APPENDIX 6
Environmental Risk Analysis

Environmental Risk Analysis

Introduction

To assist in identifying the key environment and community issues that required detailed assessment as part of the Environmental Impact Statement (EIS), a preliminary environmental risk analysis was completed for the Mangoola Coal Continued Operations (MCCO) Project. The preliminary environmental risk analysis (July 2017) was included in the Preliminary Environmental Assessment (PEA) (Umwelt 2017) provided to the NSW Department of Planning and Environment (DPE).

The preliminary environmental risk analysis was undertaken in general accordance with the principles outlined in Australian Standard AS/NZS ISO 31000:2009. The preliminary environmental risk analysis considered the existing approved mining operation and the existing Project Approval criteria, operational policies and procedures in place. 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. It is noted that as an outcome of the assessment process additional controls have been identified that will be applied as part of the MCCO Project. In some cases the further assessment and additional controls have resulted in a change in the assessed risk level, whereas in some cases no changes to the risk assessed at the PEA stage.

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 MCCO Project.

Table 1 – 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 NOT 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 2 – Environmental Risk Analysis

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Socio-economic	The MCCO Project has the potential to result in a range of social and economic impacts, both positive and negative.	3	C	13(M)	• Given the limited life of the proposed additional mining (approximately 5 years beyond existing planned operations) and Mangoola's pre-emptive mine plan design to avoid and minimise impacts, the social impacts of the MCCO Project have been minimised where practicable through project design and the proposed management approaches. • Of key focus from a social impact perspective is the impact of the MCCO Project on proximal landholders due to perceptions of impacts on property value and a dwindling sense of community, and impacts associated with being near neighbours to a large development. • To address these issues, a number of mitigation and enhancement strategies are proposed, including the continued implementation of a Voluntary Planning Agreement with Muswellbrook Shire Council; the development of a Community Enhancement Program; implementation of a range of existing and new mitigation measures to address the identified impacts; a series of property specific agreements; and the implementation of a Social Impact Management Plan for the ongoing monitoring and management of social impacts. • These mitigation measures have been specifically targeted to address the issues identified in the Social Impact Assessment (SIA) and based on stakeholder feedback. • The SIA has found that while a number of social and environmental issues have been raised by local landholders in proximity to the MCCO Project – the broader community of Muswellbrook has appeared more accepting of the proposal due to the predicted economic benefits at a local and regional level. • The MCCO Project will provide significant ongoing benefits for local and wider communities through employment, local and regional expenditure and payment of royalties and taxes. • A cost benefit analysis of the MCCO Project indicates that the overall net benefits of the Project (after full incorporation of costs, including environmental costs) would be in the order of $409 million in net present value terms.	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
Noise generation	Degradation of noise amenity (including cumulative impacts).	3	B	17(H)	• As part of the design of the MCCO Project, Mangoola has incorporated a range of noise controls to minimise noise impacts. • Seven residences are predicted to experience noise from the MCCO Project at levels where it is expected that voluntary acquisition rights will apply. • Nineteen residences (located on 14 properties) with predicted exceedances of 3-5 dB will be offered acoustic treatments to reduce noise inside the residence. • There are predicted to be no exceedances of the sleep disturbance criterion and no adverse cumulative noise impacts are anticipated as a result of the MCCO Project. • There are no predicted changes to operational road traffic noise and construction road traffic is not predicted to exceed the relevant criterion. • Noise impacts will be managed through the implementation of proactive noise management and monitoring measures which will be used to adaptively manage mining operations as required to minimise noise impacts.	3	C	13(M)
						For those outside acquisition		
						3	B	17(H)
						For those in acquisition		
Blasting	Potential visual and health impacts from blast flume. Vibration impacts on structures (such as the existing 500 kV ETL or rock structures) and other sensitive receivers. Potential impacts from overpressure.	2	C	8(M)	• Blasting activities will be managed so that relevant blast criteria are met at private residences or at blast sensitive infrastructure. • 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	D	5(L)

Aspect	Potential Impact	Preliminary Risk Assessment			Assessment Findings and Proposed Control Measures	Revised Risk Assessment		
		C	L	R		C	L	R
Dust generation	Increased dust emissions resulting in degraded air quality and potential impacts on health and amenity, including cumulative impacts.	3	B	17(H)	• Proactive and reactive dust control measures will continue to be implemented to minimise dust emissions over the life of the MCCO Project, including by adaptively managing the mining operations to minimise impacts in adverse conditions. • Comprehensive air quality management controls have been incorporated into the design of the MCCO Project to minimise the contribution of the MCCO Project to impacts on local and regional air quality. • The MCCO Project will comply with the applicable annual average PM_{10}, incremental 24-hour average PM_{10}, $PM_{2.5}$, TSP and dust deposition criteria at all privately owned residences. • The maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations for the MCCO Project when considered alone meet the criteria at all private receivers. When the MCCO Project is considered cumulatively with existing background levels the maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations are predicted to meet the criteria at all but one sensitive receiver (property ID 83). Property ID 83 is subject to voluntary acquisition under the existing approved operation and is within the predicted noise voluntary acquisition zone for the MCCO Project. The modelling indicates that the MCCO Project will contribute to, but will not be the primary cause of, exceedances of the criteria.	3	C	13(M)
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)	• A comprehensive WMS has been designed for the MCCO Project to manage water in accordance with legislative requirements and relevant guidelines. • The WMS for the MCCO Project builds on the existing WMS at Mangoola Mine and maximises water recycling and reducing external water import. • Mining in the MCCO Additional Mining Area will not result in additional impacts to Wybong Creek alluvium. • The key potential impacts of the MCCO Project on surface water relate primarily to the ephemeral Big Flat Creek, with water capture associated with the mine water management system resulting in reduced catchment flowing to Big Flat Creek (and to a smaller degree to Wybong Creek) and resulting reductions in flow. • Water quality in downstream watercourses is not predicted to be adversely impacted by the MCCO Project. No adverse impacts related to water quality have been predicted by the surface water assessment. • Flood modelling indicates some small localised changes to flooding in Big Flat Creek, however, there are no adverse impacts on private landholders or on flooding in Wybong Creek. • Studies indicate that existing water licences held by Mangoola are sufficient for the water needs and account for the water take of the MCCO 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
Ecology	Impact to flora and fauna including potential impacts on threatened species, communities and populations	4	B	21(H)	• Avoidance of impacts to key biodiversity values was a key driver for the project design and the impacts were reduced through changes to the design • The biodiversity impacts of the MCCO Project are being assessed, managed and offset under the Framework for Biodiversity Assessment and the NSW Biodiversity Offsets Policy for Major Projects. • The MCCO Project will result in the disturbance to approximately 570 hectares of native vegetation and fauna habitat. • Four NSW listed threatened ecological communities occur within the MCCO Additional Project Area, one of which is listed as threatened at the Commonwealth level; White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. • 11 threatened species have been recorded in the MCCO Additional Project Area including five birds, four bats and two orchids. • Mangoola has secured a biodiversity offset package for the MCCO Project that fully satisfies the credit requirements of the MCCO Project.	4	D	14(M)
Agricultural Lands	Potential impacts to agricultural land	2	D	5(L)	• The primary existing land use of the MCCO Project Area is mining and low intensity grazing. • The mine owned grazing land impacted is primarily low productivity land. • The MCCO Project is not predicted to result in adverse impacts on surrounding private agricultural land and the mining operations are expected to continue to coexist with the surrounding agricultural land uses.	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
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 MCCO Project in consultation with the registered Aboriginal parties for the MCCO Project. • The assessment noted that the surrounding area is held to be of higher significance to many members of the Wonnarua and Gomeroi community, however based on consultation with RAPs, the sites and/or places within the MCCO Project area held in no higher significance or value(s) than any other. • The assessment process found the MCCO Additional Project Area has a relatively low cultural significance when compared to other places within the wider region. • An archaeological survey identified 26 Aboriginal sites that would be impacted by the MCCO Project (11 Isolated Finds and 15 Artefact Scatters). A majority of these (92%) sites were assessed as having low scientific significance and two sites (8%) have either low-moderate or moderate scientific significance. • Mangoola has developed management and mitigation measures in consultation with the registered Aboriginal parties involved in the assessment and these will be implemented in consultation and participation of the knowledge holders and community stakeholders.	3	C	13(M)
Historic heritage	Potential impacts to historical heritage features	2	D	5(L)	• No potential heritage items of local or state significance were identified in the MCCO Additional Project Area. • Direct impacts on the identified potential heritage items that are within the MCCO Additional Project Area will not result in an adverse impact to the historical heritage of the wider study area or the local area more broadly. • No indirect impacts to any listed or potential historical heritage items were identified.	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
Traffic	Additional traffic associated with the construction phase of the MCCO Project may impact on the road network and other road users. Changes to travel routes due to the realignment of Wybong Post Office Road and diversions required during construction of the Wybong Road overpass may result in minor delays during construction and increased travel times.	2	C	8(M)	• The MCCO Project will require the realignment of a portion of Wybong Post Office Road. • During construction the MCCO Project is predicted to result in short term traffic increases, including an average of approximately 16 heavy vehicles per day and a peak of approximately 35 heavy vehicles per day. The assessment has confirmed that all intersections modelled will continue to operate at acceptable levels of service. • During construction a two-lane bypass road is planned to be in place to enable Wybong Road to remain open. • During operation the current approved maximum annual production rate and existing employment levels will be maintained and as such, no operational traffic changes above those previously assessed and approved are anticipated.	2	D	5(L)
Visual Amenity	Potential impacts to visual amenity as a result of mining operations and associated infrastructure.	2	B	12(M)	• The proposed operations are not expected to be visible from any private residences. • The MCCO Project would be visible from small sections of public roads surrounding the site similar to the views that are already available to the existing approved Mangoola Coal Mine. • Visual impacts associated with views from public roads will be reduced over time with progressive rehabilitation. • 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.	2	B	12(M)
Greenhouse Gas	Emission of greenhouse gases from the construction and operational phases of the MCCO Project contributing to climate change.	2	A	16(M)	• A range of energy and greenhouse gas management initiatives will be implemented as part of the MCCO Project to improve energy efficiency and reduce the greenhouse gas emissions of the onsite mining operations. • The predicted greenhouse gas emissions associated with the MCCO Project have been quantified, including the scope 1, 2 and 3 emissions. The implications of the predicted emissions in the context of climate change policy have been assessed.	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
Rehabilitat-ion and Mine Closure	Impact on the landscape and future land use from the final landform and rehabilitation.	3	C	13(M)	• The rehabilitation strategy for the Project aims to minimise environmental impacts throughout the life of the MCCO Project as well as upon completion of the MCCO Project. • The MCCO Project will provide for a fully integrated rehabilitation program and final landform in accordance with leading practice natural landform design principles across the existing and proposed mining area. • Ecological rehabilitation on the site will contribute to the biodiversity offset strategy for the MCCO Project. • The strategy will improve local and regional biodiversity outcomes through establishment of strategic habitat corridors, while also providing areas for managed agriculture on suitable lands not used for biodiversity conservation.	2	C	8(M)
Waste (excluding overburden rejects and tailings)	Impacts of waste management and disposal on the surrounding environment.	2	D	5 (L)	• The existing waste management plan will be updated and implemented to incorporate the MCCO Project. The existing plan is based on the principles of avoid, re-use and recycle, with waste disposed of in accordance with legislative requirements where necessary.	2	D	5 (L)
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	D	5 (L)	• To manage bushfire risk for the MCCO Project, Mangoola will update and implement the existing Bushfire Management Plan. • The hazard assessment identified a range of technical control measures and non-technical safeguards and procedures that will be put in place to eliminate or mitigate the level of risk associated with the handling of hazardous materials and operation of the facility.	2	D	5 (L)

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