DRAYTON SOUTH COAL PROJECT

REVISED ENVIRONMENTAL RISK ASSESSMENT

for

Anglo American Coal

Issue	Aspect	Impact	Preliminary Risk Assessment			Proposed control measures	Revised Risk Assessment		
			C	L	R		C	L	R
Air Quality	Vegetation clearing, drilling and topsoil stripping	Wind blown dust contributing to elevated dust levels.	2	3	8 (M)	An Air Quality and Greenhouse Gas Impact Assessment has been completed by Pacific Environment Limited (PEL) in accordance with the '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' (NSW EPA, 2005). The air quality assessment demonstrates that the regulatory criteria will be met at all privately owned residences (including the horse studs). Further to this the results of the air quality assessment confirm that there is a significant reduction in predicted impacts when compared to the previous application due to the further contraction of proposed mining operations. Anglo American will implement best practice dust mitigation measures, including: • Minimising disturbed areas ahead of the mining operation; • Watering of haul roads, including the application of a dust suppression agent; • Progressive rehabilitation of mined areas; • Less rehandle by increased direct feed to the CHPP;	2	2	5 (L)
	Overburden emplacement by dragline, dozers and trucks		2	3	8 (M)		2	2	5 (L)
	Coalmining		2	2	5 (L)		2	2	5 (L)
	Coal transport		1	2	2 (L)		1	1	1 (L)
	CHPP operation and stockpiles		1	2	2 (L)		1	2	2 (L)

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						• Real time air quality monitoring. The current Drayton Air Quality Management Plan will be updated in consultation with OEH and to the satisfaction of DP&E.			
	Combustion of diesel fuel	Greenhouse gas emissions	1	2	2 (L)	The Air Quality and Greenhouse Gas Impact Assessment undertaken by PEL assessed the Project's Scope 1, 2 and 3 emissions in accordance with the '*Factors and Methods Workbook*' (Australian Greenhouse Office, 2005). Anglo American will update the Greenhouse and Energy Efficiency Management Plan. This will include measures to improve energy efficiency and minimise GHG generation..	1	2	2 (L)
	Electricity use		1	2	2 (L)		1	2	2 (L)
	Downstream impacts from the burning of coal		1	2	2 (L)		1	2	2 (L)
	Blasting	Fume and dust generation	3	2	9 (M)	Blasting impacts will be minimised by; • Limiting blasting to suitable weather conditions; • Increased buffer distance to horse studs; • Use of electronic detonation techniques; and • Use of waterproof explosives to minimise potential fume.	2	2	5 (L)
Acoustics	Plant and equipment working in-pit and on overburden	Excessive noise generation at sensitive	2	3	8 (M)	An Acoustics Impact Assessment has been conducted by Bridges Acoustics in accordance with the *Industrial Noise Policy 2000*. This assessment has identified the noise impacts associated with construction, operations, rail transport, road traffic and sleep disturbance. The	1	2	2 (L)

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	dumps	receivers				assessment has also assessed cumulative noise impacts with surrounding mining operations and other industry.			
	Coal haulage		2	3	8 (M)	Noise management and mitigation measures will be implemented as described in the EIS including:	1	2	2 (L)
	Coal loading and train movements on rail loop and spur		3	3	13 (S)	• Noise attenuation devices on equipment; • Blast design and stemming; • Timing of blasts. Anglo American will update the existing Noise Management Plan which incorporates a combination of engineering controls and mitigation measures employed to manage and control noise impacts. Anglo American will conduct real time noise monitoring at representative receivers.	2	3	8 (M)
	CHPP operation and stockpiles		3	3	13 (S)		2	3	8 (M)
	Increased traffic movements		1	3	4 (L)		1	3	4 (L)
	Blasting	Overpressure and ground vibration impacts at sensitive receivers (including horse studs	2	3	8 (M)	An Acoustics Impact Assessment has been conducted by Bridges Acoustics. This has predicted the overpressure and ground vibration generated by blasting associated with the Project. All blasts will adhere to the regulatory criteria at all privately owned residences and structures with results indicating a significant reduction when compared to the previous	2	2	5 (L)

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		and private residences)				application. Specific blast management includes: • Increased buffer distance to horse studs • All blasts modelled • Blasts only fired when weather conditions permit Anglo American will update the approved Blasting Management and Monitoring Plan, which includes management and mitigation measures to minimise blasting impacts.			
Equine Health	Dust generated by mining operations	Impacts on health of horses in the vicinity of the Project (particularly respiratory and fright/flight response)	3	2	9 (M)	An Equine Health Impact Assessment has been undertaken by Dr. Nicholas Kannegieter, specialist equine surgeon. Studies have confirmed the very low dust generated by the Project contains only negligible quantities of endotoxins (the prime cause of respiratory diseases in horses). The expert finding is that dust is not a risk to equine health. The noise levels generated by the Project are at current background levels. Blasting impacts will be intermittent, and are not predicted to be at a level that is considered to agitate horses. Current horse stud operations are adjacent to a major highway carrying heavy trucks, farm equipment operating during the day, and a high incidence of lightning strikes of far greater intensity than any potential blast impact	1	1	1 (L)
	Noise generated by mining operations		3	2	9 (M)		1	1	1 (L)
	Blasting		2	3	8 (M)		2	2	5 (L)

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Visual	Mining Operations	Visual impact to surrounding receivers (particularly sensitive areas on the horse studs)	2	2	5 (L)	A Visual Impact Assessment has been completed for the Project by JVP Visual Planning and Design. This assessment considered the visual and lighting impacts of the Project. Mitigation measures have been incorporated into the design of the Project, including: • Limiting mining to the north of the second ridgeline as nominated by the PAC for the previous application thus increasing buffer distance; • Tree screens; and • Use of low lux lamps and directing fixed lights towards the ground. • Dragline not visible at any time No direct views will be available from the horse studs primary areas of operations as operations will be constrained behind two intervening ridgelines which provide an adequate buffer.	2	1	2 (L)
	Lighting from mobile and fixed equipment, buildings and potential night glow		2	3	8 (M)		2	2	5 (L)
Ecology	Vegetation clearing	Net loss of biodiversity and disruption to threatened flora and fauna or habitats	3	3	13 (S)	An Ecology Impact Assessment has been completed by Cumberland Ecology. This assessment has identified the potential impacts of the Project on flora and fauna (including threatened species and ecological communities). Management and mitigation measures will be adopted, including:	2	3	8 (M)

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		Disturbance to federally listed species	2	3	8 (M)	• Mine plan designed to minimise the area of disturbance; • Progressive rehabilitation of disturbed areas, with an emphasis on re-establishing woodland communities; • Committing to updating the existing fauna and flora management plan (including a biodiversity action plan); • Restoration of Saddlers Creek; and • Provision of a suitable biodiversity offset strategy to meet State and Commonwealth requirements.	2	2	5 (L)
Archaeology and Cultural Heritage	Vegetation clearing, blasting and topsoil stripping	Disturbance of Aboriginal artefacts, sites or places of cultural heritage significance	3	4	17 (S)	An Aboriginal Archaeological and Cultural Heritage Impact Assessment has been undertaken by AECOM Australia Pty Ltd (AECOM) in accordance with the NSW Office of Environment and Heritage's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) This assessment has identified the potential impacts of the Project on Aboriginal objects and places. In order to mitigate impacts on Aboriginal archaeology, an Aboriginal Cultural Heritage Management Plan has been drafted in consultation with OEH and the Aboriginal community. This management plan will outlines Aboriginal	2	2	5 (L)

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						objects will be managed.			
		Disturbance of non-Aboriginal heritage sites	2	3	8 (M)	A Non-Aboriginal Heritage Impact Assessment has been completed by AECOM in accordance with the standards prescribed by the Heritage Office of NSW. The Project will not impact any sites of significant heritage value. The Project will result in the destruction of a fence and a Nissan hut and stockyard. Archival recordings of these sites will be prepared prior to their destruction.	1	2	2 (L)
Agriculture	Land clearing and disturbance	Loss of agricultural production	2	4	12 (M)	An Agricultural Impact Statement has been completed by Scott Barnett & Associates. This assessment quantified the value of agricultural production that will be foregone as a result of the Project (including Project disturbance and the offsite biodiversity offset property). The annual agricultural production that will be foregone amounts to approximately $0.8 M. This is a negligible proportion of regional, state and national production.	1	3	4 (L)
Social	Employees residing in local communities	Availability and use of public facilities	2	1	3 (L)	A Social Impact Assessment has been completed by Hansen Bailey. The Project will continue to rely upon the existing workforce of Drayton Mine. As such, there are not likely to be any significant additional demands on local community services and infrastructure.	2	1	3 (L)

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Water Management	Topsoil stripping, haul roads, un-rehabilitated spoil	Mine affected water - runoff entering local waterways	2	3	8 (M)	A Surface Water Impact Assessment has been undertaken by WRM Water & Environment. This assessment included a review of existing surface water assessment reports, the identification of surface water resources, assessment of existing surface water hydrology, assessment of potential surface water impacts on and offsite, assessment of post-mine surface water impacts and predicted final void water levels. The Water Management System minimises the risk of runoff entering watercourses. Mine affected water will be captured and stored in onsite dams. If these dams reach capacity, water will be stored in the south void. Mine affected water will be used for dust suppression and coal processing. Clean water will be diverted around disturbed areas and discharged into Saddlers Creek.	2	2	5 (L)
	Coal extraction and overburden removal	Drawdown of aquifers impacting surrounding private water users	2	3	8 (M)	A Groundwater Impact Assessment has been undertaken by Australasian Groundwater and Environmental Consultants. The SURFACT MODFLOW model was used to predict the Project's impacts on groundwater (including groundwater inflows, drawdown of the alluvial aquifers, and impacts on private landowner bores). The assessment considered the cumulative impact of mining operations in the locality.	2	2	5 (L)
		Cumulative	2	3	8 (M)		2	2	5 (L)

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		impacts				Predicted total seepage rates (Permian and spoil) peaks at 427 ML/year in Year 8. The seepage rate over the life of the mine averages 288 ML/year. The Project will cause only a negligible decrease in the seepage flux to the Hunter River alluvium. Seepage into the Saddlers Creek alluvium of 0.28 ML/day will be reduced to about 0.09 ML/day by the neighbouring Mt Arthur Coal Mine operations. The remaining Permian leakage into the Saddlers Creek alluvium is predicted to be reduced to zero as a cumulative impact between the existing mines and the Project. No landowner bores will be impacted by the Project. Ongoing monitoring of groundwater levels and qualities will be undertaken.			
	Coal processing and production	Water demand for dust suppression and coal washing	1	4	7 (M)	Water stored in the mine water dams will be used for dust suppression and coal washing. There is less than a 10% chance that water will need to be sourced from offsite to satisfy operational demands. The use of a dust suppressant agent significantly reduces the watering application rate. This reduces the operational water demand, thus decreasing the likelihood of water shortages.	1	1	1 (L)
	Water discharges	Surface water contamination	3	3	13 (S)	The Water Management System will minimise the Project's impacts on surface water by segregating clean and mine	3	2	9 (M)

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	into local waterways	Contaminated water from wash down bays, etc	1	2	2 (L)	affected (dirty) water prior to on site storage. The Mine Infrastructure Areas have the potential to produce water containing hydrocarbons. Contaminated water will continue to be treated using a triple interceptor to remove hydrocarbons. No discharge will be required from the Project as all water will be able to be stored and used within the mine water system.	1	1	1 (L)
	Flooding	Increased flood levels and erosion of catchment	2	2	5 (L)	The impact of flooding on the Project was assessed as part of the Surface Water Impact Assessment. The Project is situated beyond the 100 year ARI flood extents of both the Hunter River and Saddlers Creek.	2	2	5 (L)
Rehabilitation and Final Landform	Topsoil stripping and land preparation	Loss of productive topsoil and BSAL	2	3	8 (M)	A Soils and Land Capability Impact Assessment was undertaken by Environmental Earth Sciences. This assessment identified the soil types within the Project Boundary and assessed the suitability of these soils for use as topdressing material. Topsoil will be stripped and placed onto reshaped, free-draining landforms wherever possible. Topsoil will be stored in stockpiles if it cannot be used immediately for topdressing. Progressive rehabilitation will be undertaken to minimise the total disturbed area at any one time. The objective of post mining land rehabilitation is to return impacted areas to their	2	2	5 (L)
		Deterioration of land capability	2	3	8 (M)		2	2	5 (L)
	Rehabilitation	Erosion	2	3	8 (M)		2	2	5 (L)
		Weed invasion	2	3	8 (M)		1	3	4 (L)

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		Feral animal invasion	2	3	8 (M)	pre-mining condition prior to their use as a native woodland offset. Landform design will reduce erosion by wind and runoff. The monitoring program will ensure effective management of erosion by early detection and implementation of any required structures. The aim of rehabilitation will be to restore the vegetation communities present on the site prior to mining. Particular emphasis has been placed on re-establishing Central Hunter Box-Ironbark Woodland and Narrabeen Footslopes Slaty Box Woodland. Weed and feral animal controls will be implemented. Weeds will be targeted using both herbicide and hand removal. Feral animals will be controlled using baiting. The proposed mine plan and ultimate final landform for the Project has been designed using leading best practice final landform modelling to produce an undulating, free-draining and stable landform consistent with the surrounding environment. Final rehabilitation and completion criteria for mine closure will be developed and agreed in consultation with the relevant government agencies and community and incorporated into the Mining Operations Plan and Mine Closure Plan.	1	3	4 (L)
	Final Landform	Unstable landform	3	2	9 (M)		2	2	5 (L)
		Poor drainage	2	2	5 (L)		2	2	5 (L)
		Erosion	2	3	8 (M)		2	2	5 (L)

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Hazardous Materials	Storage and handling	Soil and water contamination	2	2	5 (L)	Hazardous materials will be managed in accordance with the existing Drayton Mine hazardous materials management system.	2	2	5 (L)
	Bushfire	Fire hazard	2	3	8 (M)	Anglo American will operate in accordance with a bushfire management plan.	1	2	2 (L)
Traffic and Transport	Increased vehicle movements from employees, deliveries and train loading	Increased traffic movements	2	2	5 (L)	A Traffic and Transport Impact Assessment has been undertaken by DC Traffic Engineering in accordance with the *'Guide to Traffic Generating Developments'*. The key intersections potentially impacted by the Project are planned to be upgraded in accordance with the *DP&E Thomas Mitchell Drive Contributions Study* as completed by GHD. As such these intersections are predicted to operate satisfactorily. While the Edderton Road realignment is being constructed the existing road will not be closed. The newly realigned road will be constructed to be all weather and of a higher standard than the existing road. Rail traffic will not increase as a result of the Project.	1	2	2 (L)
	Road upgrades	Public perception	2	2	5 (L)		2	2	5 (L)
Geochemical	Overburden placement	Potentially acid forming materials affecting soil	2	2	5 (L)	A Geochemical Impact Assessment has been completed by RGS Environmental Pty Ltd. This assessed the potential for PAF and NAF of overburden and reject materials. Overburden and reject materials associated with the Project	2	1	3 (L)

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		and water resources				will be non-acid forming. Some materials demonstrated sodic properties. The probability of spontaneous combustion is low.			
Stygofauna	Changes to groundwater levels and quality	Loss of stygofauna communities	2	3	8 (M)	A Stygofauna Impact Assessment was undertaken by Eco Logical Australia Pty Ltd. The Project is predicted to result in a drawdown of 1 m to 2 m along a 4 km section of Saddlers Creek. The Saddlers Creek alluvium is sparsely populated with non-endemic stygofauna. There are no impacts on any rare or significant species of stygofauna. The Project will not measurably affect the Hunter River alluvium, so there are no impacts on stygofauna in this environment. Stygofauna are not known to exist in the coal seam aquifers, nor are they likely to exist in these aquifers. The removal of coal is not a risk to stygofauna.	2	2	5 (L)
	Removal of aquifer material		3	2	9 (M)		2	2	5 (L)
Waste	General waste management	Land contamination	1	2	2 (L)	Anglo American will implement a waste management plan, which includes strategies for minimising waste generation, and reuse and recycling options. The current Drayton Mine waste management system and the newly constructed sewage treatment facility within the Drayton South area will be utilised for the Project.	1	2	2 (L)
	Sewage management	Soil and water contamination	2	3	8 (M)		2	2	5 (L)

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Spontaneous Combustion	Spontaneous Combustion	Release of harmful emissions/ risk of fire	2	2	5 (L)	The potential impacts arising from spontaneous combustion were addressed as a component of the air quality and greenhouse gas impact assessment prepared for the Project. The Geochemical assessment report indicates a very low propensity for spontaneous combustion. Any risks associated with spontaneous combustion will be managed in accordance with the existing Drayton Spontaneous Combustion Management Plan.	2	2	5 (L)

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Risk Assessment Tools: Matrix for Determining Level of Risk

Loss Type	Consequence (C)				
	1 Insignificant	2 Minor	3 Moderate	4 High	5 Major
(S/H) Harm to People (Safety/Health)	First aid case. Exposure to minor health risk.	Medical treatment case. Exposure to major health risk.	Lost time injury. Reversible impact on health.	Single fatality or loss of quality of life. Irreversible impact on health.	Multiple fatalities. Impact on health ultimately fatal.
(EI) Environmental Impact	Minimal environmental harm (L1 incident).	Material environmental harm (L2 incident, remediable short term).	Serious environmental harm (L2 incident remediable with LOM).	Major environmental harm (L2 incident remediable post LOM).	Extreme environmental harm (L3 incident irreversible).
(BI/MD) Business Interruption/Material Damage and Other Consequential Losses	No disruption to operation. Five percent loss of budgeted operating profit.	Brief disruption of operation. Ten percent loss of budgeted operating profit/listed assets.	Partial shutdown. Fifteen percent loss of budgeted operating profit/listed assets.	Partial loss of operation. Twenty percent loss of budgeted operating profit/listed assets.	Substantial or total loss of operation. Twenty-five percent of loss budgeted operating profit/listed assets.
(L&R) Legal and Regulatory	Low level legal issue.	Minor legal issue. Non compliance and breaches of the law.	Serious breach of the law. Investigation/report to authority, prosecution and/or moderate penalty.	Major breach of the law. Considerable prosecution and penalties.	Very considerable penalties and prosecutions. Multiple law suits and jail terms
(R/S/C) Impact on Reputation/Social/Community	Slight impact. Public awareness may exist but no public concern.	Limited impact. Local public concern.	Considerable impact. Regional public concern.	National impact. National public concern.	International impact. International public attention.
Likelihood (L)	Risk Rating				
5 Almost Certain	11 (M)	16 (S)	20 (S)	23 (H)	25 (H)
4 Likely	7 (M)	12 (M)	17 (S)	21 (H)	24 (H)
3 Possible	4 (L)	8 (M)	13 (S)	18 (S)	22 (H)
2 Unlikely	2 (L)	5 (L)	9 (M)	14 (S)	19 (S)
1 Rare	1 (L)	3 (L)	6 (M)	10 (M)	15 (S)

Likelihood Rating

Likelihood	Examples
5 **Almost Certain**	The unwanted event has occurred frequently; occurs in order of one or more times per year and is likely to reoccur within one year.
4 **Likely**	The unwanted event has occurred infrequently; occurs in order of less than once per year and is likely to reoccur within five years.
3 **Possible**	The unwanted event has happened in the business at sometime or could happen within 10 years.
2 **Unlikely**	The unwanted event has happened in the business at sometime or could happen within 20 years.
1 **Rare**	The unwanted event has never been known to occur in the business or it is highly unlikely that it will occur within 20 years.

Risk Rating

Risk Rating	Risk Level	Guidelines
21 to 25	(H) High	A high risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised immediately.
13 to 20	(S) Significant	A significant risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as soon as possible.
6 to 12	(M) Medium	A moderate risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as part of the normal management process.
1 to 5	(L) Low	A low risk exists that management's objectives may not be achieved. Monitor risk, no further mitigation required.