Revised Risk Assessment

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DRAYTON SOUTH COAL PROJECT

REVISED ENVIRONMENTAL RISK ASSESSMENT

for

Anglo American

Issue	Aspect	Impact	Preliminary Risk Assessment			Proposed control measures	Revised Risk Assessment		
			C	L	R		C	L	R
Ecology	Vegetation clearing	Loss of biodiversity and disruption to threatened flora and fauna or habitats	3	5	20 (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 have been recommended, including: • Designing the mine plan to minimise the area of disturbance; • Progressive rehabilitation of disturbed areas, with an emphasis on re-establishing box-gum woodland; • Committing to updating the existing fauna and flora management plan (including a biodiversity action plan); • Restoration of Saddlers Creek in conjunction with the Hunter-Central Rivers Catchment Management Authority; and • Provision of an offsite biodiversity offset property. A referral has been made under section 68 of the *Environment Protection and Biodiversity Conservation Act*	3	3	13 (S)
		Disturbance to federally listed species	3	5	20 (S)		3	3	13 (S)

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						1999. The Minister has declared the Project to be a controlled action.			
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 in accordance with the *National Parks & Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* and DECCW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. 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 will be developed in consultation with OEH and the Aboriginal community. This management plan will outline how Aboriginal objects will be managed.	3	3	13 (S)
		Disturbance of non-Aboriginal heritage sites	2	3	8 (M)	A Non-Aboriginal Heritage Impact Assessment has been completed by AECOM Australia Pty Ltd 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.	2	2	5 (L)

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Water Management	Topsoil stripping, haul roads, un-rehabilitated spoil	Dirty water runoff entering local waterways	3	4	17 (S)	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 the Transfer Dam, Houston Dam and ROM Dam. If these dams reach capacity, dirty 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 stored in the Blakefield Dam. This clean water will be discharged into Saddlers Creek.	3	2	9 (M)
	Coal extraction and overburden removal	Drawdown of aquifers on 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	2	2	5 (L)

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		Cumulative impacts with surrounding users	4	2	14 (S)	private landowner bores). The assessment considered the cumulative impact of mining operations in the locality. Groundwater inflows into the mining areas are predicted to average 876 ML/yr over the life of the Project. Peak inflows of 1,682 ML/yr are predicted to occur in year 10. The Project will cause only a negligible decrease in the seepage flux to the Hunter River alluvium. The seepage to the Saddlers Creek alluvium has been reduced from 0.31 ML/day to 0.12 ML/day by operations at Mt Arthur Coal Mine. The Project may reduce this seepage to nil. No landowner bores will be impacted by the Project. Ongoing monitoring of groundwater levels and qualities will be undertaken.	4	2	14 (S)
	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 only a 1% 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. The Mine Infrastructure Areas	3	2	9 (M)

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	into local waterways	Contaminated water from wash down bays, etc	3	3	13 (S)	have the potential to produce water containing hydrocarbons. Contaminated water will be treated using a triple interceptor to remove hydrocarbons.	3	2	9 (M)
	Flooding	Increased flood levels and erosion of catchment	3	2	9 (M)	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.	3	1	6 (M)
Acoustics	Coal, rejects and overburden haulage	Excessive noise generation at sensitive receivers	3	3	13 (S)	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 assessment has also assessed cumulative noise impacts. Noise management and mitigation measures have been recommended, including: • Fitting conveyors with soft idlers; • Fitting equipment with noise attenuation devices; • The Houston Visual Bund; and • Initial excavation in the Houston mining area using the double benching method. Anglo American will develop a construction noise	3	2	9 (M)
	Plant and equipment working in-pit and on overburden dumps		3	3	13 (S)		3	2	9 (M)
	Train movements on rail loop and spur		2	3	8 (M)		2	3	8 (M)

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	CHPP operation and stockpiles		2	3	8 (M)	management plan. Anglo American will conduct real time noise monitoring at representative receivers.	2	3	8 (M)
	Coal loading at rail loop		2	3	8 (M)		2	3	8 (M)
	Product coal transport		2	4	12 (M)		2	3	8 (M)
	Increased traffic movements		1	4	7(M)		1	3	4 (L)
	Blasting	Overpressure and ground vibration impacts at sensitive receivers	3	3	13 (S)	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 the exception of Arrowfield where it is predicted that relevant criteria would be exceeded if the maximum instantaneous charge is above 500 kg. Anglo American will develop a Blasting Management Plan, which will include management and mitigation measures to minimise blasting impacts.	2	2	5 (L)

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Visual	Overburden emplacement	Visual impact to surrounding receivers	3	4	17 (S)	A Visual Impact Assessment will be completed for the Project by JVP Visual Planning and Design and Greenpond. This assessment has assessed 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 southern ridgeline; • The Houston Visual Bund; • Tree screens; and • Use of low lux lamps and directing fixed lights towards the ground. High visual impacts will only occur during the 16 month construction of the Houston Visual Bund.	3	2	9 (M)
	Active mining		2	3	8 (M)		2	2	5 (L)
	Lighting from mobile and fixed equipment, buildings and potential night glow		3	4	17 (S)		3	2	9 (M)
Air Quality	Vegetation clearing, drilling and topsoil stripping	Wind blown dust and machinery exhaust fumes contributing to elevated dust levels	3	3	13 (S)	An Air Quality and Greenhouse Gas Impact Assessment has been completed by PAEHolmes in accordance with the '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' (DEC, 2005). Anglo American will implement best practice dust mitigation measures, including: • Minimising disturbed areas; • Watering of haul roads, including the application of a dust suppression agent;	2	3	8 (M)
	Overburden emplacement		3	3	13 (S)		2	3	8 (M)
	Uncovering of coal		3	3	13 (S)		2	3	8 (M)

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	Coal, rejects and overburden haulage		3	3	13 (S)	• Progressive rehabilitation of mined areas; • Stemming of blasts; and • Real time air quality monitoring. Anglo American will develop an Air Quality Management Plan, which will facilitate the implementation of dust controls.	2	3	8 (M)
	Coal processing and transport		2	4	12 (M)		2	3	8 (M)
	CHPP operation and stockpiles		2	3	8 (M)		2	3	8 (M)
	Combustion of diesel fuel	Greenhouse gas emissions	2	3	8 (M)	The Air Quality and Greenhouse Gas Impact Assessment undertaken by PAEHolmes 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 develop a Greenhouse and Energy Efficiency Management Plan. This will include measures to improve energy efficiency.	2	3	8 (M)
	Electricity use		2	3	8 (M)		2	3	8 (M)
	Downstream impacts from the burning of coal		2	3	8 (M)		2	3	8 (M)
	Blasting	Greenhouse gas emissions, fume and dust generation	3	2	9 (M)	Blasting impacts will be minimised by limiting blasting to suitable weather conditions, ensuring optimal material breakage and movement, and minimising the amount of explosive used.	3	2	9 (M)

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Equine Health	Dust generated by mining operations	Impacts on health of horses in the vicinity of the Project	3	3	13 (S)	An Equine Health Impact Assessment has been undertaken by Dr. Nicholas Kannegieter, specialist equine surgeon. The dust generated by the Project contains only negligible quantities of endotoxins (which are known to cause respiratory diseases in horses). The Project's dust impacts will not pose a risk to equine health. The noise levels generated by the Project are below levels that are likely to agitate horses. Blasting impacts will be intermittent, and horses are expected to adapt to these conditions through habituation.	1	3	4 (L)
	Noise generated by mining operations		3	3	13 (S)		1	3	4 (L)
	Blasting		2	3	8 (M)		2	2	5 (L)
Social	Increased employees residing in local communities	Social impacts	3	2	9 (M)	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	2	5 (L)
Geochemical	Overburden placement	Potentially acid forming materials affecting soil and water resources	3	2	9 (M)	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 will be non-acid forming. Some materials demonstrated sodic properties. The probability of spontaneous combustion is low.	2	2	5 (L)

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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 will result in a 2 m drawdown along a 6 km length of Saddlers Creek. The Saddlers Creek alluvium is sparsely populated with 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	3	8 (M)
	Removal of aquifer material		3	2	9 (M)		2	2	5 (L)
Rehabilitation and Final Landform	Topsoil stripping and land preparation	Loss of productive topsoil	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 areas wherever possible. Topsoil will be stored in stockpiles if it cannot be used immediately for topdressing. This assessment also classified the land according to land capability classes.	2	2	5 (L)
		Deterioration of land capability	2	3	8 (M)		2	2	5 (L)
	Rehabilitation	Erosion	2	3	8 (M)	Progressive rehabilitation will be undertaken to minimise the	2	2	5 (L)

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		Weed invasion	1	3	4 (L)	total disturbed area at any one time. This reduces erosion by wind and runoff. 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 to produce an undulating, free-draining and stable landform consistent with the surrounding environment. Except for the final voids, the landform will be shaped so that gradients are less than 10%. This will assist in reducing erosion.	1	3	4 (L)
		Feral animal invasion	1	3	4 (L)		1	3	4 (L)
	Final landform	Unstable landform	2	2	5 (L)		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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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	4	7 (M)
Traffic and Transport	Increased vehicle movements from employees, deliveries and train loading	Increased traffic movements	2	3	8 (M)	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 by Mt Arthur Coal Mine (as required by their Project Approval). As such these intersections are predicted to operate satisfactorily.	2	3	8 (M)
	Road upgrades	Public perception	2	2	5 (L)	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.	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,	1	2	2 (L)

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	Sewage management	Water contamination	2	3	8 (M)	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.	2	2	5 (L)
			2	2	5 (L)		2	2	5 (L)
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.	2	2	5 (L)

DRAYTON SOUTH COAL PROJECT

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.