

Risk Assessment

A risk assessment has been undertaken to identify, evaluate and outline the key risks, impacts and mitigation measures from the proposed works. The risk assessment process has approached the source, pathway and receptor model, considering the likelihood of an environmental or human impact and the relative consequence of the event. The risk assessment is provided in Table 1. The definitions for Likelihood and Consequence have been provided in Tables 2 and 3. The proposed works have been determined to be a **LOW** risk to the sensitive receptor.

Table 1: Risk Assessment for the upgrade to the Gold Room Fume Extraction System.

Source/Activity	Risk	Risk pathway	Receptor	Likelihood	Consequence	Risk	Actions to be implemented/Treatment
Transport of saline/hypersaline mine dewater via pipelines (surface, underground)	Hypersaline water/mine dewater	Discharge to land: Pipeline leak or rupture, resulting in overland runoff potentially impacting nearby flora.	Native Vegetation	D	5	Low	<p>Controls:</p> <p>All saline pipelines are in bunded areas, v-drains or buried, which provides adequate containment in the event of a pipeline failure. Leaks are identified using automated telemetry leak detection systems and KCGM are alerted to any leaks in the system by the Distributed Control System (DCS), which is continuously monitored by the Control Room Operators and Site Services.</p> <p>Pipeline corridors are inspected regularly for leaks.</p> <p>All water management infrastructure is located within already cleared and disturbed land within the mining footprint.</p> <p>Based on the above controls Impacts to nearby Native Vegetation is unlikely and is considered a LOW risk</p>
Deposition of mine dewater to Union Club Pit.		Discharge to land: Pipeline leak or rupture, resulting in overland runoff potentially impacting nearby flora.	Native vegetation	D	5	Low	<p>Controls:</p> <p>The dewatering discharge rate is expected to be in the range 400,000 m³/year to 800,000 m³/year, with a maximum system capacity of 2,000,000 m³/year, and the flows are planned to be pumped out at the same rate.</p> <p>The water level in the Union Club Pit will not exceed 312m AHD to maintain integrity of the pit wall.</p> <p>If pumping out ceases. Discharge of mine dewater into the pit will not exceed the required days to maintain stable water levels.</p> <p>Water balance modelling conducted has determined that it is unlikely that the Union Club pit will overtop to the adjacent Mystery Pit. Overtopping was a potential risk at 372m AHD, and this is unlikely with the elevation limited to 312m AHD.</p>
		Seepage to Groundwater: Seepage and infiltration, lateral movement of pit lake water through the pit walls. Potentially impacting pit wall stability. Pit Lake water potentially seeping to groundwater resources.	Groundwater Resources.	D	4	Low	<p>The water management infrastructure will form part of KCGM water monitoring program where flow rates, water volumes, elevation levels and water quality will be monitored.</p> <p>The pit lake is currently acting as a groundwater sink, and it is expected to remain a sink and not seep any water to the underlying groundwater resources.</p> <p>No problematic materials were identified from geochemical (Refer to Attachment 8B). All rocks were non acid forming with neutral to alkaline pH and low to moderate salinity levels. Surrounding groundwater is hypersaline</p> <p>The addition of dewatering discharge to the pit lake will rapidly increase TDS concentrations to match the discharge quality. Major ion proportions will remain similar to the existing lake. There will be a proportionally larger increase in nitrate concentrations and in bicarbonate concentrations which will provide additional alkalinity to neutralise any potential acidity generated from mineralised zones exposed in the pit slopes.</p> <p>In the long term, the TDS concentrations in the Union Club Pit driven by evapoconcentration will be very similar regardless of whether dewatering flows are discharged to the pit.</p> <p>The Mt Percy pits are groundwater sinks for local hypersaline groundwater. Water circulating through the pits will not discharge into the surrounding rock formations / low yielding hypersaline aquifers for this reason.</p> <p>Based on the above controls Impacts to nearby Native Vegetation and Groundwater Resources is unlikely and is considered a LOW risk.</p>
Deposition of mine dewater to Gravity Dam		Discharge to land: Dam water (hypersaline/saline) overflows, resulting in overland runoff		E	5	Low	<p>The Gravity Dam (a balancing dam within an existing water management system) is lined with a HDPE liner and does not interact with Groundwater resources.</p> <p>Telemetric System is installed at the dam to prevent risk of overtopping, leaks and spills, which automatically ensures there a freeboard is maintained. There is an emergency containment area for the full volume, located downhill of the Gravity Dam, should there be a total failure.</p>

Source/Activity	Risk	Risk pathway	Receptor	Likelihood	Consequence	Risk	Actions to be implemented/Treatment
		potentially impacting nearby flora.					<p>Dam is monitored and inspected regularly.</p> <p>Fauna egress mats are installed.</p> <p>Based on the above controls Impacts to nearby Native Vegetation and Groundwater Resources is unlikely and is considered a LOW risk.</p>
Noise from water management infrastructure	Noise Emissions	Noise Emissions: Air /windborne pathway causing Noise emissions impacting health and amenity.	City of Kalgoorlie Boulder >2km	E	5	Low	<p>All works will be compliant to the Noise Regulations (1997).</p> <p>The pump for the system is located underground, making the system almost silent. Surface water management infrastructure is not expected to contribute to noise emissions.</p> <p>It is unlikely that the water management infrastructure will contribute additional noise emissions impacting nearby residents. This is considered a low risk.</p>

Table 2: Measures of Consequence


Measures of Consequence						
CONSEQUENCE RATING		Insignificant	Minor	Moderate	2Major	Catastrophic
		5	4	3	2	1
Safety		First Aid Injury	Restricted Work Injury	Lost Time Injury >48hrs.	Single Fatality -or- Permanent Disability	Multiple Fatalities - or - Multiple Permanent Disabling Injuries
Health		Reversible health effects with little to no ongoing concern	Significant, reversible health effect with potential to result in a medical treatment/ restricted work illness -or- Illness/ exposure that requires regulatory reporting	Severe, reversible health effects with potential to result in a lost time injury/ illness -or- Diagnosable psychiatric condition	Single Fatality -or- Specific diagnosable condition with irreversible health effects -or- Requires admission >48hrs. at a medical treatment facility	Multiple fatalities - or - Health effects resulting in a specific diagnosable condition leading to early mortality
Community		No negative socio-economic impact or inconvenience to the community - or - no media attention	Minor negative socio-economic impact or disturbance to the community - or - local media attention	Negative socio-economic impact or disturbance to the community - or - negative local media attention with enquiries from NGO's	Major negative socio-economic impact and serious community relations impacts - or - negative national headlines with high levels of NGO attention	Loss of social licence to operate with disastrous community relations impacts - or - negative international media headlines
Environment		Localised environmental impact, contained, with no regulatory reporting	Minor on-site environmental impact, reportable to regulators	Moderate environmental impacts, extends beyond site boundary - or - regulatory violations with fines	Serious medium term environmental impacts - or - major regulatory violations	Severe irreversible environmental impacts - or - severe breach of regulations with operation suspended
Emergency and Crisis Management		Emergency response may be required with routine notification of line management. No crisis or Emergency Management Activation required	The Registered Manager and Managing Director are notified	The Registered Manager is notified and the Emergency Management Team may be activated. The Managing Director is notified. Action by off-site persons is necessary	The Emergency Management Team and Crisis Management Team are activated.	As for Level 2 / Major incident
Financial (% of Market Cap)		< 5%	5% - 10%	10% - 20%	20% - 33%	> 33%
Loss or Business Disruption	Company	<\$100,000	>\$100,000	>\$1,000,000	>\$5,000,000	>\$25,000,000
	Site	<\$50,000	>\$50,000	>\$500,000	>\$2,500,000	>\$10,000,000
	Process Loss (time)	Loss Equivalent up to 6 hours production	Loss Equivalent up to 24 hours production	Loss Equivalent to 7days production	Loss Equivalent up to 1 month's production	Loss Equivalent to greater than 1 month's production
Legal Compliance		Minor legal compliance issue unlikely to attract a regulatory response	Legal compliance issue which may attract an administrative response from regulator	Breach of regulation with possible prosecution and penalties - or - continuing occurrences of minor	Major breach of regulation resulting in investigation by regulator - or - major regulatory penalties - or -	Serious breach of regulation resulting in operation suspended and/ or licences revoked - or - in the U.S., investigation and

			breaches of regulation	in the U.S., investigation and possible prosecution for knowing violation pursuant to § 110© of the Federal Mine Safety and Health Act of 1977.	possible prosecution for knowing violation pursuant to § 110© of the Federal Mine Safety and Health Act of 1977.
Security	Violations of internal policies and procedures	Minor criminal offenses eg. trespassing, theft under \$50,000, minor property damage, etc.	Low intensity civil unrest - or - theft over \$50,000 value - or - appreciable property damage	High intensity civil unrest - or - Significant criminal offenses committed against persons - or - Significant property damage resulting in operational shutdown - or - high level fraud	Major criminal offences - or - forced evacuation of all personnel - or - fatalities

Table 3: Measures of Likelihood

Measures of Likelihood			
LIKELIHOOD	Description		Criteria (read as either/ or)
	Almost Certain	A	The event is expected to occur in most circumstances Once per week
	Likely	B	The event will probably occur in most circumstances Once per month
	Possible	C	The event could possibly occur at some time Once per year
	Unlikely	D	The event could possibly occur at some time but is unlikely Once every 5-10 years
	Rare	E	The event may occur in exceptional circumstances >10 years

Table 4: Risk Matrix

			CONSEQUENCE				
			Insignificant	Minor	Moderate	Major	Catastrophic
			5	4	3	2	1
LIKELIHOOD	Almost Certain - Expected occurrences - once per week	A	5A Medium	4A Medium	3A High	2A High	1A High
	Likely - Probable occurrences - once per month	B	5B Medium	4B Medium	3B High	2B High	1B High
	Possible - Possible occurrences - once per year	C	5C Low	4C Medium	3C Medium	2C Medium	1C High
	Unlikely - Unlikely to occur - once every 5-10 years	D	5D Low	4D Low	3D Low	2D Medium	1D Medium
	Rare - May occur in exceptional circumstances - >10 years	E	5E Low	4E Low	3E Low	2E Medium	1E Medium