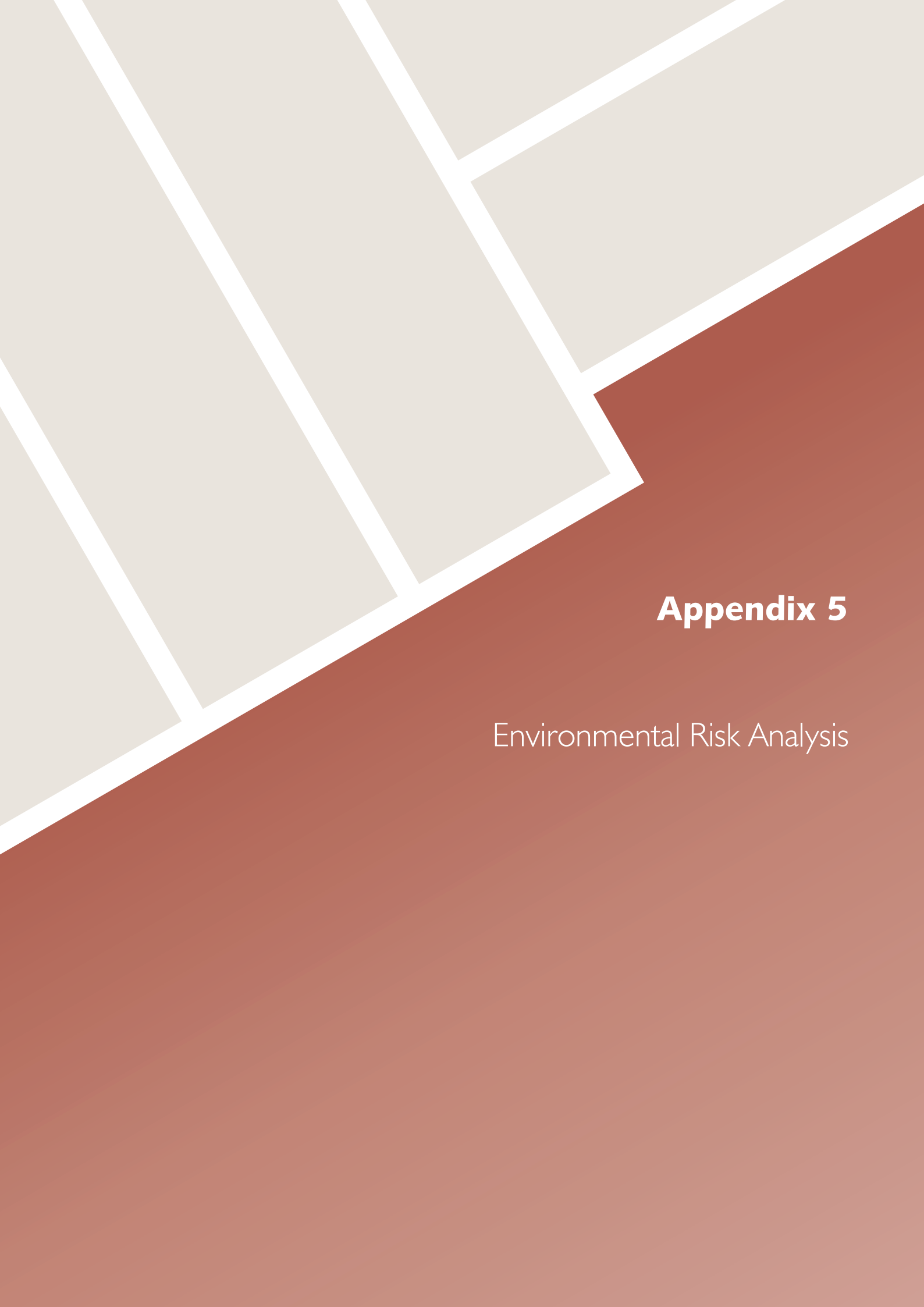




Appendix 5

Environmental Risk Analysis

Environmental Risk Analysis

To assist in identifying the key environment and community issues that require detailed assessment as part of the Environmental Impact Statement (EIS), a preliminary environmental risk analysis was completed by Glencore for the Project. The preliminary environmental risk analysis was undertaken in accordance with Glencore Coal Risk Management Standard, which is consistent with the principles outlined in Australian Standard AS/NZS 4360:2004 Risk Management (Standards Australia 2004) and Australian Standard AS/NZS ISO 31000:2009. In accordance with the Glencore Coal Assets Australia Risk Matrix, environmental risks were categorised with a Risk Ranking of 1 to 25.

The preliminary environmental risk analysis was subsequently revised following completion of the relevant technical assessments for the EIS as these assessments provide updated information on the level of risk associated with each aspect.

The environmental risk analysis provided below identifies both the preliminary risk rating as assessed for the Preliminary Environmental Assessment and provides a revised risk rating that considers the EIS assessment findings and control measures proposed for the Project.

Table 1 – Consequence Criteria

	Health & Safety	Environment	Financial Impact	Image & Reputation / Community	Legal & Compliance
5 Catastrophic	- Multiple fatalities - Multiple cases of permanent total disability / health effects	- Environmental damage or effect (permanent; >10 years) - Requires major remediation	>\$600M investment return >\$100M operating profit >\$20M property damage	- Negative media coverage at international level - Loss of multiple major customers or large proportion of sales contracts - Loss of community support - Significant negative impact on the share price	- Major litigation / prosecution at Glencore corporate level - Nationalisation / loss of licence to operate
4 Major	Fatality or permanent incapacity / health effects	- Long-term (2 to 10 years) impact - Requires significant remediation	\$60-600M investment return \$20-100M operating profit \$2-20M property damage	- Negative media coverage at national level - Scrutiny from government and NGOs - Complaints from multiple "final" customers - Loss of major customer - Loss of community support - Negative impact on share price	Major litigation / prosecution at Division level
3 Moderate	Lost time / disabling injury / occupational health effects / multiple medical treatments	- Medium-term (<2 years) impact - Requires moderate remediation	\$6-60M investment return \$2-20M operating profit \$200K-2M property damage	- Negative media coverage at local / regional level over more than one day - Complaint from a "final" customer - Off-spec product - Community complaint resulting in social issue	Major litigation / prosecution at Operation level
2 Minor	- Medical Treatment Injury (MTI) / occupational health effects - Restricted Work Injury (RWI)	- Short-term impact - Requires minor remediation	\$600K-6M investment return \$200K-2M operating profit \$10-200K property damage	- Complaint received from stakeholder or community - Negative local media coverage	Regulation breaches resulting in fine or litigation
1 Negligible	First Aid Injury (FAI) / illness	- No lasting environmental damage or effect - Requires minor or no remediation	<\$600K investment return <\$200K operating profit <\$10K property damage	Negligible media coverage	Regulation breaches without fine or litigation

Table 2 – Likelihood Criteria and Risk Matrix

Basis of Rating	E - Rare	D - Unlikely	C - Possible	B - Likely	A – Almost Certain
LIFETIME OR PROJECT OR TRIAL OR FIXED TIME PERIOD OR NEW PROCESS / PLANT / R&D	Unlikely to occur during a lifetime OR Very unlikely to occur OR No known occurrences in broader worldwide industry	Could occur about once during a lifetime OR More likely <u>NOT</u> to occur than to occur OR Has occurred at least once in broader worldwide industry	Could occur more than once during a lifetime OR As likely to occur as not to occur OR Has occurred at least once in the mining / commodities trading industries	May occur about once per year OR More likely to occur than not occur OR Has occurred at least once within Glencore	May occur several times per year OR Expected to occur OR Has occurred several times within Glencore
5 Catastrophic	15 (M)	19 (H)	22 (H)	24 (H)	25 (H)
4 Major	10 (M)	14 (M)	18 (H)	21 (H)	23 (H)
3 Moderate	6 (L)	9 (M)	13 (M)	17 (H)	20 (H)
2 Minor	3 (L)	5 (L)	8 (M)	12 (M)	16 (M)
1 Negligible	1 (L)	2 (L)	4 (L)	7 (M)	11 (M)

Table 3 - Environmental Risk Analysis

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Noise generation	Degradation of noise amenity (including cumulative impacts).	3	A	20(H)	The Noise Impact Assessment identified that seven private residences are predicted to be significantly affected by the Project and are expected to be afforded acquisition rights. Moderate impacts are predicted at 18 private residences and these residences are expected to be afforded noise mitigation measures. The Project also has potential to contribute to cumulative noise impacts in Warkworth, Maison Dieu and at the nearest private residences to the northwest of the Project Area. Noise management measures to be implemented include noise attenuation of equipment, strategic bunding and haul road locations, and design of mining activities to shield operations, where practicable. Adaptive noise monitoring and implementation of operational changes as required to respond to adverse meteorological conditions will also be undertaken in accordance with a Noise Management Plan.	3	A	20(H)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Blasting	Potential visual and health impacts from blast plume. Vibration impacts on structures and other sensitive receivers. Potential impacts from overpressure.	2	B	12(M)	Blasting activities will be managed so that relevant blast criteria are met at private residences or at blast sensitive infrastructure. Any impacts in excess of these criteria would only occur where a negotiated agreement is in place. Blast management measures to be implemented include restricting blasting during periods of adverse meteorological conditions, management of blasting products and loading practices to minimise fume, and appropriate design of all blasts to minimise vibration and overpressure on sensitive receivers.	2	C	8(M)
Dust generation	Increased dust emissions resulting in degraded air quality and potential impacts on health and amenity, including cumulative impacts.	2	A	16(M)	Modelling undertaken in the Air Quality Impact Assessment predicts that cumulative dust levels and other air quality parameters will comply with the relevant criteria at all surrounding private residences, with the exception of a single private residence in Warkworth village. This residence has current acquisition rights under the existing Wambo and MTW development consents and is expected to be afforded acquisition rights for the Project. Suitable operational controls will be implemented during the Project to minimise dust emissions, including watering of haul roads, water sprays on the ROM stockpile and ceasing operations during adverse meteorological conditions that generate dust. An Air Quality Management Plan will be developed and will include a detailed air quality monitoring program and an air quality response plan that incorporates visual, meteorological and air quality monitoring triggers.	2	B	12(M)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Water Resources	Potential impact to surface water quality and quantity, including flooding damage to infrastructure. Interactions and potential impacts on aquifers.	3	B	17(H)	The Project is not predicted to have significant impacts on downstream water quality, flows, flooding or water users. The Project is predicted to make a minor contribution to impacts on alluvial groundwater systems. The Joint Venture has adequate water licences for the predicted groundwater take for the Project. One private bore has the potential to be impacted as a result of the Project, however, this bore is not currently serviceable and is on one of the properties within the noise affectation zone. United has committed to make good arrangements with the owner of the bore should the potential impact be realised and the property not be purchased by United. A comprehensive water management system (WMS) has been designed for the Project to manage water in accordance with legislative requirements and relevant guidelines. The WMS for the Project will be integrated with the existing WMS at Wambo to maximise water recycling, reducing external water import and releases. A Water Management Plan, including a surface and groundwater monitoring program, will be developed to guide the overall management of water as part of the Project.	2	C	8(M)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Agricultural Lands	Potential impacts to agricultural land	2	C	8(M)	The primary existing land use of the Project Area is mining. A small portion (30ha) of the mine owned land within the Project Area is currently used for low intensity grazing. The mine owned grazing land impacted is primarily low productivity land, with the exception of approximately 4 hectares of biophysical strategic agricultural land (BSAL) which will be subject to relatively minor impacts as a result of construction of water management infrastructure. The BSAL will not be mined. The Project will have a minimal impact on surrounding land uses. At the conclusion of mining, it is proposed to rehabilitate the land and soil resources to broadly the same mix of land and soil capability. The proposed rehabilitation plan includes returning the northwest corner of the Project Area to soil capability class 4 agricultural land,	2	D	5(L)
Ecology	Impact to flora and fauna including potential impacts on threatened species, communities and populations	3	B	17(H)	The Ecological Assessment has identified the predicted impacts on endangered ecological communities and threatened species due to the Project. United has committed to a biodiversity offset strategy under the Upper Hunter Strategic Assessment (UHSA) to offset the biodiversity impacts of the Project. Impacts to key biodiversity values have been avoided where practical through Project design. Key mitigation measures to be implemented as part of the Biodiversity Management Plan include clearing procedures to minimise the impacts of the clearing process and maximise the recovery of any valuable biodiversity resources, feral animal and noxious weed control, and landform establishment.	3	B	17(H)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Aboriginal Archaeology and Cultural Heritage	Potential impact to Aboriginal Heritage sites and Cultural Heritage values.	3	B	17(H)	A comprehensive Aboriginal Cultural Heritage Assessment process was completed for the Project. The Aboriginal Cultural Heritage Assessment found that the surrounding area is held to be of higher significance to many members of the Wonnarua community, however, the sites and/or places within the Project Area were considered to be of lower significance. 128 Aboriginal sites will be impacted by the Project. United will implement an impact mitigation strategy as part of the Project in consultation with the registered Aboriginal parties.	3	B	17(H)
Historic heritage	Potential impacts to historical heritage features	2	C	8(M)	The State Heritage Register listed Wambo Homestead occurs to the south of the proposed open cut mining operations. A detailed assessment found that the Project will not adversely impact on Wambo Homestead. Several other heritage sites have been identified within and surrounding the Project Area. This includes a 'Dog-leg' fence which has been assessed as having State level significance. A detailed survey and photographic/archival recording of the Dog-leg fence will be undertaken following relevant guidelines. Part of the fence will be re-erected in a new location determined in consultation with representatives of the local community. Local heritage values impacted by the Project will be managed by archival recording.	3	C	13(M)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Visual Amenity	Potential impacts to visual amenity as a result of mining operations and associated infrastructure.	2	A	16(M)	Views of the existing mining operations are currently available from residences to the south, northwest, northeast and along the Golden Highway. Similar views to the existing will continue, with overburden emplacement areas increasing in height in some areas and remaining visible as the Project progresses. The progressive rehabilitation of emplacement areas and shaping of the final landform using natural landscape principles is expected to reduce the visual impact of emplacement areas. Additional tree planting is proposed to assist in screening views of the Project from the Golden Highway.	2	A	16(M)
Greenhouse Gas	Emission of greenhouse gases from the proposed mining operations and infrastructure construction contributing to climate change.	2	A	16(M)	A range of energy and greenhouse gas management initiatives will be implemented as part of the Project to improve energy efficiency and reduce greenhouse gas emissions.	2	A	16(M)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Traffic	Additional traffic associated with the construction and ongoing operation of the Project may impact on the road network and other road users.	2	B	12(M)	The Project will require the realignment of a 2 kilometre section of the Golden Highway. The realignment will be designed in accordance with Roads and Maritime Service (RMS) and Austroads requirements and will be constructed prior to the closure of the section of the Golden Highway impacted by the Project to minimise the potential for disruption. The predicted changes in traffic resulting from the Project are well within the capacity of the existing road network. The total approved maximum annual tonnage of coal transported by train from the Wambo train loading facility will remain unchanged.	2	D	5(L)
Socio-economic	The Project has the potential to result in a range of social and economic impacts, both positive and negative.	3	B	17(H)	The Social Impact and Opportunities Analysis found that from a technical social perspective, it is unlikely that the Project will result in significant change across any of the key community capitals (natural, economic, human, physical and social). There will be localised impacts on nearby landholders. The Project will provide significant ongoing benefits for local and wider communities through employment, local and regional expenditure and payment of royalties and taxes. A Stakeholder Engagement Plan (SEP) will incorporate the social strategies and management actions proposed to be implemented as part of the Project, to monitor the effectiveness of the proposed strategies in mitigating negative social impacts and/or enhancing positive social impact over time.	3	C	13(M)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Rehabilitation and Mine Closure	Impact on the landscape and future land use from the final landform and rehabilitation.	4	C	18 (H)	The Project will result in the provision of an improved, more natural final landform across the Wambo and United mining areas. The final landform achieved for the Project will be a substantial improvement on the final landform that would have resulted from two adjoining and separate mines. Ecological rehabilitation on the site will contribute to the biodiversity offset strategy for the Project. Rehabilitation will be undertaken progressively to minimise the area of disturbance at any time. Rehabilitation would be undertaken in accordance with Glencore rehabilitation and mine closure procedures.	3	C	13(M)
Waste (excluding overburden, rejects and tailings)	Impacts of waste management and disposal on the surrounding environment.	2	D	5 (L)	To manage waste generated by the Project, United will develop and implement a site specific Waste Management System based around the Glencore Waste Management Guideline. Wastes will continue to be separated on site to allow different waste streams to be appropriately managed. The majority of wastes that cannot be reused or recycled will be transported off site by licensed waste management contractors.	2	D	5(L)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Hazard	Bushfire hazard associated with mining activities and land management activities. Hazards associated with the use of various materials as part of the mining operation.	2	C	8 (M)	Bushfire management will incorporate management measures including regular surface slashing around critical infrastructure, maintaining roadways and tracks to provide an effective fire break and the provision of on-site surface water facilities for bushfire management. Strategies are put in place to mitigate the residual risks relating to the handling of hazardous materials using appropriate control measures, safeguards and procedures.	2	D	5(L)



Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

Perth

PO Box 8177
Subiaco East WA 6008
33 Ventnor Avenue
West Perth WA 6005

Ph. 08 6260 0700

Canberra

PO Box 6135
56 Bluebell Street
O'Connor ACT 2602

Ph. 02 6262 9484

Sydney

50 York Street
Sydney NSW 2000

Ph. 1300 793 267

Brisbane

GPO Box 459
Brisbane QLD 4001

Ph. 1300 793 267

www.umwelt.com.au