which will include tailings management and clean water management.	Yes

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Visual Amenity	Aesthetics of cleared areas and exposed earthworks and stockpiles	4	C	Med	Potential to impact on visual amenity. Current controls include: • Visual control measures (e.g. vegetation screens); • SDMS; and • Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	4	D	Low	A full assessment of the potential visual impacts of the Projects will be undertaken.	Yes
	Ecology – extension areas	Direct impact through clearing in extension areas to approved project disturbance boundary	3	C	Med	Potential to impact on ecological values and threatened species. Current controls include: • Mining Operations Plan (MOP); • SDMS; • ROMP; and • Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	4	C	Med	An assessment of the potential impacts of the Projects on ecological values will be undertaken. Project design will minimise impacts on threatened flora and fauna wherever possible.	Yes

Activity	Environmental Value	Potential Impact/Hazard	Risk Assessment			Status and Proposed Control	Residual Risk			Further Assessment Requirements	Key Issue?
			MRC	L	R		MRC	L	R		
	Energy and Greenhouse	Emission of greenhouse gases	4	D	Low	The operation of the modified mine will require use of electricity, diesel and petrol. The greenhouse gas emissions resulting from this energy consumption will be assessed. Current controls include: • SDMS; • Energy efficiency audits; • NGERS reporting; and • Controls specified in Project Approval and original Environmental Assessment (Umwelt, 2006).	5	E	Low	A greenhouse gas assessment will be undertaken.	Yes
	Socio-economic	Impacts on services/local infrastructure	4	D	Low	The project will employ approximately 300 people plus contractors. Potential impacts to services and local infrastructure.	4	D	Low	Potential socio-economic impacts will be addressed.	No
ANCILLARY ACTIVITIES AND ISSUES											
Maintenance of relocated ETL	Dust generation and noise	Degradation of air quality and noise amenity	4	D	Low	All maintenance activities associated with the relocated ETL will be undertaken in accordance with TransGrid procedures.	4	E	Low	No further assessment is required.	No

References

Standards Australia (2009), *Australian, New Zealand and the International Organization for Standardization AS/NZS ISO 31000:2009 – Risk Management: Principles and Guidelines*.

Umwelt (Australia) Pty Limited (Umwelt) (2006), *Anvil Hill Project Environmental Assessment*, Prepared for Centennial Hunter Pty Limited.