



Memorandum

17 February 2017

To	Vista Gold Australia Pty Ltd		
Copy to	Workshop attendees		
From	Fiona Duncan	Tel	+61 3 8687 8207
Subject	Mt Todd Mine Risk Assessment Update	Job no.	4322632

1 Background

In 2013, GHD completed a draft Environmental Impact Statement (EIS) Vista Gold Australia Pty Ltd (Vista Gold). The EIS focus was the development of the Mt Todd Gold Mine (Mt Todd), consisting of the re-establishment, operation and rehabilitation of the Mt Todd mine site. The Mt Todd site is located approximately 55 km north-west of Katherine and 250 km south of Darwin in the Northern Territory.

2 Scope

The scope of work requires a review and update of the existing environmental risk register developed for the draft 2013 EIS.

3 Workshop Objectives

The risk register includes major issues that could occur during construction, operation, decommissioning and rehabilitation of Mt Todd. These risks include both the previously identified risks plus any new risks. Confirmation / identification of planned controls and assessment using the EIS risk assessment matrix, consequence table and likelihood table is also included.

Any potential action items to reduce the risks or comments were noted.

4 Workshop Overview

A risk assessment workshop was held for Vista Gold on Thursday 9 February 2017 at the Minerals Council Offices, 28/90 Frances Bay Drive, Darwin.

Six people, as well as the GHD facilitator and scribe, attended the workshop. A list of the attendees and their roles is in Table 1. They include representatives from Vista Gold, the Department of Primary Industry and Resources and GHD. This group comprised sufficient disciplines, knowledge and experience to provide sound input to the workshop.

The workshop determined that there are no changes to the proposed mining process or plant have occurred since the draft 2013 EIS. One environmental change was identified. This change is the treatment of onsite water to remove cyanide.



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Table 1 Workshop Attendees

Name	Role	Company
Fiona Duncan	Facilitator	GHD
Liz Kneen	Scribe	GHD
Brent Murdoch	General Manager and Director	Vista Gold
Steve Tatzenko	Director – Mining Development	DPIR
James Hill	Environmental Scientist	GHD
Brendan Selley	Environmental Scientist	GHD
John Ross	Environmental Scientist	GHD
Tim Murphy	Hydrogeologist	GHD

5 Workshop Approach & Results

The workshop approach was to review and update the existing EIS risk register to assess any changes from the 2013 assessment. The risks were grouped into areas of impact, including:

1. Community
2. Climate change and sustainability
3. Greenhouse gas
4. Land
5. Surface water
6. Groundwater
7. Flora and vegetation
8. Fauna
9. Cultural heritage
10. Air quality
11. Noise and vibration
12. Traffic and transport
13. Economics
14. Acid and metalliferous drainage
15. Waste
16. Closure and rehabilitation



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Current risks associated with sustainability were discussed and none was identified. In the future, sustainable water use and water harvesting might become an issue. The workshop team recommended monitoring the issue and updating if risks emerge.

During the review a number of the 2013 risks were consolidated / merged. The result is that some risk events have multiple consequences and the highest reasonable consequence was used during the risk rating. The consolidation avoids repetition of risks and controls.

The discussion on groundwater indicated that significant risks were not expected. However, a specialist review of groundwater in relation to Mt Todd will be conducted shortly. The workshop team agreed that a review of the groundwater risks should be completed following the specialist review. The Federal Government, under the Environment Protection and Biodiversity Conservation (EPBC) Act, is reviewing impacts from Mt Todd on the Gouldian Finch. An EPBC ruling is expected within the month. As a result, no groundwater or Gouldian Finch related risks were assessed during the workshop.

Fifty-six (56) risks were identified, including two new risks. Seven (7) of these however were not re-assessed (six ground water risks and one Gouldian Finch risk) due to imminent specialist input. The Environmental Risk Register is attached at the end of this memorandum.

The risk rating completed during the workshop used the EIS consequence and likelihood tables, also attached at the end of this memorandum. A summary of the risk ratings is in Table 2.

The ten (10) risks rated as "High" all had the maximum consequence (critical) as a result of a fatality, an economic loss of more than \$10m, permanent damage to a sacred site or widespread detrimental long term impacts on the environment.

The high-risk events for this project are:

- bushfire;
- disturbance of sacred sites;
- Gouldian Finch breeding site (not re-assessed but expected to remain high following specialist input);
- increased capacity of Tailing Storage Facility (TSF) 1 (not re-assessed but expected to reduce following specialist input);
- leaching and seepage from the Waste Dump Rock (WDR) (not re-assessed but expected to reduce following specialist input);
- light vehicle accident;
- heavy vehicle accident;
- downturn in the gold price;
- increase in the USA / Australia exchange rate; and
- ineffective mine closure.



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Table 2 Environmental Risk Assessment summary

Impact Area	Current Risk Rating (with planned control measures)					Total
	Extreme	High	Medium	Low	Very Low	
Community			4	3		7
Climate change and sustainability				1		1
Greenhouse gas			1			1
Land		1	1	2		4
Surface water			8	1		9
Groundwater		2	4			6
Flora and vegetation				3	1	4
Fauna		1	1		1	3
Cultural heritage		1	3		1	5
Air quality			1	1		2
Noise and vibration				1		1
Traffic and transport		2				2
Economics		2	2			4
Acid and metalliferous drainage					2	2
Waste			1	1		2
Close and rehabilitation		1	2			3
Total	0	10	28	13	5	56

The risk assessment identified four actions, as shown in Table 3.



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Table 3 Action Plan

Ref No.	Action
1	Monitor sustainable water use and water harvesting issues and update risk register if a new risk emerges.
2	Complete review of groundwater risks following specialist input
3	Complete review of Gouldian Finch related risks following EPBC input
4	Determine if Edith farms use bore water.

6 Next Steps

The three items in the action plan should be completed and the planned controls selected to manage all risks should be progressively implemented.

An assessment of safety risks for the project should be considered separately.

Regards

A handwritten signature in black ink, appearing to read 'F. Duncan', with a small dot at the end.

Fiona Duncan

Senior Advisor

Attachment: Mt Todd Mine Environmental Risk Register

Definitions Consequence Ratings

Rating	Consequence	Environmental (including Heritage)	Social and Regulatory (including Health & Safety)	Economic
5	Critical	<p>Extensive long term environmental harm and / or harm that is extremely widespread. Impacts unlikely to be reversible within 10 years.</p> <p>Widespread / catastrophic detrimental long term impacts on the environment, which could include extensive pollutant discharges.</p> <p>Unsalvageable and permanent damage to sensitive structures or sites of cultural significance or sacred value.</p>	<p>Loss of life / fatality; or long term or permanent disabling effects on human health (more than one person).</p> <p>Community condemnation and irreconcilable community loss of confidence (including severe and detrimental long term impacts on the community and / or public health). Public or media attention of national to international scale.</p> <p>Severe action / prosecution by key agencies including the likes of NT EPA, Department of Mines and Energy, AAPA and NT WorkSafe. Major litigation or prosecution.</p>	> \$10m impact on company or stakeholders.
4	Major	<p>Major or widespread, unplanned environmental impact on or off the site. Significant resources required to respond and rehabilitate.</p> <p>Major detrimental long term impacts on the environment, which could include substantial pollutant discharges.</p> <p>Major damage or infringement to sensitive structures or sites of cultural significance or sacred value.</p>	<p>Injuries requiring hospitalisation. Serious long term or permanent disabling effects on human health (one person).</p> <p>Prolonged community condemnation or annoyance and / or loss of confidence and local media attention.</p> <p>Major regulatory restrictions or orders – substantial prosecution.</p>	\$5m - \$10m impact on company or stakeholders.
3	Significant	<p>Significant, unplanned environmental impact contained within the site or minor impact that is off the site.</p> <p>Considerable damage or infringement to sensitive structures or sites of cultural significance or sacred value.</p>	<p>Injury or illness requiring medical treatment. Short term or reversible disabling effect (impairment) to human health.</p> <p>Limited and localised loss of confidence by the community.</p> <p>Significant breach of regulations. Direction to operate under limited regulatory restrictions or orders.</p>	\$2m - \$5m impact on company or stakeholders.
2	Moderate	<p>Moderate, unplanned localised environmental impact (maybe of a temporary nature) or discharge contained on-site or with negligible off-site impact.</p> <p>Moderate but repairable damage to important historic structures or sites of cultural importance.</p>	<p>Injuries requiring first aid treatment. Minor short term inconvenience or symptoms to human health.</p> <p>Localised community impacts and concerns.</p> <p>Some regulatory restrictions, associated with breach of regulation with investigation or report to authority necessary.</p>	\$100k - \$2m impact on company or stakeholders.
1	Minor	<p>Minor environmental impact. Any impacts are contained on-site and short term in nature. No detrimental effect on the environment.</p> <p>Minor repairable damage to more common structures or sites. No disturbance of historic and / or cultural heritage sites.</p>	<p>Incident with or without minor injury. No impact on human health or very minor short term inconvenience or symptoms.</p> <p>Isolated community or individual issue-based concern and complaints.</p> <p>Minor issues around non-compliance.</p>	Insignificant < \$100k impact on company or stakeholders.

Definition of Likelihood Ratings

Rating	Likelihood	Definitions
5	Almost certain	The event is expected to occur in most circumstances (The event is likely to occur once per year).
4	Likely	The event will probably occur in most circumstances (The event is likely to occur once every 1 – 2 years).
3	Possible	The event might occur at some time (The event is likely to occur once every 2 – 5 years).
2	Unlikely	The event could occur at some time (The event is likely to occur once every 5 – 10 years).
1	Rare	The event may occur only in exceptional circumstances (The event is unlikely to occur in any 10 year period).

Qualitative Risk Analysis Matrix

		Severity of Consequence				
		Critical (5)	Major (4)	Significant (3)	Moderate (2)	Minor (1)
Likelihood of Consequence	Almost Certain (5)	Extreme	Extreme	High	High	Medium
	Likely (4)	Extreme	High	High	Medium	Medium
	Possible (3)	Extreme	High	Medium	Medium	Low
	Unlikely (2)	High	Medium	Medium	Low	Very Low
	Rare (1)	Medium	Medium	Low	Low	Very Low

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
Community									
CO01	Poor integration of workforce and local community (Pine Creek and Katherine)	<ul style="list-style-type: none"> “Us versus them” mentality Increase in incidence of anti-social behaviour Loss of social license Exacerbation of existing labour and skills shortages Cross-over employment impacts (shifts from local and regional employers to the Project) Local inflationary impacts Reduced focus on traditional customer base 	<ul style="list-style-type: none"> Developing an inclusive company culture Employ local first as principle Implementation of Community Benefits Plan Local goods and services first Acknowledge past financial experiences Develop an overall Workforce Management Strategy including workforce sources, management, health and wellbeing and appropriate behaviour Prepare and implement an Industry Participation Plan for the Project Work with local training providers to develop local training programs that will provide unskilled people opportunities to gain employment in the Project Housing of the temporary construction workforce in a camp located outside of existing communities Community engagement strategy in place 	2	2	L			Chapter 6 Chapter 7
CO02	Increase in demand for short-term and long-term accommodation	<ul style="list-style-type: none"> Reduction in affordability of rental housing leading to rent escalation, housing price inflation 	<ul style="list-style-type: none"> The housing and accommodation strategy includes a purpose-built construction camp For the operations workforce, the provision of additional housing and accommodation in Katherine and Pine Creek areas Further develop the housing and accommodation strategy in consultation with key stakeholders Community engagement strategy in place 	2	3	M			Chapter 6 Chapter 7
CO03	Impacts to community values, conditions (e.g. increased demand to community infrastructure and utilities)	<ul style="list-style-type: none"> leading to local / regional shortfalls including increased demand on health facilities Impacts on vulnerable groups such as women and Indigenous groups 	<ul style="list-style-type: none"> Provision of first aid capability at the mine site during construction and operational phases of the Project Liaison with emergency services to assist with offsite accidents / emergencies where appropriate Implement an Emergency Response Plan Liaison with NT Government regarding expected population growth as a result of the project phases Implement Community Benefits Plan Establish a community and stakeholder relations role for the Project Establish and support a community reference group (similar to the Mt Todd Rehabilitation Reference Group) that can provide advice to Vista Gold on the Project from a community perspective, including vulnerable groups representation Implement a Community and Stakeholder Engagement Plan for keeping the community informed regarding the Project and providing appropriate feedback and consultation Establish a complaints and feedback register for tracking and appropriately responding to any community issues raised Develop an overall workforce management strategy including workforce sources, management, health and wellbeing and appropriate behaviour 	2	2	L	Increases in resident population (as there will be no FIFO) will contribute to local economy, but may require expansion of health and other community infrastructure	A portion of the construction workforce is likely to comprise FIFO / DIDO workers who will, in part, address their health requirements in their place of origin	Chapter 6 Chapter 7
CO04	Expectations of benefits to be afforded to the local Indigenous population is not met	<ul style="list-style-type: none"> Potential for exacerbation of existing community conflict 	<ul style="list-style-type: none"> Continue to work in partnership with the Jawoyn Association under the Partnership Agreement Establish clear mechanisms for ongoing consultation and communication with Indigenous groups potentially affected by the Project Implement and monitor a Cultural Heritage Management Plan Implement an Industry Participation Plan for the Project, including indigenous participation Community engagement strategy in place 	3	2	M			Chapter 6 Chapter 7

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CO05	Project is not meeting its environmental obligations (perceived or actual)	<ul style="list-style-type: none"> Loss of social license Community back lash Validity of approvals challenged by NGOs Contamination of neighbouring production bores 	<ul style="list-style-type: none"> Community communication and consultation Contributions to community environmental programs Transparency of data/information to provide confidence Regular open days and open door policy Community reference group Monitor groundwater quality Appropriate material storage and back-up controls bunding 	3	2	M			Chapter 6 Chapter 7
CO06	Increase in potential breeding sites for mosquitoes due to water ponding	<ul style="list-style-type: none"> Nuisance levels of mosquitoes for those working on the Mineral Leases 	<ul style="list-style-type: none"> Comply with Department of health requirements Rectification of artificially created mosquito breeding sites including tanks and ponds Improving drainage of grassy waterways Actions to prevent breeding in artificial receptacles such as drums Follow guidelines for effective design and management of water storage structures 	2	2	L			Chapter 6 Chapter 7
CO07	Increase in potential breeding sites for mosquitoes due to water ponding	<ul style="list-style-type: none"> Transmission of disease by mosquitoes infecting those working on Mineral Leases 	<ul style="list-style-type: none"> Personnel educated and provided with PPE Regular monitoring, recording, reporting and inspection of site for breeding mosquitos Mosquito larvacides used in consultation with Health Authorities 	3	3	M			Chapter 6 Chapter 7
Climate Change and Sustainability									
CC01	Changes in climatic conditions and water availability over the design life of the mine including increases in the number of extreme heat days and precipitation extremes (drought and flood)	<ul style="list-style-type: none"> Increased expansion and contraction of built structures from increased temperature variability Efficiency of wetlands may be affected by high rates of evaporation and / or extreme flood events Capacity and efficiency of ponds may be effected by high rates of evaporation and / or extreme flood events Potential increased risk of flooding or inundation of pits / dams / retention ponds 	<ul style="list-style-type: none"> Consideration of appropriate temperature ranges in selection of plant and equipment Undertake adequate preventative maintenance of plant, pumps and generators etc. as part of standard procedures Monitor plant and equipment on days of extreme weather conditions Appropriate design of structures and material selections Consider appropriate temperature suitability of stored chemicals and explosives Site drainage will be sufficient to manage potential extremes in rainfall events Appropriate bunding of watercourse redirection and overflow collection areas For recycled plant process water, design will consider both dry and wet periods Ponds sized appropriately, including overflow capacity Open pit slopes walled and designed to withstand appropriate flood volumes 	2	2	L	Life of mine is <20 yrs	Temperature increase predicted for the site is not significant in relation to the project life	Chapter 8
Greenhouse Gas									
GG01	Emissions to atmosphere at local level	<ul style="list-style-type: none"> Contribution to Northern Territory emission levels 	<ul style="list-style-type: none"> Commit to energy efficiency within the site environmental management plan Integrate appropriate management into all activities and processes Monitor greenhouse gas emissions and report Scope 1 and Scope 2 emissions as part of The National Greenhouse and Energy Reporting Scheme Seek continuous improvement in compliance and emissions reduction throughout the Project life through assessment and review processes including legislative reporting requirements Investigate voluntary offsets 	1	5	M			Chapter 20

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
Land									
LA01	Lengthy exposure of bare soils during land clearing and mine construction and operation	<ul style="list-style-type: none"> Erosion and sedimentation leading to soil scouring and increased turbidity of water courses and drainage lines downstream 	<ul style="list-style-type: none"> Land clearing planning (stage clearing) Implement Erosion and Sediment Control Plan including install temporary erosion control measures such as sediment fences, diversion drains, hay bales, sediment traps and hardstand covers Regular inspection and maintenance of sediment control structures Minimise the disturbance footprint and undertake progressive rehabilitation where practicable Construction and management of soil stockpiles to ensure they do not contribute to sediment load on drainage lines and watercourses 	2	2	L			Chapter 9
LA02	Erosion of waste rock dump, TSFs and HLP due to significant rainfall events leading to increased sediment load into the retention ponds	<ul style="list-style-type: none"> Capacity of sedimentation basins exceeded, reducing their efficiency and leading to sediments and contaminants entering waterways 	<ul style="list-style-type: none"> Appropriate design of surface water drainage plan Ongoing stabilisation and rehabilitation of embankments Regular inspections and maintenance Monitoring in accordance with Surface Water Monitoring Plan General maintenance of water management infrastructure 	2	2	L	Due to nature of the waste rock, geotechnical failure is considered very low		Chapter 10 Appendix I Appendix J
LA03	Bushfire, caused by either onsite fire event or external events	<ul style="list-style-type: none"> Fatality Asset damage 	<ul style="list-style-type: none"> Fire management plan The existing system of early Dry Season controlled burns should be maintained. Additionally the introduction to a 'patchy' mosaic approach to burning should be investigate whereby patches of habitat could be left unburnt for subsequent years and not burnt at all Inclusion of fire breaks around site Integration with local Traditional Owner's fire management Onsite fire fighting capability Emergency Response plan Hot work permits Compliance to flammable chemical storage requirements 	5	2	H			
LA04	Breach of site security	<ul style="list-style-type: none"> Fatality Asset damage 	<ul style="list-style-type: none"> 24 hr staffed security post at mine site entry Boom gate at entry Security fencing CCTV on minor roads 	5	1	M	Site is isolated, although the turn off to the site is on the same road as a tourist road to the Edith Falls National Park		
Surface Water									
SW01	Major Flooding of significant structures such as mine pit, infrastructure and roads	<ul style="list-style-type: none"> Loss of production Loss of life Damage to infrastructure and equipment and cost of remediation Loss of site access 	<ul style="list-style-type: none"> Significant mine infrastructure located outside 1 in 100yr ARI flood design extent of creeks passing through the mine area Construction of flood protection barriers / levees, or upgrading and redesign of existing ones Diversion channels designed to keep velocities as per acceptable design criteria Use of rip-rap protection on earthwork embankments adjacent to drainage channels Creek and channel diversions to be constructed to meet 1 in 100yr ARI flood event Regular inspections of bunds and maintenance as necessary Site safety procedures relating to extreme rain events and evacuation protocols – emergency response plan Use of multiple bench elevations in the open cut Alternate evacuation using onsite helipad 	5	1	M	Not an offsite environmental issue, primarily onsite operational and safety issue Risk rating discussed as the maximum risk for flooding		Chapter 10 Appendix I

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
SW02	Overflow from the retention ponds due to extreme rainfall event, pump failure	<ul style="list-style-type: none"> Surface water quality in receiving waters exceeds water quality criteria contained in Waste Discharge Licence Adverse impacts on downstream water quality, aquatic environment, and downstream users Impact on structural integrity of engineered embankments – wall bank failure Adverse impacts downstream for organic farmers Adverse impacts on aquatic fauna Decrease in aquatic macroinvertebrates species diversity and changes in community structure through contaminants (including AMD) entering the water way Decrease in fish populations and species richness 	<ul style="list-style-type: none"> Water retention ponds sized to capture an ARI (1 in 100) Wet Season rainfall appropriate to their hazard category Maintain an appropriate freeboard allowance for sedimentation Update Conceptual Site Model and ground contours of the SW of the site on a regular basis Monitor (real time telemetry) and manage water levels in the retention ponds to maximise available storage capacity prior to the Wet Season – water management plan including Goldsim software Continued discharge from site consistent with conditions of WDL in order to maximise storage capacity during major storm events Capacity of WTP and equalisation pond sufficient to prevent overflows in normal operating conditions If all water storages are at capacity, excess water will be redirected to the TSFs up to the height of beached tailings for temporary storage Water retention ponds have been designed to overflow and discharge to the natural environment in periods of extreme rainfall, in order to protect the integrity of the structure Develop and implement and review site Water Management Plan and align to regulations Regular update of Water Balance Model (Goldsim) Surface Monitoring to update and validate Water Balance Model Design and construction in accordance with ANCOLD for hazardous materials Have spare parts for pumps on site (including maintenance program) Increase the rate of treatment and discharge if uncontrolled release likely Ongoing monitoring and evaluation of water quality and macroinvertebrate and fish community structure Targeting sampling of refugia pools during the Dry Season to investigate to potential of groundwater seepage impacting the aquatic fauna 	2	3	M	<p>Future plan to expand organic farming land downstream of mine</p> <p>RP1 is the most critical retention pond on site</p> <p>New pond downstream of plant (next to WTP) also critical</p> <p>Keep a monitor on technology developments in regards to automated water management</p> <p>There is a dilution factor with high rainfall event that reduces the consequence</p>	<p>In such circumstances the dilution would be very high</p> <p>Current modelling indicated additional engineering is required Remodelling and updates required (design accordingly) 50ktpd [VG]</p>	Chapter 10 Appendix I Appendix J
SW03	Severe rainfall event leading to AMD in surface runoff (disturbed) leaving site (e.g. leachate from WRD, HLP)	<ul style="list-style-type: none"> Potential adverse impacts on the ecosystem Release sediments and contaminants into the environment Compliance breach Food chain accumulation of metals 	<ul style="list-style-type: none"> Treatment of water and consumed in the operation Design drainage/seepage to flow into retention ponds Monitor and Report discharge events in accordance with requirements set out in WDL Wet Season release to the Edith River in consultation with NT EPA (maintain RP to maximise RP capacity) Implement and review of surface water monitoring program Selective placement of potentially acid generating (PAG) rock, progressive encapsulation Optimising pumping capacity Reshaping of HLP for drainage control and reduce percolation Relining of the moats around HLP to reduce seepage Regular inspections and maintenance of drainage system Regular checks of structures (blockage) and scouring protection Erosion and Sediment Control Plan Drain design to recognise 1 in 100 year flow events Site water management plan Tailings dam design (to ANCOLD guidelines) Notify the NT EPA and / or DME in accordance with requirements of WDL and / or the MMP 	3	2	M		WRD runoff will be diverted into a RP1	Chapter 10 Appendix I Appendix J
SW04	Physically altered surface flow regime including creek diversion effects	<ul style="list-style-type: none"> Impact on downstream aquatic habitats including changing flow rates, frequency and / or magnitude of flood / drought 	<ul style="list-style-type: none"> Adequate design to minimise environmental impacts Monitor impacts to understand changes and respond to identified impacts 	3	2	M	Peer reviewed report conducted detailing potential impacts	Changes may include positive benefits to stream flow	Chapter 10 Appendix I Appendix J

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
SW05	Failure of retention pond wall or WRD or creek diversion	<ul style="list-style-type: none"> Surface water quality in receiving waters exceeds water quality criteria Adverse impacts on downstream water quality, aquatic environment, and downstream users Impact on structural integrity of engineered embankments – wall bank failure Adverse impacts downstream for organic farmers Impact on the integrity of the store and release cover 	<ul style="list-style-type: none"> Design to ANCOLD guidelines Regular structural checks and maintenance Design according to Western Australia and Northern Territory guidelines including benches, stormwater drainage, erosion and sediment controls Immediate reconstruction of affected area Develop a robust and fully implemented mine closure plan Use of GCL During detailed design material characteristics of waste will be addressed and appropriate design criteria (i.e. Factor of Safety) 	4	1	M	All regulation of water on mine site is DPIR responsibility only not EPA		Chapter 10 Appendix I Appendix J
SW06	Complete failure of the WTP during a significant storm event (1 in 5 yrs)		<ul style="list-style-type: none"> Regular checks and maintenance Operations generating waste shut down as much as possible Water Storage capacity to be maintained at a level to accommodate potential failure Provide alternative temporary supply of potable water Direct water to alternative storage area Emergency release to the Edith River only conducted in consultation with NT EPA 	3	1	L	Risk discussed – environmental impact not seen as significant (more operational) If WTP fails, water can be pumped into retention ponds In storm event WTP will not make large impact on discharge		Chapter 10 Appendix I Appendix J
SW07	Spills of hazardous materials leading to entry into surface water and/or soil	<ul style="list-style-type: none"> Contamination of surface waters from chemicals, hydrocarbons and ANFO Contamination of soils from chemicals, hydrocarbons and ANFO Onsite: adverse impact on the ecosystem 	<ul style="list-style-type: none"> Design, storage and handling of hazardous materials to Australian standards and regulations (secondary containment) All hydrocarbons will be stored and handled in accordance with the bunding requirements of AS 1940:2004: The Storage and handling of combustible and flammable liquids Consult with NT WorkSafe and DPIR for hazardous material advice Minimise quantities held on site Spill clean-up procedures developed and implemented Regular inspections of storages, tanks and bulk containers and the integrity of bunded areas and containment systems Testing for chemicals included in surface water monitoring program Spill register Address hazardous materials storage within the final site Environmental Management Plan (EMP) All hazardous materials will be transported in compliance with Dangerous Goods legislation Appropriate training for relevant employees 	2	3	M	Discussion around likelihood due to 2013 risk being “leading to entry into surface water” added “an/or soil” to make it more inclusive Likelihood increased due to spillages outside of storage areas		Chapter 10 Appendix I Appendix J
SW08	Failure of TSFs	<ul style="list-style-type: none"> Widespread uncontrolled release of contaminated tailings and water in to the surrounding environment Major adverse environmental impacts 	<ul style="list-style-type: none"> Design new TSF to ANCOLD guidelines Protection of toe of TSFs through construction of diversion drains and installation of rock armour (new and old TSF) Regular structural checks and maintenance Formulate, develop and implement tailings dam management plan Use of piezometers to monitor phreatic loads Fully implement mine closure plan Installation of emergency spillway to ensure water is not against dam wall Specific item in the emergency response plan, including potential ANFO plant located downstream of TSF 	5	1	M	No known communities downstream of TSF wall	Tailings Dam Management Plan will be a requirement of the operations Mining Management Plan	Chapter 10 Appendix I Appendix J

SW09	Diversion channel construction on Horseshoe Creek and Stow Creek	<ul style="list-style-type: none"> • Changes in the overall character of the watercourse and loss of habitat • Infrequent fish passage restrictions • Altered water quality from erosion • Contamination of waterways 	<ul style="list-style-type: none"> • Prior to construction existing and proposed site drainage patterns will be identified • Implement a revegetation plan prior to creek diversion to suit the physical characteristics and requisite environmental values of the waterway • Incorporate appropriate materials into the design to achieve the requirements for habitat creation • Stabilise banks, including appropriate native plantings, to consolidate banks post-construction and restore habitat to current, or improved, condition • Any diversion will be constructed using clean non-erodible material • Post-construction monitoring to assess creek bank remediation measures • More detailed modelling at lower 'normal' flow conditions will be undertaken in order to assess the associated hydraulic impacts on fish passage • Consider fish passage in the design and provide sufficient depth, velocities and resting habitat in the diversion design for regular flow events • A clearly definable site boundary will be delineated (where practicable), with construction and vegetation clearance not occurring outside of this area Site entry and exit points will be clearly defined • Works will be scheduled so that construction coincides with periods of low flow and low rainfall • Implement site induction program • Implement sediment control measures (such as silt curtains within the river channel) to minimise the potential for sediments to deposit on downstream foraging areas • Avoid stockpiling of soil along existing drainage lines, keep vehicles to tracks and divert storm water away from disturbed areas to minimise soil loss • Minimise the area of exposed ground and conduct excavation in stages to minimise ground exposed to erosion • Use existing crossings to move equipment across the waterway If there is no crossing, machinery should be carefully 'walked' across the waterway • If frequent crossings are required, lay a pad of clean rock at a shallow point of the waterway to make a temporary crossing. Remove temporary crossings when works have finished • Develop contingency measures to prevent flooding of the worksite by a rapid rise in the creek • Control erosion at the works site using slope stabilisation, revegetation, soil coverings, rip-rap and armouring, check dams, sediment traps, brush barriers and vegetation filters as appropriate • Implement spill control measures • Store and transfer petroleum products and other hazardous substances away from waterway in a bunded storage facility • Use non-toxic hydraulic fluids, such as vegetable-based fluids if possible • All equipment will be inspected and repaired regularly to prevent oil and other fluids leaking • If equipment is to be immersed in the waterway, it will be cleaned beforehand to remove any external grease, oil and other fluids • Dirt and mud will be removed from all equipment before entering the works site and waterway to avoid transferring weeds and disease • Wash-down water will not be allowed to enter waterways • Any cast-in-place concrete will be isolated from the waterway for at least 48hr to allow pH to neutralise • If using wood treated with preservatives, the chemicals will be given enough time to fix before immersing the wood in the water • A macroinvertebrate monitoring program will take into account the location of potential sources of impact, the large inputs of rain during the Wet Season and the necessary level of statistical power to detect change in macroinvertebrate communities 	3	3	M	Stability of the new channel is key		Chapter 10 Chapter 14 Appendix O
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Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
Groundwater									
GW01	Vertical and lateral extension of Batman Pit leading to drawdown of groundwater levels locally	<ul style="list-style-type: none"> Reduction in ground water flow from the Mineral Lease to local creeks, rivers and / or groundwater dependent ecosystems incl. Edith River Reduction in local water supply 	<ul style="list-style-type: none"> Monitoring of bores that are potentially influenced by groundwater drawdown including neighbouring properties (Werenbun and Edith River) Data to be assessed monthly and summarised yearly within the Water Management Plan Bores that do not meet the minimum construction requirements for water bores in Australia will be decommissioned or rehabilitated in accordance with the guidelines Exploration drill holes that may act as conduits interacting with mine features will be considered for rehabilitation Monitoring of bores potentially influenced by groundwater drawdown Alternative water supply provided if impact to water supply detected 	4	1	M	<p>GW discussed – based on the below, GW risks were not reviewed any further</p> <p>Geology of mine is hard and tight, no conductivity between surface and groundwater</p> <p>Have specialist confirm above statement and review GW section and circulate to group</p> <p>Ongoing GW monitoring/assessment No GW use in/around the area</p> <p>Confirm if Edith Farms use bores</p>	Groundwater drawdown impact would be limited to Mineral Lease It is likely that any potentially groundwater dependent ecosystems in or adjacent to the riparian zone of the Edith River will be compensated by interaction with the Edith River surface water flows Modelled groundwater discharge to the Edith River and adjacent riparian zone decreases during mining by 0.02% and flow to Stow Creek decreases by 0.78% and post mining by 0.06% and 0.92% Groundwater drawdown impact would be limited to Mineral Lease approximately 1 m drawdown surround the Batman Pit and TSF1	Chapter 11 Appendix K
GW02	Increase capacity of TSF1	<ul style="list-style-type: none"> Localised increase of groundwater levels in comparison to surrounding areas Increased seepage of contaminated waters from structure to underlying aquifer Increased seepage through artisan boreholes adjacent to structure to surrounding surface waters / localised contamination waterlogging and risk to embankment stability Increased long-term risk to groundwater 	<ul style="list-style-type: none"> Reinstate existing TSF1 underdrainage system and associated infrastructure to reduce seepage to groundwater prior to expansion and operation, reducing future risk Rehabilitation of monitoring bores proposed to be retained, to meet most current Minimum Construction Requirements for Water Bores in Australia; and closure of redundant bores and / or grouting of exposed exploration drill holes Monitoring of water levels and quality adjacent to TSF1 to establish if there is a linkage with TSF1 and the surrounding environment Data to be assessed monthly and summarised yearly within the Water Management Plan Tailings will be managed in accordance with the Tailings Management Plan 	4	3	H			Chapter 11
GW03	Establishment of TSF2	<ul style="list-style-type: none"> Localised increase of groundwater levels in comparison to surrounding areas Seepage of contaminated waters from structure or artesian bores causing contamination Increased long term risk to groundwater 	<ul style="list-style-type: none"> TSF2 will be designed, constructed and rehabilitated in a manner that will minimise oxidisation of sulphides and leakage of contaminated liquor or leachate; TSF2 construction and materials are designed for the complete lifecycle of the mine TSF2 will be underlain by a system of under-drains, geo-membrane liner, toe drains and over-drains, completely seal system with no connection between TSF2 and underlying groundwater Bores to be constructed and monitored monthly for depth and quality to assess potential interaction between TSF2 and the surrounding environment Tailings will be managed in accordance with the Tailings Management Plan 	4	2	M			Chapter 11

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GW04	WRD leaching, including seepage from existing and expanded WRD	<ul style="list-style-type: none"> Leaching of AMD, and seepage into groundwater Long term and widespread impact on groundwater 	<ul style="list-style-type: none"> Existing WRD will be encapsulated within the expanded waste rock dump Investigate alternative methods of neutralising PAG rock (e.g. anoxic limestone drains) AMD materials selectively handled to remove oxygen and water Waste Rock Dump will be managed in accordance with the Waste Rock Management Plan RP1 will continue to collect any AMD drainage Groundwater Monitoring Program Detailed analysis and design of expanded waste rock dump 	4	3	H		Hydrogeological study and historical groundwater monitoring has suggested limited widespread interaction WRD Management Plan 41% PAF 41% NAF 18% unknown	Chapter 11 Chapter 12
			<ul style="list-style-type: none"> Construction of 8m wide benches at 30m vertical intervals to collect stormwater drainage and provide access for closure cover installation, reclamation activities and maintenance. Stormwater collected on benches will be conveyed to surface water collection ditch A surface water collection ditch will be constructed down gradient of WRD to collect flows for treatment prior to discharge PAF rock will be contained in a NAF shell reducing exposure to air and water during operations and post mining Monitoring of water levels and quality adjacent to WRD to establish if there is a linkage with the WRD and the surrounding environment. Data to be assessed monthly and summarised yearly within the Water Management Plan Installation of GCL progressively throughout closure of areas of the WRD. The installation of the GCL will reduce / eliminate infiltration and generation of AMD in the structure Detailed analysis and design of expanded waste rock dump 						
GW05	HLP	<ul style="list-style-type: none"> Seepage of cyanide through HLP into localised / site groundwater system 	<ul style="list-style-type: none"> Processing or rehabilitation of heap leach materials Ongoing maintenance of heap leach post Wet Season Cleaning of moat and repairs of liners as required Pumping of stormwater from HLP to TSFs Monitoring of water levels and quality adjacent to HLP to establish if there is a linkage with the surrounding environment. Data to be assessed monthly and summarised yearly within the Water Management Plan 	3	2	M		End of year 12 and year 13 processing of HLP and no additional cyanide being added No cyanide currently detected based on monitoring	Chapter 11
GW06	Liquid and solid waste leaks and disposal, including chemicals	<ul style="list-style-type: none"> Production of leachate leading to the contamination of groundwater Seepage of chemicals into groundwater leading to contamination of the aquifer 	<ul style="list-style-type: none"> Manage disposal of wastes in accordance with the Waste Management and Pollution Control Act and waste management hierarchy the MMP Chemical and hydrocarbon storage facilities banded and managed in accordance with Mine Management Plan including inventory of chemicals onsite, material safety data sheets, spill kits and spill response procedures 	3	3	M			Chapter 11
Flora and Vegetation									
FL01	Vegetation clearing during construction and operation	<ul style="list-style-type: none"> Modify or inhibit ecological processes Reduce the diversity or modify the composition of plant species Damage habitat important for the conservation of biological diversity 	<ul style="list-style-type: none"> Adhere to buffer widths recommended by the Northern Territory Land Clearing Guidelines where possible, with regard to riparian vegetation in drainage lines. If not possible install structures that would capture sediment downstream of development Identify any no-go zones within site and adhere to management practices Adopt a land clearance permit system Stage clearing of vegetation to minimise areas of bare ground and clear land only as required and in accordance with ESCP Avoid land clearing for construction during the Wet Season (Dec-May) 	2	2	L	609 hectares to be cleared, of that, 138 considered potential Gouldian finch breeding habitat Risk rating across veg clearing	Diversions in Stow Creek and Horseshoe Creek are likely to alter ecological processes in those drainage lines	Chapter 13 Appendix M

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FL02	Introduction of weed species onto site and / or spread of existing weeds into new areas	<ul style="list-style-type: none"> Modify or inhibit ecological processes Reduce the diversity or modify the composition of plant species Fragment or damage habitat important for the conservation of biological diversity 	<ul style="list-style-type: none"> Weed Management Plan implemented Environmental inductions for workforce Vehicle and equipment wash-down and inspection procedures on site 	2	2	L			Chapter 13 Appendix M
FL03	Elevated levels of dust from mining operations	<ul style="list-style-type: none"> Modify or inhibit ecological processes Reduce the diversity or modify the composition of plant species Damage habitat important for the conservation of biological diversity Cause a long term reduction in rare, endemic or unique plant populations or species Fragment, isolate or substantially damage habitat for rare, endemic or unique plant species 	<ul style="list-style-type: none"> Implement dust mitigation within the site EMP Soil binding polymers to treat haul roads to minimise dust emissions, use water sprays on haul roads, and loads, wet ore before crushing, use hooded crushers and enclosed HPGR's Dust suppression sprays on conveyor COWPU dust modelling to understand extent Establish BAM real-time dust monitoring stations. Modify operations if thresholds exceeded 	2	2	L	<p>Review the Gouldian finch monitoring and mitigation plan to export dust controls</p> <p>Should be no impact on health or environment</p>		Chapter 13 Appendix M
FL04	Clearing of individuals or habitat of <i>Utricularia singeriana</i> (threatened) or <i>Fimbrostylus fimbrostyloides</i> (endemic)	<ul style="list-style-type: none"> Cause a long term reduction in rare, endemic or unique plant populations or species Fragment, isolate or subsequently damage habitat for rare, endemic or unique plant populations or species 	<ul style="list-style-type: none"> Targeted survey if habitat area proposed for development An ecologist must review and approve clearing permit Add line in permit to tick off that species was not observed Implement procedure to deal with plants if found, e.g. collect seeds, relocate plant 	1	2	VL	Surveys have been conducted and nothing found as yet	<p><i>U. singeriana</i> not found in Mineral Leases but marginal habitat located outside mine site footprint, 1km to the south-west of proposed works</p> <p><i>F. fimbrostyloides</i> located outside mine site footprint, 500m north of batman pit</p> <p>Similar habitat well represented in Mineral Leases</p> <p>Individuals or habitat of <i>Utricularia singeriana</i> (threatened) or <i>Fimbrostylus fimbrostyloides</i> (endemic) known to occur in the Yinberrie Hills</p>	Chapter 13 Appendix M

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
Fauna									
FA01	Cumulative impacts of clearing, dust, noise, wildfire, exotic animals and plants, tailings dam water, lowering and contamination of the water table and artificial light on the Gouldian finch	<ul style="list-style-type: none"> Long-term decrease in the size of the population Reduce the area of occupancy of the species Adversely affect habitat critical to the survival of the species Fragment an existing population into two or more populations Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline Result in invasive species that are harmful to the Gouldian finch Introduce a disease that may cause the species to decline Interfere with recovery of the species 	<ul style="list-style-type: none"> Commit to dust mitigation within the final site EMP Standard dust mitigation will include chemical treatment of roads to reduce dust generation; use of water sprays; wetting of ore prior to crushing; hooded crushers; and enclosed HPGR Monitoring of the breeding population will continue and will focus on dealing with uncertainties surrounding the highest recorded risk to the Yinberrie Hills fauna Areas of land to be cleared will be clearly marked as per vegetation clearing sub plans in EMP Activities will be monitored to ensure compliance with areas marked for clearing and no intrusion of any kind will be made on areas outside the clearing zone The Gouldian finch habitat, <i>E. tintinnans</i> woodlands, adjacent to the pit, will only be cleared during the non-breeding season i.e. the Wet Season Standard noise mitigation will be included in site wide EMP to minimise noise level The existing system of early Dry Season controlled burns should be maintained Additionally the introduction to a 'patchy' mosaic approach to burning should be investigate whereby patches of habitat could be left unburnt for subsequent years and not burnt at all Standard mitigation using sound waste management will limit the potential for colonisation by feral pests. Monitor and eradicate any incursion The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP There is the potential impact of dust on the Yinberrie Hills Gouldian finch population 	4	3	H	Risks for Gouldian finch will be re-assessed following EPBC approval	Only the predicted high levels of dust are likely to impact the population and could interfere with the species recovery	Chapter 14 Chapter 16
FA02	Cumulative impacts of clearing, dust, noise, wildfire, exotic animals and plants and artificial light on the threatened species. Species known to be in area: Mertens' water monitor Species with potential to be in area (but not known): crested shrike-tit and partridge pigeon, Australian bustard, painted honeyeater and pale field-rat, Mitchell's water monitor and yellow-spotted monitor	<ul style="list-style-type: none"> Long-term decrease in the size of the population Reduce the area of occupancy of the species Adversely affect habitat critical to the survival of the species Fragment an existing population into two or more populations Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline Result in invasive species that are harmful to the shrike-tit Introduce a disease that may cause the species to decline Interfere with the recovery of the species 	<ul style="list-style-type: none"> Implement land clearance permit Pre-clearing survey Spotter/catcher during clearing For all animals a cyanide destruction plant prior to discharge to TSF (cyanide levels below toxic level) The existing system of early Dry Season controlled burns should be maintained The introduction to a 'patchy' mosaic approach to burning should be investigate whereby patches of habitat could be left unburnt for subsequent years and not burnt at all Implement Dust Management Plan (incl. chemical treatment of roads to reduce dust generation; use of water sprays; wetting of ore prior to crushing; hooded crushers; and enclosed HPGR) Implement Noise Management Plan Gouldian Finch monitoring will also assist with inferring impacts on the Australian bustard, painted honeyeater and pale field-rat populations Areas of land to be cleared will be clearly marked as per vegetation clearing sub plans in EMP Activities will be monitored to ensure compliance with areas marked for clearing and no intrusion of any kind will be made on areas outside the clearing zone Standard mitigation using sound waste management will limit the potential for colonisation by feral pests. Monitor and eradicate any incursion The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP 	1	2	VL	Combined all 'potential' threatened species under one heading with a list of the potential species	Only the predicted high levels of dust are likely to impact the population and could interfere with the species recovery	Chapter 14 Chapter 16 Chapter 17

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
FA03	Cumulative impacts of clearing, dust, noise, wildfire, exotic animals and plants, artificial light and channel diversion on the fauna / aquatic fauna of the Site of Conservation Significance (SOCS #30) (Yinberrie Hills)	<ul style="list-style-type: none"> Modify ecological processes Reduce the diversity or modify the composition of animal species Cause a long-term reduction in rare, endemic or unique animal species Fragment or damage habitat important for the conservation of biological diversity 	<ul style="list-style-type: none"> Adhere to dust management plan Minimise mine lights facing the SOCS area Implement land clearance permit Gouldian finch monitoring will also assist with inferring impacts on the Yinberrie Hills fauna. There is the potential impact of dust on the Yinberrie Hills fauna Standard mitigation using sound waste management will limit the potential for colonisation by feral pests Incursion by additional exotic species will be regularly monitored, and any incursion eradicated The existing system of early Dry Season controlled burns should be maintained Additionally the introduction to a 'patchy' mosaic approach to burning should be investigate whereby patches of habitat could be left unburnt for subsequent years and not burnt at all Areas of land to be cleared will be clearly marked as per vegetation clearing sub plans in EMP Activities will be monitored to ensure compliance with areas marked for clearing and no intrusion of any kind will be made on areas outside the clearing zone Compliance with the WDL Implement a revegetation plan prior to creek diversion to suit the physical characteristics and requisite environmental values of the waterway Consider fish passage in the design and provide sufficient depth, velocities and resting habitat in the diversion design for regular flow events Implement spill and sediment control measures (such as silt curtains within the river channel) to minimise the potential for sediments to deposit on downstream foraging areas A clearly definable site boundary will be delineated (where practicable), with construction and vegetation clearance not occurring outside of this area as per EMP Incorporate appropriate materials into the design to achieve the requirements for habitat creation A macroinvertebrate monitoring program will be developed Incorporate appropriate materials into the design to achieve the requirements for habitat creation Stabilise banks, including appropriate native plantings, to consolidate banks post-construction and restore habitat to current, or improved, condition 	4	2	M		<p>None of the sources of impact is likely to have a major effect on ecological processes</p> <p>Only the predicted high levels of dust are likely to impact diversity / composition of the fauna, and the long-term retention of rare, endemic or unique species</p> <p>None of the sources of impact is likely to have a major effect on habitat important for conservation</p>	Chapter 14 Chapter 16
Cultural Heritage									
HE01	Ground disturbance and land clearing	<ul style="list-style-type: none"> Archaeological sites and artefacts of Indigenous cultural significance adversely impacted 	<ul style="list-style-type: none"> Implement and maintain an active Cultural Heritage Management Plan Where possible impacts to sites of medium and high significance will be avoided Clearly demarcate (including additional buffer zone) in field, areas of significance Permit to Disturb applications and consultation for isolated artefacts and small sites if necessary to disturb and or relocate Consultation with Traditional Owners as part of the management, permitting and possible salvage of sites using acceptable archaeological methodology and approval under the Heritage Act Land clearing permit to include heritage clearance/check Conduct cultural heritage training 	4	2	M			Chapter 15

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
HE02	Ground disturbance and land clearing	<ul style="list-style-type: none"> Archaeological sites of non-indigenous cultural heritage significance impacted 	<ul style="list-style-type: none"> Implement Cultural Heritage Management Plan Impacts to the high and medium significance sites will be avoided where practicable Clearly demarcate (including additional buffer / stand-off) in field areas of heritage significance Consultation with Heritage Branch and other relevant stakeholders in relation to heritage management decisions and location of heritage objects removed with approval under the Heritage Act 	3	2	M			Chapter 15
HE03	Ground disturbance and / or access	<ul style="list-style-type: none"> Sacred sites are adversely impacted by mine site construction and / or operations 	<ul style="list-style-type: none"> Address protection in Cultural Heritage Management Plan (CHMP) Actively maintain AAPA certificate(s) for the project area and the proposed works Create no go areas where necessary Undertake inductions and provide all personnel with an understanding of the need to understand and comply with the conditions of the AAPA certificate 	5	2	H			Chapter 15
HE04	Major open pit slope failure	<ul style="list-style-type: none"> Major damage to adjacent sacred or culturally significant site (exposed within region of failure / instability) 	<ul style="list-style-type: none"> Identify sacred sites within close proximity of open pit crest Ensure adjacent slope design configuration and Factor of Safety and / or Probability of Failure are commensurate with nature of sensitive site (i.e. acceptable design tolerance given level of confidence in geotechnical model and analysis – within detailed design phase) Develop and implement a suitably robust and appropriate Ground Control Management Plan (including comprehensive slope design verification, protection measures and monitoring routines) 	5	1	M	No identified sacred sites within close proximity to open pit crest to date		Chapter 15
HE05	Vegetation clearing and surface water contamination	<ul style="list-style-type: none"> Reduction in bush tucker sources for Jawoyn community 	<ul style="list-style-type: none"> Consultation with traditional owners Include in the land clearance permit 	1	1	VL	Current understanding from TOs is low value bush tucker area		Chapter 15
Air Quality									
AQ01	Dust from mine operations	<ul style="list-style-type: none"> Closest offsite sensitive Receptor (residences at Werenbun Community) approx. 7.49 km experience levels of dust in exceedance of air quality criteria Onsite workers exposed to dust levels above 50 µg/m³/hr 	<ul style="list-style-type: none"> Interactive Dust management plan produce with standard dust mitigation procedures detailed including chemical treatment of roads to reduce dust generation; use of water sprays; wetting of ore prior to crushing; hooded crushers; and enclosed HPGR Continuous dust and metrological monitoring during preproduction construction and operations at site boundary and sensitive receptors including Werenbun Reconsider likely risks with validated model results Implement additional management controls if exceedances occur 	4	1	M	Most likely consequence considered to be onsite worker exposure		Chapter 16

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
AQ02	Air emissions from the power station	<ul style="list-style-type: none"> Reduced air quality (NO_x) 	<ul style="list-style-type: none"> Operation and maintenance of power station in accordance with the design and emission criteria 	2	1	L		Emissions modelling indicates no guidelines will be exceeded	Chapter 16
Noise and Vibration									
NV01	Noise and vibration from construction and operation including blasting	<ul style="list-style-type: none"> Nuisance noise levels at the Werenbun Community Reduction in animal species diversity and population sizes Vibration impacts at the Werenbun Community 	<ul style="list-style-type: none"> A Noise Management Plan including mitigation measures will be included in site wide EMP Operation of more recent and silenced equipment where possible and maintenance for good working condition Annually compare modelling to actual noise level, modify plan as required Appropriate PPE Annual health monitoring Blasting will only occur during daylight hours Although not expected to cause adverse vibration impacts, a complaint management system will be implemented. Including the implementation of management measures adopted should a vibration complaint be received 	3	1	L	Recent noise modelling indicates low levels of noise Onsite personnel are impacted the most	Modelling indicates that guidelines will not be exceeded at sensitive receptors (25dB (A)) at Werenbun) and that predicted noise levels will have little impact on animal communities (historical monitoring has not detected any impact to Gouldian finch). Studies indicate that noise and vibration will not impact sensitive receptors (<115dB(lin) peak and <5mm/s PPV) with maximum instantaneous charges of less than 100kg	Chapter 17
Traffic and Transport									
TR01	Increased personnel traffic to mine site	<ul style="list-style-type: none"> Major single vehicle or vehicle to vehicle accident leading to a fatality Major vehicle to pedestrian fatality 	<ul style="list-style-type: none"> Implement Road Transport Management Plan Community consultation strategy as part of the Transport Management Plan Use of pooled vehicles such as buses and work vehicles (to minimise exposure) Fitness for work incl. fatigue assessments Application of Contractor Management Plan Enforce Emergency Response Plan Onsite Traffic Management Plan Segregated pedestrian and vehicle access 	5	2	H		Potential for significant increase in traffic particularly during construction Number of vehicles will be reduced by use of buses	Chapter 18

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TR02	Increase in freight trucks on Edith Falls Road and Stuart Highway, including transport of dangerous goods	<ul style="list-style-type: none"> Major single vehicle or vehicle to vehicle accident leading to a fatality Major vehicle to pedestrian fatality Road surface degradation Spillage of dangerous goods and their release to the environment 	<ul style="list-style-type: none"> Prepare offsite Traffic Management Plan Community consultation strategy as part of the Transport Management Plan Fitness for work assessments Workforce management strategy to address driver fatigue Prepare Contractor Management Plan Consolidation of freight and reagent transportation to rationalise transport movement Liaise with Infrastructure and Planning Department on road maintenance/repairs, ports, approval for Traffic Management Plan Undertake baseline pavement condition assessment prior to construction Regular pavement condition monitoring of Edith Falls Road Liaise with Northern Territory Government agency to ensure funding and maintenance routines are appropriate Liaise with NT WorkSafe Audit suppliers for compliance with legislation Transport of dangerous goods in accordance with relevant legislation with measures incorporated into the Transport Management Plan Prepare Emergency Response Plan Prepare and comply with Road Transport Management Plan and statutory approvals Comply with International Cyanide Management Code 	5	2	H			Chapter 18
Economics									
EC01	Dewatering of Batman Pit to commence mining	<ul style="list-style-type: none"> Pit still retains water which inhibits execution of Mining Plan 	<ul style="list-style-type: none"> Continue treating Batman Pit (RP3) waters to level deemed appropriate for discharge in accordance with Mine Management Plan / Waste Discharge Licence Ongoing monitoring of water quality prior to discharge 	4	2	M			Chapter 19
EC02	Severe gold price downturn and / or high production costs	<ul style="list-style-type: none"> Not providing community and stakeholder financial benefits Unsustainable and / or unprofitable mining operations Reduced or negative margins 	<ul style="list-style-type: none"> Independent specialist Prefeasibility and Feasibility Studies inputs Hedging of gold for the first five years to reduce exposure to the spot price Comprehensive financial modelling and scenario planning Building in contingencies and adopting conservative assumptions (e.g. Au price, capital and operating costs, mine design parameters, etc.) for basis of Final Investment Decision and approvals 	5	2	H			Chapter 19
EC03	Low unemployment rate in Northern Territory leads to shortage of skilled local labour	<ul style="list-style-type: none"> Vista Gold has difficulties accessing appropriate skilled labour locally leading to higher labour costs or interruptions to construction / production schedule 	<ul style="list-style-type: none"> Address within Industry Participation Plan Identify labour requirements early and provide opportunities to develop skills where gaps in the local labour force are found to be present Draw on contracting firms and personnel (local and / or interstate) 	4	2	M			Chapter 19

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
EC04	Significant increase in the AUD relative to the \$USD	<ul style="list-style-type: none"> Substantial fluctuations in AUD:USD reducing the financial performance / margins and financial viability of the Project (reduces the project Net Present Value and Internal Rate of Return) 	<ul style="list-style-type: none"> Comprehensive financial modelling and scenario planning Building in contingencies and adopting conservative assumptions Consider contracting a currency desk 	5	2	H			Chapter 19
Acid and Metalliferous Drainage									
AMD01	Dewatering of Batman Pit to commence mining	<ul style="list-style-type: none"> Exposure of PAF rock resulting in the generation of AMD 	<ul style="list-style-type: none"> Continue treating Batman Pit (RP3) waters to level deemed appropriate for discharge in accordance with Waste Discharge License Ongoing monitoring of water quality prior to discharge 	1	2	VL	Dewatering has occurred for four seasons without evidence of increase in AMD		Chapter 12
AMD02	Dewatering of Batman Pit during mining	<ul style="list-style-type: none"> Exposure of PAF rock resulting in the generation of AMD 	<ul style="list-style-type: none"> Collection and treatment of AMD pit waters resulting from incident rainfall in RP3 Treated RP3 water to be reused in process 	1	2	VL		No or limited groundwater ingress or egress to the pit	Chapter 12
Waste									
WA01	Poor waste characterisation and / or Insufficient on-site supply of cover material for rehabilitation	<ul style="list-style-type: none"> Possible release of AMD via seepage and / or run-off from WRD, TSF, HLP and LGO stockpile (on-site and off-site into surrounding waterways) 	<ul style="list-style-type: none"> Adequate waste rock characterisation Schedule waste rock placement to ensure adequate encapsulation Monitor GCL effectiveness and modify as appropriate Ensure sufficient capacity in downstream retention ponds (RP1 and equalisation pond) Implement WRD management plan Provide ongoing refinement of materials balance Increase contingency for cover requirements Construction of surface and sub-surface drainage and implementation of a water management plan for contaminated water MMP includes Water Management Plan 	3	2	M		All PAG will be encapsulated. Waste rock characterisation will identify unknown rock as NAF or PAF for further management	Chapter 12
WA02	Generation of putrescible waste, sewerage on-site and at the accommodation facility	<ul style="list-style-type: none"> Release of putrescible, construction and non-mining wastes to the environment Release of sewage to the environment 	<ul style="list-style-type: none"> Waste management addressed in EMP Separation of waste for recycling and recovery Removal of residual waste to landfill Disposal of hydrocarbon and other chemical spills to approved facilities Record waste types and volumes generated on-site and being transported off-site Monitor for potential environmental impacts by conducting surface water quality monitoring on site Treatment of sewage via a waste water treatment plant 	2	1	L			Chapter 12

Reference	Source of Impact / Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Consequence (clearly understand what is the final impact)	Mitigation / Planned controls to manage risk	Consequence	Likelihood	Residual Risk	2017 Comments	2013 Comments	2013 EIS Reference
Closure and Rehabilitation									
CL01	Rehabilitation delayed beyond proposed schedule	<ul style="list-style-type: none"> Increased rehabilitation costs Loss of rehabilitated vegetation Erosion of exposed surfaces Potential sedimentation into waterways Unable to recover security bonds 	<ul style="list-style-type: none"> Closure and Rehabilitation Plan updated and refined throughout mining operations including life of mine closure planning, contingency planning, tailings management plan, waste rock management plan and a care and maintenance plan Revegetation and weed management trials to determine best practice for revegetation of the site Progressively rehabilitating the mine reducing the environmental and financial risk of closure Annual review of security bond calculations 	3	2	M			Chapter 12 Chapter 24
CL02	Ineffective mine closure including insufficient TSF and WRD cover / thickness or general rehabilitation practices	<ul style="list-style-type: none"> Ongoing AMD issues Deterioration TSF and WRD store and release cover Change in MMP conditions Perception based on legacy mines Closure costs greater than calculated Financial impact (unplanned) late in process to company Third party financial impacts 	<ul style="list-style-type: none"> Closure and Rehabilitation Plan updated and refined throughout mining operations including life of mine closure planning, contingency planning, tailings management plan, waste rock management plan and a care and maintenance plan Engagement with Northern Territory Government regulatory authorities on plans to leverage off other projects Thickness of rock armouring to ensure integrity of the cover to be reviewed during progressive rehabilitation and updated as required Revegetation and weed management trials to determine best practice for revegetation of the site Progressively rehabilitating the mine reducing the environmental and financial risk of closure Under the Water Management Plan and Closure and Rehabilitation Plan implement and maintain a passive water treatment system Annual review of security bond calculations 	5	2	H		Independent peer review processes occurred on design	Chapter 12 Chapter 24
CL03	Post mining (during closure) water management inadequate (i.e. passive water management fails)	<ul style="list-style-type: none"> Uncontrolled offsite release of poor quality water 	<ul style="list-style-type: none"> Closure planning progressively refined over the life of mine including e.g. passive water treatment system, Vista Gold will maintain responsibility until Northern Territory Government accepts relinquishment and security bond refunded 	3	3	M	Potential waste rock dump releasing metals after closure into the environment		Chapter 10 Appendix I Appendix J