I3 — Risk Matrix and Impacts Table

Water Management Failure Assessment Register

ASSESS THE RISKS

ESTABLISH THE CONSEQUENCE OR SEVERITY & ASSIGN A RATING OF LEVEL 1 TO 5

Consequence	Environmental Impact
Level 1	Limited damage to minimal area of low significance
Level 2	Minor effcts on biological or physical environment
Level 3	Moderate short term effects but not affecting eco-system
Level 4	Serious medium term environmental effects
Level 5	Very serious long term environmental impairment of eco-system

ESTABLISH THE PROBABILITY FACTOR OF THE EVENT

Description	Frequency Examples
Happens often	More than 1 event per month
Could easily happen	More than 1 event per year
Could happen and has occurred here or elsewhere	1 event per 1 to 10 years
Hasn't happened yet but could	1 event per 10 to 100 years (e.g. within a single mine life)
Conceivable, but only in extreme circumstances	Less than 1 event per 100 years (e.g. within life of BMA)

USING THE MATRIX BELOW DETERMINE THE RISK CATEGORY

		CONSEQUENCE SEVERITY				
		Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
PROBABILITY FACTOR	**Happens**	High	High	Extreme	Extreme	Extreme
	Could easily happen	Moderate	High	High	Extreme	Extreme
	Could happen and has occurred here or	Low	Moderate	High	Extreme	Extreme
	Hasn't happened yet but could	Low	Low	Moderate	High	Extreme
	Conceivable, but only in extreme circumstance	Low	Low	Moderate	High	High

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URS

Water Management Failure Assessment

Aspect	Impacts	Inherent Risk			Mitigation Measures	Residual Risk			Comments/Information Gaps
		Consequence	Probability Factor	Risk Rating		Consequence	Probability Factor	Risk Rating	
Erosion and Sediment Mobilisation	Sediment from earth moving and stockpiling can enter surface water runoff during rainfall events or blown by wind and discharge to watercourses leading to deleterious effects on water quality and aquatic habitats.	Level 2	Could easily happen	High	Appropriate design (erosion and scour protection) for sections of pipeline crossing active floodplain and main channel; Stormwater management (development, implementation and maintenance of plan), to include: Erosion control and energy dissipation, watercourse stabilisation i.e.. matting, riprap and gabions; Stormwater controls and upstream treatment, i.e.. infiltration devices and vegetation filters; Stabilisation techniques, i.e.. revegetation; Construction to occur in dry season; Crossings to be at right angles to direction of flow; Stockpiling of topsoil located away from watercourses; Vehicle wash bay to be located away from watercourses; Minimise vegetation disturbance; Routine inspection.	Level 2	Hasn't happened yet but could	Low	Construction timeline
Pollution	Oily waste water (from miscellaneous plant and equipment wash water); Contaminated runoff from chemical storage areas; Potentially contaminated drainage from fuel oil storage areas; Oil-filled transformer yard areas and general wash down water. Diesel and other petroleum-based fuels and lubricants used by excavation and construction machinery. Environmental and public health and safety issue.	Level 3	Could happen and has occurred here or elsewhere	High	Chemical and fuel storage areas to be appropriately bunded; Spill cleanup kits in accordance with Australian Standards (AS1940 and AS3780) to be located in convenient locations, i.e. work vehicles; Refuelling to occur in bunded areas; Should a spill occur, ensure it is contained and does not enter drainage lines or watercourses; Follow all other operational procedures.	Level 3	Hasn't happened yet but could	Moderate	Spill/Emergency Response Procedures
Works adjacent to/within drainage lines and watercourses	Haul road crossing and creek diversion construction at watercourse crossings and vehicle access crossings can alter flow characteristics.	Level 2	Could easily happen	High	Diversion of watercourse either by low flow diversion or coffer dam with pumping construction activities that will affect existing drainage channels and control measures must only be carried out after suitable stormwater management infrastructure has been implemented onsite; Minimal disturbance by heavy earth moving equipment Vehicle crossings should be adequately designed for a range of flow conditions, including under road drainage	Level 2	Hasn't happened yet but could	Low	Construction Stormwater Management Plan
Flooding	Possibility of rainfall event causing: - mining pit inundation; and - damage to infrastructure (haul roads, mine infrastructure area, etc).	Level 3	Could happen and has occurred here or elsewhere	High	If practical avoid major construction during wet season and try and work outside the flood plain. However if not possible, make sure a flood assessment has been conducted; Stormwater management eg drainage diversions and bunding; Emergency response procedures and flood forecasting.	Level 3	Conceivable, but only in extreme circumstances	Moderate	Emergency Response Procedures
Lack of water supply	Inadequate dust suppression, soil compaction and wash down	Level 3	Could easily happen	High	Develop, implement and maintain Water Supply Strategy and Emergency Plan	Level 3	Conceivable, but only in extreme circumstances	Moderate	Water supply source for construction
Commissioning									
Disposal of water	Improper disposal of water used in hydrostatic testing - impact surrounding environment and receiving waters (erosion)	Level 2	Could happen and has occurred here or elsewhere	Moderate	Water management/disposal procedures.	Level 2	Conceivable, but only in extreme circumstances	Low	
Pipeline failure	Discharge of water to environment	Level 2	Hasn't happened yet but could	Low	Hydrostatic testing procedure	Level 2	Conceivable, but only in extreme circumstances	Low	
Operation									
Erosion and Sediment Mobilisation	Permanent structures and minor earth disturbance can result in localised erosion and sediment mobilisation leading to deleterious effects on water quality and aquatic habitats.	Level 2	Could happen and has occurred here or elsewhere	Moderate	Stormwater management to include: - Localised erosion control and energy dissipation measures; - Stabilisation techniques, i.e.. revegetation; - Routine inspection and maintenance of existing erosion and sediment control measures.	Level 2	Hasn't happened yet but could	Low	
Incomplete rehabilitation	Erosion and movement of sediment. Turbid and sediment laden runoff into watercourses.	Level 2	Could easily happen	High	Develop, implement and maintain Rehabilitation Plan	Level 2	Hasn't happened yet but could	Low	
Pollution	Diesel and other petroleum-based fuels and lubricants used by operational vehicles and machinery entering watercourses.	Level 2	Hasn't happened yet but could	Low	Chemical and fuel storage areas to be appropriately bunded; Spill cleanup kits in accordance with Australian Standards (AS1940 and AS3780) to be located in convenient locations, i.e. work vehicles; Refuelling to occur in bunded areas; Should a spill occur, ensure it is contained and does not enter drainage lines or watercourses; Follow all other operational procedures.	Level 2	Conceivable, but only in extreme circumstances	Low	
Non-compliant discharge	Discharge of mine water exceeding environmental authority limits (i.e. above background water quality) resulting in environmental impact on receiving waters, ecosystem and downstream landholders.	Level 3	Could happen and has occurred here or elsewhere	High	Operational water balance model - kept up to date. Monitoring equipment with telemetry system on creeks, dams. Flexible water management system. Monitoring and maintenance of dams and water management infrastructure (e.g. pumps and pipelines). Separation of clean and dirty water systems. Treatment of poor quality mine water.	Level 3	Hasn't happened yet but could	Moderate	
Flooding	Possibility of rainfall event causing: - mining pit inundation; and - damage to infrastructure (haul roads, mine infrastructure area, etc).	Level 3	Could happen and has occurred here or elsewhere	High	Minimise catchment contributing to mining pits and regular monitoring of levees and bunds to protect mining pits; Monitoring and maintenance of erosion and sediment control features; Appropriate design of water management infrastructure; Emergency Response Procedures and flood forecasting.	Level 3	Hasn't happened yet but could	Moderate	Emergency Response Procedures
Water Supply	Insufficient water supply to mee preparation plant and water demand requirements.	Level 3	Hasn't happened yet but could	Moderate	Operational water balance model - kept up to date. Water management strategy to include: - Efficient usage of water within preparation plant and industrial area; - Maximise reuse of water around the mine.	Level 3	Conceivable, but only in extreme circumstances	Moderate	