

## Executive Summary

### **Overview**

Vista Gold Australia Pty Ltd (Vista Gold) is proposing to develop the Mt Todd Gold Project (the Project) consisting of the re-establishment, operation and rehabilitation of the Mt Todd Gold Mine. The Mt Todd Gold mine site is located approximately 55km north-west of Katherine and 250km south of Darwin in the Northern Territory.

This Draft EIS has been prepared to support key Commonwealth and Northern Territory Government approvals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Northern Territory *Environmental Assessment Act 1982*.

### **Status of the Mt Todd Gold Project**

Recent mining for gold at Mt Todd started in 1986, with a number of companies having operated the site since then. Pegasus Gold Australia Pty Ltd operated the mine from 1993 to 1997. The project closed due to technical difficulties and deterioration of the market value for gold. In 1999, Multiplex Resources Pty Ltd and General Gold Resources Ltd bought the deeds to the mine and operated the mine until 2000. Mining infrastructure such as the raw water dam, tailing dam, waste rock dump, overhead power line, natural gas pipeline, and the remains of processing facilities were abandoned and remain on-site.

A Northern Territory Government managed care and maintenance program was adopted from 2000.

Vista Gold purchased the rights to the Mt Todd property on 1 March 2006. Under the terms of the Agreement, Vista Gold initiated a comprehensive review of the Project to evaluate current site conditions and developed programs to stabilise the legacy facilities in order to minimise the offsite migration of potential contaminants. Vista Gold was additionally required to examine all technical, economic and environmental issues, estimate the cost to rehabilitate the site, explore and evaluate the potential of the Project, and prepare a technical and economic feasibility study for the potential development and re-starting of operations of Mt Todd.

Vista Gold undertook the required reviews and the Agreement was extended to 31 December 2015. An initial Preliminary Feasibility Study (PFS) was completed in January 2011 and a revised PFS for an expanded project was released in June 2013.

### **Assessment Process**

Vista Gold submitted a referral under the EPBC Act to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) in April 2011. The Commonwealth Minister for SEWPaC declared the action (Project) “a controlled action” as there is the potential for the Project to have a significant impact on listed threatened species and communities, and listed migratory species.

The Project was referred by the Northern Territory Department of Resources in April 2011 (now Department of Mines and Energy) to the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) (now Northern Territory Environment Protection Authority) for environmental assessment. In August 2011, the Northern Territory Minister for Natural Resources, Environment and Heritage determined that the Project required formal assessment under the *Environmental Assessment Act 1982* at the level of a Draft EIS and that the Project will be assessed under the bilateral agreement (now accredited process) between the Northern Territory and Commonwealth Governments.

In September 2011 NRETAS issued Guidelines for the Project.

This Draft EIS will be submitted to the NT EPA for formal review and will be made available to the public for comment. Matters arising from submissions relating to the Draft EIS will be forwarded by the Northern Territory Government to Vista Gold for a formal response. A Supplement to the Draft EIS may need to be prepared that addresses the issues raised during the public review process. The Supplement would be submitted by Vista Gold to the NT EPA for review.

Assuming no further information is requested, an assessment report and recommendations based on the Draft EIS and the Supplement will be prepared for the Northern Territory Minister. The Assessment Report will also be provided to SEWPaC to allow assessment under the EPBC Act to be concluded.

### ***Project Description***

The Mt Todd Gold Mine site is a brownfield / disturbed site. Mining infrastructure such as tailing dams, waste rock dump and remains of processing facilities remain on site (refer figure below).

Mining will be an open pit truck and shovel operation using hydraulic shovels, front end loaders and haul trucks that will transport materials to the crusher. The crushed material will be stockpiled and the gold will be extracted using Carbon in Leach (CIL) followed by an adsorption, desorption and recovery process. The CIL tailing will be detoxified and sent to an impoundment from which plant process water will be recycled.

Approximately 17.8Mtpa of ore will be processed. The product out of the gold room will be gold dore (unrefined gold bars). Gold dore will be transported for onward secure shipment to a refinery.

The Project will have a life of around 19 years inclusive of construction, operations and closure. Construction is anticipated to take two years. The mine is scheduled to operate for an additional 13 years, and closure and rehabilitation is expected to take four years.

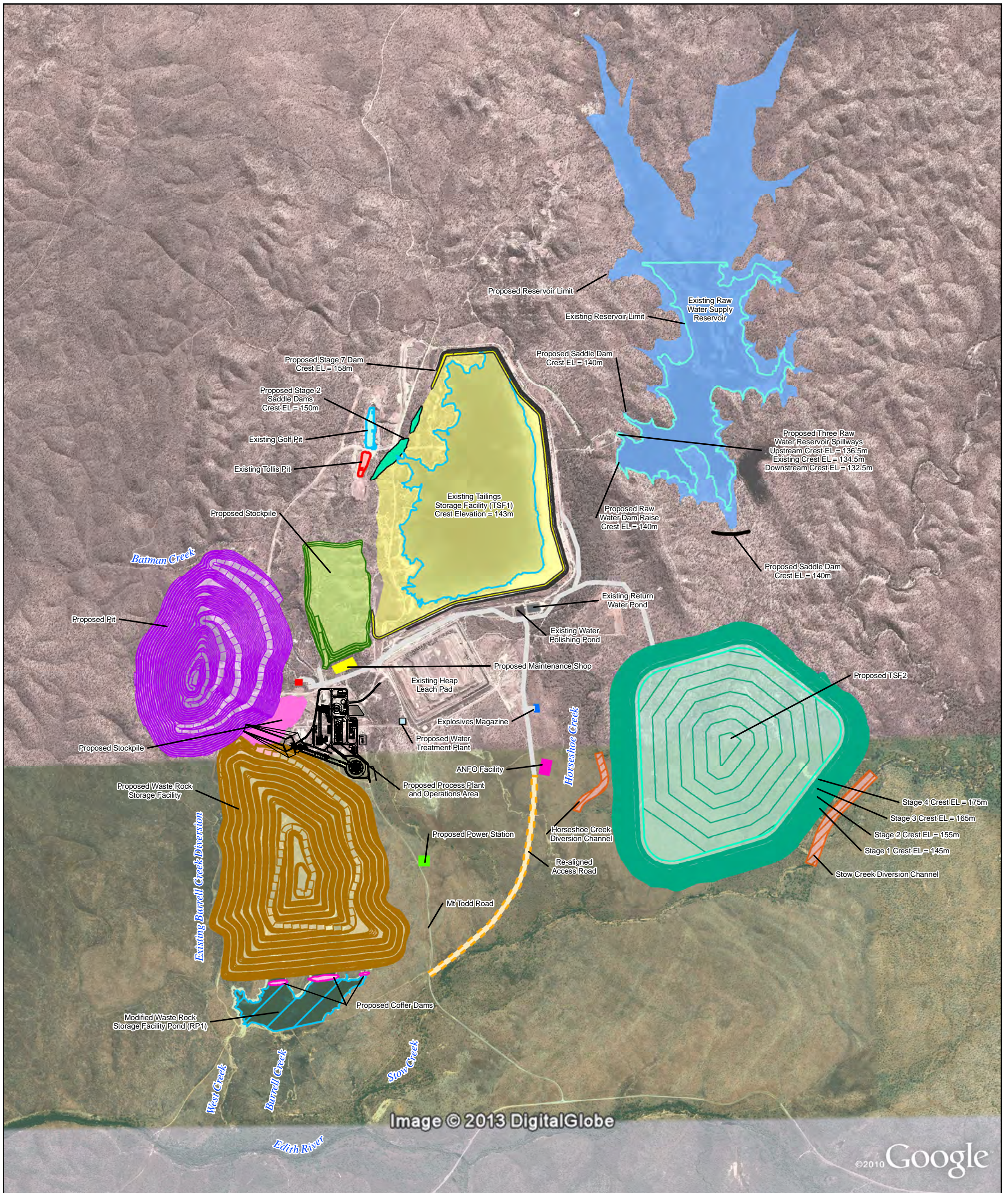
Key characteristics of the Project are provided below.

### ***Stakeholder Engagement***

Consultation with stakeholders and the community occurred through a variety of methods during development of the Project. Consultation enabled stakeholders and the public to be informed about the Project and to communicate their opinions, concerns and ambitions for the Project and the environment. The approach included meetings with the Traditional Owners, Northern Land Council, Northern Territory Government, and public meetings and exhibitions in Katherine and Pine Creek.

Consultation will continue during the remaining Project planning, construction, operation and closure phases in accordance with a Stakeholder Consultation Plan and Social Impact Management Plan.





LEGEND							
Process Plant	Power Plant	Explosives Magazine	TSF1 Existing Water Body	TSF2 Impounded Surface Area (Year 12)	Proposed Saddle Dam (Raw Water Dam)	Stockpile	
Golf Pit	Proposed Haul Road	Diversion Channels	Proposed Saddle Dam	TSF2 Contours (Year 12)	Retention Pond 1	Batman Pit Footprint (Year 12)	
Tollis Pit	Re-aligned Access Road	Raw Water Dam Existing Water Body	TSF1	TSF2 Footprint (Year 12)	Water Treatment Plant	Waste Rock Dump Contours (Year 10)	
Fuel Bays	Coffer Dams	Indicative Raw Water Dam	Low Grade Ore Stockpile Contours	Batman Pit Contours (Year 12)	Waste Rock Dump Footprint (Year 10)		
Proposed Maintenance Shop	ANFO Facility	TSF1 Contours	Low Grade Ore Stockpile				

0 0.25 0.5 0.75 1  
Kilometres

Vista Gold Australia Pty Ltd  
Mt Todd Gold Project

Job Number | 43-21801  
Revision | 1  
Date | 21 Jun 2013



## Key Characteristics of the Project

Element	Characteristics
<b>Project Life</b>	
Construction period	2 years
Operations period	13 years
Closure and rehabilitation	4 years
<b>Production Estimates</b>	
Ore mined	209.4Mt over the mine life.
Waste mined	562.3Mt over the mine life.
Ore processed	Up to 17.8Mtpa.
Strip ratio	Average 2.68, range 0.11 – 11.39.
<b>Mining</b>	
Pit	Extension of the existing Batman Pit from its current depth of 114m to 588m, and surface area of 40ha to 137ha.
Materials handling	Conventional drill, blast, shovel and haul operation.
Waste	Up to 510Mt trucked to waste rock dump (WRD) over the mine life.
Operations	24 / 7, 365 days per annum.
<b>Ore Processing</b>	
Comminution	Primary and secondary ore crushing, crushed ore screening, transfer of ore to coarse ore stockpile, further grinding in High Pressure Grinding Rolls, hydrocyclone concentration of ore and further size reduction in ball mills.
Adsorption and detoxification	Pre-leach thickening, cyanide addition, and gold leaching and adsorption. Tailings detoxified and disposed to tailings storage (50,000tpd).
Gold extraction	Loaded carbon screened, gold stripped via electrowinning, washed, dried and smelted to dore.
Reagents	Quick lime (16,153tpa), sodium cyanide (13,668tpa), flocculent (266tpa), sodium metabisulfite (12,958tpa), hydrochloric acid (1,441tpa), activated carbon (355tpa), lead nitrate (1,775tpa) and flux (3.6tpa).
<b>Mine Infrastructure and Facilities</b>	
Waste Rock Dump	Expansion of the existing WRD from 24m to 350m in height and a footprint of 70ha to 217ha to provide capacity of up to 510Mt.
Tailings Storage Facility 1	Raising the existing facility (TSF1) from 16m to approximately 34m.
Tailings Storage Facility 2	Construction of a new facility (TSF2) 300ha in area and up to 60m high.
Low Grade Ore Stockpile 1	Processing and / or reclamation of the existing stockpile (LGO1).
Low Grade Ore Stockpile 2	Construction and processing of a new stockpile (LGO2) with a footprint of 47ha.

Element	Characteristics
Anaerobic treatment wetlands	Approximately 10ha in area.
Power	Approximately 86MW produced via a Rolls Royce Trent 60 Wet Low Emissions single gas turbine generator and two reciprocating engines. 8.9PJ of gas will be used per annum.
Water Treatment Plant	Treatment of 500m <sup>3</sup> /h to provide potable supply (1%), on-site use (1.7m <sup>3</sup> /h) and to meet discharge criteria to the Edith River.
Sewage	Modular treatment plant.
Explosives depot	Explosives stored in ammonium nitrate / fuel oil storage bins, powder magazine and cap magazine.
Clay borrow area	From on-site clay borrow areas or from an off-site source.
<b>Closure and Rehabilitation</b>	
Waste Rock Dump	Progressive rehabilitation of external batters using non acid forming (NAF) waste rock with store and release cover installed.
Tailings Storage Facilities	Rehabilitation with NAF rock, low permeability material (LPM) and plant growth medium (PGM).
Low Grade Ore Stockpile 2	Rehabilitation with NAF rock, LPM and PGM.
Plant site	Infrastructure and facilities removed, and site graded and rehabilitated.
Water treatment	Waste water treated in the water treatment plant until acid and metalliferous drainage (AMD) flow and water quality is conducive to passive / semi-passive water treatment. Construction of three passive / semi-passive water treatment systems to provide long term treatment of water from TSF1, TSF2, WRD and reclaimed heap leach pad (HLP).
Batman Pit	Will remain as a void with a pit lake developing.
<b>Workforce</b>	
Construction	Peak of 450 housed in purpose built camp.
Operations	Peak of 350 housed in modified construction camp, new and existing houses and single person accommodation.
Decommissioning	Peak of 40 housed in operations camp and single person accommodation.

### Project Benefits

Project benefits are summarised below.

Aspect	Description of Positive Impact
Community	<ul style="list-style-type: none"> <li>• Direct and indirect employment opportunities (with the company, suppliers and service providers), new business ventures and capacity building.</li> <li>• Increase in business opportunities and regional spend.</li> <li>• Partnering with education and training providers to increase local and regional employment.</li> <li>• Indigenous engagement and capacity building.</li> <li>• Provision of additional housing and accommodation in the community as part of a hybrid accommodation strategy and possible public / private development opportunities.</li> <li>• 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.</li> <li>• May experience increase in worker lifestyle opportunities associated with residential living.</li> </ul>
Land	<ul style="list-style-type: none"> <li>• Benefits to local / regional community from additional resources committed to rehabilitation of the existing contaminated mine site.</li> <li>• Potential for near neighbours to benefit from assistance with shared land management responsibilities (e.g. introduced species and fire).</li> </ul>
Surface water	<ul style="list-style-type: none"> <li>• Likelihood of uncontrolled discharge considerably reduced due to increased capacity for water storage and treatment on-site as part of the new mine plan.</li> <li>• More active water management practices and procedures, through an increase in dedicated resources and more substantial / continuous site presence during operations.</li> <li>• Appropriate treatment of legacy issues around water quality prior to resumption of mining.</li> </ul>
Groundwater	<ul style="list-style-type: none"> <li>• Reduction in potentially contaminated groundwater flow from the Mineral Leases.</li> </ul>
Flora and vegetation	<ul style="list-style-type: none"> <li>• Opportunity to comprehensively rehabilitate key areas such as the WRD, HLP and surrounding / satellite pits and areas of current disturbance; and do so progressively.</li> </ul>
Fauna	<ul style="list-style-type: none"> <li>• An increased presence and resources to manage fire to help protect habitat for endangered species such as the Gouldian finch.</li> <li>• The opportunity of implementing processes around feral animal control.</li> </ul>
Economics	<ul style="list-style-type: none"> <li>• Construction and operational expenditure of \$5.1 billion in the region.</li> <li>• Opportunities for indigenous employment and economic development. Significant employment and economic development for the Katherine Region.</li> <li>• Additional expenditure in the local Katherine / Pine Creek area by workers has the potential to benefit retail, food and beverage and entertainment providers.</li> </ul>
Closure	<ul style="list-style-type: none"> <li>• Rehabilitation of existing contaminated mine site.</li> </ul>

### Potential Impacts and their Management

The following tables provide a summary of the potential impacts associated with the Project and the proposed management measures.



**Summary of Potential Impacts and their Management – Social Impacts**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>Katherine is located approximately 55km from the Project</p> <p>Katherine will be the main service centre for the supply of goods and services to the Project, and a key location for housing of the operations workforce. It is a key government administration centre providing health, education, housing and business development services to towns, the broader region, pastoral properties and outlying Aboriginal communities.</p> <p>The regional study area is referred to as the Lower Top-End Northern Territory which includes the local government areas of Roper Gulf Shire and Victoria Daly Shire, and the Township of Pine Creek. In addition to this region, some potential impacts are relevant at a Territory-wide scale.</p> <p>The Regional Study Area also includes traditional land of the Jawoyn Aboriginal People.</p>	<p>Potential impacts include:</p> <ul style="list-style-type: none"> <li>• lack of workforce social integration</li> <li>• increase in anti-social behaviour</li> <li>• exacerbation of labour / skills shortages</li> <li>• cross-over employment impacts (shifts from local employers to the Project)</li> <li>• local inflationary impacts</li> <li>• reduced focus on traditional customer base</li> <li>• increase in demand for short- and long-term accommodation. Reduction in affordability of rental housing leading to rent escalation and house price inflation</li> <li>• decline in worker wellbeing associated with a fly-in / fly-out (FIFO) or drive-in / drive-out (DIDO) workforce such as obesity, depression, alcohol and substance abuse, disconnection from family</li> <li>• increased demand for community infrastructure and utilities leading to local / regional shortfalls</li> <li>• impacts on vulnerable groups such as women and Indigenous groups.</li> </ul>	<p>Potential management measures include:</p> <ul style="list-style-type: none"> <li>• a Social Impact Management Plan has been prepared</li> <li>• develop a Workforce Management Strategy including workforce sources, management, health and wellbeing and appropriate behavior</li> <li>• prepare and implement an Industry Participation Plan, including indigenous participation</li> <li>• work with local training providers to develop local training programs that will provide unskilled people opportunities to gain employment</li> <li>• housing of the temporary construction workforce in a camp located outside of existing communities</li> <li>• offering operations workers a choice of FIFO or residential options</li> <li>• establish a community and stakeholder relations role for the Project</li> <li>• establish and support a community reference group that can provide advice to Vista Gold on the Project from a community perspective</li> <li>• develop a Community and Stakeholder Engagement Plan for keeping the community informed and providing appropriate feedback and consultation</li> <li>• establish a complaints and feedback register</li> <li>• continue to work in partnership with the Jawoyn Association under the Partnership Agreement.</li> </ul> <p>It is expected that potential negative social impacts on Katherine and the regional community can be managed.</p>



**Summary of Potential Impacts and their Management - Climate Change and Sustainability**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>Changes in climatic conditions and water availability over the Project's design life have been assessed. Projected changes include:</p> <ul style="list-style-type: none"> <li>• increase in number of extreme heat days</li> <li>• no change in mean annual rainfall, increase in precipitation extremes and no increase in cyclonic events but a possible increase in intensity</li> <li>• no significant change in evaporation, wind speed and humidity.</li> </ul>	<p>Increase in number of extreme heat days could impact the functioning of critical plant (e.g. power station).</p> <p>Increase in precipitation / flash floods impacting drainage structures, causing storage pond overflow and flooding of pit.</p> <p>Increased evaporation may affect efficiency of wetlands and capacity of dams and ponds.</p>	<p>The Project incorporates design features that recognise potential impacts from climate change including the selection of plant and equipment. In extreme weather conditions plant functioning will be monitored.</p> <p>Additional site water balance modeling will be undertaken to ensure that drainage and storage ponds can accommodate extreme rainfall events.</p> <p>The storage capacity of the raw water dam will be increased to provide additional water availability and security.</p> <p>Climate change is unlikely to have a significant impact.</p>
<p>A sustainability framework for the Project has been developed which identifies sustainability initiatives to facilitate reduced construction and operation costs, reduced costs associated with the environmental footprint and minimises potential adverse impacts associated with project development, operation and closure.</p>	<p>Project is unsustainable due to poor economic, social, cultural, environmental and health and safety performance.</p>	<p>Various sustainability initiatives will be implemented where practicable such as incorporating sustainability criteria and requirements into tender documents such as material specifications.</p> <p>An environmental management monitoring and reporting schedule will be established, with reports made available to the project team through each project phase.</p>





**Summary of Potential Impacts and their Management - Land**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Topography</b></p> <p>Topographically, the main features are Mt Todd at 230m AHD and the Edith River. As a result of previous mining the primary anthropogenic features are Batman Pit (114m deep, 40ha), WRD (24m high, 70ha), TSF1 (16m high), LGO1 and the HLP.</p>	<p>Key impacts resulting from the Project include extension to the Batman Pit (588m deep, 137ha), expansion of the WRD (350m high, 217ha), raising TSF1 (34m) and construction of TSF2 (60m high, 300ha). Most topographical changes will be permanent.</p>	<p>The Batman Pit will partially fill with water at the cessation of mining. Other structures will be rehabilitated involving a combination of grading external surfaces, installing low permeability cover material, installing a store and release cover, application of plant growth medium, revegetation with local native species and monitoring. The HLP will be either rehabilitated or the material will be reprocessed.</p> <p>There will be a permanent change to the landscape of the project area.</p>
<p><b>Soils</b></p> <p>Soils vary from sandy and loamy red and yellow earths to lateritic and yellow podsollic soils on gently undulating land often over compacted clay sub-soils. Heavier textured grey soils on the floodplains.</p>	<p>Soils will be stripped from areas where new structures are required with the material used in rehabilitation. Soil structure and properties are likely to change.</p> <p>Soil erosion has the potential to impact on the adjacent Yinberrie Hills site of conservation significance and to release sediments to waterways.</p>	<p>An Erosion and Sediment Control Plan will be developed to minimise soil erosion and the discharge of sediments to waterways. This will include minimising disturbance areas, rehabilitating progressively, immediate reuse of recovered soil and provision of sediment traps.</p> <p>The Project is unlikely to have a significant impact on soils.</p>
<p><b>Contamination</b></p> <p>Potential sources of land contamination, all as a result of historical mining, include WRD, TSF1, HLP, LGO1, scats stockpile, ROM pad, process plant site and Batman Pit.</p>	<p>The primary impact associated with expansion of the Project is the management of AMD from mined ore and waste and legacy issues relating to AMD in waste from previous mining.</p>	<p>Geochemical characterisation has been undertaken of existing waste and the material that will be excavated from the expanded Batman Pit. Management measures are proposed including collection and treatment of water prior to off-site discharge, selective handling (encapsulation) of PAF rock within the WRD and rehabilitation of facilities containing AMD material (WRD and TSFs). TSF2 will be clay lined to prevent seepage of AMD. Measures implemented during mining are expected to result in AMD being controlled on-site.</p>



**Summary of Potential Impacts and their Management – Surface Water**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Water courses</b></p> <p>Edith River, to the south of the mine, is a tributary of the Fergusson River. Several tributaries of Edith River cross, or are close to, the Mineral Leases including Horseshoe, Batman, Stow, West and Burrell creeks.</p>	<p>The Project will not directly impact on Edith River.</p> <p>A section of Horseshoe Creek and Stow Creek will be diverted to allow construction of TSF2.</p>	<p>No specific direct management of Edith River is proposed and no significant impact on Edith River is expected.</p> <p>The Horseshoe Creek and Stow Creek diversions are discussed below.</p>
<p><b>Water management</b></p> <p>The mine site has nine facilities which store water as their primary or secondary function. These are the raw water dam (RWD), RP1 (retention pond 1), RP2, RP3, RP5, RP7, decant / polishing ponds, equalisation ponds and HLP.</p> <p>Diversion channels isolate runoff from undisturbed areas, such as the upper reaches of Horseshoe Creek and Burrell Creek, and reduce the amount of water entering the mine site water management system. Diversions are used to divert runoff from disturbed areas of the mine, such as the low grade ore stockpiles, and direct it into water retention ponds.</p>	<p>Development of the mine will result in the construction of TSF2, together with a diversion of the adjacent Horseshoe Creek and Stow Creek, an expanded WRD and haul roads across waterways. Potential impacts include:</p> <ul style="list-style-type: none"> <li>• inundation of mine infrastructure due to flooding</li> <li>• change in the local flow regime due to creek diversions</li> <li>• change in local flow regime due to construction of haulage roads across waterways.</li> </ul>	<p>A storm water assessment has been undertaken to assess the likely impact that construction of new facilities will have on flooding and the performance of drainage structures.</p> <p>Modelling demonstrates that existing infrastructure has immunity from flooding during a 100-year ARI design event. Critical infrastructure constructed as part of mine re-establishment will be located outside of the 100-year ARI design event.</p> <p>The diversions of Horseshoe Creek and Stow Creek will be an engineered structure designed to handle the required flow and to protect the toe of TSF2 from scour.</p> <p>Other new channels constructed as part of mine re-establishment will be assessed during the design phase to determine the required channel and embankment height.</p> <p>Erosion protection and sediment control structures will be designed and installed to manage runoff from low permeability areas.</p>





Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Contamination</b></p> <p>The declared beneficial use of water from the Edith River is protection of aquatic ecosystems. Agricultural land use occurs downstream of the mine.</p> <p>Wet Season discharge from the mine site has historically occurred from:</p> <ul style="list-style-type: none"> <li>• discharge of Stow Creek into the Edith River</li> <li>• controlled siphon discharge from RP1</li> <li>• discharge from West Creek, which receives overflow from RP1 via a spillway.</li> </ul> <p>AMD in several of the retention ponds is the main water quality concern.</p> <p>A monitoring program assesses surface water quality upstream and downstream of the mine site. Historical monitoring has identified the release of metal laden, acidic water to the Edith River. There is some influence of mine discharge on zinc, copper and manganese levels in sediments but with no detectable impact on macroinvertebrates. Any potential impacts that have been observed in the past have been very short-term and do not indicate a long-term adverse effect.</p>	<p>Potential exposure of sulfide minerals can result in the liberation of heavy metal ions such as zinc and copper. Exposure of these contaminants to the aquatic environment could potentially result in:</p> <ul style="list-style-type: none"> <li>• direct effects to fish through gill exposure to heavy metals, and bioaccumulation through the food chain</li> <li>• direct effects to macroinvertebrate populations which could result in the loss of available prey items for fish</li> <li>• settling of precipitates on stream substrates which can clog interstitial spaces in river bed sediments and restrict availability of habitat to aquatic organisms.</li> </ul> <p>Potential contamination sources include RP2, RP3, RP5 RP7 and the HLP Moat.</p> <p>Contaminated runoff could also occur from spoil dumps and plant areas.</p> <p>Post-mining, metal laden water could potentially be generated from storage facilities remaining on-site such as the WRD, TSF1 and TSF2.</p>	<p>Vista Gold is currently treating contaminated water on-site through lime dosing which has the effect of raising pH resulting in metals coming out of solution and settling to the bottom. Controlled release of this treated water will occur consistent with the Waste Discharge Licence. At the commencement of operations Batman Pit (RP3) is expected to be dry and other water containment structures (except the RWD) will contain significantly reduced volumes.</p> <p>A water treatment plant will be constructed. All potentially contaminated water exiting the site during normal operating and rainfall conditions will be treated prior to discharge to meet criteria defined in the Waste Discharge Licence.</p> <p>Vista Gold will manage water volumes within containment structures to maximise storage volumes during the Wet Season. Emergency overflow provisions will be maintained.</p> <p>Mine design reflects the need to separate clean water from potential sources of contamination with any contaminated water being treated prior to discharge.</p> <p>The water treatment plant will be retained post-mining until such time as waste streams originating from on-site facilities can be treatment via passive wetlands.</p>



**Summary of Potential Impacts and their Management - Hydrogeology**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Batman Pit</b></p> <p>The Mt Todd area is a fractured rock aquifer, overlain by a number of groundwater sources and sinks.</p> <p>Regional groundwater flow is generally westwards. Groundwater flow on the mine site is generally south towards the Edith River.</p> <p>Observed groundwater elevations adjacent to creeks suggested connection and interaction between the aquifer system and drainage lines.</p> <p>The existing Batman Pit was developed below the water table. Due to the very low permeability of material in the pit area, the interaction between water in the pit and the surrounding groundwater is very limited.</p> <p>Groundwater in the region has a declared beneficial use for raw water for drinking, raw water for agriculture, and raw water for industrial purposes and is referred to as the Katherine Area groundwater.</p> <p>The closest off-site bore is located over 4km from, and up gradient of, the mine site.</p>	<p>Potential impacts from pit dewatering associated with groundwater drawdown include:</p> <ul style="list-style-type: none"> <li>• a decrease in groundwater available to watercourses</li> <li>• the behavior of the pit following mining</li> <li>• the extent of groundwater level recovery post-mining</li> <li>• groundwater abstraction from neighbouring bores.</li> </ul>	<p>Groundwater modelling indicates that:</p> <ul style="list-style-type: none"> <li>• modelled groundwater inflow to the pit is estimated at 30L/s at the end of mining</li> <li>• groundwater drawdown during mining decreases rapidly with distance from the pit, with the 10m drawdown contour extending only to the pit rim. The 1m drawdown contour extended approximately 300m northwest and 200m south of the pit at the end of mining</li> <li>• drawdown of the local aquifer is unlikely to have a significant impact on local groundwater flows into the Edith River and Stow Creek (approximately 0.8% and 0.92% decrease in stream flow during mining and post mining respectively) or to neighbouring groundwater supply bores</li> <li>• the area affected by 1m or more of drawdown within the 500-year post-mining period was limited to a portion of the mine lease area adjacent to Batman Pit and TSF1</li> <li>• post-mining the pit is likely to form a sink pit lake with a water level of 15m AHD, significantly below the surrounding land surface. This is expected to prevent outward migration of pit lake water into and through the aquifer.</li> </ul> <p>Groundwater drawdown during mining is not expected to result in any significant impact. Post-mining groundwater levels will largely recover.</p>





Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Other features</b></p> <p>A number of features currently on-site are impacting groundwater chemistry or level. These include the WRD, TSF1, HLP and LGO1 stockpile.</p> <p>Elevated levels of contaminants and major ions were observed in bores down-gradient from water retaining structures.</p> <p>Regional groundwater flow is not likely to be affected by current on-site features. Local groundwater flow is influenced by anthropogenic features (sources and sinks) at the mine site such as the WRD and TSF1.</p>	<p>Major changes to the mine site include raising TSF1, a new TSF2 and an expansion of the WRD. Potential impacts include:</p> <ul style="list-style-type: none"> <li>• increased head from lifts in TSF1 resulting in increased seepage rates – highly likely without any management measures in place</li> <li>• localised increase in groundwater elevation adjacent to the new TSF2 if in contact with the groundwater system – unlikely if designed, constructed and rehabilitated adequately</li> <li>• storage of tailings in TSF1 and TSF2 presents a long-term risk of contamination of the local groundwater system - unlikely if designed, constructed and rehabilitated adequately</li> <li>• storage of contaminated material in the WRD presents a long-term risk of contamination of the local groundwater system – unlikely if designed, constructed and rehabilitated adequately</li> <li>• spills of contaminants required for mining and processing resulting in groundwater contamination – unlikely if adequately managed.</li> </ul>	<p>Potential management measures include:</p> <ul style="list-style-type: none"> <li>• bores that do not meet the minimum construction requirements will be decommissioned or rehabilitated</li> <li>• TSF1 lifts will not be undertaken until all bores in the vicinity are rehabilitated</li> <li>• exploration drill holes that may act as conduits interacting with mine features will be rehabilitated</li> <li>• management plans will be developed for all potential contaminants brought to site (fuel, explosives, process reagents etc.)</li> <li>• design, construct and rehabilitate TSF2 to minimise oxidation of sulfides and leakage of contaminated liquor or leachate</li> <li>• rehabilitate TSF1, HLP and associated infrastructure to either significantly reduce seepage or improve seepage water quality</li> <li>• construct the new WRD so it does not result in a significant change to the local groundwater regime and in a manner that limits AMD production</li> <li>• on-going monitoring to ensure that groundwater impacts are not greater than those predicted.</li> </ul> <p>Opportunities exist to manage existing contamination from the site and to design new features to limit the potential for contamination in the future.</p>



**Summary of Potential Impacts and their Management - Acid and Metalliferous Drainage**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>Features on the mine site that currently present AMD risks include Batman Pit, WRD, TSF1 and HLP, LGO1, scats stockpile, ROM pad and the existing process plant and pad area.</p> <p>The Batman Pit is currently a source of, and storage for, AMD with the pit being used as a repository for AMD water since 2005.</p>	<p>At the start of mining the Batman Pit will have been dewatered with current pit water having been treated and discharged consistent with the Waste Discharge Licence.</p> <p>As a result of project development Batman Pit and the WRD will be significantly expanded, TSF1 will be raised and a new TSF2 constructed.</p> <p>Potential impacts include:</p> <ul style="list-style-type: none"> <li>• AMD accumulation in the Batman Pit from groundwater inflow during mining and from rainfall runoff from pit walls</li> <li>• AMD drainage from the WRD impacting ground and surface waters. A total of 192Mt of potentially acid forming (PAF) material will be placed in the WRD</li> <li>• AMD seepage from the additional 60Mt of tailings that will be placed in TSF1</li> <li>• AMD seepage from 130Mt of tailings proposed for the new TSF2</li> <li>• seepage and runoff from other facilities including the HLP, LGO1, LGO2, scats stockpile, site roads and the process plant site.</li> </ul>	<p>During mining, AMD waters will be managed via in pit sump pumping to the WTP. No pit water will be discharged without treatment. Post mining the pit will act as a groundwater sink, confining AMD to the pit and preventing its release to the environment.</p> <p>The expanded Batman Pit is the primary source of AMD material for the Project. Geochemical characterisation of rock will allow potentially acid forming (PAF) material to be selectively handled.</p> <p>PAF waste from the pit will be encapsulated within the WRD within a NAF shell. Rehabilitation of the WRD will involve installation of a geosynthetic clay lining (GCL) to reduce water and oxygen ingress.</p> <p>TSF1 and TSF2 will be zero discharge facilities with all water contained within the process circuit. TSF2 will be lined. Rehabilitation will see the installation of seepage collection ditches and a store and release cover to minimise rainfall infiltration.</p> <p>Other facilities on-site will be rehabilitated in a similar manner through installation of a store and release cover to minimise rainfall infiltration.</p>





**Summary of Potential Impacts and their Management - Flora and Vegetation**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Vegetation</b></p> <p>The Project is located in the Pine Creek Bioregion and part of the Yinberrie Hills Site of Conservation Significance (SOCS). Eight vegetation types covering 5,462.56ha were mapped in the Mineral Leases. <i>Eucalyptus tectifica</i>, <i>E. latifolia</i>, <i>E. tintinnans</i>, <i>E. spp.</i> Woodland; <i>E. phoenicea</i>, <i>Corymbia latifolia</i> low woodland – woodland (scattered <i>E. tintinnans</i>); and <i>C. dichromophloia</i>, <i>E. tintinnans</i>, <i>Erythrophleum chlorostachys</i> Woodland covers 80% of the site.</p> <p>Guidelines for the Daly catchment limit clearing of 40% of each major vegetation type in a sub-catchment and 40% of all vegetation in any sub-catchment. The Project occurs in the Fergusson River sub-catchment.</p>	<p>The project footprint covers 1267.13ha. Of this:</p> <ul style="list-style-type: none"> <li>• 608.72ha is remnant native vegetation</li> <li>• 28.83ha is degraded (or modified) vegetation</li> <li>• 629.58ha is cleared land.</li> </ul> <p>Potential sources of impact include:</p> <ul style="list-style-type: none"> <li>• clearing (including within drainage line buffers) leading to potential loss of vegetation and flora</li> <li>• introduction of weeds potentially damaging vegetation and flora</li> <li>• contamination of groundwater and / or altering the water table leading to potential damage to vegetation and flora</li> <li>• mine generated dust potentially impacting on vegetation and flora.</li> </ul>	<p>If the buffer widths around drainage lines are respected, there will be no impact on the water dependent vegetation.</p> <p>The largest amount of clearing of any one vegetation type in the Yinberrie Hills SOCS is the proposed removal of 16.16% of <i>Corymbia dichromophloia</i>, <i>Erythrophleum chlorostachys</i> woodland (scattered <i>E. tintinnans</i>). This equates to 14% of this vegetation type within the Katherine to Pine Creek region.</p> <p>The clearing proposed does not constitute 40% of any major vegetation type or total vegetation in the Fergusson River sub-catchment.</p> <p>Modelling indicates that the extent of groundwater drawdown will be limited with levels largely recovering post-mining.</p> <p>Standard dust mitigation will be applied to reduce dust levels to as low as practicable.</p> <p>The Project is not expected to significantly impact vegetation in the area.</p>
<p><b>Flora</b></p> <p>840 species are known to occur within 10km of the leases. Recent surveys identified 226 taxa, of which 67 were not recorded from previous surveys. The total number of species known from the area is now 959.</p> <p>The only threatened plant species recorded from the area is the bladderwort, <i>Utricularia singeriana</i>. This species is vulnerable to extinction. The closest known record is 6km west of the Mineral Leases.</p>		<p>Clearing will not impact the threatened bladderwort or habitat that may be suitable for the bladderwort.</p> <p>Weeds are currently distributed along the interface between cleared areas and bushland. The interiors of the native vegetation are mostly weed free. There is an active weed management program at the site.</p> <p>The Project is not expected to have an impact on any threatened flora.</p>



**Summary of Potential Impacts and their Management - Fauna**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Terrestrial fauna</b></p> <p>The Project is located in the Pine Creek Bioregion and part of the Yinberrie Hills SOCS.</p> <p>The Mineral Leases are part of a site of conservation significance called the Yinberrie Hills. The area is particularly noted for having the largest known breeding population of the endangered Gouldian finch.</p> <p>A total of 346 terrestrial vertebrate species have been recorded from within 10km of the leases: 50 mammals, 197 birds, 77 reptiles and 22 amphibians. Eight of these are exotic. Threatened species recorded from the leases by GHD are the Gouldian finch, crested shrike-tit, Australian bustard, painted honeyeater, pale field-rat and Mertens' water monitor.</p>	<p>Potential significant sources of impact include:</p> <ul style="list-style-type: none"> <li>clearing of breeding and / or foraging habitat</li> <li>dust from mining and processing impacting on animals or their habitats</li> <li>noise from mining and processing impacting fauna</li> <li>predation by, poisoning by and / or competition from exotic animals, or habitat degradation caused by exotic plants</li> <li>poisoning from fauna drinking tailings dam water</li> <li>loss of habitat from lowering or contamination of the water table.</li> </ul>	<p>Mining will result in a cumulative loss of 1497.26ha (2.09%) of foraging and/or breeding habitat for Gouldian finch, crested shrike-tit, partridge pigeon, Australian bustard, pale field-rat, painted honeyeater and the fauna as a whole. There will be no impact on Mertens' water monitor, Mitchell's water monitor and yellow-spotted monitor habitat. Clearing at the above low level is unlikely to have any significant impact on threatened species and populations.</p> <p>The Gouldian finch population and the fauna as a whole were unaffected by dust from previous mining. Dust will increase as a result of mining and there is potential for dust to impact the Gouldian finch population and the fauna of the Yinberrie Hills. Little is known about the tolerance of Gouldian finch to elevated levels of dust. To manage this potential impact it is proposed to:</p> <ul style="list-style-type: none"> <li>expand the current dust monitoring program</li> <li>establish artificial nest boxes throughout the area potentially affected</li> <li>continue the existing population monitoring program</li> <li>expand the program to include areas adjacent to the Yinberrie Hills and in the broader Mt Todd to Pine Creek region.</li> </ul> <p>There is no evidence that previous levels of noise impacted Gouldian finch or fauna in general.</p> <p>The leases have minor feral animal problems and proposed mining is unlikely to increase feral animal numbers. Exotic animal incursions e.g. black rats will be exterminated.</p> <p>Tailings dam operation during previous mining has not resulted in a decline in the Gouldian finch population or impact to other species. No impact is expected from the revised proposal.</p> <p>The limited drawdown of groundwater in the Yinberrie Hills and elsewhere on the site is unlikely to significantly impact fauna.</p> <p>A suite of management measures are proposed to reduce the impacts of land clearing, advance rehabilitation, minimise dust and noise emissions and control feral and exotic animals.</p>





Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Aquatic fauna</b></p> <p>A total of 6,520 macroinvertebrate specimens from 39 taxa have been identified from the leases. Edith River and Stow Creek returned 33 taxa, while the Fergusson River returned 30 taxa. Community composition varied across the three waterways.</p> <p>Triochoptera and Coleoptera dominate the Fergusson and Edith river communities and Dipterans dominated the Stow Creek community.</p> <p>Fourteen fish species were collected from Edith River and Stow Creek. Juvenile freshwater crocodile were recorded from Edith River.</p>	<p>Horseshoe Creek and Stow Creek diversions will be constructed to provide flood protection to TSF2. Potential impacts are:</p> <ul style="list-style-type: none"> <li>• changes in the overall character of watercourse</li> <li>• fish passage restrictions</li> <li>• loss of habitat.</li> </ul> <p>Acid and metalliferous drainage (AMD) has the potential to impact the aquatic environment through point source discharge and diffuse sources. There is a large amount of acid producing rock on the Mt Todd leases and the flow of groundwater is towards the Edith River. Diffuse sources of AMD created during mine operation and closure have the greatest potential to impact the aquatic environment, especially during low flow conditions.</p>	<p>The diversion channels have been designed to accommodate a flow of 182m<sup>3</sup>/s with an average stream velocity of 2.0m/s. The channels will:</p> <ul style="list-style-type: none"> <li>• operate as part of a self-sustaining stream system promoting nutrient processing, ecological connectivity and sediment storage and transport</li> <li>• avoid the use of artificial grade control structures or other structures likely to require maintenance beyond the life of the mine</li> <li>• include natural, locally and regionally occurring geomorphic and habitat features</li> <li>• establish a state of dynamic equilibrium (equal rates of sediment erosion and deposition) with adjoining sections of the creek.</li> </ul> <p>Construction of the diversion channels will result in a loss of in-stream habitat and a revegetation plan has been developed to suit the physical characteristics and requisite environmental values of the waterway.</p> <p>The management of point source AMD inputs will largely occur through engineering design and treatment. Diffuse source management will occur through the selective handling and storage of AMD material and the successful rehabilitation of structures that contain AMD material.</p> <p>Monitoring of water quality and macroinvertebrates will be undertaken as part of the Waste Discharge Licence. The monitoring plan 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.</p>
<p><b>Biting insects</b></p> <p>A total of 39 species of mosquito have been trapped from the leases. Species such as <i>Aedes normanensis</i> and <i>Culex annulirostris</i> reached levels that could cause low to relatively high pest problems, while the potential malaria mosquito <i>Anopheles annulipes s.l.</i> reached levels that could cause potential low to moderate pest problems.</p>	<p>The Project has the potential to increase breeding sites for mosquitoes resulting in a long-term increase in:</p> <ul style="list-style-type: none"> <li>• mosquito nuisance levels</li> <li>• transmission of viruses.</li> </ul>	<p>The potential for nuisance levels and disease transmission by mosquitos to increase will be mitigated by:</p> <ul style="list-style-type: none"> <li>• rectifying artificially created breeding sites including ground depressions around the mine site and alongside tracks, shallow borrow pits and disused septic tanks</li> <li>• improving drainage of poorly draining areas</li> <li>• preventing potential mosquito breeding in artificial receptacles such as used tyres, drums, rubbish items and rainwater tanks</li> <li>• screening rainwater tank inlets and outlets</li> <li>• treating artificial ponding with an undiluted bleach solution or a residual insecticide</li> <li>• following “Guidelines for preventing mosquito breeding sites associated with mining sites” (Medical Entomology Centre for Disease Control 2005).</li> </ul> <p>It is not expected that mosquitoes numbers will be a significant issue at the mine site.</p>



**Summary of Potential Impacts and their Management - Heritage**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Indigenous</b></p> <p>Surveys located 20 archaeological sites. The most significant was Mt Todd 26 – an extensive greywacke quarry, extraction and reduction site, one of the largest recorded in the Northern Territory. The remainder were lithic scatters or quarry and reduction sites with low to medium heritage significance.</p>	<p>Impacts relate to the potential for the Project to disturb sites of heritage significance.</p>	<p>Part of Mt Todd 26 is in an area proposed for impact and cannot be avoided. A permit to disturb a small portion of the site has been sought.</p> <p>Two sites with medium significance (Mt Todd 37 and 38) may be impacted by the Horseshoe Creek diversion. A permit to disturb these sites will be applied for if disturbance is required.</p> <p>Several sites of low significance will be disturbed and permits to disturb will be applied for.</p>
<p><b>Non-indigenous</b></p> <p>Surveys identified 31 historical features including mining shafts and associated artefacts, and Overland Telegraph Line features. The most significant was Mt Todd H1, an extensive mining site with large shafts and adits. The remainder had low to medium heritage significance.</p>		<p>Mt Todd H1 has previously been fenced and will not be disturbed as part of the proposed development.</p> <p>The remnants of the Overland Telegraph Line and seven mining sites of probable Chinese origin are assessed as having medium significance. While no permit is required to disturb historical sites, it is recommended that the sites of medium historical significance are conserved <i>in situ</i> where possible</p>
<p><b>Jawoyn Resource Knowledge</b></p> <p>62 animal, 63 plant and one fungal taxa were identified and the associated Jawoyn knowledge recorded.</p>	<p>Impacts relate to the potential loss of species from the mine site that are used as a food source by Jawoyn.</p>	<p>Amongst the Jawoyn, the mine site is not considered a notably productive environment. Plants and animals encountered and discussed during this ecological knowledge consultation are widespread and not unique to the mine site.</p>





**Summary of Potential Impacts and their Management – Air Quality**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>The area surrounding the mine site is rural and sparsely populated. The Werenbun community, the closest human sensitive receptor, is located 6.5km from the site.</p> <p>At present, the main sources of particulate matter in the vicinity of the mine are smoke from scrub fires and crustal dust from wind erosion. As a result, the majority of the particulate load in the ambient air is composed of PM<sub>2.5</sub> and PM<sub>10</sub>.</p> <p>The Yinberrie Hills lie to the west of the Batman Pit and support a population of the threatened Gouldian finch.</p>	<p>The Project will generate dust during construction and operations with the potential for levels to exceed air quality criteria at the nearest sensitive receptor. Significant sources include:</p> <ul style="list-style-type: none"> <li>• wind erosion of unconsolidated, exposed and open surfaces, including stockpiles and WRD</li> <li>• overburden removal</li> <li>• loading ore onto haul trucks</li> <li>• wheel generated dust from vehicles on unsealed haul roads</li> <li>• wheel generated dust from vehicles on paved roads</li> <li>• dumping of ore at the ROM pad</li> <li>• primary and secondary crushing</li> <li>• screening</li> <li>• conveyor transfer points between different process stages.</li> </ul> <p>There is also the potential for elevated dust levels to impact on the Yinberrie Hills Gouldian finch population.</p> <p>Nitrous oxide (NO<sub>x</sub>) as nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO) will be the main air pollutants emitted from the power station.</p>	<p>Construction activities are not expected to generate large quantities of dust.</p> <p>Based on conservative dispersion modelling assumptions, dust emission estimates and worst case meteorological conditions, the Project is predicted to exceed the 24-hour average Air NEPM standard of PM<sub>10</sub> of 50µg/m<sup>3</sup> at Werenbun for a maximum of two days per year.</p> <p>The relevant air quality impact assessment criteria for the annual average of TSP and deposited dust are predicted to be met at Werenbun.</p> <p>Dust emissions can be managed to meet the relevant air quality standards through the implementation of an interactive Dust Management Plan, including:</p> <ul style="list-style-type: none"> <li>• implementation of dust mitigation strategies</li> <li>• real-time monitoring of meteorological conditions to inform dust mitigation strategies</li> <li>• continuous real-time monitoring of dust at the boundary and at sensitive places</li> <li>• real-time alerting of site operators when dust concentrations at the boundary and sensitive places exceed trigger levels. Additional dust mitigation can then be implemented</li> <li>• review of mining practices on days when the worst case dust impacts are expected to occur.</li> </ul> <p>Gouldian finch habitat has the potential to be exposed to maximum PM<sub>10</sub> 24 hour ground level concentration of greater than 200µg/m<sup>3</sup>. Management measures are discussed under fauna above.</p> <p>The assessment found that the maximum 1-hour average ground level concentration of NO<sub>2</sub> is predicted to be 5% of the Air NEPM standard.</p>



**Summary of Potential Impacts and their Management - Noise and Vibration**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>The Project is located within a predominantly rural area. Noise sources in the area include:</p> <ul style="list-style-type: none"> <li>• traffic noise from the Stuart Highway and Edith Falls Road</li> <li>• rail noise from the Adelaide – Darwin rail line</li> <li>• natural noise from wind, insects and other animals.</li> </ul> <p>The community of Werenbun, the closest human sensitive receptor, is located 8km from the site.</p> <p>The mine site and surrounding area supports populations of the threatened Gouldian finch.</p>	<p>The Project will generate noise during construction and operations with the potential for levels to exceed noise and vibration criteria at the nearest sensitive receptor. Significant sources include:</p> <ul style="list-style-type: none"> <li>• noise from plant and machinery during construction</li> <li>• noise and vibration from pile driving during construction</li> <li>• noise during operations including from vehicles, power station and plant (crushers, screening plants, conveyors, HPGR mills etc.)</li> <li>• vibration from in-pit blasting.</li> </ul> <p>There is the potential for elevated noise levels to impact on Gouldian finch.</p>	<p>The results of the construction assessment indicate that construction noise and vibration is expected to comply with nominated criteria at sensitive receptors at all times.</p> <p>The results of the operational assessment indicate that operational noise and vibration is expected to comply with nominated criteria at sensitive receptors under all weather conditions.</p> <p>The nature and level of vibration emitted from the site will vary with the activities being undertaken. Due to the distances between the sources and receptors, vibration impacts are unlikely to be an impact.</p> <p>Literature suggests that noise from the Project is unlikely to result in negative impacts to native fauna.</p>





**Summary of Potential Impacts and their Management - Traffic and Transport**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>Stuart Highway is a national highway extending from Darwin to Port Augusta. The Highway will connect major population centres to the mine via Edith Falls Road. Near the intersection with Edith Falls Road, the Highway is a four-lane, two-way road.</p> <p>Edith Falls Road is a two-way, two-lane road which intersects with Jatbula Road (mine access road).</p> <p>Near the mine site Stuart Highway has an average daily traffic volume of less than 2000, less than 20% being heavy vehicles. Edith Falls Road has an annual daily traffic volume of less than 200, less than 10% being heavy vehicles.</p>	<p>The Project will increase traffic on Stuart Highway and Edith Falls Road during construction and operations.</p> <p>Traffic generated during construction is associated with the transport of machinery and equipment to-site, import and disposal of materials by truck, the removal of machinery post-construction and the construction workforce. Up to 124 heavy vehicle trips (of which 24 are personnel buses) and up to 53 light vehicle trips are anticipated per day.</p> <p>Traffic generated during operations is associated with the transport of mine personnel and the delivery of reagents, fuel and explosives. Up to 40 light vehicle and 39 heavy vehicle trips are anticipated per day.</p>	<p>A traffic assessment has determined the following for construction:</p> <ul style="list-style-type: none"> <li>• peak hour traffic on Stuart Highway will increase by 9% (from 193 to 213 vehicles)</li> <li>• peak hour traffic on Edith Falls Road will increase by 65% (from 18 to 51 vehicles).</li> </ul> <p>This increase in traffic volume is low and will not affect the existing Level of Service on the roads.</p> <p>A traffic assessment has determined the following for operations:</p> <ul style="list-style-type: none"> <li>• peak hour traffic on Stuart Highway will increase by 9% (from 193 to 212 vehicles)</li> <li>• peak hour traffic on Edith Falls Road will increase by 51% (from 18 to 41 vehicles).</li> </ul> <p>This increase in traffic volume is low and will not affect the existing Level of Service on the roads.</p> <p>An assessment also concluded that the low level of project-generated traffic will not impact vehicle turning movements and that the current intersection configurations were capable of safely handling the increase in traffic.</p> <p>A number of measures are proposed to manage over dimensional loads, driver fatigue, pavement deterioration and the transport of dangerous goods.</p>



**Summary of Potential Impacts and their Management - Economics**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>In 2011:</p> <ul style="list-style-type: none"> <li>the population of the Katherine region was 21,379, with 43% being indigenous</li> <li>there was an estimated 8,035 persons working in the Katherine region</li> <li>the major industries in the Katherine region were public administration (including Defence and safety (24%), health care and social assistance (11%), agriculture, forestry and fishing (9%), education and training (9%) and retail trade (7%)</li> <li>8.7% of people were unemployed.</li> </ul> <p>The Gross Regional Product (GRP) of the Katherine region in 2006 was \$1.12 billion, 7.9% of the total NT Gross State Product of \$14.2 billion. The top six sectors in term of contribution to the GRP of the Katherine region were mining (\$270M), government administration and Defence (\$145M), agriculture, forestry and fishing (\$73M), health and community services (\$68M), construction (\$57M) and education (\$40M).</p> <p>There was a slight increase in the number of businesses in the Katherine region between 2008 and 2011, from 864 to 911.</p>	<p>Development of the Project is estimated to deliver considerable economic benefits to the region in the form of direct and indirect employment opportunities and expenditure.</p> <p>During construction:</p> <ul style="list-style-type: none"> <li>direct expenditure in the Katherine region is estimated at \$163M and \$657 for the NT. Total expenditure is \$1.5 billion</li> <li>employment in the Katherine region is estimated at 704 FTE person years and 2,462 FTE person years for the NT.</li> </ul> <p>During operations:</p> <ul style="list-style-type: none"> <li>direct expenditure in the Katherine region is estimated at \$725M and \$1.6 billion for the NT. Total expenditure is \$3.6 billion</li> <li>employment in the Katherine region is estimated at 1,503 FTE person years and 4,605 FTE person years for the NT.</li> </ul> <p>Assuming a gold price of \$1,400 AUD per ounce, the value of production is estimated at \$6.7 billion (as revenue).</p> <p>It is estimated that the Project will generate the following taxes and royalty payments:</p> <ul style="list-style-type: none"> <li>significant (Commercial-In-Confidence) royalty payments to the Jawoyn people</li> <li>\$277M in royalty payments to the Northern Territory Government</li> <li>\$469M in taxation payments to the Australian Government.</li> </ul>	<p>Development of the Project is expected to have a range of positive economic impacts for communities in the Katherine region and in the NT including:</p> <ul style="list-style-type: none"> <li>job creation</li> <li>increased income benefits</li> <li>investment in residential and non-residential buildings.</li> </ul> <p>Socio-economic indicators or parameters that should be monitored on an ongoing basis to gain an understanding of actual benefits include:</p> <ul style="list-style-type: none"> <li>employment by industry</li> <li>unemployment rates</li> <li>median personal and household income levels</li> <li>value of residential and non-residential approvals.</li> </ul>



**Summary of Potential Impacts and their Management - Greenhouse Gas Emissions**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>Australia's total GHG emissions for 2009/10 are estimated at 560.8 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub>-e) and the Northern Territory's emissions for 2009 / 2010 were estimated at 17.4Mt CO<sub>2</sub>-e. The major emission sources for the Northern Territory were agriculture (primarily the burning of savannahs) and fuel combustion for stationary energy purposes.</p> <p>2010 global greenhouse gas emissions stood at 30.9 gigatonnes of carbon dioxide equivalent.</p>	<p>The Project will generate GHG emissions during construction, operations and closure from a number of sources including:</p> <ul style="list-style-type: none"> <li>• diesel use in vehicles and stationary sources and gas use in the power station</li> <li>• construction materials (steel, cables, concrete) construction and transport</li> <li>• employee transport</li> <li>• wastewater treatment</li> <li>• consumables production and transport during operations.</li> </ul>	<p>Total emissions for the life of the Project are estimated at 10,537,731t CO<sub>2</sub>-e with 98.8% of emissions occurring during the operations phase.</p> <p>For the operations phase, average annual emissions from the Project are estimated at 0.395Mt CO<sub>2</sub>-e or 2.9% of Northern Territory annual emissions, 0.09% of Australia's annual emissions and 0.002% of global emissions.</p> <p>GHG emissions are relatively minor when compared to state, national and global emissions.</p> <p>The major emissions source during operations was energy consumption (natural gas and diesel), contributing 79.5% of emissions. This was followed by embodied emissions in materials (18%), transportation of materials to site (2.5%) and employee transportation (0.1%).</p> <p>GHG emissions have been reduced where possible. The greatest reduction results from having a gas fired power station on-site which reduces the emissions associated with the purchase of grid electricity. Other possible emission reductions may occur through the selection of a more fuel efficient vehicle fleet and undertaking an energy efficiency review.</p>





**Summary of Potential Impacts and their Management - Waste Management**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p>The site is a brownfield site, resulting from historic mining operations. Waste types currently generated on-site as part of the care and maintenance phase include cardboard, plastics tyres, paper, metals, hazardous materials (chemicals, batteries, fuels, oils), waste water / effluent and putrescibles.</p> <p>Katherine Town Council operates a Waste Transfer Station and recycling facilities.</p> <p>A number of companies equipped to treat and dispose of hazardous waste are located in Darwin</p>	<p>The Project will generate a variety of waste types including:</p> <ul style="list-style-type: none"> <li>• waste rock and overburden</li> <li>• tailings</li> <li>• solid wastes from the WTP</li> <li>• sewage</li> <li>• packaging materials</li> <li>• scrap material and timber</li> <li>• geotextiles</li> <li>• electrical off-cuts</li> <li>• concrete</li> <li>• waste fuels, oils and chemicals</li> <li>• tyres</li> <li>• green waste from clearing</li> <li>• general domestic waste.</li> </ul>	<p>The main waste streams have been identified with waste being managed consistent with the following hierarchy:</p> <ul style="list-style-type: none"> <li>• avoidance</li> <li>• re-use</li> <li>• re-cycling and recovery of energy</li> <li>• treatment</li> <li>• containment</li> <li>• disposal.</li> </ul> <p>A Waste Management Plan will be developed in accordance to the <i>Waste Management and Pollution Control Act 1998</i>.</p> <p>Chapter 21 provides specific detail relating to management of the various waste streams. Also provided is reference to rehabilitation and closure of the main on-site waste repositories, namely the tailings storage facilities and the Waste Rock Dump.</p>



**Summary of Potential Impacts and their Management - Matters of National Environmental Significance**

Existing Environment	Potential Impacts	Impact Assessment / Proposed Management
<p><b>Nationally Threatened Species</b></p> <p>Ten EPBC Act listed threatened species potentially occur within 10km of the project area. Two of these, the Gouldian finch and crested shrike-tit, were recorded on-site. The partridge pigeon was not recorded, but may be present on-site occasionally. The remaining seven species are unlikely to occur on-site.</p>	<p>Threatened species have the potential to be impacted through habitat clearing, dust, noise, wildfire, poisoning from tailings dam water and contamination / alteration of the water table.</p>	<p>The potential impact on threatened species was assessed against SEWPaC Significant Impact Guidelines.</p> <p>The risk to Yinberrie Hills Gouldian finch is “High” due to the potential for dust to cause population decline, interfere with the recovery of the species and adversely affecting habitat critical to its survival. To manage this potential impact it is proposed to:</p> <ul style="list-style-type: none"> <li>• expand the current dust monitoring program</li> <li>• establish artificial nest boxes throughout the area potentially affected</li> <li>• continue the existing population monitoring program</li> <li>• expand the program to include areas adjacent to the Yinberrie Hills and in the broader Mt Todd to Pine Creek region.</li> </ul> <p>Levels of risk to the crested shrike-tit and partridge pigeon are “Very Low” to “Low”.</p>
<p><b>Migratory and / or Marine Species</b></p> <p>Fourteen EPBC Act listed migratory bird species potentially occur within 10km of the project area. Ten have been recorded from the leases.</p> <p>Seven EPBC listed marine species potentially occur with 10km of the project area. This includes six bird species and one reptile species. The freshwater crocodile was recorded in the leases.</p>	<p>Migratory and / or marine species have the potential to be impacted through habitat clearing, dust, noise, poisoning from tailings dam water and contamination / alteration of the water table.</p>	<p>There is no evidence to suggest that the Mineral Leases provide “important habitat” for a migratory species, or support an “ecologically significant proportion” of a migratory species population as defined in the SEWPaC guidelines on significance of impacts to migratory species.</p> <p>None of the listed marine species is likely to suffer a high risk of impact from the proposed development.</p>
<p><b>National Heritage Places</b></p> <p>The Yinberrie Hills is a Site of Conservation Significance and was placed on the Interim Register of the National Estate for its natural values. However in 2007 the Register of the National Estate was declared no longer a statutory list.</p>	<p>The Project has the potential to impact vegetation, flora and fauna in the Yinberrie Hills primarily through clearing and dust.</p>	<p>Level of risk to the Yinberrie Hills flora and vegetation is “Medium” when assessed against SEWPaC Significant Impact Guidelines.</p> <p>Level of risk to Yinberrie Hills fauna is “High” due largely to the level of risk to the endangered Gouldian finch discussed above.</p>

### ***Environmental Management***

Environmental Management for the Project will need to address conditions of approval, permit requirements, conditions of the Mine Management Plan which will include an Environmental Management Plan, and legislative and company requirements.

A Mine Management Plan will be developed by Vista Gold in the event approval for the Project is granted. An Environmental Management Plan framework for the Project for inclusion in the Mine Management Plan has been developed. The framework will be updated by Vista Gold to enable conditions of approval to be incorporated and addressed.

Mine planning has focussed on the reuse of existing infrastructure and disturbed areas where possible to minimise the extent of new works on-site. Closure and rehabilitation will occur progressively throughout the life of the Project. Existing facilities and infrastructure that are not required will be decommissioned and rehabilitated as soon as possible after mining commences.

The key on-site features requiring rehabilitation are:

- ▶ WRD;
- ▶ HLP and moat;
- ▶ TSF1 and TSF2;
- ▶ Batman Pit; and
- ▶ disturbance areas such as the process plant site, site roads and stockpile areas.

Closure costs are estimated at \$155 million. All closure and rehabilitation planning considers the entire life of the mine, from pre-mining site preparation to final closure and rehabilitation. In line with standard practice, the Reclamation Plan and other aspects of closure and rehabilitation will be updated and refined throughout mining operations, to improve the level of detail, accuracy and scope of the plan. This process will continue up to the end of mine operations so that the Reclamation Plan remains up to date and consistent with ongoing research.

Vista Gold will ultimately close the Mt Todd Gold Mine and hand over commitments and responsibility to the Northern Territory Government. It is expected that successful closure will result in minimal to no ongoing management, and minimal ongoing monitoring.