5. Environmental Risk Assessment

5.1 Introduction

A risk assessment was completed to assist in identifying the key environmental, social and economic issues and potential impacts associated with the Mt Todd Gold Project, in the context of the EIS scope. The risk assessment was initially conducted early in the study process in order to identify key risks for focus and to guide (through enabling informed choices and prioritisation of actions / works) site specific technical and specialist studies being undertaken. Further and more recent updates to the risk assessment have been made to reflect an improved understanding of the associated issues (i.e. final outcomes of specialist studies) and stakeholder feedback received on the interim technical studies and preliminary risk assessment feedback.

The process has provided an understanding of residual risks and potential impacts during detailed design, construction, operations, decommissioning and closure phases of the Project. It also reinforces the importance of effective control measures for risk reduction and management.

The major or key risks identified as part of the Guidelines for the Preparation of a Draft EIS in September 2011 (by the then NRETAS) are detailed below. There is a clear expectation these will be comprehensively addressed and that any further risks are also identified and assessed during the EIS process:

- AMD seepage and runoff from the waste rock dump WRD, ore stockpiles and TSFs polluting surface and ground waters;
- Contamination of groundwater from mining activities causing groundwater quality impacts outside of the Mineral Lease or release of contaminated groundwater expressing to surface water;
- Groundwater drawdown impacts on groundwater flows in the Edith River and the potential to impact production bores in the region;
- Contamination of on-site surface water from AMD and mining activities, potentially exacerbated by poor segregation of clean and polluted water generated on-site, causing adverse impacts to downstream environmental values;
- Biodiversity impacts associated with the disturbance footprint of mining activities and infrastructure requirements;
- Mine closure and rehabilitation – failure of final design of the WRD and TSFs to adequately ensure the structures are safe, stable, not prone to significant erosion, minimises AMD seepage and runoff and meet stakeholder expectations as final land use structures; and
- Social, economic, transport and heritage impacts.

In addition, the NT EPA has also expressed a specific interest in potential transport impacts and a potential catastrophic failure of the tailings dam.

A suitably robust risk assessment process was undertaken consistent with industry standards and risk management approaches around environmental risks within a mine site, as described in Section 5.2.

The details (particularly risk assessment registers and tables included in this chapter) around the level of risk and necessary controls have been addressed consistent with the specialist studies, and linkages made through appropriate cross-referencing.

5.2 Risk Assessment Process and Methodology

Risk relates to the effect of uncertainty on objectives. These objectives relate in this case primarily to environmental goals within the Draft EIS. Risk is expressed and assessed in terms of a combination of the consequence of an event and the associated likelihood of occurrence.

Levels of risk, possible mitigation of risk and determination of residual risk to environmental components (aspects) have been determined using standard qualitative risk assessment procedures with a matrix form Table 5-1). The process has been consistent with AS/NZS ISO 31000:2009 'Risk Management – Principles and guidelines', with the exception of economic risk which is not addressed in the guidelines.

The risk assessment process has included a coordinated approach, with specialist discipline inputs from a range of environmental aspects and risk assessment steps across several workshops. These facilitated workshops have involved technical specialists and a cross section of individuals with the necessary skills and experiences to understand and adequately address risks associated with the Project. Steps in the risk process included:

- communication and consultation;
- context establishment;
- risk assessment;
  - risk identification
  - risk analysis
  - risk evaluation
- risk treatment; and
- monitoring and review.

According to the EIS Guidelines referred to in Section 5.1 (and for additional context), the risk assessment approach is also expected to:

- acknowledge and discuss the full range of risks presented by the Project including those of special concern to the public;
- demonstrate risks to people, the environment and nearby facilities associated with the Project can and will be managed effectively during the construction, commissioning, operation, and decommissioning of the Project;
- quantify (where possible) and rank risks so that the reasons for proposed management responses are clear;
- acknowledge levels of uncertainty about estimates of risk and the effectiveness of risk controls;
- include the potential scenario where benefits of the Project for the wider community may not eventuate; and
- identify residual risks (risks remaining once risk management strategies have been implemented) and their consequences expected to be borne by the community, providing better understanding of equity issues.

Assessment of risk has been conducted through consideration of the circumstances around risks, identifying necessary controls to address potential impacts and assuming effective implementation of planned and committed mitigation of potential impacts. Mitigation is proposed, where possible, to reduce

residual risk (risk after mitigation) to below “Extreme” or “High” risk outcomes to the extent reasonably practicable as part of reducing the overall project risk profile.

The depth of focus on risk controls is linked to the level of risk and opportunity for reduction to meet organisational commitments and goals linked to an environmentally and socially responsible operation, and those requirements are part of the regulatory obligations and impact assessment guidelines.

Table 5-1 provides a summary of the qualitative risk matrix adopted and the levels of risk for the various consequence and likelihood combinations.

Table 5-1 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

A brief description of each risk classification and the likely responses is provided below, with detailed definitions included in Table 5-2 and Table 5-3.

- Extreme
  - Represent unacceptable risks primarily critical in nature in terms of consequences (e.g. extensive and long term environmental harm, permanent sacred site damage, fatality, massive economic impacts) that are effectively considered a possibility through to almost certain to occur. Such risks significantly exceed the risk acceptance threshold and require comprehensive control measures, and additional urgent and immediate attention towards the identification and implementation of measures necessary to reduce the level of risk.
- High
  - Typically relate to significant to critical consequences (e.g. a major amount of environmental or heritage damage, and considerable safety, social or economic impacts) that are inclined to cut across the possible to almost certain likelihood ratings. These are also likely to exceed the risk acceptance threshold and although proactive control measures have been planned or implemented, a very close monitoring regime and additional actions towards achieving further risk reduction is required.
- Medium
  - As suggested by the classification, medium level risks span a group of risk combinations varying from relatively low consequence / high likelihood to mid-level consequence / likelihood to relatively high consequence / low likelihood scenarios across environmental, social and economic areas. These risks are likely to require active monitoring as they are effectively positioned on the risk acceptance threshold.

- Low
  - These risks are below the risk acceptance threshold and although they may require additional monitoring in certain cases are not considered to require active management. In general such risks represent relatively low likelihood and low to mid-level consequence scenarios.
- Very Low
  - Such risks are below the risk acceptance threshold and would at the most require additional monitoring and in many cases would not require active management. These risks can include unlikely to rare events with minor consequences and in essence relate to situations around very low probabilities of relatively minor impacts occurring.

Levels (and definitions) of likelihood and the severity for the types of consequences that make up the risk rating determination are defined in Table 5-2 and Table 5-3 respectively. Likelihoods have been categorised around the probability of occurrence, within the context of reasonable timeframes and frequencies given the nature of the anticipated mine life.

Table 5-2 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).

Table 5-3 describes the types of consequences that have been identified and assessed as part of the risk assessment process. These have been grouped into three sections to effectively address the key areas requiring attention as part of the overall Draft EIS risk assessment:

- Environmental – which also includes heritage considerations
- Social and Regulatory / Legislative – including health and safety
- Economic – whether relating to the company / operator or other stakeholders

Table 5-3 Definitions Consequence Ratings

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

In summary the risk assessment has involved the following:

- Review of matters specified in the Draft EIS Guidelines;
- Review of the risk assessment undertaken for the EPBC Act referral prepared for the Project;
- Review of the matters specified in the EPBC Act controlling provisions for the Project;
- Consideration of issues and concerns raised by stakeholders (including preliminary NT EPA feedback);
- Consultation with project team members and technical specialists;
- Workshops involving people with the necessary skills and experience;
- Advice of the technical specialists regarding project activity and impact pathways arising from the project components and associated activities; and
- Documenting risk pathways in the Risk Register.

Environmental and related aspects investigated include:

- Community
- Greenhouse gas
- Climate change
- Land
- Surface water
- Groundwater
- Flora and vegetation
- Fauna
- Heritage
- Air quality
- Noise and vibration
- Traffic and transport
- Landscape and visual
- Economics
- Waste
- Closure

Identified sources of impact are a function of the various specialist studies undertaken for the Draft EIS. More detailed accounts of the sources of impacts can be found in the relevant Chapters and Appendices.

The Project's construction, operation and decommissioning phases present a number of sources of impact and consequences. A review (and update as required) of the risk assessment will be conducted and communicated to all relevant stakeholders once the detailed project design is completed, and before construction commences.

5.3 Discussion of Key Outcomes

The risk assessment provided a good understanding of the project risk profile and has enabled priority risks to be highlighted in order to minimise the likelihood of occurrence and / or the consequence severity. Risk assessments were based on the outcomes of planned mitigation and monitoring to detect incipient or actual failure of management systems. In total 135 different environmental, social and economic aspects were evaluated.

The major areas of interest in terms of the number of different risk scenarios identified and assessed include the following, which represents 97 risks or just over two-thirds of the total number of aspects:

- Fauna (45)
- Surface water (17)
- Flora and vegetation (16)
- Groundwater (9)
- Community (10)

The specific results that are of greatest or priority interest are addressed below in Section 5.3.1.

5.3.1 Risk Assessment Results

Table 5-4 summarises the outcomes of the risk assessment process.

The specific impact and consequence scenarios are detailed in Table 5-6 below, along with the residual risk rating, based on a reasonable assumption of effective implementation of the control measures described.

Ongoing monitoring and management will be required to test the effectiveness of these controls, audit their implementation and identify other measures or different approaches that may be required to achieve and maintain acceptable risk levels.

In terms of table layout and structure (Table 5-6), risks are grouped according to the environmental aspects identified (listed towards the end of Section 5.2). Comments are also included in the table in order to provide additional context, assumptions and / or logic in assessing the risks.

The distribution of risks with the assumption of thorough implementation of identified controls (i.e., residual risk) can be summarised as follows:

Table 5-4 Summary of Risks

Risk Level	No. Risks	Reference No's (refer Table 5-6)
Extreme	nil	N/A
High	14	SW12, GW03, GW06, FA01-FA03, FA08, FA34, FA37, FA40, HE04, TR01, TR03 and CL03
Medium	64	*(see Table 5-6)*
Low	29	*(see Table 5-6)*
Very Low	28	*(see Table 5-6)*
Total	**135**	

The High and Medium risks flagged above (78 in total) will have inspection, reporting and / or monitoring programs, and many will have specific management programs associated with them. All management, mitigation and monitoring measures will be subject to continuous review and updates / improvement depending on circumstances and performance.

5.3.2 Critical Controls

The summarised critical controls below relate to the 14 High risks analysed through the risk assessment process. The distribution of the related High risks and those in Table 5-4 (as per reference numbers provided) are categorised as follows, with full details of these provided in Table 5-6:

- Surface water (1)
- Groundwater (2)
- Fauna (7) – including two aquatic fauna related
- Heritage (1)
- Traffic and Transport (2)
- Closure (1)

In essence the critical controls to address effective management of many of the higher risk areas (associated with surface water, groundwater, fauna, heritage, traffic and transport, and mine closure) as well as others of greatest significance are anticipated to include:

- reinstatement and construction of TSF under-drainage systems, TSF management plan development and implementation (including borehole installations and monitoring);
- tailings management plan and design according to Australian National Committee on Large Dams (ANCOLD) guidelines;
- surface water management (quantity and quality);
- dust mitigation measures;
- carefully executed vegetation clearing and controlled burning practices;
- monitoring of fauna and artificial lighting control strategies;
- compliance with approved WDL and MMP conditions;
- management of sacred and significant heritage sites (and careful pit design and ground movement monitoring practices);
- a ground control management plan regarding open pit slope stability;
- transport management plan development and implementation, and community consultation;
- site safety procedures and evacuation protocols;
- development and implementation of re-vegetation plans;
- comprehensive mine closure planning – development and implementation.

It should be noted that, as a separate matter, often for major projects the high consequence and low likelihood scenarios are very important to identify and understand. These ‘black swan’ (surprise events with a major effect) events are also particularly important to manage through effective control development and implementation.

Although they may or may not correlate to High risks (as detailed above) according to the matrix rating system used, it will remain important to keep focus on the following risks (detailed by risk reference number) that have potentially critical consequences (see Table 5-3 definitions for critical consequences).

- CC02 Economic, social, cultural and community issues associated with an unsustainable project / operation
- SW11 Fatality associated with major flood event
- SW12 Major infrastructure damage and associated remedial costs
- SW15 TSF catastrophic failure
- HE04 Major slope failure adjacent to and impacting on culturally significant site(s)
- TR01-TR04 Transport related fatalities on public roads.
- EC02 Project failure / unsustainable operations, not delivering anticipated benefits to community and stakeholders (and additional site legacy issues beyond present conditions). Similar to CC02 outlined above. Linked to major Au price decline.
- EC04 Similar to above, but driven by major Australian dollar fluctuations and NPV impacts.

5.3.3 Positive Impacts

The risk assessment has highlighted potential risks, important management strategies and control measures associated with the Project, as summarised above and detailed in Table 5-6. Nevertheless as a result of the current site conditions and legacy issues, it is considered there are opportunities to substantially enhance and improve the current and on-going impacts (as opposed to retaining an undeveloped brownfields site) by undertaking a well-planned and effective / responsible mining operation.

Such positive impacts are described in Table 5-5, according to the aspect area, and adopting a high-level rating system (net of potential issues and risks assessed and separately dealt with), as follows:

1 Major positive and opportunity to be realised

2 Moderately positive

3 Relatively minor / marginal positive impact likely

Table 5-5 Summary of Positive Impacts Anticipated

Aspect	Rating	Description of Positive Impact
Community	1	• Direct and indirect employment opportunities (with the company, suppliers and service providers), new business ventures and capacity building. • Increase in business opportunities and regional spend. • Partnering with education and training providers to increase local and regional employment. • Indigenous engagement and capacity building. • Provision of additional housing and accommodation in the community as part of a hybrid accommodation strategy and possible public / private development opportunities. • Increases in resident population will contribute to local economy, and coupled with Northern Territory Government support, it is likely that the Project would support the expansion of health and other community infrastructure. • May experience increase in worker lifestyle opportunities associated with residential living arrangements or even FIFO or DIDO workforce (depending on circumstances).
Land	2	• Benefits to local / regional community from enabling additional resources to be committed to rehabilitation of existing contaminated mine site. • Potential for near neighbours to benefit from assistance with shared land management responsibilities (e.g. introduced species and fire)
Surface Water	1	• Likelihood of uncontrolled discharge considerably reduced due to increased capacity for water storage and treatment on site as part of the new mine plan. • More active water management practices and procedures, through an increase in dedicated resources and more substantial / continuous site presence during operations. • Appropriate treatment of legacy issues around water quality prior to intended resumption of mining.
Groundwater	3	• Reduction in groundwater flow (groundwater recharge) from the Mineral Lease to local creeks, rivers and / or groundwater dependent ecosystems incl. Edith River • This reduction in base-flow is beneficial because it decreases the quantity of potentially contaminated groundwater entering the Edith River i.e. groundwater that may have elevated levels of metals and other potential contaminants.
Flora and Vegetation	1	• As per Land - an opportunity to comprehensively rehabilitate key areas (although they will be in a different form to current conditions) such as the WRD, HLP and surrounding / satellite pits and areas of current disturbance; and do so progressively.
Fauna	3	• Similar to logic around enhanced Surface Water management; by having an increased presence and resources to manage fire. Benefits from better fire management could help protect habitat for endangered species such as the Gouldian finch. • The opportunity of implementing processes around feral animal control.

Aspect	Rating	Description of Positive Impact
Economics	1	• As per Community – including opportunities for indigenous employment and economic development. Significant employment and economic development for the Katherine Region. • Additional expenditure in the local Katherine / Pine Creek area by workers has the potential to benefit retail, food and beverage and entertainment providers
Waste	3	• Supporting local recycling centre and local scrap metal merchant located in Katherine. • Waste Hierarchy practices including avoidance; re-use; re-cycling and recovery of energy; treatment; containment; and disposal. • Metals such as steel and copper wire will be collected in designated areas prior to removal from site for recycling. Plastic pipe including high-density polyethylene, polyvinyl chloride (PVC) and acrylonitrile-butadiene-styrene (ABS) will be reused wherever possible. Used tyres will be collected and periodically dispatched to off-site recyclers or a re-tread facility.
Closure	2	• As per Land, and Flora and Vegetation - benefits to community from rehabilitation of existing contaminated mine site through comprehensive rehabilitation.

Table 5-6 Project Risk Assessment (by Aspect)

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Community								
CO01	Redevelopment and operation of the Mt Todd Gold Mine including the requirement for a FIFO or DIDO construction workforce of up to 450 persons (peak) during the construction period (approx. 2 years); and an operational workforce of up to 350 full-time positions comprising a mix of FIFO or DIDO contract workers and a permanent residential workforce.	• Lack of social integration of workforce • Increase in incidence of anti-social behaviour • 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	• 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 • Proposed 'hybrid' option offers operations workers a choice of FIFO / DIDO or residential options • Adoption of recruitment policies that allow for appropriate notice periods to be served for new employees	2	3	M		Chapter 6 Chapter 7
CO02		• Increase in demand for short-term and long-term accommodation, and reduction in affordability of rental housing leading to rent escalation, housing price inflation	• The housing and accommodation strategy includes a purpose-built construction camp. • For the operations workforce, a 'hybrid' accommodation solution is proposed with the provision of additional housing and accommodation. • Further develop the hybrid housing and accommodation strategy in consultation with key stakeholders	2	3	M		Chapter 6 Chapter 7
CO03		• Increased demand for community infrastructure and utilities leading to local / regional shortfalls including increased demand on health facilities	• Increases in resident population will contribute to local economy, and coupled with Northern Territory Government support, it is likely that the Project would support the expansion of health and other community infrastructure • Provision of first aid capability at the mine site during construction and operational phases of the Project • Develop an Emergency Response Plan • The proponent will work closely with the Katherine police, fire and emergency services to effectively plan for any emergencies	2	2	L	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		Impacts on community values and conditions including : • Decline in community, health, safety and wellbeing • Impacts on vulnerable groups such as women and Indigenous groups	• 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 • Develop 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 • Include vulnerable groups representation on a community reference group • Develop an overall workforce management strategy including workforce sources, management, health and wellbeing and appropriate behaviour	3	3	M		Chapter 6 Chapter 7

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
CO05		• Decline in worker wellbeing associated with FIFO / DIDO workforce such as obesity, depression and alcohol and substance abuse, disconnection from family, and financial difficulties associated with over-commitment and indebtedness	• Develop an overall Workforce Management Strategy including workforce sources, management, health and wellbeing and appropriate behaviour	3	3	M		Chapter 6 Chapter 7
CO06		Indigenous resources, values and aspirational impacts including: • Potential for exacerbation of existing community conflict • Traditional Owner cultural heritage and resources	• 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 • Prepare and implement an Industry Participation Plan for the Project, including indigenous participation	3	3	M		Chapter 6 Chapter 7
CO07	Release into drainage channels and water courses of untreated surface water from retention ponds and storage impoundments	• Contamination of water intended for use downstream	• Monitor surface water quality • Comply with conditions set out in the WDL • Comply with Site Water Management Plan • Refer to SW01	3	3	M		Chapter 6 Chapter 7
CO08	Ineffective containment of hazardous materials in impoundments	• Contamination of neighbouring production bores	• Monitor groundwater quality • Communication with landowners especially should contamination be identified • Appropriate material storage and back-up controls bunding	3	1	L	Production bores are outside zone of influence of the mine	Chapter 6 Chapter 7
CO09	Increase in potential breeding sites for mosquitoes due to water ponding	• Nuisance levels of mosquitoes for those working on the Mineral Leases	• 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
		• Transmission of disease by mosquitoes infecting those working on Mineral Leases	• 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		

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
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)	• 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.	• 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. • Increase height of the raw water dam • 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	Temperature increase predicted for the site is not significant in relation to the project life	Chapter 8
CC02	Substantial social, economic and environmental issues.	• Project is unsustainable due to poor economic, social, cultural, environmental and health and safety performance.	• Implement a system to effectively monitor, measure and report on environmental management. • An environmental management monitoring and reporting schedule will be established, with reports made available to the project team through each project phase • Educate Vista Gold personnel and Contractors and other individuals on-site to make them aware of Environmental Management System (EMS) procedures and work within the system • Where practicable incorporate sustainability criteria and requirements into tender documents such as material specifications (i.e. establish preferential priority to products which are locally sourced / contain recycled materials / are low in volatile organic compounds / etc.) • Communicate procedures to ensure Contractors are aware of any requirements that have been incorporated into tender documents • Review key contractors based on past performance and / or audit during contract delivery • Identify appropriate and achievable sustainability goals for the Project and reflect outcomes of subsequent monitoring and reporting annually • Consider whole of life costing in the design • Consider resilience of equipment to reduce long –term costs • Undertake mine planning to achieve efficient recovery, processing and resource use • Apply risk management systems to provide early identification and corrective action to avoid project / mine failure • Create a culture of risk awareness and risk management through site construction and operational activities	5	1	M	Risks and associated mitigation measures dealt with in other chapters of the Draft EIS also contribute to the overall sustainability of the Project. For example, measures to reduce greenhouse gas emissions, effectively manage hazardous materials, minimise pollution, prevent harmful discharges to the environment, protect heritage values and improve community development all contribute to enhancing the social, economic and environmental performance of the Project.	Chapter 8

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Greenhouse Gas								
GG01	Emissions to atmosphere at local level	• Contribution to Northern Territory emission levels	• Commit to energy efficiency within the final 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 • Consider voluntary offsets for additional greenhouse gas emissions when assessing the Project's liability under the carbon pricing mechanism.	1	5	M		Chapter 20
Land								
LA01	Ineffective containment of Cyanide and AMD	• Leaching of cyanide from the existing heap leach and AMD from the waste rock dump and TSFs	• Monitoring of groundwater quality • Characterisation of waste material • Encapsulation of AMD material in the WRD • Treatment of water prior to discharge • Comply with International Cyanide Management Code	3	2	M		Chapter 9 Chapter 12
LA02	Inappropriate / poorly managed chemical storage facilities	• Contamination of soils from chemicals, hydrocarbons and ANFO	• Appropriate design and storage of hazardous materials to Australian standards • Address hazardous materials storage within the final site Environmental Management Plan (EMP) • Consult with NT WorkSafe to further manage and reduce risk • 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. • All hazardous materials will be transported in compliance with Dangerous Goods legislation • Spill clean-up procedures developed and implemented • Appropriate training for relevant employees • Regular inspections of storages, tanks and bulk containers and the integrity of bunded areas and containment systems	2	2	L		Chapter 9 Chapter 18 Chapter 21
LA03	Lengthy exposure of bare soils during land clearing and mine construction and operation	• Erosion and sedimentation leading to soil scouring and increased turbidity of water courses and drainage lines downstream	• Develop and 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	3	M		Chapter 9

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Surface Water								
SW01	Overflow from the retention ponds due to extreme rainfall event	• 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	• Water retention ponds sized to capture an ARI Wet Season rainfall appropriate to their hazard category plus an appropriate freeboard allowance for sedimentation • Monitor and manage water levels in the retention ponds to maximise available storage capacity prior to the Wet Season • 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 • Surface Monitoring to validate Water Balance Model • Design and construction in accordance with ANCOLD for hazardous materials	3	3	M	In such circumstances the dilution would be very high Current modelling indicated additional engineering is required Remodelling and updates required (design accordingly) 50ktpd [VG]	Chapter 10 Appendix I Appendix J
SW02	Severe rainfall event leading to AMD in surface runoff (e.g. leachate from WRD, HLP)		• Treatment of water prior to release • Monitor and Report discharge events in accordance with requirements set out in WDL • Notify the NT EPA and / or DME in accordance with requirements of WDL and / or the MMP • Wet Season release to the Edith River in consultation with NT EPA • Development and implementation of site water management plan • Development, implementation and review of surface water monitoring program • Selective placement of potentially acid generating (PAG) rock • Lower RP1 as low as possible prior to the Wet Season • Installation of additional pumping capacity • Reshaping of HLP • Relining of the moats around HLP • Deeping of RP1	3	3	M	WRD runoff will be diverted into a RP1	Chapter 10 Appendix I Appendix J
SW03	Failure of retention pond wall or creek diversion		• Design to ANCOLD guidelines • Regular structural checks and maintenance • Advise stakeholders consistent with the Waste Discharge License	4	1	M		Chapter 10 Appendix I Appendix J
SW04	Complete failure of the WTP		• 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 and / or alternative water treatment applied • Emergency release to the Edith River only conducted in consultation with NT EPA	3	1	L		Chapter 10 Appendix I Appendix J

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
SW05	Post mining (during closure) water management inadequate (i.e. passive water management fails)	• Uncontrolled offsite release of poor quality water	• 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		Chapter 10 Appendix I Appendix J
SW06	Insufficient capacity of drains leading to the retention ponds	• Release sediments and contaminants into the environment	• Drain design to recognise 1 in 100 year flow events • Erosion and Sediment Control Plan	2	2	L		Chapter 10 Appendix I Appendix J
SW07	Failure of cross drainage structures		• Regular checks of structures (blockage) and scouring protection • Erosion and Sediment Control Plan	2	2	L		Chapter 10 Appendix I Appendix J
SW08	Erosion in diversion drains or other mine related drainage infrastructure		• Regular checks and maintenance on all drains • Erosion and Sediment Control Plan	2	2	L		Chapter 10 Appendix I Appendix J
SW09	Erosion of waste rock dump, TSFs and HLP due to significant rainfall events	• Capacity of sedimentation basins exceeded, reducing their efficiency and leading to sediments and contaminants entering waterways	• Ongoing stabilisation and rehabilitation of embankments • Regular inspections and maintenance • Monitoring in accordance with Surface Water Monitoring Plan	3	2	M		Chapter 10 Appendix I Appendix J
SW10	Major Flooding of significant structures such as mine pit, infrastructure and roads	• Loss of production	• 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 • Emergency Wet Season release to the Edith River in consultation with NT EPA • Site safety procedures and evacuation protocols	2	2	L		Chapter 10 Appendix I
SW11		• Loss of life		5	1	M		Appendix I
SW12		• Damage to infrastructure and equipment and cost of remediation		5	2	H		Appendix I
SW13		• Loss of site access		3	2	M		Appendix I
SW14	Spills of hazardous materials from storage areas	• Contamination of surface waters from chemicals, hydrocarbons and ANFO	• Design, storage and handling of hazardous materials to Australian standards and regulations • Consult with NT WorkSafe to further manage and reduce risk • Lubricating oil stored in tank with bunded area with spill protection • Waste oil stored in tank within bunded area and held for collection by contractor for reprocessing and recycling • 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 • Back up protective bunding	2	3	M		Chapter 10 Appendix I Appendix J

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
SW15	Failure of TSFs	• Widespread uncontrolled release of contaminated tailings and water in to the surrounding environment • Major adverse environmental impacts	• Design to ANCOLD guidelines • Protection of toe of TSFs through construction of diversion drains and installation of rock armour • Regular structural checks and maintenance • Formulate, develop and implement tailings dam management plan • Use of piezometers to monitor phreatic levels • Develop a robust and fully implemented mine closure plan • Installation of emergency spillway to ensure water is not against the dam wall • Compliance with MMP conditions	5	1	M	Tailings Dam Management Plan will be a requirement of the operations Mining Management Plan	Chapter 10 Appendix I Appendix J
SW16	Failure of WRD (slope failure)	• Impact on the integrity of the store and release cover • Contamination of surrounding environment by AMD • Destruction of flora and fauna	• 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		Chapter 10 Appendix I Appendix J
SW17	Physically altered surface flow regime including creek diversion effects	• Impact on downstream aquatic habitats including changing flow rates, and frequency and / or magnitude of flood and or drought event	• Diversion of clean, run on surface water • Containment and treatment of contaminated water • Monitor impacts to understand changes and respond to identified impacts	3	3	M	Changes may include positive benefits to stream flow	Chapter 10 Appendix I Appendix J
Groundwater								
GW01	Vertical and lateral extension of Batman Pit leading to drawdown of groundwater levels locally.	• Reduction in ground water flow from the Mineral Lease to local creeks, rivers and / or groundwater dependent ecosystems incl. Edith River.	• Monitoring of bores that are potentially influenced by groundwater drawdown including neighboring 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	2	4	M	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%.	Chapter 11 Appendix K
GW02		• Reduction in local water supply.	• Monitoring of bores potentially influenced by groundwater drawdown • Alternative water supply provided if impact to water supply detected	4	1	M	Groundwater drawdown impact would be limited to Mineral Lease approximately 1 m drawdown surround the Batman Pit and TSF1.	Chapter 11

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
GW03	Increase capacity of TSF1	• 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.	• 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
GW04	Establishment of TSF2	• 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	• TSF2 will be designed, constructed and rehabilitated in a manner that will minimise oxidisation of sulfides 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
GW05	Existing WRD	• Leaching of AMD, and seepage into groundwater. • Long term and widespread impact on groundwater.	• 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	3	1	L	Hydrogeological study and historical groundwater monitoring has suggested limited widespread interaction	Chapter 11 Chapter 12

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
GW06	Expanded WRD	• Leaching of AMD and seepage into groundwater. • Long term and widespread impact on groundwater.	• 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. • Continued collection of seepage from WRD by RP1 • 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. • Managed in accordance with the WRD Management Plan. • Detailed analysis and design of expanded waste rock dump	4	3	H	WRD Management Plan 41% PAF 41% NAF 18% unknown	Chapter 11 Chapter 12
GW07	HLP	• Seepage of cyanide through HLP into localised / site groundwater system	• 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
GW08	Liquid and solid waste disposal	• Production of leachate leading to the contamination of groundwater.	• Manage disposal of wastes in accordance with the Waste Management and Pollution Control Act and waste management hierarchy the MMP.	2	3	M		Chapter 11
GW09	Chemical spills and leaks	• Seepage of liquids into groundwater leading to contamination of the aquifer.	• Chemical and hydrocarbon storage facilities bunded and managed in accordance with Mine Management Plan including inventory of chemicals onsite, material safety data sheets, spill kits and spill response procedures. • Consult with NT WorkSafe to further manage and reduce risk	3	3	M		Chapter 11
Flora and Vegetation								
FL01	Vegetation clearance within buffer zones defined by Land Clearing Guidelines	• Modify or inhibit ecological processes	• 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 • 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	3	M	Diversions in Stow Creek and Horseshoe Creek are likely to alter ecological processes in those drainage lines.	Chapter 13 Appendix M
FL02		• Reduce the diversity or modify the composition of plant species		2	3	M		
FL03		• Fragment or damage habitat important for the conservation of biological diversity		2	3	M		
FL04	Over clearing of vegetation	• Modify or inhibit ecological processes	• Develop and implement Vegetation Clearing sub plans which include areas not to be cleared (no-go areas) and make all workers aware of them through EMP and site work briefings • Clearly mark limits of clearing	1	4	M		Chapter 13 Appendix M
FL05		• Reduce the diversity or modify the composition of plant species		1	3	L		

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FL06		• Fragment or damage habitat important for the conservation of biological diversity		1	2	VL		
FL07	Introduction of weed species onto site and / or spread of existing weeds into new areas	• Modify or inhibit ecological processes	• Weed Management sub plan implemented • Environmental inductions for workforce • Vehicle and equipment wash-down procedures on site	2	3	M		Chapter 13 Appendix M
FL08		• Reduce the diversity or modify the composition of plant species		2	2	L		
FL09		• Fragment or damage habitat important for the conservation of biological diversity		2	3	M		
FL10	Elevated levels of dust from mining operations	• Modify or inhibit ecological processes	• Commit to dust mitigation within the final site EMP • Chemically 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	3	3	M		Chapter 13 Appendix M
FL11		• Reduce the diversity or modify the composition of plant species		2	2	L		
FL12		• Fragment or damage habitat important for the conservation of biological diversity		3	3	M		
FL13		• Cause a long term reduction in rare, endemic or unique plant populations or species		3	3	M	Individuals or habitat of *Utricularia singeriana* (threatened) or *Fimbrostylus fimbrostyloides* (endemic) known to occur in the Yinberrie Hills.	
FL14		• Fragment, isolate or substantially damage habitat for rare, endemic or unique plant species		3	3	M		
FL15	Clearing of individuals or habitat of *Utricularia singeriana* (threatened) or *Fimbrostylus fimbrostyloides* (endemic)	• Cause a long term reduction in rare, endemic or unique plant populations or species	• Targeted survey if habitat area proposed for development	2	2	L	*U. singeriana* not found in Mineral Leases but marginal habitat located outside mine site footprint, 1km to the south-west of proposed works *F. fimbrostyloides* located outside mine site footprint, 500m north of batman pit Similar habitat well represented in Mineral Leases	Chapter 13 Appendix M
FL16		• Fragment, isolate or subsequently damage habitat for rare, endemic or unique plant populations or species		2	2	L		

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	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	• Long-term decrease in the size of the population	• 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.	4	3	H	Only the predicted high levels of dust are likely to impact the population.	Chapter 14 Chapter 16
FA02		• Reduce the area of occupancy of the species	• 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 • 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, *E. tintinnans* 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.	4	3	H	Only the predicted high levels of dust are likely to impact the population.	Chapter 14 Chapter 16
FA03		• Adversely affect habitat critical to the survival of the species	• 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 • 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.	4	3	H	Only the predicted high levels of dust are likely to impact the population.	Chapter 14 Chapter 16
FA04		• Fragment an existing population into two or more populations	• 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.	1	2	VL	None of the sources of impact is likely to fragment the population	Chapter 14 Chapter 16
FA05		• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	• 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.	2	3	M	Only the predicted high levels of dust are likely to impact the population.	Chapter 14 Chapter 16
FA06		• Result in invasive species that are harmful to the Gouldian finch	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated.	2	2	L	None of the sources of impact is likely to cause the invasion of exotic species	Chapter 14 Chapter 16

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA07		• Introduce a disease that may cause the species to decline	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated. • Monitoring of the breeding population will continue and will focus on dealing with uncertainties surrounding the highest recorded risk to the Yinberrie Hills fauna.	1	1	VL	None of the sources of impact is likely to cause the introduction of disease	Chapter 14 Chapter 16
FA08		• Interfere with recovery of the species	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • Monitoring of the breeding population will continue and will focus on dealing with uncertainties surrounding the highest recorded risk to the Yinberrie Hills fauna. There is the potential impact of dust on the Yinberrie Hills Gouldian finch population.	4	3	H	Only the predicted high levels of dust could interfere with the species recovery	Chapter 14 Chapter 16
FA09	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 crested shrike-tit and partridge pigeon	• Long-term decrease in the size of the population	• 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 • Additional mitigation measures planned should dust levels prove excessive. • Gouldian Finch monitoring will also assist with inferring impacts on the crested shrike-tit and partridge pigeon populations.	1	2	VL	None of the sources of impact is likely to impact the population	Chapter 14 Chapter 16
FA10		• Reduce the area of occupancy of the species	• 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 noise mitigation will be applied through site EMP to minimise noise levels.	1	1	VL	None of the sources of impact is likely to have a major effect on species range	Chapter 14 Chapter 16 Chapter 17
FA11		• Adversely affect habitat critical to the survival of the species	• 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.	1	2	VL	None of the sources of impact is likely to have a major effect on critical habitat	Chapter 14 Chapter 16
FA12		• Fragment an existing population into two or more populations	• 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.	1	1	VL	None of the sources of impact is likely to fragment the population	Chapter 14 Chapter 16
FA13		• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	• 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.	1	1	VL	None of the sources of impact is likely to greatly reduce or modify the species habitat	Chapter 14 Chapter 16
FA14		• Result in invasive species that are harmful to the shrike-tit	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated.	2	2	L	None of the sources of impact is likely to cause the invasion of exotic species	Chapter 14 Chapter 16

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA15		• Introduce a disease that may cause the species to decline	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated. • There is the potential impact of dust on the Yinberrie Hills crested shrike-tit and partridge pigeon populations. Gouldian Finch monitoring will also assist with inferring impacts on the crested shrike-tit and partridge pigeon populations.	1	1	VL	None of the sources of impact is likely to cause the introduction of disease	Chapter 14 Chapter 16
FA16		• Interfere with the recovery of the species	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • Gouldian Finch monitoring will also assist with inferring impacts on the crested shrike-tit and partridge pigeon populations.	3	2	M	Only the predicted high levels of dust could interfere with the species recovery	Chapter 14 Chapter 16
FA17	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 Australian bustard, painted honeyeater and pale field-rat	• Long-term decrease in the size of the population	• 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 • Additional mitigation measures are planned should dust levels prove excessive. • Gouldian Finch monitoring will also assist with inferring impacts on the Australian bustard, painted honeyeater and pale field-rat populations.	1	1	VL	None of the sources of impact is likely to measurably impact the population	Chapter 14 Chapter 16
FA18		• Reduce the area of occupancy of the species	• 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 noise mitigation will be included in site wide EMP to minimise noise level.	1	2	VL	None of the sources of impact is likely to have a major effect on species range	Chapter 14 Chapter 16
FA19		• Adversely affect habitat critical to the survival of the species	• 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.	1	2	VL	None of the sources of impact is likely to have a major effect on critical habitat	Chapter 14 Chapter 16
FA20		• Fragment an existing population into two or more populations	• 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.	1	1	VL	None of the sources of impact is likely to fragment the population	Chapter 14 Chapter 16
FA21		• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	• 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.	1	1	VL	None of the sources of impact is likely to greatly reduce or modify the species habitat	Chapter 14 Chapter 16
FA22		• Result in invasive species that are harmful to the Australian bustard, painted honeyeater and pale field-rat	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated.	1	2	VL	None of the sources of impact is likely to cause the invasion of exotic species	Chapter 14 Chapter 16

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA23		• Introduce a disease that may cause the species to decline	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated. • Gouldian finch monitoring will also assist with inferring impacts on the Australian bustard, painted honeyeater and pale field-rat populations.	1	1	VL	None of the sources of impact is likely to cause the introduction of disease	Chapter 14 Chapter 16
FA24		• Interfere with the recovery of the species	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • Gouldian finch monitoring will also assist with inferring impacts on the Australian bustard, painted honeyeater and pale field-rat populations.	1	2	VL	Only the predicted high levels of dust could interfere with the species recovery	Chapter 14 Chapter 16
FA25	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 Mertens' water monitor, Mitchell's water monitor and yellow-spotted monitor	• Long-term decrease in the size of the population	• 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 • Gouldian finch monitoring will also assist with inferring impacts on the monitor populations.	1	1	VL	None of the sources of impact is likely to measurably impact the population	Chapter 14 Chapter 16
FA26		• Reduce the area of occupancy of the species	• 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 noise mitigation will be included in site wide EMP to minimise noise level.	1	1	VL	None of the sources of impact is likely to have a major effect on species range	Chapter 14 Chapter 16 Chapter 17 Appendix U
FA27		• Adversely affect habitat critical to the survival of the species	• 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.	1	1	VL	None of the sources of impact is likely to have a major effect on critical habitat	Chapter 14 Chapter 16
FA28		• Fragment an existing population into two or more populations	• 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.	1	1	VL	None of the sources of impact is likely to fragment the population	Chapter 14 Chapter 16
FA29		• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	• 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.	1	1	VL	None of the sources of impact is likely to greatly reduce or modify the species habitat	Chapter 14 Chapter 16
FA30		• Result in invasive species that are harmful to the monitors	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated.	1	2	VL	None of the sources of impact is likely to cause the invasion of exotic species	Chapter 14 Chapter 16

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA31		• Introduce a disease that may cause the species to decline	• Standard mitigation using sound waste management will limit the potential for colonisation by black rats (*Rattus rattus*). • Incursion by additional exotic species will be regularly monitored, and any incursion eradicated. • Gouldian finch monitoring will also assist with inferring impacts on the monitor populations.	1	1	VL	None of the sources of impact is likely to cause the introduction of disease	Chapter 14 Chapter 16
FA32		• Interfere with the recovery of the species	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • Gouldian finch monitoring will also assist with inferring impacts on the monitor populations.	1	1	VL	Only the predicted high levels of dust could interfere with the species recovery	Chapter 14 Chapter 16
FA33	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 fauna of the Yinberrie Hills	• Modify ecological processes	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • 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 black rats (*Rattus rattus*). • 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.	3	3	M	None of the sources of impact is likely to have a major effect on ecological processes	Chapter 14 Chapter 16
FA34		• Reduce the diversity or modify the composition of animal species Cause a long-term reduction in rare, endemic or unique animal species	• Commit to dust mitigation within the final site EMP • The potentially negative impacts of artificial light will be mitigated by implementation of measures outlines in EMP • 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 black rats (*Rattus rattus*). • 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.	4	3	H	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	Chapter 14 Chapter 16
FA35		• Fragment or damage habitat important for the conservation of biological diversity	• 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.	1	1	VL	None of the sources of impact is likely to have a major effect on habitat important for conservation	Chapter 14 Chapter 16

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Aquatic Fauna								
FA36	Overflow from the retention ponds and contaminants incl. AMD in surface runoff entering receiving water bodies Diffuse sources of AMD i.e. groundwater seepage	• Decrease in aquatic macroinvertebrates species diversity and changes in community structure through contaminates (including AMD) entering the water way • Decrease in fish populations and species richness	• Proactive management of water levels to ensure adequate storage capacity • 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 • Effective implementation of site water management plan	3	1	L	No evidence of any measurable change in macroinvertebrates species diversity or fish populations data available since 1998	Chapter 10 Chapter 14
FA37	Release of tailings water into water bodies	• Food chain accumulation of metals	• Compliance with the Waste Discharge Licence • Site water management plan • Tailings dam design (to ANCOLD guidelines) • Monitoring program • Compliance with MMP conditions	4	3	H		Chapter 10 Chapter 14
FA38	Diversion channel construction on Horseshoe Creek and Stow Creek	• Changes in the overall character of the watercourse and loss of habitat	• Prior to construction existing and proposed site drainage patterns will be identified. • Develop 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. • A macroinvertebrate monitoring program will be developed that takes account of 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.	2	4	M		Chapter 10 Chapter 14
FA39	Diversion channel construction on Horseshoe Creek and Stow Creek	• Infrequent fish passage restrictions	• 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.	3	4	M		Chapter 10 Chapter 14

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA40	Diversion channel construction on Horseshoe Creek and Stow Creek	• Altered water quality from erosion	• 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. • A site induction program will be developed and provided to all construction site workers. • Implement sediment control measures (such as silt curtains within the river channel) to minimise the potential for sediments to deposit on downstream foraging areas. • Stabilise banks, including appropriate native plantings, to consolidate banks post-construction and restore habitat to current, or improved, condition. • 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. • Existing crossings should be used to move equipment across the waterway. If there is no crossing, machinery should be carefully 'walked' across the waterway. • If frequent crossings are required, a pad of clean rock will be laid at a shallow point of the waterway to make a temporary crossing. Temporary crossings will be entirely removed when works have finished. • Develop contingency measures to prevent flooding of the worksite by a rapid rise in the creek. • A revegetation plan will be developed during the detailed design phase of the diversion to suit the physical characteristics and requisite environmental values of the waterway. • A macroinvertebrate monitoring program will be developed. • Long-term measures will be used to control erosion at the works site. Suitable measures include slope stabilisation, revegetation, soil coverings, rip-rap and armouring, check dams, sediment traps, brush barriers and vegetation filters.	3	5	H		Chapter 10 Chapter 14

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA41	Diversion channel construction on Horseshoe Creek and Stow Creek	• Contamination of waterways	• Implement spill control measures. • Petroleum products and other hazardous substances will be kept out of the waterway and in a bunded storage facility. • Refuelling, top-ups and oil checks will be done well away from the waterway. • Non-toxic hydraulic fluids, such as vegetable-based fluids will be used 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. • Paints will not be allowed to enter the waterway when constructing, repairing and maintaining in-stream structures. • 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 be developed that takes 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. Site selection is discussed in the aquatic fauna report (Appendix O).	3	3	M		Chapter 10 Chapter 14
FA42	Cumulative impacts of diversion channel construction and mine construction and operations on the aquatic fauna of the Yinberrie Hills	• Modify ecological processes	• Compliance with the WDL • Develop and 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.	2	3	M		Chapter 10 Chapter 14
FA43		• Reduce the diversity or modify the composition of animal species • Cause a long-term reduction in rare, endemic or unique animal species	• Develop and implement a revegetation plan prior to creek diversion to suit the physical characteristics and requisite environmental values of the waterway. • A macroinvertebrate monitoring program will be developed • Consider fish passage in the design and provide sufficient depth, velocities and resting habitat in the diversion design for regular flow events.	2	3	M		Chapter 10 Chapter 14
FA44		• Fragment or damage habitat important for the conservation of biological diversity	• 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 • Consider fish passage in the design and provide sufficient depth, velocities and resting habitat in the diversion design for regular flow events. • Stabilise banks, including appropriate native plantings, to consolidate banks post-construction and restore habitat to current, or improved, condition.	1	1	VL	None of the sources of impact is likely to have a major effect on habitat important for conservation	Chapter 10 Chapter 14

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
FA45		• Fragment, isolate or substantially damage habitat for rare, endemic or unique animal species	• Develop and 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. • Consider fish passage in the design and provide sufficient depth, velocities and resting habitat in the diversion design for regular flow events. • Stabilise banks, including appropriate native plantings, to consolidate banks post-construction and restore habitat to current, or improved, condition.	1	1	VL	None of the sources of impact is likely to fragment habitat of rare, endemic or unique species	Chapter 10 Chapter 14
Cultural Heritage								
HE01	Ground disturbance and land clearing	• Archaeological sites and artefacts of Indigenous cultural significance adversely impacted	• 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	3	3	M		Chapter 15
HE02		• Archaeological sites of non-indigenous cultural heritage significance impacted	• 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	3	M		Chapter 15
HE03	Ground disturbance and / or access	• Sacred sites are adversely impacted by mine site construction and / or operations	• 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	3	3	M		Chapter 15
HE04	Major open pit slope failure	• Major damage to adjacent sacred or culturally significant site (exposed within region of failure / instability)	• 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	2	H		Chapter 15
HE05	Vegetation clearing and surface water contamination	• Reduction in bush tucker sources for Jawoyn community	• Minimise vegetation clearing and impacts to fauna through EMP and vegetation clearing sub plan and Water Management plan	2	1	L		Chapter 15

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Air Quality								
AQ01	Dust from mine operations incl. construction	• Closest sensitive Receptor (residences at Werenbun Community) experience levels of dust in exceedance of air quality criteria	• 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.	3	3	M		Chapter 16
AQ02	Air emissions from the power station	• Reduced air quality at closest sensitive receptor	• Operation and maintenance of power station in accordance with the design and emission criteria	3	1	L	Emissions modelling indicates no guidelines will be exceeded	Chapter 16
Noise and Vibration								
NV01	Noise from construction and operation	• Nuisance noise levels at the Werenbun Community	• A Noise Management Plan including mitigation measures will be included in site wide EMP. • Although not expected to cause adverse noise impacts, a complaint management system will be implemented. Including the implementation of management measures adopted should noise complaints be received. • Operation of more recent and silenced equipment where possible and maintenance for good working condition.	3	1	L	Modelling indicates that guidelines will not be exceeded at sensitive receptors (25dB (A)) at Werenbun)	Chapter 17
NV02		• Reduction in animal species diversity and population sizes	• 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.	2	2	L	Modelling indicates that predicted noise levels will have little impact on animal communities and historical monitoring has not detected any impact to Gouldian finch populations as a result of previous mining activities	Chapter 17
NV03	Blasting	• Vibration impacts at the Werenbun Community	• Blasting will only occur between 9am to 5pm (Monday to Friday) and 9am to 1pm (Saturday) to reduce social impacts. • Maximum instantaneous charges of less than 100kg and limit (interim or final walls) blasting. • 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.	2	2	L	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

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Traffic and Transport								
TR01	Increased personnel traffic to mine site	• Major single vehicle or vehicle to vehicle accident leading to a fatality	• Prepare 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 assessments • Prepare Contractor Management Plan • Develop Emergency Response Plan	5	2	H	Potential for significant increase in traffic particularly during construction	Chapter 18
TR02		• Major vehicle to pedestrian fatality		5	1	M	Number of vehicles will be reduced by use of buses	Chapter 18
TR03	Increase in freight trucks on Edith Falls Road and Stuart Highway	• Major single vehicle or vehicle to vehicle accident leading to a fatality	• Prepare 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 assessments • Workforce management strategy to address driver fatigue • Prepare Contractor Management Plan • Consolidation of freight and reagent transportation to rationalise transport movement	5	2	H		Chapter 18
TR04		• Major vehicle to pedestrian fatality		5	1	M		Chapter 18
TR05		• Road surface degradation	• 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	1	4	M		Chapter 18
TR06	Transportation of dangerous goods	Spillage of dangerous goods and their release to the environment	• 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 • Prepare Contractor Management Plan • Consolidation of freight and reagent transportation to rationalise transport movement	3	2	M		Chapter 18
Economics								
EC01	Dewatering of Batman Pit to commence mining	• Pit still retains water which inhibits execution of Mining Plan	• 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 down-turn and / or high production costs	• Not providing community and stakeholder financial benefits • Unsustainable and / or unprofitable mining operations • Reduced or negative margins	• Independent specialist Prefeasibility and Feasibility Studies inputs • Comprehensive financial modelling and scenario planning • Building in contingencies and adopting conservative assumptions (eg., Au price, capital and operating costs, mine design parameters, etc.) for basis of Final Investment Decision and approvals	5	1	M		Chapter 19

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
EC03	Low unemployment rate in NorthernTerritory leads to shortage of skilled local labour	• Vista Gold has difficulties accessing appropriate skilled labour locally leading to higher labour costs or interruptions to construction / production schedule	• 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
EC04	Significant increase in the AUD relative to the $USD	• 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)	• Comprehensive financial modelling and scenario planning • Building in contingencies and adopting conservative assumptions	5	1	M		Chapter 19
Acid and Metalliferous Drainage								
AMD01	Dewatering of Batman Pit to commence mining	• Exposure of PAF rock resulting in the generation of AMD	• Continue treating Batman Pit (RP1) waters to level deemed appropriate for discharge in accordance with Waste Discharge License. • Ongoing monitoring of water quality prior to discharge	1	4	M		Chapter 12
AMD02	Dewatering of Batman Pit during mining	• Exposure of PAF rock resulting in the generation of AMD impacting groundwater.	• Collection and treatment of AMD pit waters resulting from incident rainfall in RP1	2	4	M	No or limited groundwater ingress or egress to the pit	Chapter 12
AMD03	Closure of Batman Pit (no extraction of pit water)	• Collection of AMD impacted water in Batman Pit and seepage to groundwater.	• Develop and implement a Water Management Plan and Closure Plan with detailed monitoring and contingency plans.	2	2	L	Provision will be made for overflow water to go through passive treatment wetlands No connectivity through groundwater at depth	Chapter 12
AMD04	Existing diversion drains	• Diversion drains from existing AMD sources and acting as conduits to Horseshoe Creek and ultimately the Edith River.	• Maintain existing diversion drains	2	2	L		Chapter 12
AMD05	Installation of new Diversion Drains	• Exposure of PAF rock resulting in the generation of AMD.	• Restrict excavation depths to oxidised material • Inspect material types and classify as necessary	2	2	L		Chapter 12

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
Waste								
WA01	Poor waste characterisation and / or Insufficient on-site supply of cover material for rehabilitation	• Possible release of AMD via seepage and / or run-off from WRD, TSF, HLP and LGO stockpile (on-site)	Undertake: • Additional drilling • Further and ongoing waste characterisation • Leach Testing • Cover trials Implement WRD management plan • Provide ongoing refinement of materials balance • Increase contingency for cover requirements	3	3	M	All PAG will be encapsulated. Waste rock characterisation will identify unknown rock as NAF or PAF for further management	Chapter 12
WA02		• Possible release of AMD via seepage and / or run-off from WRD, TSF, HLP and LGO stockpile (off-site into surrounding waterways)	Undertake: • Additional drilling • Further and ongoing waste characterisation • Leach Testing • Cover trials 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 • Diversion of run on water and catchment reduction measures	4	2	M		Chapter 12
WA03	Generation of putrescible waste, sewerage on-site and at the accommodation facility	• Release of putrescible, construction and non-mining wastes to the environment	• 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 as discussed in Chapter 10	2	1	L		Chapter 12
WA04		• Release of sewage to the environment	• Treatment of sewage via the WTP	2	1	L		Chapter 12
Closure and Rehabilitation								
CL01	Rehabilitation occurs at a slower rate than planned	• Increased rehabilitation costs • Loss of rehabilitated vegetation • Erosion of exposed surfaces • Potential sedimentation into waterways	• 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.	3	3	M		Chapter 12 Chapter 24

Reference	Source of Impact	Consequence	Mitigation	Consequence	Likelihood	Residual Risk	Comments	Reference
CL02		• Unable to recover security bonds	• Annual review of security bond calculations. • 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.	3	3	M		Chapter 12 Chapter 24
CL03	Ineffective mine closure	• Closure plan is ineffective • Closure costs greater than calculated • Financial impact (unplanned) late in process to company • Third party financial impacts	• Annual review of security bond calculations. • Closure and Rehabilitation Plan updated and refined throughout mining operations including life of mine closure planning, contingency planning, tailings management planning, waste rock management planning and care and maintenance planning. • 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.	5	2	H		Chapter 12 Chapter 24
CL04	Insufficient WRD cover / thickness or general rehabilitation practices	• Ongoing AMD issues. • Deterioration WRD store and release cover. • Change in MMP conditions.	• 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 be substantially enough to ensure integrity of the cover. • 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.	4	2	M	Independent peer review processes occurred on design	Chapter 24