

Qualitative Risk Analysis Matrix – Level of Risk

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (almost certain)	H	H	E	E	E
B (likely)	M	H	H	E	E
C (possible)	L	M	H	E	E
D (unlikely)	L	L	M	H	E
E (rare)	L	L	M	H	H

Risk Score Legend

E	Extreme risk; immediate action required.
H	High risk; senior management attention needed.
M	Moderate risk; management responsibility must be specified.
L	Low risk; manage by routine procedures.

Risk Types	Description
Safety	Risk of an injury on site.
Legal	Risk of legal action against MMG
Environmental	Risk of causing ongoing serious or material harm.
Social	Risk of not meeting social expectations.
Economic	Risk of closure plan cost blow-outs.

MMG 2/5 Dam TSF - Qualitative Risk Assessment

Item	Potential Risk	Risk Type	Inherent Risk		Risk Score	Control Measures	Residual Risk		Risk Score	Control Measures
			L	C			L	C		
Tailings Storage Facility	Dam failure	Safety	C	4	E	Construct in accordance with ANCOLD requirements; undertake periodic monitoring of dam stability, especially following minor seismic events.	D	2	L	Periodic monitoring will reduce the risk of any sudden and unexpected failure of dam walls, thereby enabling structural modifications to be carried out to ensure that the integrity of dam structures is not compromised.
		Legal	B	4	E		C	2	M	
		Environmental	A	4	E		C	2	M	
		Social	C	2	M		D	2	L	
		Economic	B	4	E		C	2	M	
Tailings Storage Facility	Leakage and seepage from the tailings into the surrounding groundwater and surface water	Safety	B	3	H	Construction of the dam with a suitable safeguard including grout curtains, liner systems and cut-off drains to significantly reduce the possibility of leakage into Stitt River and surrounding environment.	C	2	M	Appropriate construction will ensure that leakage to groundwater is minimised; ongoing monitoring of groundwater will ensure that any leakages are identified, allowing for early remediation.
		Legal	B	3	H		C	2	M	
		Environmental	B	3	H		C	2	M	
		Social	C	3	H		D	1	L	
		Economic	B	3	H		C	2	M	
Tailings Storage Facility	AMD in TSF	Safety	B	3	H	Ensure that acid-forming material saturated by way of permanent sub-aqueous tailings deposition	D	3	M	Only minimal AMD will be formed within the TSF due to sub-aqueous tailings deposition.
		Legal	B	3	H		D	3	M	
		Environmental	B	4	E		D	3	M	
		Social	D	2	L		D	2	L	
		Economic	B	2	H		D	2	L	

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Embankment Construction Materials	Potential risk for PAF rock used in embankment construction materials	Safety	C	2	H	Ensure that appropriate geochemical testing is conducted to determine NAF/PAF properties to ensure that only NAF rock is reused in construction activities and PAF rock is directed to the TSF. Monitoring of construction material as per Earth Systems recommendations	D	2	L	Any PAF materials identified during borrow material extraction
		Legal	B	3	H		D	3	M	
		Environmental	A	3	E		D	3	M	
		Social	D	2	L		E	1	L	
		Economic	A	3	E		D	2	L	
Extreme rainfall events results in contamination of Stitt River TW drinking offtake	Impact on drinking water quality	Safety	C	4	E	Spillway location relocated downstream of TW offtake locations	E	2	L	Water levels continuously monitored and overflow from spillway reports to Stitt River downstream of drinking water offtake
		Legal	C	4	E		D	3	M	
		Environmental	C	4	E		D	3	M	
		Social	C	3	H		D	2	L	
		Economic	C	4	E		D	3	M	
Construction and Operations	Spills or uncontrolled discharge	Safety	C	4	E	HAZOP conducted prior to construction with risks and specific mitigation measures identified. Piping and dam embankments designed with safety and environmental mitigation measures employed	D	3	M	Results of HAZOP and associated mitigation and management measures will be incorporated into future design development to ensure further mitigation of safety and environmental risks
		Legal	C	4	E		D	3	M	
		Environmental	C	4	E		D	3	M	
		Social	D	2	L		D	2	L	
		Economic	C	3	H		D	3	M	

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Site Access (foot & roads)	Uncontrolled access.	Safety	B	4	E	Provision of suitable access control gates / barriers and signage.	E	2	L	Access by unauthorised personnel to unsafe areas and infrastructure is seen as a significant future safety risk in the area. Uncontrolled access may also lead to degradation of the existing environment and impact on rehabilitation measures completed and/or being undertaken.
		Legal	B	2	H		E	2	L	
		Environmental	C	2	M		E	2	L	
		Social	C	2	M		E	2	L	
		Economic	B	2	H		E	2	L	
Degraded Site	Ongoing environmental degradation of site; extension of degradation beyond site.	Safety	C	2	M	Sediment and AMD mitigation measures to be implemented to reduce potential for impacts. Separation of clean and potentially contaminated water	D	2	L	All measures will be implemented through operational management plans.
		Legal	A	4	E		C	2	M	
		Environmental	A	4	E		C	2	M	
		Social	A	4	E		C	2	M	
		Economic	A	4	E		C	2	M	
Revegetation	Revegetation may be slow and/or only partly successful in specific areas following closure.	Safety	D	2	L	Revegetate using locally sourced materials, appropriate fertilisers and ensure regular monitoring.	D	2	L	The natural revegetation process may be slow in some areas. A monitoring program will ensure that appropriate responses can be undertaken when necessary.
		Legal	B	4	E		D	2	L	
		Environmental	B	4	E		D	2	L	
		Social	B	4	E		D	2	L	
		Economic	B	4	E		D	2	L	

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Visual Impact	Scars remain on the landscape	Safety	N/A			No extra risk abatement measures proposed. Actions implemented for revegetation of the site should address this issue.	N/A			The scars associated with the mining activities are likely to remain a feature of the landscape for some time; no part of the site is expected to be visible from the road.
		Legal	C	3	H		D	2	L	
		Environmental	B	2	H		D	2	L	
		Social	B	3	H		D	2	L	
		Economic	D	3	M		D	2	L	
Mine Life	Long term closure plan objectives cannot be achieved	Safety	C	3	H	Full provision will be made for contingency costs.	D	2	L	Full provision for contingency costs will ensure that all commitments in the Closure Plan are met.
		Legal	B	4	E		D	2	L	
		Environmental	A	4	E		D	2	L	
		Social	B	4	E		D	2	L	
		Economic	B	4	E		D	2	L	
Government and public expectation	The mine closure plan may not meet Government and public expectations or future land use and values.	Safety	D	2	L	Undertake a consultation process that provides for input from all stakeholders and any interested parties.	D	2	L	Wide consultation with all stakeholders and other interested parties will ensure the widest possible consensus.
		Legal	B	3	H		D	2	L	
		Environmental	B	3	H		D	2	L	
		Social	B	3	H		D	2	L	
		Economic	B	3	H		D	2	L	

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Surface water	Elevated concentrations of solids, etc may pose a safety, health and environmental risk	Safety	C	3	H	Maintaining a competent wet tailings cover will prevent oxidation of pyritic material and hence acid generation.	D	2	L	TSF design is based on a wet cover both during operation and at closure.
		Legal	B	4	E		C	2	M	
		Environmental	A	4	E		C	2	M	
		Social	B	4	E		C	3	H	
		Economic	B	4	E		C	2	M	
Contaminated site	The site is contaminated during operations	Safety	B	4	E	Management measures implemented during operations. Undertake a contaminated site investigation and risk assessment as part of closure and decommissioning; remove any contaminated material.	D	3	M	Contaminated site investigation and risk assessment, together with removal of any contaminated material following closure to an appropriate facility will significantly reduce this risk.
		Legal	A	4	E		D	3	M	
		Environmental	A	4	E		D	3	M	
		Social	B	4	E		D	3	M	
		Economic	A	4	E		D	3	M	