



Mt Todd Gold Project DRAFT ENVIRONMENTAL IMPACT STATEMENT

Volume II

June 2013

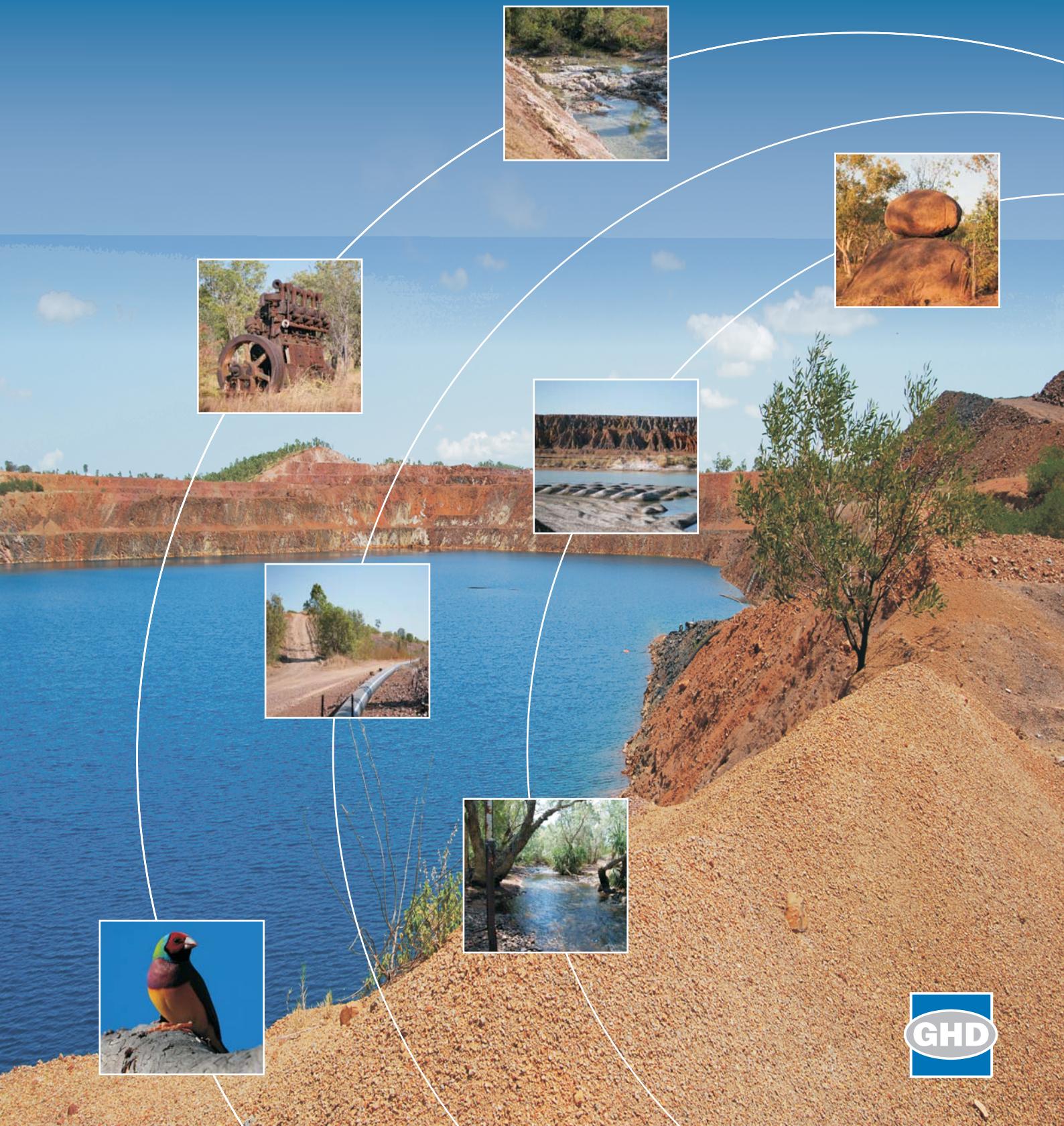


Table of Contents - Volume II

Appendices

Appendix A – EIS Team

Appendix B – NT Guidelines for Preparation of a Draft Environmental Impact Statement

Appendix C – EPBC Determination Letter

Appendix D – Cross Reference of EIS Guidelines

Appendix E – Public Consultation Report

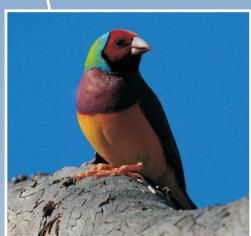
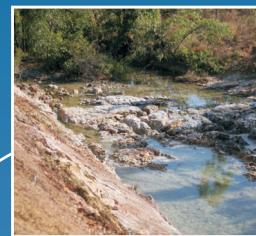
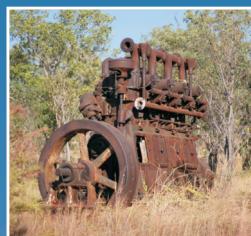
Appendix F – Social Impact Assessment

Appendix G – Climate Change Report

Appendix H – Sustainability Report

Appendix I – Surface Water – Hydrology Report

Appendix J – Surface Water Monitoring Program



APPENDIX A

EIS Team

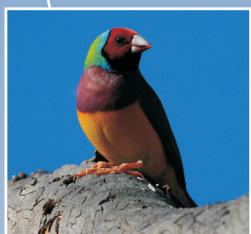
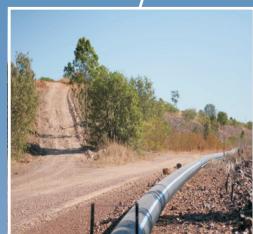
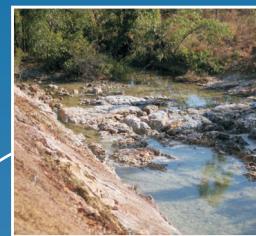
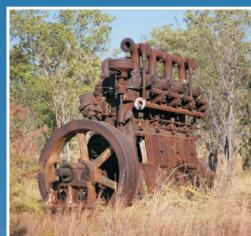


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APPENDIX B

NT Guidelines for the Preparation of a Draft Environmental Impact Statement



Northern
Territory
Government

DEPARTMENT OF
NATURAL RESOURCES, ENVIRONMENT, THE ARTS AND SPORT

Guidelines for the Preparation of an Environmental Impact Statement

**Mount Todd Gold Project
Katherine Region, NT**

Vista Gold Australia Pty Ltd

September 2011

TABLE OF CONTENTS

1	Introduction	4
2	General advice on the EIS	6
2.1	General content.....	6
2.2	Format and Style	7
2.3	Administration.....	8
3	Background Information	9
3.1	Project Objectives.....	10
3.2	Location and Site Layout	10
3.3	History	10
4	Description of the Proposed Development.....	12
4.1	Project Components and Supporting Infrastructure.....	12
4.2	Mining Operations	12
4.3	Ore Processing.....	12
4.4	Tailings Storage Facilities (TSF1 and TSF2).....	12
4.5	Waste Rock Dump (WRD).....	13
4.6	Power Supply	14
4.7	Operational Water Management.....	15
4.8	Social Impact Assessment.....	15
5	Project alternatives	16
6	Existing environment.....	17
6.1	Hydrogeology and groundwater.....	17
6.2	Surface water	18
6.3	Biodiversity	19
6.4	Climate	20
7	Risk Assessment	21
7.1	Risk assessment approach.....	21
7.2	Key risks of the Mount Todd Gold Project	21
7.3	Acid and Metalliferous Drainage (AMD)	22
7.4	Groundwater Impacts	24
7.5	Surface Water Impacts	25
7.6	Biodiversity	27
7.7	Rehabilitation, Decommissioning and Closure	28
7.8	Other Impacts	30
7.8.1	Cultural Heritage	30
7.8.2	Socio-Economics	31
7.8.3	Fire	33
8	Environmental Management	33
9	Public involvement and consultation.....	34
10	Policy and Guidance Notes.....	34
10.1	Greenhouse gas emissions and climate change guidelines	34
10.2	Environmental offsets	34

10.3 Biodiversity and Land Clearing Guidelines	35
10.4 Erosion and sediment control guidelines	35
10.5 Mine closure guidelines	36
10.6 Transport guidelines	36
11 Regulatory Notes	37
11.1 Public health premises and food premises	37
11.2 Water supply.....	37
11.3 Waste water.....	37
11.4 Solid waste storage and disposal	38
11.5 Mosquito breeding	38
11.6 Work Health and Safety Act.....	39
12 References.....	40

1 INTRODUCTION

Vista Gold Australia Pty Ltd (the Proponent) proposes to re-establish and operate the Mount Todd Gold Mine (“the Project”), located 55km north of Katherine and 250km south of Darwin. A limestone quarry would also be established approximately 20km west of the mine site to use lime/limestone as a neutralising agent in mining operations and rehabilitation.

The proposed Project comprises:

- Extension of the existing Batman pit from its current depth of 114m to approximately 471m and surface area of 40 hectares (ha) to approximately 100ha;
- Extension of the existing Waste Rock Dump (WRD) from height 24m to approximately 140 – 170m and surface area 70ha to approximately 200ha. The existing WRD comprising of 16 Million tonnes (Mt) would expand to contain approx.214Mt of waste rock;
- Existing Tailings Storage Facility (TSF1) raised from 16m to approx.34m;
- Proposed new Tailings Storage Facility (TSF2) (approximately 420ha, 80m high);
- Rehabilitation of the existing heap leach pad no longer required for gold production (40ha);
- Construction and processing of low grade ore stockpiles (approx.40ha);
- New Water Treatment Plant;
- Clay borrow area (approx.12ha, 15m depth);
- Administration and Plant Site Buildings (32ha)
- Anaerobic Treatment Wetlands (10ha); and
- Limestone quarry (approx.150m x 150m at approx.25m depth) and access road approximately 20km west of the Mount Todd mine site.

The proposed operations involve open cut mining and processing up to 10.65 Million tonnes of ore per annum (Mtpa) to produce gold dore (unrefined gold). Over the life of the Project approximately 214 Mt of waste material would be disposed in the WRD.

Gold dore would be trucked weekly to Darwin in an armoured car for onward secure shipment to a refinery. The proposed limestone quarry consists of a 300 – 500 tonnes per day (tpd) open pit mine to process in a 150 tpd vertical lime kiln. The kiln would produce the lime for ore processing and waste water treatment. An access road would be required from the limestone quarry to the mine site. The proposed disturbance footprint for mine facilities and infrastructure is approximately 1000ha. An exploration lease has just been granted for the limestone quarry and a specific location and dimensions of the quarry has yet to be determined depending on the outcomes of exploration and environmental impact assessment.

The Project is anticipated to run for approximately 15 years with the construction workforce of approximately 400 and a mine workforce of up to 300 personnel. It is expected that all employees would live in the local area.

A detailed description of the Mount Todd Gold Project can be found within the Notice of Intent on the NRETAS website at:

http://www.nt.gov.au/nreta/environment/assessment/register/vista_gold/index.html

The Proponent submitted a referral under the *Environment Protection and Biodiversity Conservation Act* to the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) and the Project was determined to be a controlled action. The proposed action has the potential to have a significant impact on listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A).

The Project was referred by the Northern Territory (NT) Department of Resources (DoR) on 21 April 2011 to the Department of Natural Resources, Environment the Arts and Sport (NRETAS), for environmental assessment. On 8 August 2011, the NT Minister for Natural Resources, Environment and Heritage determined that the Project requires formal assessment under the NT *Environmental Assessment Act 1982* (EA Act), at the level of an Environmental Impact Statement (EIS) and will be assessed under the bilateral agreement between the NT and Australian Government. Issues of concern contributing to the decision included:

- Acid and Metalliferous Drainage (AMD) seepage and runoff from the waste rock dump, ore stockpiles and tailings storage facilities potentially contaminating surface and ground waters continuing long after the mine has ceased operation;
- Potential contamination of surface water from AMD causing adverse impacts on downstream water quality, aquatic environment and downstream users;
- Potential contamination of groundwater from AMD causing groundwater quality impacts outside of the mineral lease or release of contaminated groundwater expressing to surface water;
- Potential groundwater drawdown impacts to groundwater flows in the Edith River and the potential to impact production bores in the region;
- Management and treatment of a large quantity of acidic and metal laden water currently existing on the site;
- The proposed WRD covers an approximate area of 200ha with an estimated height of 140 – 170m. Final design of the WRD must ensure the structure is safe, stable, not prone to significant erosion, minimises AMD seepage and runoff and meets stakeholder expectations as a final land use structure;
- Biodiversity impacts, including matters of environmental significance, associated with disturbance footprint of mining activities and infrastructure requirements;
- The challenges of successful mine closure and rehabilitation; and
- Potential social, economic, transport and heritage impacts.

These Guidelines have been developed to assist The Proponent in preparing an EIS for the Project, in accordance with Clause 8 of the NT *Environmental Assessment Administrative Procedures 1984* of the EA Act.

2 GENERAL ADVICE ON THE EIS

2.1 General content

The EIS should be a stand-alone document. It should contain sufficient information to avoid the need to search out previous or additional, unattached reports.

The EIS should enable interested stakeholders and the Minister to understand the environmental consequences of the proposed development. Information provided in the EIS should be objective, clear and succinct and be supported by maps, plans, diagrams or other descriptive detail. The body of the EIS is to be written in a concise style that is easily understood by the general reader and technical jargon should be avoided. Cross-referencing should be used to avoid unnecessary duplication of text. Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the EIS.

The EIS should demonstrate a Project commitment to the principles of ecologically sustainable development, which is defined as development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

In general, the EIS should:

- Describe the existing environment and key ecosystem processes;
- Describe the proposed action and evaluated alternatives;
- Determine the nature and magnitude of environmental impacts of the proposed action on the existing environment at a local and regional scale including both human and ecological concerns;
- Identify key environmental issues and the safeguards in place to avoid, minimise or ameliorate adverse impacts; and
- Establish mechanisms to determine the long term impact of environmental impacts associated with key environmental issues (monitoring and reporting).

The level of analysis and detail in the EIS should reflect the level of significance of the expected and potential impacts on the environment, as determined through adequate technical studies. Any and all unknown variables or assumptions made in the assessment must be clearly stated and discussed. The extent to which the limitation, if any, of available information may influence the conclusions of the environmental assessment should also be discussed.

The Proponent should demonstrate its commitment in the EIS to best practice environmental management. Best practice requires careful planning and commitment from all levels and groups within a mining company and through all phases of a resource Project from the initial exploration to construction, operation and closure. It is based on a comprehensive and integrated approach to recognising, and avoiding or minimising, environmental impacts and maximising benefits of the Project.

2.2 Format and Style

The EIS should comprise three elements, namely:

- The Executive Summary;
- The main text of the document; and
- Appendices containing detailed technical information and other information that can be made publicly available.

The structure of these Guidelines may be adopted as the format for the EIS. This format need not be followed if the required information can be presented alternatively for better effect. However, each of the elements in these Guidelines must be addressed to meet NT Government regulatory requirements.

The Executive Summary must include a brief outline of the Project and each chapter of the EIS, allowing the reader to obtain a clear understanding of the proposed Project, its environmental implications and management objectives. It must be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read the EIS as a whole.

The main text of the EIS should include a glossary to define abbreviations, technical terms, acronyms and colloquialisms.

The appendices must include:

- A copy of these Guidelines;
- A list of persons and agencies consulted during the EIS;
- Contact details for the proponent;
- A table listing commitments made by the proponent;
- A table cross referencing key risks to address in these Guidelines to relevant sections in the EIS;
- The names of, and work done by, the persons involved in preparing the EIS;
- The qualifications and experience of the people involved in work contributing to the EIS; and
- The environmental record of The Proponent, including details of their environmental policy and planning framework and details of any proceedings (if applicable) under a Commonwealth, or state law for the protection of the environment against them.

The EIS must be written so that any conclusions reached can be independently assessed. All sources must be appropriately referenced using the Harvard Standard. The reference list should include the address of any internet pages used as data sources. All referenced supporting documentation must be available upon request.

The EIS should be produced on A4 size paper capable of being photocopied, with any maps and diagrams on A4 or A3 size and in colour if possible.

The proponent should consider the format and style of the document appropriate for publication on the internet. The capacity of the website to store data and display the material may influence how the document is constructed.

2.3 Administration

Fifteen bound copies of the EIS should be lodged with the Minister, care of the Environment and Heritage Division (EHD) of the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) for distribution to NT Government advisory bodies.

The EIS should be provided in Adobe PDF format for placement on the NRETAS internet site. Additionally, copies in Microsoft Word or unsecured PDF of the EIS should be provided to facilitate production of the Assessment Report and Recommendations.

The EIS is to be advertised for review and comment in the *NT News*, *Weekend Australian* and the *Katherine Times*. The EIS should be made available for public review at:

- Northern Territory Library, Parliament House, Darwin;
- Minerals and Energy Information Centre, Department of Resources, 3rd Floor, Paspalis Centrepoin, 48 Smith Street Mall, Darwin;
- Darwin City Council Library (Casuarina) (casuarinalibrary@darwin.nt.gov.au; Ph: 8930 0200);
- Palmerston City Library, Goyder Square, Palmerston (Ph 8935 9991);
- Pine Creek Community Library, National Trust Museum, Railway Terrace (Ph 8976 1287);
- Katherine Town Council Public Library (ph: 8972 5500);
- Environment and Heritage Division (Department of Natural Resources, Environment, the Arts and Sport), 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin;
- Australian Department of Sustainability, Environment, Water, Population and Communities, John Gorton Building, King Edward Terrace, Parkes, ACT 2600, or GPO Box 787, Canberra ACT 2601;
- Northern Land Council offices (Darwin and Katherine);
- The Environment Centre, Unit 3, 98 Woods St Darwin; and
- Jawoyn Association Aboriginal Corporation, Pandanus Plaza, 1st Street, Katherine, NT, 0851 (ph: 8972 5400, 8971 1100).

To ensure optimal opportunity for public and Government scrutiny of the submitted EIS document, EIS exhibition should not occur in late December or January in any year. If EIS public exhibition overlaps this period, additional time will be added to the EIS exhibition period. The EIS public exhibition period will span a minimum period of six weeks.

The Project Officer is Sally-anne Strohmayer from the Environmental Assessment Unit of NRETAS. Contacts are: Ph (08) 8924 4020; Fax (08) 8924 4053; e-mail: sally.strohmayer@nt.gov.au with cc. to: eia.nretas@nt.gov.au.

3 BACKGROUND INFORMATION

The EIS should have a chapter that provides general information on the background and context of the action including:

- The title of the action;
- The full name and postal address of the designated proponent;
- Legislative background for the Project including the relevant NT legislation that applies to the Project;
- Terms of current agreement between the Northern Territory Government and the Proponent;
- The background to the development of the action, including discussion of previous environmental impact assessment and overview of historic mining activities;
- How the action relates to any other proposals or actions (of which the proponent should reasonably be aware) that have been or are being taken, or that have been approved in the region affected by the action, including the Proponent's long-term plan for exploration and mining in the area;
- All components of the Project should be described in detail, including construction through to rehabilitation, and care and maintenance;
- Tenure/s under which the proposal would be held and any Native Title issues;
- Relevant National and Northern Territory standards, codes of practice and guidelines (see section 10);
- Proximity of sites of sacred, cultural, historical or social interest;
- The sources of greenhouse gas emissions caused by the Project and any offsets or actions to mitigate emissions (see section 10.1);
- Employment and business opportunities (direct and indirect), including sources of workforce, skill levels required and opportunities for local people, Indigenous employment and businesses;
- Methods for storage, handling, containment and emergency management of chemicals and other hazardous substances (including fuel);

- Rehabilitation objectives for the site; and
- The consequences of not proceeding with the action.

3.1 Project Objectives

The EIS should provide:

- A brief summary of the type of operation including size, scale, Project life, areas impacted and tonnages mined and processed;
- A summary of environmental, economic and social impacts in the region; and
- Schedule or timeline for all relevant aspects of the proposal.

3.2 Location and Site Layout

Provide detailed location maps and site plans at appropriate scale that clearly show:

- Location of Project and associated ancillary activity sites in the Northern Territory in relation to nearest major centres, towns, other mines and regional infrastructure;
- Conceptual site plan for the mining Project including all infrastructure, haulage routes (from limestone quarry to mine), other proposed disturbances and tenement boundaries;
- Surrounding land tenure including reserves and pastoral lease boundaries;
- Biogeographical zones and relevant natural features including significant groundwater resources, conservation reserves and sensitive environments;
- Vegetation communities and other environmental constraints such as rare flora and fauna populations;
- Aboriginal/cultural heritage sites;
- Geological plans; and
- Surface contours at appropriate interval showing major topographic features including landform types, surface hydrology (rivers, creeks, drainage lines).

An aerial photograph should be provided to underlay the layout plan to provide an indication of Project component's footprint and scale relative to existing surrounding landscape.

3.3 History

As the Project is a brown field site, description, photographs and maps to document the extent of this disturbance should be included to provide context of the legacy issues and rehabilitation liability. An outline of information gaps and assumptions made in the 1992 Assessment of the Zapopan NL, Mount Todd Gold Project (NSR Environmental Consultants Pty Ltd, 1992) would provide background to the reader of information that may provide context for this current assessment.

The existing environmental issues and extent of current remediation liability should be clearly defined to show that the Proponent has an understanding of remediation costs that will be taken on if granted mining approval. The Proponent should describe the existing condition of the Mount Todd site, how it is currently being managed and the extent of remediation works required if the Proponent assumes responsibility of the site. While it is recognised that the Proponent does not take on any rehabilitation liability for the site until the assessment process is complete and a Mining Management Plan approved, any evidence to date of company performance resulting in positive environmental benefits, would provide the public with assurance the company has capacity and understanding to manage the existing environmental issues and rehabilitation liability.

It is essential that adequate identification and characterisation of existing environmental conditions occurs to ensure proposed future activities do not cause further degradation to existing environmental conditions. Additionally, discuss any benefits of the re-opening of the Project in the long term management of pre-existing liabilities on site.

The EIS should discuss the background to the proposal:

- Describe the extent of pre-existing environmental conditions, including sources of contamination and condition of receiving waters downstream from the proposed Project site. Existing environmental monitoring data, modelling and reporting should be summarised (include the most recently authorised Water Management Plan and Waste Discharge Licence report as appendices). Important aspects such as an understanding of current environmental liability and legacy issues and a clear understanding of the estimated costs to remediate those issues should be demonstrated;
- Outline the management of environmental legacy issues since the Proponent signed the current agreement with the Government (2007) – including both successful treatment/rehabilitation programs and incidents where uncontrolled releases of contaminated water have occurred, complaints received etc. and subsequent action the Proponent has taken to prevent re-occurrence;
- Provide an indication of the existing volumes and quality of water treated and released from the Project site and any modifications to current Waste Discharge Licence;
- Detail the capacity of the current water treatment facility compared to the proposed water treatment infrastructure to inform future water management techniques;
- Outline how the proposed expansion of activities would influence the existing condition of the Project site and downstream receiving waters;
- State how the Project will potentially affect the management of surface water and groundwater volumes and quality both within the Project site and surrounding environment; and
- Describe how the Project would contribute to the future management of the Project site in a rehabilitation and closure context.

4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Project Components and Supporting Infrastructure

The existing and proposed facilities/infrastructure, including ancillary activities, quarry and borrow areas should be described in detail and disturbance footprint (hectares) for each facility listed. The infrastructure design and engineering for all phases of construction, operation and management of the Project should be detailed and relevant plans, photos and maps included. More detail is required for key components with the most potential for significant short and long term environmental impacts. Details of the proposed road connecting the mine and limestone quarry (covering 20km) must also be provided. Detailed technical information can be included in the appendices.

4.2 Mining Operations

Describe the construction and operation including:

- Overview of mining operations including mining techniques, plant and equipment;
- Timing and duration of construction, operation and decommissioning phases;
- Tonnages of material mined, ore produced and waste rock generated;
- Provide a conceptual pit design and waste rock dump design that provides an indication of their scale in relation to existing surrounding landscape; and
- De-watering and raw water use requirements.

4.3 Ore Processing

- Describe the ore processing method, including flow diagrams;
- Describe the high pressure grinding roll technology proposed and its efficiency success or otherwise in similar operations;
- Describe the anticipated recovery rate of cyanide and details of its storage; and
- Describe the waste streams, tailings and emissions produced from the processing activities.

4.4 Tailings Storage Facilities (TSF1 and TSF2)

Seepage from tailings storage facilities is often difficult to predict prior to construction due to the complexity of factors in their siting (e.g. if over a water course or within a flood zone), construction material, design, location of ground and surface waters and climatic influence. Modelling potential impacts to the environment requires a thorough investigation of variables affecting the stability of these facilities. Clearly outline methods to construct, manage and rehabilitate tailings storage facilities.

Provide a description of:

- Surface configurations, capacity and location of the tailings storage facilities including conceptual designs that provides an indication of the scale in relation to surrounding landscape;
- Tailings disposal and impoundment principles, wall designs and construction, estimated flood heights, erosion protection, spillway design and location, sub drainage and seepage collection systems;
- Sediment capture structures;
- Construction methods including lining systems for walls and floor;
- Source of construction material including consideration of AMD potential in selection of materials;
- Geochemical and geophysical characterisation of the tailings material and expected seepage chemistry;
- Projected groundwater interactions with TSFs;
- Location of TSFs in relation to surface water drainage (catchment details);
- Implications of any geotechnical and hydrogeological studies on the design, construction and management of the TSFs;
- Details of mitigation measures proposed to manage seepage, with focus on the post-mine-closure period; and
- Indicate contingency arrangements including reporting protocols for dealing with both minor leakage and catastrophic failure of the tailings dam.

References

The following guidance on planning tailings storage facility siting, design and operation should be used:

Government of Western Australian Department of Mines and Petroleum Environment, Mining Environmental Management Guidelines – *Safe Design and Operating Standards for Tailings Storage*:

<http://www.dmp.wa.gov.au/documents/000139.gemma.dunthorne.pdf>

Current geotechnical engineering principles/practices and Australian National Committee on Large Dams (ANCOLD) guidelines
(<http://www.ancold.org.au/publications.asp>)

Australian Government Department of Resources, Energy and Tourism Leading Practice Sustainable Development Program Handbooks – *Tailings Management*

<http://www.ret.gov.au/resources/Documents/LPSDP/LPSDP-TailingsHandbook.pdf>

4.5 Waste Rock Dump (WRD)

The mining proposal should clearly outline methods to manage and rehabilitate the WRD. Management strategies should be based on material characterisation, encapsulation of Potentially Acid Forming (PAF) material, designing long term stability,

visual amenity, stakeholder expectations and the integration of final outcomes (closure planning) into mining operations.

General details of waste rock management in the EIS should include:

- A cross section diagram showing final design concept;
- Identification of the total amount of waste rock produced;
- Characterisation of waste rock in terms of AMD potential and neutralising capacity from static acid-base accounting;
- Identification of classes and amounts of waste rock;
- A description of proposed waste rock storage location, dimensions, water catchments, surface treatment and final landform. Any alternative locations, surface configurations, wall/pad designs and construction and provisions for extreme rainfall and flood events, erosion protection, sub-drainage and collection sumps should also be discussed;
- Detection and remediation plans for potential AMD waste rock seepage;
- How construction quality control will be achieved;
- A description of final rehabilitation and revegetation plans;
- Ongoing monitoring and management plans for WRD, including proposed cover systems to manage PAF material;
- Describe extent and significance of the changed skyline as a result of the proposed waste rock dump on visual amenity from key vantage points day and night and during all stages of the Project, as it relates to the surrounding landscape. Provide visual Projects from visually sensitive locations.

References

Please refer to the International Network for Acid Prevention (INAP) Gard Guide for guidance on best practices and technology to address issues relating to waste rock dump design and AMD management:

http://www.gardguide.com/index.php/Main_Page

Australian Government Department of Resources, Energy and Tourism Leading Practice Sustainable Development Program Handbooks – *Managing Acid and Metalliferous Drainage*:

<http://www.ret.gov.au/resources/Documents/LPSDP/LPSDP-AcidHandbook.pdf>

4.6 Power Supply

Describe energy supplies, including:

- Quantity for the pit, transport processing circuit and workforce purposes;
- An estimate of the greenhouse gases that will be produced over the life of the mine from power production;

- Types of energy which can be utilised, including alternative (renewable) sources of energy;
- Sulphur content of fuel oils to be used; and
- Proposed sources of energy supplies, increased power generating capacity and transmission nodes (including placement of power lines).

4.7 Operational Water Management

Describe water management, including:

- Management of clean, dirty and contaminated water (definitions can be provided in the draft EIS);
- Management of effluent;
- Diversion of surface waters;
- Dewatering of the pit;
- Management of high/extreme rainfall events including Probable Maximum Precipitation;
- Management of process waters;
- Water recycling;
- Treatment of domestic sewage; and
- Identify any requirements for additional clean water in the dry season and wet season discharge options for excess contaminated water.

References

Please refer to the Northern Territory Department of Resources Water Management Plan Guidance note:

http://www.nt.gov.au/d/Minerals_Energy/Content/File/Forms_Guidelines/AA7-023_Water_Management_Plan_Guide.pdf

4.8 Social Impact Assessment

Conduct a Social Impact Assessment (SIA) to gauge community values and opinions on the potential impacts of the Mount Todd Gold Project in the region. The SIA should:

- Identify key stakeholders, regional community structure and community vitality (including demography, health, education and social well-being, access to services and housing etc);
- Include ongoing consultation with stakeholder groups to ensure the full range of community viewpoints are sought. The proponent is to outline its proposed methods for community consultation, including how it will respond to community feedback, questions and concerns in a formal, publicly accessible communication plan for the Project;

- Estimate local employment including a breakdown of skills/trades required and specific opportunities for skills development;
- Indicate where the workforce will be sourced and commute arrangements for non-local workforce personnel;
- Direct and indirect employment, training and business opportunities associated with the Project particularly in relation to Indigenous employment and training programs and how this would be managed and implemented;
- Outline accommodation requirements and arrangements for construction and operation activities and associated infrastructure and services required;
- Discuss the potential negative social impacts that could arise from the Project including the impacts of the Project on affected landowners and communities, recreational users, local health services, etc.
- Discuss the potential positive social benefits that could be realised from the Project;
- Provide information on impacts from additional road transport that may affect the community;
- Identify and discuss expected regional, Territory or national benefits and costs (including those that cannot be adequately described in monetary or physical terms e.g. effects on cultural and aesthetic amenity), in the short and long term; and
- Develop management controls to minimise the negative social impacts and optimise the positive opportunities.

5 PROJECT ALTERNATIVES

Alternatives to the proposal must be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and rejecting others. These alternatives should include locations for various components of the Project, mining methodologies, waste and water management. The final proposed configuration of the mine should be based on best practice environmental management and adhere to the EPA NT principles of ecologically sustainable development:

[\(http://www.epa.nt.gov.au/wp-content/uploads/2010/02/Final-Advice-ESD-in-the-Northern-Territory1.pdf\)](http://www.epa.nt.gov.au/wp-content/uploads/2010/02/Final-Advice-ESD-in-the-Northern-Territory1.pdf).

Alternative management techniques need to be considered for moderate to high level impacts with the following hierarchy of impact strategies followed:

1. Impact avoidance
2. Impact assessment
3. Impact minimisation
4. Identification of mitigation measures
5. Assessing mitigation measure effectiveness
6. Mitigation plan selection
7. Monitoring, reporting and adaptive management

Discussion should include:

- Not proceeding with the Project;
- Alternative locations for Project infrastructure;
- Alternative WRD and TSF location, configurations and cover systems considered, and why a particular option was chosen;
- Alternative sources of raw materials for the Project, including limestone, water supply and alternative energy sources;
- Alternative transport options;
- Alternative extraction and processing technologies;
- Alternative environmental management techniques for moderate to high risk impacts;
- Alternative mine closure and rehabilitations options— refer to industry leading practice sustainable development guidelines (http://www.ret.gov.au/resources/resources_programs/lpsdpmining/handbooks/Pages/default.aspx#closure) and discuss option of:
 - Scenarios for immediate remediation costs and outcomes of existing site compared to rehabilitation after further mining;
 - Backfilling the final void with waste rock; and
 - Alternative final pit void closure scenarios with final selection based on lowest potential impact to the environment, stakeholder expectations and minimum post closure maintenance requirements.

6 EXISTING ENVIRONMENT

6.1 Hydrogeology and groundwater

Provide a description, including detailed maps or diagrams where appropriate, of underlying aquifer. Incorporate:

- Local and underlying geology and depths of underlying geological strata at the mine site, limestone quarry and clay borrow areas;
- Relevant groundwater resources in any areas likely to be affected by the construction and operation of the mine (including quarry and borrow areas);
- A map with groundwater levels for dry and wet season with groundwater contours, surface connections, via springs or recharge zones, extent and degree of connectivity or confinement, proximity and connectivity to local and regional aquifers, and flow velocities and directions; and
- An estimate of the effects of current and future pits, water stores and operational processes on groundwater distribution and quality, including effect on base flows.

Use the above information to develop a conceptual hydrogeological model to understand and assess the groundwater regime, groundwater/surface water

interactions and risk posed by the off-site migration of contamination from the site with consideration of:

- Geology and structures (with maps presenting geology in planar view and section view included);
- site boundary borehole logs showing stratigraphy;
- details of different water bearing zones (perched, confined and unconfined aquifers) and their characteristics in terms of permeability and yield and identify any connectivity between the water bearing zones;
- detailed description of the location, design and construction of boundary wells;
- background water quality;
- directions and rate of groundwater flow;
- environmental monitoring bore data (water quality, depth, screen depth, lithology);

Estimate the demand for potable and raw water for the operational period (in ML per annum) and discuss this in relation to the resource capacity and current use with particular reference to the cumulative impacts on water resources.

Describe the current groundwater monitoring program and any proposed modifications to the program to monitor impacts (incurred both during operation and following closure of the mine) on the local and regional hydrogeological conditions. Provide a map illustrating the location of groundwater monitoring sites.

6.2 Surface water

For surface water systems within the Project area, identify and discuss, using detailed maps or diagrams where appropriate. Incorporate:

- Catchments, their significance (Ramsar etc), boundaries, area and topography. Indicate location of infrastructure footprints;
- An estimate of effects of current and future pits, water stores and operational processes on surface water distribution and quality;
- Areas of inundation, drainage lines, surface-water flow directions, creeks and receiving waterways. Existing surface drainage patterns, flows (including flood level contours) and discharge rates;
- Size and seasonal flow rates of drainage lines, creeks and waterways, and frequency of extreme rainfall events;
- Declared beneficial uses (<http://www.nt.gov.au/nreta/water/beneficial/>); and
- Sensitive receptors to impacts upon surface water systems, including consideration of riparian and aquatic ecosystems, flora and fauna.

Describe the current surface water monitoring program, any proposed modifications to the program, and how it will be implemented in order to include monitoring of impacts from the Project (incurred both during operation and following closure of the mine) on

the local and regionally hydrogeological conditions. Provide a map illustrating the location of surface water monitoring sites.

Present and interpret water quality monitoring data for surface water in the area of the Project.

6.3 Biodiversity

The Project falls within a NT Site of Conservation Significance – the Yinberrie Hills. Sufficient information is required regarding the current biodiversity of the Project area to assess and monitor expansion impacts. With reference to the NRETAS biodiversity and natural resource guidelines and Australian Government Survey Guidelines for threatened species (<http://www.environment.gov.au/epbc/guidelines-policies.html#threatened>):

- Present baseline flora and fauna surveys of areas both within and surrounding the Project area. Identify EPBC and NT listed flora and fauna species that are present, or are potentially present within the Project area, including the Gouldian Finch, and which may be affected by the Project either directly or indirectly;
- Conduct a systematic fauna survey targeting EPBC and NT listed species in areas of native vegetation that the Proponent proposes to clear in the proposal; and areas that lie adjacent to cleared areas. This also includes all areas of vegetation or potential habitat that are proposed for clearing in order to accommodate the new road connecting the mine to the limestone quarry;
- Provide a map of the vegetation communities within the Project and quarry leases and surrounding areas at an appropriate scale such as 1:25 000 or 1:50 000. Surrounding areas must include the area of land where the 20km road connecting the mine to the limestone quarry is proposed to occur. The map must also identify areas containing significant¹ vegetation communities, including creek lines with associated riparian vegetation or rainforest;
- Conduct targeted surveys for the limestone quarry on the NT listed threatened fauna species including the Victoria's land snail (*Setobaudinia victoriana*) known to be restricted to limestone areas;
- Conduct a targeted survey of the cycad species *Cycas calcicola* and, if present, mapping the distribution of the species within the quarry and adjacent area;
- Describe in detail aquatic fauna (e.g. macro-invertebrates, crustaceans, fish) present in local creeks and rivers in and downstream of the Project area;
- Identify and discuss species of traditional Aboriginal cultural significance (particularly aquatic and terrestrial fauna species), based upon consultation with traditional owners and surveys of the Project area;
- Identify areas requiring clearing of native vegetation for the Project, including potential for edge (degradation) effects and any disturbance to drainage lines.

¹ Rare, threatened, endangered and regionally restricted species, vegetation types or habitats such as mangroves, rainforest, vine thicket, monsoon vine forest, riparian or closed forest and vegetation containing large trees with hollows suitable for fauna.

Present alternative configurations where available to minimise clearing requirements. Detail habitat types within areas to be cleared, with focus on significant habitats and habitats supporting species of conservation significance;

- Describe whether the limestone quarry has potential to significantly impact stygofauna. Refer to the Western Australian Guidance notes: (http://www.epa.wa.gov.au/docs/1720_GS54.pdf) if the quarry does present a significant impact on groundwater levels and quality of subterranean cave and void systems in an environment where stygofauna may be restricted;
- Identify presence and potential presence within the Project area of declared and environmental weeds and feral animals; and
- Identify all listed threatened and/or migratory species that could be affected either directly or indirectly as a consequence of the proposal;
- Provide a description of the distribution, ecology and habitat preferences of listed threatened and/or migratory species;
- The listed threatened and/or migratory species that need to be addressed includes but is not limited to:
 - *Gouldian Finch (Erythrura gouldiae)*
 - *Northern Quoll (Dasyurus hallucatus)*
 - *Crested Shrike-tit (northern)/Northern Shrike-tit (Falcunculus frontatus whitei)*
 - *Patridge Pigeon (Geophaps smithii smithii)*
 - *Bare-rumped Sheathtail Bat (Saccolaimus saccolaimus nudicluniatus)*
 - *Red Goshawk (Erythrociorchis radiates)*
 - *Mased Owl (Tyto novaehollandiae kimberli)*
 - *Northern Brush-tailed Phascogale (Phascogale pirata)*
 - *Freshwater Sawfish (Pristis microdon)*
 - *Brush-tailed Rabbit-rat (Conilurus penicillatus)*
- Provide appropriate scale maps for listed threatened and/or migratory species showing:
 - The location of known records (from databases and all surveys including those described in bullet points 1-2 of Section 6.3);
 - All potential habitat for each species within the Project and surrounding area; and
 - Habitat components important for each species such as breeding habitat.
- Provide calculations of the area (in hectares) of all potential and known habitat of EPBC listed species that will be directly or indirectly impacted.

6.4 Climate

- Describe the existing climate of the region, including extremes in climate (such as highest rainfall records, evaporation, longest period of wet and dry spells, cyclonic activity, etc.);
- Provide sufficient information that would allow an understanding of the potential impacts climate will have on infrastructure longevity and maintenance – particular emphasis should be given to appropriate water storage and cover system designs; and

- Describe what variations to the known climate (eg. future rainfall) may occur under various climate change scenarios and how that may impact surface water management.

7 RISK ASSESSMENT

7.1 Risk assessment approach

Understanding environmental risk and uncertainty is a major element of the National Strategy for Ecologically Sustainable Development. This EIS should be undertaken with specific emphasis on identification, analysis and treatment of risks through a whole-of-Project risk assessment. Through this process, the EIS should:

- 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.

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of controls. If levels of uncertainty do not permit robust quantification of risk, then this should be clearly acknowledged.

The risk assessment should be based on international best practice. Processes for risk management are formalised in Standards Australia / Standards New Zealand (e.g. AS/NZS ISO 31000:2009; HB 436:2004; HB 203:2006; HB 158:2010).

7.2 Key risks of the Mount Todd Gold Project

The major risks below have been identified through analysis by the Northern Territory Government of the Notice of Intent for the Mount Todd Gold Project. It is possible that

further risks will be identified in the environmental impact assessment process. The major risks currently identified are:

- Acid and Metalliferous Drainage (AMD) seepage and runoff from the waste rock dump (WRD), ore stockpiles and tailings storage facilities (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 have not yet been fully identified.

Environmental objectives, or overarching goals identifying environmental values to be protected, have been identified for each risk. These are supported by **environmental outcomes**, which define specific performance requirements to be met by the proponent in order to achieve identified environmental objectives.

Each of the identified risks should be addressed by the Proponent in the risk assessment and management process. Additionally, any further risks identified through the comprehensive risk assessment process required for the EIS should be addressed and appropriate management initiatives instigated.

The Environmental Impact Statement must demonstrate the following environmental outcomes:

7.3 Acid and Metalliferous Drainage (AMD)

The Mount Todd Mine site has a history of mining operations with a legacy of contamination from waste rock and tailings storages. This history highlights the importance of mine planning for all new Projects to minimise the potential for AMD development during operations and as a legacy of the proposed mine. Assessment of likelihood and consequence for the AMD risk assessment should take into account other incidences of AMD that have occurred in the region, as well as associated management and rehabilitation costs.

Key Risk

- Potential for AMD from Project infrastructure and operations causing environmental impact.

Environmental Objective

- Prevent, mitigate or manage AMD so that it does not create off-site environmental impact during mine operations and legacy issues both on and off site after mine closure.

Outcomes

- The footprint, intensity and duration of AMD impacts associated with waste rock and tailings disposal is minimised; and
- Potential for AMD development is minimised and managed to a degree which can be assimilated by the receiving environment without causing environmental harm, both now and in the future, for all mine components and construction, operation and post closure stages.

Information Requirements

- Summary of the proposed ongoing treatment of existing AMD at the Mount Todd site;
- Summary of the AMD characterisation of final pit wall, ore and waste rock and tailings including chemical and physical characteristics such as sodicity, salinity and dispersive potential and detail appropriate AMD management strategies;
- Provide a conceptual site model describing potential release, transport, and fate of any AMD waters from the mine site identifying possible sources, pathways, and receptors (see example figure 4.4 GARD Guide);
- Provide total sulphur and total metals for a representative suite of samples from all rock types and process materials and ensure information is an integral component of ore body and waste block modelling phase of mine development;
- Provide details on selection of samples (drill core, drill cuttings) and sampling methodology for subsequent testing for potential AMD;
- An assessment of potential for AMD using specific AMD chemical analyses (pH, Total Sulphur, Net Acid Producing Potential (NAPP), Net Acid Generation (NAG), Acid Neutralising Capacity (ANC), multi-element composition and mineralogy of mine waste and tailings samples;
- Full waste characterisation report (as an appendix) with details on methodologies used for above determinations and main results summarised in the EIS;
- Describe classes and quantities of waste rock and selective handling purposes to minimise AMD for life of mine plan;
- A geological waste block model based on comprehensive static and kinetic test data to facilitate AMD management;

- Proposed strategies to prevent, mitigate and manage AMD including avoidance of disturbance, dry covers, underwater storage, neutralisation and collection and treatment;
- Develop detailed operational guidelines integrating AMD management practices into the daily operating activities;
- Detail a monitoring program to ensure design specifications to manage AMD are implemented (e.g. proposed instrumentation used to evaluate whether oxidation of sulphides is occurring and evaluate the performance of encapsulation layers, cover systems);
- Detail proposed performance monitoring of geochemical and geotechnical characteristics of placed waste, oxygen and temperature monitoring and water quality data to evaluate performance of AMD management; and
- Detail long term closure options for AMD storage and management.

References:

Western Australia Department of Mines and Petroleum – Acid Mine Drainage:
http://www.dmp.wa.gov.au/documents/acid_mine_drainage.docx.pdf

INAP 2009, *Global Acid Rock Drainage Guide (GARD Guide)*, International Network for Acid Prevention (<http://www.gardguide.com/>)

DITR 2007, *Managing Acid and Metalliferous Drainage*, Leading Practice Sustainable Development Program for the Mining Industry produced by the Department of Industry, Tourism and Resources, Canberra (available on DMP website http://www.dmp.wa.gov.au/documents/file_MAMD20070227104556.pdf)

7.4 Groundwater Impacts

Key Risks

- Impacts to groundwater quality from mining activities causing contamination of groundwater or release of contaminated groundwater expressing to surface water.
- Groundwater drawdown impacting groundwater flows in the Edith River and the potential to impact production bores in the region.

Environmental Objective

- To ensure that groundwater quality and quantity is protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.

Outcomes

- The quality and extraction of groundwater so that it complies with relevant standards and Guidelines such as document four of the National Water Quality Management

Strategy (<http://www.environment.gov.au/water/policy-programs/nwqms/>) and beneficial use declarations; and

- Groundwater monitoring, based on the known availability and extent of the groundwater resource, is sufficient to ensure over extraction of groundwater does not occur and regional groundwater quality is not impacted.

Information Requirements

- Refer to section 6.1 for information requirements of existing groundwater and hydrogeology;
- Conceptual model showing understanding of subsurface migration processes and behaviour of the groundwater system and interactions with all waste storage facilities;
- Groundwater modelling to determine the potential and scale of drawdown and whether there are impacts to groundwater dependent ecosystems;
- Describe the proposed bore field – the number of bores, location, extraction rates and pit dewatering requirements;
- Identify the natural hydro-geochemistry of the groundwater system (heavy metals, toxic metalloids, pH, redox, total dissolved solids);
- Describe the groundwater monitoring program and how it will be implemented in order to include monitoring of impacts from the mine site on the local and regional hydrogeological conditions;
 - Identify existing depths of bore holes on neighbouring properties, and seasonal depth ranges of potable aquifers being accessed by the bores, to identify appropriate water table depths which can serve as triggers for management action to provide alternative water supplies;
 - Identify water treatment options to manage risk of AMD contaminating groundwater;
 - Supply monitoring data from water quality sampling of groundwater monitoring bores receiving discharges and drainage from the Mount Todd; and
 - Present multiple lines of evidence assessment of groundwater ecosystem condition, including water quality data, sediment, rapid biological assessment data and existing land use data.

7.5 Surface Water Impacts

Key Risks

- Impacts to surface water quality from mining activities causing contamination of surface water.
- Physically altered surface flow regime impacting downstream aquatic habitats.

Environmental Objective

- To ensure that surface water quality is protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.

Outcomes

- The quality of surface water onsite and moving offsite is managed so that it complies with relevant standards and guidelines such as document four of the National Water Quality Management Strategy (<http://www.environment.gov.au/water/policy-programs/nwqms/>) and beneficial use declarations; and
- Surface water runoff from the mine site does not impact downstream water quality.

Information Requirements

- Refer to section 6.2 for information requirements of existing surface water;
- Outline a plan to develop site-specific Water Quality Objectives (WQO), such that identified environmental values and beneficial uses are maintained;
- Provide baseline surface water quality data including location of monitoring sites to inform ongoing monitoring and assessment of the legacy and future Project impacts on water resources using existing relevant site monitoring data (include details of the sources of monitoring data);
- Provide a site water balance within the water management system and its management across the mine site. The water balance must take into account inputs (rainfall, surface flows), outputs (e.g. evaporation, evapotranspiration, controlled/uncontrolled discharges, production use etc.), interactions with surface and groundwater, surface area of stores, total catchment surface area per store etc.;
- Provide details on the construction and management of any proposed creek diversions and their potential environmental impacts;
- Provide management strategies for control of erosion and sediment runoff from disturbed areas, processing areas and waste rock stockpiles. Describe the size and design of sediment control structures proposed to intercept and divert surface water;
- Describe water management systems and design criteria of infrastructure in terms of average recurrence intervals (ARI), durations and intensities;
- Provide mine de-watering requirements must be provided with details on water quality, predicted volumes, discharge points and likely impacts on regional drainage;
- Provide details on the current and proposed Water Treatment Plant with a cost/benefit analysis of purchasing and maintenance costs;
- Summarise existing surface water knowledge and how multiple lines of evidence will be used to assess the condition of surface water ecosystems, including water quality data, rapid biological assessment data and existing land use data;

- Details of the safeguards and management strategies used to minimise the impacts of construction, operation and closure on hydrogeological features should be provided:
 - Outline management of clean, dirty and contaminated water within the proposed mineral lease;
 - Detail management strategies for high/extreme rainfall events and probable maximum precipitation events;
 - Outline any water recycling; and
 - Proposed surface water monitoring program proposed to validate any models.

7.6 Biodiversity

Key Risks

- The proposed clearing of approximately 700ha of native vegetation impacting flora and fauna species of conservation significance; and
- Potential impacts on matters of national environmental significance under the EPBC Act, including listed threatened species and communities (Gouldian Finch) and listed migratory species.

Environmental Objectives

- To maintain the abundance, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge within the Project and surrounding area; and
- No net loss of biodiversity consistent with the *Territory 2030 Strategic Plan* requirement that intensive developments operate under a ‘no net biodiversity loss principle’.

Outcomes

- Native flora and fauna species, and significant habitat types, particularly those of conservation and traditional Aboriginal cultural significance, are identified, and protected from impacts from the Project; and
- Surveys of flora and fauna species, and proposed clearing of native vegetation are in accordance with relevant NT Guidelines (section 10.3).

Information Requirements

Sufficient information is required regarding the current biodiversity of the Project area to assess and monitor Project impacts. The following information should be provided:

- Refer to section 6.3 for information requirements of describing existing flora and fauna;
- Detail the extent of clearing required during construction and operation and indicate on a map;
- Discuss impacts on species, communities and habitats of local, regional or national significance including sensitivity of species to disturbance;
- Describe impacts such as loss of vegetation, reduction in species abundance, introduction and increase in abundance of pest plants and animals, edge effects, reduced conditions for favourable plant growth, impacts on habitat corridors, habitat loss and fragmentation and visual impacts associated with the vegetation clearing required during the life of the Project;
- Discuss potential impacts on water quality of creeks, streams and ephemeral lakes (habitat for aquatic fauna and drinking water for terrestrial species);
- The ability of identified stands of vegetation and fauna to withstand any increased pressure resulting from the Project (e.g., increase in dust, light, noise, vibration, traffic and fire) and measures proposed to mitigate impacts;
- Identify and discuss environmental risks associated with the proposed land clearing. Discuss proposed clearing with regard to issues raised and recommendations contained within the *NT Land Clearing Guidelines* (NRETAS 2009):

http://www.nt.gov.au/nreta/natres/natveg/pdf/clearing_guidelines_2009.pdf

- Discuss ways in which impacts on species, communities and habitats can be minimised (e.g. timing of works, minimising disturbance catchment);
- Discuss how visual impacts of land clearing will be minimised;
- A fire, weeds and feral animal management plan as part of the Environmental Management Plan; and
- Demonstrate that appropriate flora and fauna survey methodology has been employed, to define species present on the Project site.

7.7 Rehabilitation, Decommissioning and Closure

Mine rehabilitation and closure is an important step of the mining process and should be considered as early as possible in the preliminary stages of planning. This allows for the most options to be considered and can result in lower costs at the time of closure. Closure planning is a progressive process that requires review and improvement throughout the mine life. It is important to demonstrate that ecologically sustainable closure can be achieved.

Key Risk

- Legacy mine structures become unstable or produce AMD post-closure.

Environmental Objective

- Rehabilitation of the site achieves maximum protection of the environment from seepage of contaminants, erosion or other impacts with minimal maintenance inputs post-closure.

Outcomes

- Rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental and stakeholder values; and
- The decommissioning, rehabilitation and closure program is integrated into the mine plan and considered as part of mining operation, rather than as a separate phase at the end of mine life.

Information Requirements

- Provide details on the rehabilitation of the existing Heap Leach Pad (40 hectares) with decommissioning timeframes;
- Describe the future management of the Project site in a rehabilitation and closure context;
- Provide a Mine Rehabilitation and Decommissioning Plan that provides an understanding of the issues that require management at closure and that all relevant issues have been identified. It is recognised that closure planning is a progressive process and that mine closure plans are living documents which should undergo periodic review, development and continuous improvement throughout the life of a mine. Mine closure planning needs to be appropriately integrated into the different stages of the life of a mine (including planning and design stage which is part of this assessment) and be flexible enough to allow for adaptive management;
- Describe:
 - Design and construction of landforms and voids;
 - Availability and volumes of key materials required for rehabilitation such as competent waste rock, subsoil, topsoil and low permeability clays (i.e. encapsulation material);
 - Relevant scheduling information with respect to material stockpiling and deployment to ensure that rehabilitation materials mined early in the process are appropriately segregated and preserved for later use;
 - Existing and proposed mathematical models to predict long term performance or environmental impacts;
 - Learnings from closure experience generated from the previous operation and other mines in the region; and
 - Seed mixes used in rehabilitation and any information gathered from trials.

- Indicate that appropriate materials are available on site and contingencies provided to make landforms such as tailings storage facilities and waste dumps secure and non-polluting in the event of unexpected or temporary closure;
- Provide details on the proposed state the mining pit void will be left and managed following closure (i.e. whether it will remain dry or partially or totally filled with water, or backfilled), and discuss the benefits or detriments of each option and support these with studies or data;
- Estimate the quantity and quality of any water sources left on site after temporary or permanent closure;
- Identify and discuss environmental risks associated with characteristics of material to be exposed in the final (legacy) pit walls;
- Provide details on rehabilitation of the WRD and TSF1 and TSF2 and how they will be managed to prevent contamination of surface or ground waters; and
- Describe proposed post-mining land uses which have been identified and agreed upon through consultation with stakeholders.

References

Proponents are expected to follow the principles and objectives identified in the *Strategic Framework for Mine Closure* (ANZMEC/MCA 2000), and to refer to the methodology and approaches described in relevant guidance including the national *Leading Practice Sustainable Development in Mining* handbooks and the *Planning for Integrated Mine Closure: Toolkit* (ICMM 2008).

DOR Mine Close Out Objectives (2008)

(http://www.nt.gov.au/d/Minerals_Energy/Content/File/Forms_Guidelines/CA7-011_Mine_Close_Out_Criteria_V3.pdf)

Western Australian Environment Protection Authority and Department of Mines and Petroleum Mine Closure Guidelines:

[http://www.dmp.wa.gov.au/documents/Mine_Closure\(2\).pdf](http://www.dmp.wa.gov.au/documents/Mine_Closure(2).pdf)

7.8 Other Impacts

7.8.1 Cultural Heritage

Baseline information should include:

- A description of Indigenous and non-Indigenous sites, places or objects of historic or contemporary cultural heritage significance, including:
 - Areas nominated for listing or listed on Commonwealth and Northern Territory Heritage registers and Commonwealth and Northern Territory registers of Indigenous cultural heritage;

- Sacred sites - provision of evidence of an Aboriginal Areas Protection Authority (AAPA) Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act*; and
 - European historic sites.
- A description of areas with special values to Indigenous and non-Indigenous people (e.g., traditional land use).

The EIS should describe the arrangements that have been negotiated with relevant Indigenous groups in relation to archaeological surveys. The identification of Indigenous cultural heritage impact is to take place in consultation with relevant Indigenous groups.

The EIS should provide:

- A description of the potential impacts on the features described in the baseline assessment;
- An assessment of the Project's effects on lifestyles, traditional practices, heritage places, the impact of increased visitation and the effects on Indigenous culture generally. Discussion of the traditional subsistence economy, Indigenous natural resource use and any Native Title interests in the area;
- A discussion of the impacts on the relationships between groups identified with traditional and/or contemporary interest in the Project area;
- Details of any requirements to apply to, or applications already made to, the Minister for Natural Resources, Environment and Heritage to disturb or destroy a prescribed archaeological place and/or object (as defined in Heritage Conservation Regulation 3) under sections 29 and 34 of the *Heritage Conservation Act*.
- A management plan should be developed to include:
 - Procedures to avoid significant areas;
 - Protection of key sites during construction, operation and decommissioning work;
 - Ongoing protection measures; and
 - Procedures for the discovery of surface or sub-surface materials during the course of the Project.

The EIS should identify the monitoring program to be implemented for each potential cultural heritage impact and should provide outcome and assessment criteria that will give early warning that management and mitigation measures are failing.

7.8.2 Socio-Economics

The EIS should describe the socio-economic characteristics of the local, regional and Northern Territory communities (including a prediction of trends over the expected operational life of the Project). The section should present a balanced broad summary of the Project's impact on the local, regional and Northern Territory economies in terms of direct effects on employment, income and production.

It should outline the overall economic benefits of the Project, the likely contribution of the Project to the development of mining industry, regional economic development and Indigenous economic development in the Northern Territory, employment and skills development outcomes and linkages with other Northern Territory business and sectors, including suppliers and other service providers.

The EIS should specify:

- Estimated value of expenditure during the construction and operation, highlighting the proportion to be spent in the Northern Territory;
- Estimated value of annual expenditure on goods and services from the Northern Territory;
- Estimated quantity and value of production/exports;
- Anticipated markets for products;
- Estimated royalties and taxes to be paid to the Northern Territory Government;
- Opportunities for local industry and Indigenous workforce participation in the construction and operation of the mine. Identify how potential local business and employment opportunities will be identified and involved;
- Relevant opportunities to contribute to Indigenous economic development and wider regional development in the surrounding area, specifically Katherine;
- A breakdown of skills/trades required, including specific opportunities for skills development that may be of benefit to the local community, past the lifetime of the mine;
- Identification of opportunities for facilities and infrastructure development that may be of benefit to the local community, past the lifetime of the mine;
- Identification of negative impacts or potential synergies with existing land uses;
- A description of anticipated socio-economic impacts upon local residents, communities and towns;
- Any proposals to contribute to community benefit including improved services and infrastructure for relevant communities involved;
- Potential local business and employment opportunities and opportunities for synergistic facilities and infrastructure development;
- Specify the mechanisms that would be utilised to inform the local business community and workers of business and employment opportunities; and
- Detail the socio-economic parameters that would be monitored on an ongoing basis.

7.8.3 Fire

The proponent should be aware of sections of the *Bushfires Act 2009* and Regulations that may apply to the Project and address risk and management of fires occurring both within the mine site (eg. during site clearing operations) and outside the mine site.

8 ENVIRONMENTAL MANAGEMENT

Specific safeguards and controls, which are proposed to be employed to minimise or remedy environmental impacts identified in previous sections, are to be included in an Environmental Management Plan (EMP) for inclusion in the Mining Management Plan.

The EMP should be strategic, describing a framework for environmental management of the Project; however, as much detail as is practicable should be provided to enable adequate assessment of the Project during the public exhibition phase. Where possible, specific management practices and procedures should be included in the EMP.

Where practicable, the EMP should include:

- The proposed management structure of the Project and its relationship to the environmental management of the site;
- Management targets and objectives for relevant environmental factors;
- The proposed measures to minimise adverse impacts and maximise opportunities, including environmental protection outcomes;
- Performance indicators by which all anticipated and potential impacts can be measured;
- Proposed monitoring programs to allow early detection of adverse impacts;
- Information on how the land will be managed if it is taken out of production;
- A summary table listing the undertakings and commitments made in the EIS, including clear timelines for key commitments and performance indicators, with cross-references to the text of the EIS; and
- Provision for the periodic review of the EMP itself.

Reference should be made to relevant legislation, guidelines and standards, and proposed arrangements for necessary approvals and permits should be noted. Proposed reporting procedures on the implementation of the plan, independent auditing or self-auditing and reporting of accidents and incidents should also be included. The agencies responsible for overseeing implementation of the EMP should be identified.

The EMP would continue to be developed and refined following the conclusion of the assessment process, taking into consideration the proposed timing of development activities, comments on the EIS and incorporating the Assessment Report recommendations and conclusions.

9 PUBLIC INVOLVEMENT AND CONSULTATION

The EIS has an important role in informing the public about this proposal. It is essential that the Proponent demonstrate how any public concerns were identified, and will influence the design and delivery of the Project. Public involvement and the role of government organisations should be clearly identified. The outcomes of any surveys, public meetings and liaison with interested groups should be discussed including any changes made to the Project as a result of consultation. Details of any ongoing liaison should also be discussed.

An outline of negotiations and discussions with local government and the Northern Territory Government should be provided.

10 POLICY AND GUIDANCE NOTES

10.1 Greenhouse gas emissions and climate change guidelines

The Northern Territory Government's objective for managing greenhouse gas emissions from new and expanding operations is to minimise emissions to a level that is as low as practicable. This will help fulfil the objective of minimising greenhouse gas emissions from the NT into the future.

The Northern Territory Government's objective for considering future climate change in the assessment process is to ensure Projects and developments are planned taking climate change science and Projections into account, to minimise future environmental, social and economic costs and take advantage of any opportunities.

The Environmental Impact Assessment Guide (http://www.nt.gov.au/nreta/environment/assessment/eiaguide/pdf/EA_Guide_Greenhouse_Clim.pdf) aims to assist proponents in providing the information needed by the Department of Natural Resources, Environment, the Arts and Sport (NRETAS) to assess the impact of greenhouse gas emissions from proposed Projects and assess other potential impacts from proposed Projects under Projected future climatic conditions under the Northern Territory *Environmental Assessment Act*.

10.2 Environmental offsets

The Draft NT Environmental Offsets Policy provides guidance on when and how offsets should be incorporated into development proposals so that there is no net loss of environmental quality. Offsets are designed to compensate for significant residual damage that cannot be avoided, reduced or mitigated at reasonable cost at the development site. The draft NT Environmental Offsets Policy is available at http://www.greeningnt.nt.gov.au/climate/environmental_offsets.html. Consideration of proposed activities or Projects that could be implemented to offset the residual detriment should be discussed with the NRETAS Offsets Group.

The EIS should:

- Provide a consolidated list of mitigation measures and offsets proposed to be undertaken or provided to minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by the proponent; and
- Provide a detailed description of proposed offsets. Guidance on identifying appropriate biodiversity offsets under the EPBC Act is available at: <http://www.environment.gov.au/epbc/publications/consultation-draft-environmental-offsets-policy.html>
- Identify impacts or detriments that cannot be avoided, reduced or mitigated at reasonable costs; and
- Identify risks of failure of management actions (such as rehabilitation, weed control, etc.) and uncertainties of management efficacy.

10.3 Biodiversity and Land Clearing Guidelines

NRETAS has developed standardised methodologies for surveying terrestrial vertebrate fauna in the Northern Territory (Environmental Assessment Guidelines for the Northern Territory: Terrestrial Fauna Survey (available upon request)). Proponents should use these methodologies when conducting fauna surveys and the Australian Government Survey Guidelines for nationally threatened species:

<http://www.environment.gov.au/epbc/guidelines-policies.html#threatened>

Proponents proposing land clearing as part of a Project should consider the NRETAS (2010) *Land Clearing Guidelines 2010 Updated Version*. Technical Report No. 20 / 2009D. Land Clearing Guidelines. First published 2002. Updated 2006, 2010.

Department of Natural Resources, Environment, The Arts and Sport, Darwin. Northern Territory. Natural Resource Management Division. ISBN 978-1-921519-47-5. Also available at:

http://nt.gov.au/nreta/natres/natveg/Guidelines/pdf/landclearingguidelines_2010.pdf

For any vegetation surveys reference should be made to the *Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping* (Brocklehurst et al. 2007), *Guidelines for Surveying Soil and Land Resources* (McKenzie et al. 2008 (eds.)) and *The Australian Soil and Land Survey Handbook* (NCST, 2009) for further discussion of the techniques and requirements associated with particular scales of mapping.

10.4 Erosion and sediment control guidelines

It is important that the proponent comprehensively addresses the need for erosion and sediment controls, sediment capture, runoff collection and storm water drainage, dust

control, etc. as described in the NT Erosion and Sediment Control Guidelines to ensure best practice: www.nt.gov.au/nreta/natres/soil/management/index.html.

10.5 Mine closure guidelines

Closure planning is a progressive process that requires review and improvement throughout the Project life. In many instances closure will not occur for decades, however it is important to demonstrate that ecologically sustainable closure can be achieved prior to commencement. The Western Australian Environment Protection Authority and Department of Mines and Petroleum have mine closure guidelines that could be used in the formulation of a plan at

[http://www.dmp.wa.gov.au/documents/Mine_Closure\(2\).pdf](http://www.dmp.wa.gov.au/documents/Mine_Closure(2).pdf)

10.6 Transport guidelines

The Project description should consider, as a minimum, the following:

- Description of transport systems and methods to convey all site traffic (including materials, workers and product) to and from the site (both during construction and operation) including:
 - Type, size and number of vehicles required during all phases of the proposal;
 - The estimated volumes, tonnage, composition, origin and destination of traffic generated by the proposal;
 - Estimated times of travel; and
 - Additional road infrastructure works required including site access and signage.
- Description of transport systems and methods to convey any product to proposed markets;
- Description of any proposed haul roads, including length, location, land requirements, tenure and acquisition requirements (for mine proposals only);
- Description of construction methods and timeframes for any proposed private and public haul roads (for mine proposals only);
- Consultation undertaken with relevant regulatory agencies; and
- Necessary approvals required.

Provide details of the existing transport infrastructure at locations likely to be impacted by the proposal.

Describe how the Project will, or has the potential to, impact on transport infrastructure during construction and operational phases. In addition, describe possible transport impacts as a result of the Project including issues such as dust and road traffic noise.

Describe proposed safeguards, management and monitoring strategies that will be implemented to minimise potential transport impacts during construction and operation including, but not limited to:

- Methods for complying with any relevant road vehicle axle limits;
- Methods for securing loads;
- Measures to reduce any road traffic noise impacts;
- Consultation with local communities affected by transport impacts;

- Traffic management; and
- Management of driver fatigue.

11 REGULATORY NOTES

In addition to the requirements outlined in the Guidelines above, the following advice must be considered.

11.1 Public health premises and food premises

If shops or accommodation facilities are to be provided on the Project site, Northern Territory Department of Health (DOH) will require detailed plans submitted via a building certifier, prior to construction, for any future public health or food premises built on the proposed lots. This would include food businesses, public accommodation, swimming pools etc.

11.2 Water supply

The provision of an adequate potable water supply needs to be provided for mine sites and work places. All water supplies collected from groundwater must be at least 100 metres from any effluent drainage system or other water bodies as described in the *NT Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent (The Code)*.

11.3 Waste water

If the existing effluent treatment system at the mine site is to be used to treat effluent, written certification will be required from a suitably qualified hydraulic consultant, stating that the existing effluent disposal system has the capacity to handle the extra load in accordance with the Code.

If a new effluent treatment system is to be installed to treat effluent, DOH requires a notification to install a waste water treatment system outside of a building control area. Any waste water treatment system(s) installed on-site shall be capable of collecting, treating and disposing of waste water on-site in accordance with the Code.

It should be noted that if the daily waste water flow exceeds 22kL/day or a capacity of 150EP an application for recycled water systems will be required. All waste water from ablution facilities shall be directed to the waste water treatment system.

Any discharge of waste water from the mining lease will require a Waste Discharge Licence under the *Water Act 1992*. Guidance and application forms can be found at the following site: www.nt.gov.au/nreta/environment/licences/guides.html#water.

11.4 Solid waste storage and disposal

Disposal of waste should be conducted in such a way as to avoid potential public health nuisances and environmental pollution.

11.5 Mosquito breeding

A biting insect assessment including an examination of the old mine site for actual and potential mosquito breeding sites and ensure new facilities are designed to have minimal mosquito breeding potential (including minimising seepage from water impoundments that have potential to create ongoing mosquito breeding sites throughout the dry season). The biting insect assessment should include trapping to determine the current seasonal population and abundance of adult mosquitoes. The following should be considered as part of a biting insect assessment:

- Existing raw water supply dams – shallow areas of ponding, where semi-aquatic vegetation is present may be breeding sites for pest and disease carrying mosquitoes;
- Clay borrow areas – should be rendered free draining or appropriately filled when no longer required;
- Administration and plant site buildings – discharge of effluent to be used as irrigation water should be in accordance with the Department of Health (2009) Medical Entomology guideline “*Mosquito breeding and sewage pond treatment in the Northern Territory*”;
- Waste disposal – waste rock dumps sited away from natural drainage lines or suitable diversion drains with a longitudinal slope to prevent ponding within drain;
- Tailings Storage Facility – diversion channels require appropriate design to ensure erosion and silt deposition of downstream areas does not occur;
- Active water treatment – to prevent favouring mosquito breeding - should be no continual dry season water discharge into any drainage lines;
- Passive water treatment – refer to information on design and maintenance of anaerobic and aerobic wetlands in the below Medical Entomology guideline; and
- Rehabilitation and closure

Refer to the Medical Entomology guideline Department of Health (2005) *Guidelines for preventing mosquito breeding sites associated with mining sites in the Northern Territory*.

http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/40.pdf&siteID=1&str_title=Guidelines%20for%20preventing%20mosquito%20breeding%20sites%20association%20with%20Mining%20Sites.pdf

11.6 Work Health and Safety Act

The primary Northern Territory legislation for regulation of Occupational Health and Safety matters will be through the model *Work Health and Safety Act 2011* regulations and codes of practice, to commence on 1 January 2012. This legal framework will replace the current *Workplace Health and Safety Act 1995* and associated regulations. It is expected that the proposed Regulations and Codes of Practice will be finalised by the end of 2011.

12 REFERENCES

ANZECC and ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC Guidelines). Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand. Available at:

http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality

Department of Mines and Petroleum Environment (2009), *Environmental Notes on Mining - Acid Mine Drainage*

http://www.dmp.wa.gov.au/documents/acid_mine_drainage.docx.pdf

Department of Mines and Petroleum Environment (2009), *Environmental Notes on Mining – Waste Rock Dumps*

http://www.dmp.wa.gov.au/documents/waste_rock_dumps.docx.pdf

Department of Mines and Petroleum Environment (2006) *Mining Proposals in WA*,
<http://www.dmp.wa.gov.au/documents/000146.gemma.dunthorne.pdf>

Department of Mines and Petroleum Environment, Mining Environmental Management Guidelines – *Safe Design and Operating Standards for Tailings Storage*:

<http://www.dmp.wa.gov.au/documents/000139.gemma.dunthorne.pdf>

Current geotechnical engineering principles/practices and Australian National Committee on Large Dams (ANCOLD) guidelines
(<http://www.ancold.org.au/publications.asp>)

Australian Government Department of Resources, Energy and Tourism Leading Practice Sustainable Development Program Handbooks – *Tailings Management*

<http://www.ret.gov.au/resources/Documents/LPSDP/LPSDP-TailingsHandbook.pdf>

Environment Australia (2002) *Best Practice Environmental Management in Mining - Overview of Best Practice Environmental Management in Mining*. Available at:
<http://www.ret.gov.au/resources/Documents/LPSDP/BPEMOverview.pdf>

Environmental Protection Authority *Guidance for the Assessment of Environmental Factors – Consideration of Subterranean Fauna in Groundwater and Caves during*

Environmental Impact Assessment in Western Australia
http://www.epa.wa.gov.au/docs/1720_GS54.pdf

INAP 2009, *Global Acid Rock Drainage Guide (GARD Guide)*, International Network for Acid Prevention (<http://www.gardguide.com/>)

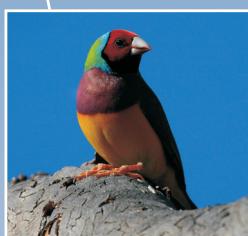
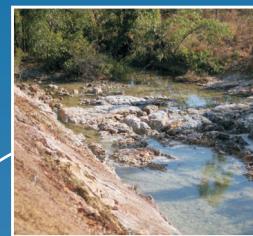
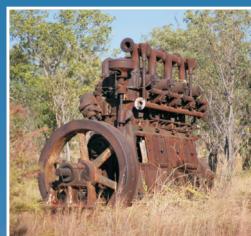
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http://nt.gov.au/nreta/natres/natveg/Guidelines/pdf/landclearingguidelines_2010.pdf

Whelan, P., Warchot, A. (2005) Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites. Medical Entomology, Centre for Disease Control, Department of Health and Families, Northern Territory Government, Darwin NT.

Available at:

http://www.health.nt.gov.au/Medical_Entomology/Publications/Development_Guidelines/index.aspx



APPENDIX C

EPBC Determination Letter



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Notification of

REFERRAL DECISION AND DESIGNATED PROPOSER – controlled action

Mt Todd Gold Mine Project (EPBC 2011/5967)

This decision is made under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

proposed action To reopen and operate the Mt Todd Gold Mine and establish a new limestone quarry 20km west of the mine site, 55km north of Katherine, Northern Territory; as described in the referral received by the department on 17 May 2011 [See EPBC Act referral 2011/5967].

decision on proposed action The proposed action is a controlled action.
The project will require assessment and approval under the EPBC Act before it can proceed.

relevant controlling provisions

- Listed Threatened Species (section 18s & 18A)
- Listed Migratory Species (sections 20 & 20A)

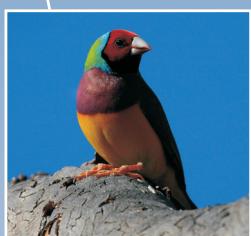
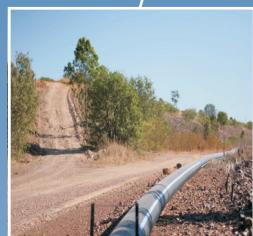
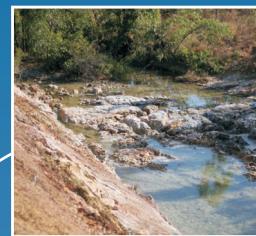
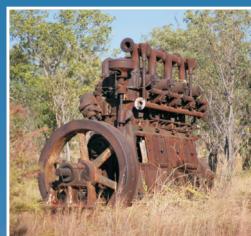
designated proponents Vista Gold Australia Pty Ltd [ABN 12 117 327 509]

Decision-maker

Name and position Michelle Wicks
Assistant Secretary
Environment Assessment Branch

Signature

date of decision 30 June 2011



APPENDIX D

Cross Reference EIS Guidelines

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

Key Risk	Guideline	Location
7.2 Key Risks of the Mt Todd Gold Project		
The major risks below have been identified through analysis by the Northern Territory Government of the Notice of Intent for the Mount Todd Gold Project. It is possible that further risks will be identified in the environmental impact assessment process. The major risks currently identified are:		
Acid and Metalliferous Drainage (AMD) seepage and runoff from the waste rock dump (WRD), ore stockpiles and tailings storage facilities (TSFs) polluting surface and ground waters.	See specific treatment in 7.3 of the EIS Guidelines See also risk assessment in Chapter 5	
Contamination of groundwater from mining activities causing groundwater quality impacts outside of the mineral lease or release of contaminated groundwater expressing to surface water.	See specific treatment in 7.4 of the EIS Guidelines See also risk assessment in Chapter 5	
Groundwater drawdown impacts on groundwater flows in the Edith River and the potential to impact production bores in the region.	See specific treatment in 7.4 of the EIS Guidelines See also risk assessment in Chapter 5	
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.	See specific treatment in 7.5 of the EIS Guidelines See also risk assessment in Chapter 5	
Biodiversity impacts associated with the disturbance footprint of mining activities and infrastructure requirements.	See specific treatment in 7.6 of the EIS Guidelines See also risk assessment in Chapter 5	
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.	See specific treatment in 7.7 of the EIS Guidelines See also risk assessment in Chapter 5	
Social, economic, transport and heritage impacts have not yet been fully identified.	See specific treatment in 7.8 of the EIS Guidelines	
Environmental objectives, or overarching goals identifying environmental values protected, have been identified for each risk. These are supported by environmental outcomes, which define specific performance requirements to be met by the proponent in order to achieve identified environmental objectives. Each of the identified risks should be addressed by the Proponent in the risk assessment and management process. Additionally, any further risks identified through the comprehensive risk assessment process required for the EIS should be addressed and appropriate management initiatives instigated.	See specific treatment in 7.3-7.8 of the EIS Guidelines See also risk assessment in Chapter 5	
7.3 Acid and Metalliferous Drainage (AMD)		
Key Risk	The Mount Todd Mine site has a history of mining operations with a legacy of contamination from waste rock and tailings storages. This history highlights the importance of mine planning for all new Projects to minimise the potential for AMD development during operations and as a legacy of the proposed mine. Assessment of likelihood and consequence for the AMD risk assessment should take into account other incidences of AMD that have occurred in the region, as well as associated management and rehabilitation costs.	N/A. There is no other mine in the catchment.
	Potential for AMD from Project infrastructure and operation causing environmental impact.	Chaper 12
Environmental Objective	Prevent, mitigate or manage AMD so that it does not create off-site environmental impact during mine operations and legacy issues both on and off site after mine closure.	Chapter 12
Outcomes	The footprint, intensity and duration of AMD impacts associated with waste rock and tailings disposal is minimised.	Chapter 12
	Potential for AMD development is minimised and managed to a degree which can be assimilated by the receiving environment without causing environmental harm, both now and in the future, for all mine components and construction, operation and post closure stages.	Chapter 12
Information Requirements	Summary of the proposed ongoing treatment of existing AMD at the Mount Todd site.	Chapters 11 and 12
	Summary of the AMD characterisation of final pit wall, ore and waste rock and tailings including chemical and physical characteristics such as sodicity, salinity and dispersive potential and detail appropriate AMD management strategies.	Chapter 12, no assessments of sodicity, salinity or dispersive materials Future action required
	Provide a conceptual site model describing potential release, transport, and fate of any AMD waters from the mine site identifying possible sources, pathways, and receptors (see example figure 4.4 GARD Guide).	Chapter 11 and appendix J

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

	Provide total sulphur and total metals for a representative suite of samples from all rock types and process materials and ensure information is an integral component of ore body and waste block modelling phase of mine development.	Chapter 12 and App L
	Provide details on selection of samples (drill core, drill cuttings) and sampling methodology for subsequent testing for potential AMD.	Chapter 12 and App L
	An assessment of potential for AMD using specific AMD chemical analyses (pH, Total Sulphur, Net Acid Producing Potential (NAPP), Net Acid Generation (NAG), Acid Neutralising Capacity (ANC), multi-element composition and mineralogy of mine waste and tailings samples.	Done in Chapter 12 and App L
	Full waste characterisation report (as an appendix) with details on methodologies used for above determinations and main results summarised in the EIS.	Appendix L
	Describe classes and quantities of waste rock and selective handling purposes to minimise AMD for life of mine plan.	Chapter 12
	A geological waste block model based on comprehensive static and kinetic test data to facilitate AMD management.	Appendix L
	Proposed strategies to prevent, mitigate and manage AMD including avoidance of disturbance, dry covers, underwater storage, neutralisation and collection and treatment.	Chapter 12
	Develop detailed operational guidelines integrating AMD management practices into the daily operating activities.	Appendix Z
	Detail a monitoring program to ensure design specifications to manage AMD are implemented (e. g. proposed instrumentation used to evaluate whether oxidation of sulphides is occurring and evaluate the performance of encapsulation layers, cover systems).	Appendix Z, i.e. states a commitment to do the work
	Detail proposed performance monitoring of geochemical and geotechnical characteristics of placed waste, oxygen and temperature monitoring and water quality data to evaluate performance of AMD management.	Done in Appendix Z, i.e. states a commitment to do the work
	Detail long term closure options for AMD storage and management.	Chapter 12
7.4 Groundwater impacts		
Key Risks	Impacts to groundwater quality from mining activities causing contamination of groundwater or release of contaminated groundwater expressing to surface water.	Chapters 11 and 12
	Groundwater drawdown impacting groundwater flows in the Edith River and the potential to impact production bores in the region.	Chapter 11
Environmental Objective	To ensure that groundwater quality and quantity is protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.	Chaper 11
Outcomes	The quality and extraction of groundwater so that it complies with relevant standards and Guidelines such as document four of the National Water Quality Management Strategy beneficial use declarations.	Chapter 11, i.e. states that groundwater is not intended for such purposes
	Groundwater monitoring, based on the known availability and extent of the groundwater resource, is sufficient to ensure over extraction of groundwater does not occur and regional groundwater quality is not impacted.	Chapter 11 and Appendix K
Information Requirements	Refer to section 6.1 for information requirements of existing groundwater and hydrogeology.	
	Conceptual model showing understanding of subsurface migration processes and behaviour of the groundwater system and interactions with all waste storage facilities.	Chapter 11 and Appendix K
	Groundwater modelling to determine the potential and scale of drawdown and whether there are impacts to groundwater dependent ecosystems.	Chapter 11 and Appendix K
	Describe the proposed bore field - the number of bores, location, extraction rates and pit dewatering requirements.	Chapter 11 and Appendix K
	Identify the natural hydro-geochemistry of the groundwater system (heavy metals, toxic metalloids, pH, redox, total dissolved solids).	Chapter 11 and Appendix K

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

	<p>Describe the groundwater monitoring program and how it will be implemented in order to include monitoring of impacts from the mine site on the local and regional hydrogeological conditions;</p> <p>Identify existing depths of bore holes on neighbouring properties, and seasonal depth ranges of potable aquifers being accessed by the bores, to identify appropriate water table depths which can serve as triggers for management action to provide alternative water supplies;</p> <p>Identify water treatment options to manage risk of AMD contaminating groundwater;</p> <p>Supply monitoring data from water quality sampling of groundwater monitoring bores receiving discharges and drainage from the Mount Todd; and</p> <p>Present multiple lines of evidence assessment of groundwater ecosystem condition, including water quality data, sediment, rapid biological assessment data and existing land use data.</p>	Chapter 11 and Appendix K
7.5 Surface Water Impacts		
Key Risks	<p>Impacts to surface water quality from mining activities causing contamination of surface water.</p> <p>Physically altered surface flow regime impacting downstream aquatic habitats.</p>	Chapter 10
Environmental Objective	To ensure that surface water quality is protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.	Chapters 10 and 14
Outcomes	<p>The quality of surface water onsite and moving offsite is managed so that it complies with relevant standards and guidelines such as document four of the National Water Quality Management Strategy and beneficial use declarations.</p> <p>Surface water runoff from the mine site does not impact downstream water quality.</p>	Chapter 10
Information Requirements	<p>Refer to section 6.2 for information requirements of existing surface water.</p> <p>Outline a plan to develop site-specific Water Quality Objectives (WQO), such that identified environmental values and beneficial uses are maintained.</p> <p>Provide baseline surface water quality data including location of monitoring sites to inform ongoing monitoring and assessment of the legacy and future Project impacts on water resources using existing relevant site monitoring data (include details of the sources of monitoring data).</p> <p>Provide a site water balance within the water management system and its management across the mine site. The water balance must take into account inputs (rainfall, surface flows), outputs (e. g. evaporation, evapotranspiration, controlled/uncontrolled discharges, production use etc.), interactions with surface and groundwater, surface area of stores, total catchment surface area per store etc.</p> <p>Provide details on the construction and management of any proposed creek diversions and their potential environmental impacts.</p> <p>Provide management strategies for control of erosion and sediment runoff from disturbed areas, processing areas and waste rock stockpiles. Describe the size and design of sediment control structures proposed to intercept and divert surface water.</p> <p>Describe water management systems and design criteria of infrastructure in terms of average recurrence intervals (ARI), durations and intensities.</p> <p>Provide mine de-watering requirements must be provided with details on water quality, predicted volumes, discharge points and likely impacts on regional drainage.</p> <p>Provide details on the current and proposed Water Treatment Plant with a cost/benefit analysis of purchasing and maintenance costs.</p> <p>Summarise existing surface water knowledge and how multiple lines of evidence will be used to assess the condition of surface water ecosystems, including water quality data, rapid biological assessment data and existing land use data.</p>	<p>Chapters 10 and 14, and Appendix J</p> <p>Chapter 10 and Appendix J for each water storage containment</p> <p>Chapters 10 and 14, and Appendix J</p> <p>Chapter 10 and Appendix Z</p> <p>Chapter 10</p> <p>Chapter 10</p> <p>Future action (pending economic assessment)</p> <p>Chapter 10 and Appendix J</p>

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

	<p>Details of the safeguards and management strategies used to minimise the impacts of construction, operation and closure on hydrogeological features should be provided.</p> <p>Outline management of clean, dirty and contaminated water within the proposed mineral lease.</p> <p>Detail management strategies for high/extreme rainfall events and probable maximum precipitation events.</p> <p>Outline any water recycling.</p> <p>Proposed surface water monitoring program proposed to validate any models.</p>	Chapter 10 and Appendices J and Z
7.6 Biodiversity		
Key Risks	The proposed clearing of approximately 700ha of native vegetation impacting flora and fauna species of conservation significance.	Chapters 13 and 14, and Appendices M and N
	Potential impacts on matters of national environmental significance including listed threatened species and communities (Gouldian Finch) under the EPBC Act, and listed migratory species.	Chapter 22
Environmental Objectives	To maintain the abundance, diversity, geographic distribution and productivity of flora and fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge within the Project and surrounding area.	Chapters 13 and 14
	No net loss of biodiversity consistent with the Territory 2030 Strategic Plan requirement that intensive developments operate under a 'no net biodiversity loss principle.'	
Outcomes	Native flora and fauna species, and significant habitat types, particularly those of conservation and traditional Aboriginal cultural significance, are identified, and protected from impacts from the Project.	Appendix S
	Surveys of flora and fauna species, and proposed clearing of native vegetation are in accordance with relevant NT Guidelines (section 10.3).	Appendices M, N and O
Information Requirements	Sufficient information is required regarding the current biodiversity of the Project area to assess and monitor Project impacts. The following information should be provided:	
	Refer to section 6.3 for information requirements of describing existing flora and fauna.	
	Detail the extent of clearing required during construction and operation and indicate on a map.	Chapter 13 and Appendix M
	Discuss impacts on species, communities and habitats of local, regional or national significance including sensitivity of species to disturbance.	Chapters 13 and 14, and Appendices M and N
	Describe impacts such as loss of vegetation, reduction in species abundance, introduction and increase in abundance of pest plants and animals, edge effects, reduced conditions for favourable plant growth, impacts on habitat corridors, habitat loss and fragmentation and visual impacts associated with the vegetation clearing required during the life of the Project.	Chapters 13 and 14, and Appendices M and N
	Discuss potential impacts on water quality of creeks, streams and ephemeral lakes (habitat for aquatic fauna and drinking water for terrestrial species).	Chapters 10 and 14, and Appendices J and O
	The ability of identified stands of vegetation and fauna to withstand any increased pressure resulting from the Project (e. g. , increase in dust, light, noise, vibration, traffic and fire) and measures proposed to mitigate impacts.	Chapters 13 and 14, and Appendices M, N and O
	Identify and discuss environmental risks associated with the proposed land clearing. Discuss proposed clearing with regard to issues raised and recommendations contained within the NT Land Clearing Guidelines (NRETAS 2009).	Chapter 13 and Appendix M
	Discuss ways in which impacts on species, communities and habitats can be minimised (e. g. timing of works, minimising disturbance catchment).	Chapters 13 and 14, and Appendices M, N and O
	Discuss how visual impacts of land clearing will be minimised.	Chapter 9
	A fire, weeds and feral animal management plan as part of the Environmental Management Plan.	Chapters 13 and 14, Appendices M, N and Z
	Demonstrate that appropriate flora and fauna survey methodology has been employed, to define species present on the Project site.	Chapters 13 and 14, Appendices M, N and O

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

7.7 Rehabilitation, Decommissioning and Closure		
Key Risk	Mine rehabilitation and closure is an important step of the mining process and should be considered as early as possible in the preliminary stages of planning. This allows for the most options to be considered and can result in lower costs at the time of closure. Closure planning is a progressive process that requires review and improvement throughout the mine life. It is important to demonstrate that ecologically sustainable closure can be achieved. Legacy mine structures become unstable or produce AMD post-closure.	Chapter 24 and Appendix Y Chapter 24 and Appendix Y
Environmental Objective	Rehabilitation of the site achieves maximum protection of the environment from seepage of contaminants, erosion or other impacts with minimal maintenance post closure.	Chapter 24 and Appendix Y
Outcomes	Rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental and stakeholder values. The decommissioning, rehabilitation and closure program is integrated into the mine plan and considered as part of mining operation, rather than as a separate phase at the end of mine life.	Chapter 24 and Appendix Y Chapter 24 and Appendix Y
Information Requirements	<p>Provide details on the rehabilitation of the existing Heap Leach Pad (40 hectares) with decommissioning timeframes.</p> <p>Describe the future management of the Project site in a rehabilitation and closure context.</p> <p>Provide a Mine Rehabilitation and Decommissioning Plan that provides an understanding of the issues that require management at closure and that all relevant issues have been identified. It is recognised that closure planning is a progressive process and that mine closure plans are living documents which should undergo periodic review, development and continuous improvement throughout the life of a mine. Mine closure planning needs to be appropriately integrated into the different stages of the life of a mine (including planning and design stage which is part of this assessment) and be flexible enough to allow for adaptive management.</p> <p>Describe: Design and construction of landforms and voids; Availability and volumes of key materials required for rehabilitation such as competent waste rock, subsoil, topsoil and low permeability clays (i. e. encapsulation material); Relevant scheduling information with respect to material stockpiling and deployment to ensure that rehabilitation materials mined early in the process are appropriately segregated and preserved for later use; Existing and proposed mathematical models to predict long term performance or environmental impacts; and Learning's from closure experience generated from the previous operation and other mines in the region Seed mixes used in rehabilitation and any information gathered from trials.</p> <p>Indicate that appropriate materials are available on site and contingencies provided to make landforms such as tailings storage facilities and waste dumps secure and non-polluting in the event of unexpected or temporary closure.</p> <p>Provide details on the proposed state the mining pit void will be left and managed following closure (i. e. whether it will remain dry or partially or totally filled with water, or backfilled), and discuss the benefits or detriments of each option and support these with studies or data.</p> <p>Estimate the quantity and quality of any water sources left on site after temporary or permanent closure.</p> <p>Identify and discuss environmental risks associated with characteristics of material to be exposed in the final(legacy) pit walls.</p> <p>Provide details on rehabilitation of the WRD and TSF1 and TSF2 and how they will be managed to prevent contamination of surface or ground waters.</p> <p>Describe proposed post-mining land uses which have been identified and agreed upon through consultation with stakeholders.</p>	Chapter 24 and Appendices Y and Z Chapter 24 and Appendices Y and Z Chapter 24 and Appendices Y and Z Chapter 24 and Appendices Y and Z, Chapter 24 and Appendices Y and Z, Chapters 24 and Appendices Y and Z Chapter 10 and 11, and Appendices J and K Chapter 12 Chapter 10, 11, and 12, and Appendices J and K Chapter 9

Mt Todd Gold Project

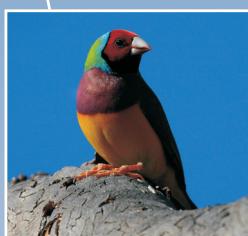
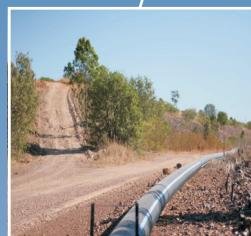
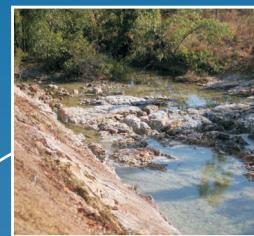
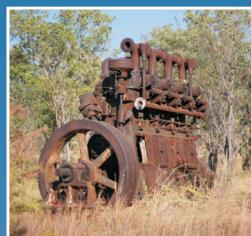
Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

7.8 Other Impacts		
7.8.1 Cultural Heritage	Baseline information should include:	Chapter 15 and Appendix Q
	Description of Indigenous and non-Indigenous sites, places or objects of historic or contemporary cultural heritage significance, including: Areas nominated for listing' or listed on Commonwealth and Northern Territory Heritage registers and Commonwealth and Northern Territory registers of Indigenous cultural heritage; Sacred sites - provision of evidence of an Aboriginal Areas Protection Authority (AAPA) Authority Certificate under the Northern Territory Aboriginal Sacred Sites Act; and European historic sites;	
	A description of areas with special values to Indigenous and non-Indigenous people (e. g., traditional land use); and	Chapter 15 and Appendix Q
	The EIS should describe the arrangements that have been negotiated with relevant Indigenous groups in relation to archaeological surveys. The identification of Indigenous cultural heritage impact is to take place in consultation with relevant Indigenous groups.	Chapter 15 and Appendix Q and R
	The EIS should provide:	
	A description of the potential impacts on the features described in the baseline assessment;	Chapter 15 and Appendix Q
	An assessment of the Project's effects on lifestyles, traditional practices, heritage places, the impact of increased visitation and the effects on Indigenous culture generally. Discussion of the traditional subsistence economy, Indigenous natural resource use and any Native Title interests in the area;	Chapter 15 and Appendices Q and S
	A discussion of the impacts on the relationships between groups identified with traditional and/or contemporary interest in the Project area;	
	Details of any requirements to apply to, or applications already made to, the Minister for Natural Resources, Environment and Heritage to disturb or destroy a prescribed archaeological place and/or object (as defined in Heritage Conservation Regulation 3) under sections 29 and 34 of the Heritage Conservation Act; and	Chapter 15 and Appendix Q and R
	A management plan should be developed to include: Procedures to avoid significant areas; Protection of key sites during construction, operation and decommissioning work; Ongoing protection measures; and Procedures for the discovery of surface or sub-surface materials during the course of the Project.	Chapter 15 and Appendix Q and R
7.8.2 Socio-economics	The EIS should identify the monitoring program to be implemented for each potential cultural heritage impact and should provide outcome and assessment criteria that will give early warning that management and mitigation measures are failing.	Chapter 15 and Appendix Q and R
	The EIS should describe the socio-economic characteristics of the local, regional and Northern Territory communities (including a prediction of trends- over the expected operational life of the Project). The section should present a balanced broad summary of the Project's impact on the local, regional and Northern Territory economies in terms of direct effects on employment, income and production.	Chapter 19 and Appendix W
	It should outline the overall economic benefits of the Project, the likely contribution of the Project to the development of mining industry, regional economic development and Indigenous economic development in the Northern Territory, employment and skills development outcomes and linkages with other Northern Territory business and sectors, including suppliers and other service providers.	Chapter 19 and Appendix W
	The EIS should specify:	Chapter 19 and Appendix W
	Estimated value of expenditure during the construction and operation, highlighting the proportion to be spent in the Northern Territory;	Chapter 19 and Appendix W
	Estimated value of annual expenditure on goods and services from the Northern Territory;	Chapter 19 and Appendix W
	Estimated quantity and value of production/exports;	Chapter 19 and Appendix W
	Anticipated markets for products;	Chapter 19 and Appendix W
	Estimated royalties and taxes to be paid to the Northern-Territory Government;	Chapter 19 and Appendix W

Mt Todd Gold Project

Appendix D - Cross Reference of EIS Guidelines with Content of Mt Todd Gold draft EIS

	Opportunities for local industry and Indigenous workforce participation in the construction and operation of the mine. Identify how potential local business and employment opportunities will be identified and involved;	Chapter 7 and Appendix F
	Relevant opportunities to contribute to Indigenous economic development and wider regional development in the surrounding area, specifically Katherine;	Chapter 7 and Appendix F
	A breakdown of skills/trades required, including specific opportunities for skills development that may be of benefit to the local community, past the lifetime of the mine;	Chapter 7 and Appendix F
	Identification of opportunities for facilities and infrastructure development that may be of benefit to the local community, past the lifetime of the mine;	Chapter 7 and Appendix F
	Identification of negative impacts or potential synergies with existing land uses;	Chapters 7 and 9
	A description of anticipated socio-economic impacts upon local residents, communities and towns;	Chapter 7 and Appendix F
	Any proposals to contribute to community benefit including improved services and infrastructure for relevant communities involved;	Chapter 7 and Appendix F
	Potential local business and employment opportunities and opportunities for synergistic facilities and infrastructure development;	Chapter 7 and Appendix F
	Specify the mechanisms that would be utilised to inform the local business community and workers of business and employment opportunities; and	Chapter 7
	Detail the socio-economic parameters that would be monitored on an ongoing basis.	Chapter 7
7.8.3 Fire	The proponent should be aware of sections of the Bushfires Act 2009 and Regulations that may apply to the Project and address risk and management of fires occurring both within the mine site (e.g.. during site clearing operations) and outside the mine site.	Chapters 13 and 14, and Appendices M, N and Z



APPENDIX E

Public Consultation Report



CLIENTS | PEOPLE | PERFORMANCE

Vista Gold Australia Pty Ltd

Mt Todd Gold Project Public Consultation Report

May 2013





This Public Consultation Report ("Report"):

1. Has been prepared by GHD Australia Pty Ltd (GHD) for Vista Gold Australia Pty Ltd (Vista Gold)
2. May only be used and relied on by Vista Gold
3. Must not be copied to, used by, or relied on by any person other than Vista Gold without the prior written consent of GHD
4. May only be used for the purpose of the Mt Todd Gold Project and must not be used for any other purpose.

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Vista Gold arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- Were limited to those specifically detailed in section 1.4 of this Report relating to public consultation activities undertaken as part of developing the Draft Environmental Impact Statement for the Mt Todd Gold Project
- Did not include any other public relations or project positioning activities undertaken separately by Vista Gold or consultation with landholders and Traditional Owners relating to contractual negotiations and compensation matters. Vista Gold is addressing these matters separately.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"). GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation and may be relied on for 6 months, after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.



Contents

1. Introduction	1
1.1 Proponent	1
1.2 Project Overview	1
1.3 Consultation Objective	2
1.4 Consultation Plan	3
1.5 Consultation Approach	3
1.6 Stages of Consultation	5
1.7 Integration with Other Draft EIS Technical Studies	6
1.8 Project Stakeholders	7
2. Consultation to Date	10
2.1 Consultation Activities	10
2.2 Communication Tools	13
2.3 Social Impact Assessment Consultation	16
3. Major Themes of the Consultation Process	18
3.1 Housing and Accommodation	18
3.2 Employment and Training	18
3.3 Business and Economic Development	19
3.4 Workforce	19
3.5 Indigenous Employment and Business Aspirations	20
3.6 Community Infrastructure and Service Provision	20
3.7 Environment	20
3.8 Traffic and Transport	20
3.9 Community	20
4. Results of Consultation	23
4.1 Community Information Sessions	23
4.2 Meetings with Local Government	25
4.3 NT Government Briefings	26
4.4 Key Stakeholder Meetings	27
4.5 Meeting of the Mt Todd Rehabilitation Reference Group	30
4.6 Community Views Survey	30
5. Future Consultation with Stakeholders	34
5.1 Post Draft EIS Public Exhibition Period	34



5.2	Ongoing Consultation Activities	34
6.	References	35

Table Index

Table 1	Key Stakeholders	8
Table 2	Summary of Community Information Sessions	11
Table 3	Summary of NT Government Agency Briefings and Meetings	13
Table 4	Utilisation of Project Contact Channels	14
Table 5	Summary of Editorial Coverage	15
Table 6	Community update schedule	15
Table 7	Community updates on Mt Todd website	15
Table 8	Community Feedback on Accommodation Options	19
Table 9	Major Issues Identified During Draft EIS Consultation	21
Table 10	Key Issues Raised at Katherine Show Information Stands	23
Table 11	Key Issues Raised at Katherine Shopping Centre Community Drop In	24
Table 12	Key Issues Raised at Pine Creek Community Information Centre	24
Table 13	Key Issues Raised at Meetings with Local Government	25
Table 14	Key Issues Raised at NT Government Briefings	26
Table 15	Key Issues Raised at Key Stakeholder Meetings	28

Figure Index

Figure 1	IAP2 Public Participation Spectrum	4
Figure 2	Draft EIS Consultation Stages and Timeframes	6
Figure 3	Links between Draft EIS and SIA Consultation	7
Figure 4	Draft EIS Consultation Activities and Communication Tools	10

Appendices

- A Project Fact Sheets and Community Updates
- B Community Views Survey
- C Public Notices and Advertising
- D Media Release
- E Mt Todd Web Page



1. Introduction

The Consultation Report (this Report) outlines the public consultation process undertaken as part of the Draft Environmental Impact Statement (EIS) for the Mt Todd Gold Project (the Project). The overall aim of consultation was to:

Inform stakeholders and the broader community of the Project, actively seek their involvement in the environmental impact assessment, and report back on how this input was considered in the Project's outcomes.

This report summarises the results and outcomes of consultation undertaken for the Project consistent with the requirements of section 9 of the *Guidelines for the Preparation of an Environmental Impact Statement: Mt Todd Gold Project, Katherine Region, NT (September 2011)* (NT EPA (formerly NRETAS) 2011).

1.1 Proponent

The Proponent for this Project is Vista Gold Australia Pty Ltd (Vista Gold).

1.2 Project Overview

Vista Gold proposes to re-establish and re-open the Mt Todd Gold Mine, located 55km north of Katherine and 250km south of Darwin.

Mining will be an open-pit truck and shovel operation, using large haul trucks, hydraulic shovels and front end loaders to transport materials to the crusher, stockpiles, Run of Mine (ROM) pad and waste dump. Extracted ore, will be processed in an ore processing plant where it will be crushed, milled and then carbon in leach (CIL) leached followed by adsorption, desorption and recovery leading to gold dore (unrefined gold).

Approximately 17.8 million tonnes per annum (Mtpa) of ore will be processed. Gold dore will be transported for onward secure shipment to a refinery.

The Project, based on current known data, will have a life of around 19 years inclusive of construction, operations and closure. Construction is anticipated to commence in the first quarter of 2014 and take two years, including 6 months pre-production. The mine is scheduled to operate for a further 13 years. Closure and rehabilitation of the mine is expected to take four years.

The key elements of the Project include:

1.2.1 Mining and Mining Infrastructure

- ▶ extension of the existing Batman Pit;
- ▶ expansion of the existing waste rock dump (WRD);
- ▶ construction of a Run of Mine (ROM) pad and ore stockpile;
- ▶ construction of an Ammonium Nitrate and Fuel Oil (ANFO) Facility;
- ▶ construction of heavy and light vehicle workshop and administration offices, and facilities comprising wash down area, tyre change facility, lube storage facility etc; and
- ▶ construction of haul roads and access roads.



1.2.2 Process Plant and Associated Facilities

- ▶ Ore Processing Plant capable of processing approximately 50,000 tonnes per day (tpd) of ore;
- ▶ processing and / or reclamation of the existing low grade ore (LGO) stockpile, residual Heap Leach material and scats stockpile, and construction and processing of new LGO stockpile with a footprint of approximately 47ha;
- ▶ raising the existing tailings storage facility (TSF1) from 16m to approximately 34m above ground level;
- ▶ construction of a new TSF2, approximately 300ha in area and up to 60m high (RL 175m);
- ▶ diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection;
- ▶ rehabilitation of the existing heap leach pad (HLP), if residual HLP material is not processed through the new plant;
- ▶ chemical and reagent storage and handling facility; and
- ▶ process plant workshops, administration offices, control room etc.

1.2.3 Other Infrastructure

- ▶ gas fired Power Station, including re-routing of the existing gas pipeline;
- ▶ anaerobic treatment wetlands, approximately 10ha in area;
- ▶ a 2m high raising of the raw water dam (RWD) and an increase in the area of inundation;
- ▶ construction of saddle dams at the RWD and TSF1;
- ▶ construction of three coffer dams at Retention Pond 1 (RP1) and deepening of RP1;
- ▶ water treatment plant;
- ▶ security gate house;
- ▶ potential re-alignment of access roads;
- ▶ site wide drainage, sediment traps; and
- ▶ modification to existing fuel storage and distribution facility.

1.3 Consultation Objective

The overall consultation aim above was supported by four objectives:

1. establish an open two-way flow of information, designed to meet both community, government and the proponent's requirements in achieving a transparent, meaningful and appropriate consultation process;
2. communicate detailed project information in an easy to interpret format;
3. enable opportunities for local and regional communities, and other stakeholders to identify issues, impacts and possible mitigation measures to be documented for consideration as part of the Draft EIS; and
4. build community understanding and support of the EIS process.



1.4 Consultation Plan

A Consultation Plan was developed to guide effective and timely delivery of Draft EIS consultation activities. The Plan identified:

- ▶ the types of activities to be undertaken;
- ▶ timing of activities;
- ▶ identification of key stakeholder and community representatives;
- ▶ integration with other Draft EIS activities and the project development process;
- ▶ consultation responsibilities;
- ▶ communication protocols; and
- ▶ reporting and feedback arrangements.

The Draft Consultation Plan was reviewed and approved by Vista Gold prior to public consultation activities being undertaken. The scope of the Consultation Plan excluded other 'non Draft EIS' communication that may be developed and implemented independently by Vista Gold, for example:

- ▶ Project positioning;
- ▶ public relations, marketing and promotion of the Project; and
- ▶ media management and advertising.

1.5 Consultation Approach

Consultation and engagement strategies have been developed in accordance with best practice standards for community consultation and stakeholder engagement including the core values and principles of the International Association of Public Participation (IAP2) (IAP2, 2007). IAP2 has developed a tool to define the level of public participation as a spectrum beginning with *Inform*, *Consult* and then moving on to *Involve*, *Collaborate* and *Empower* (Figure 1).

Stakeholders were engaged using a range of consultation and communication techniques, including face-to-face meetings, community views surveys, workshops, briefings, public information sessions, fact sheets and web-based features (Photo 1).

These were supported by project-specific stakeholder feedback mechanisms through which stakeholders and community members could provide subsequent feedback (including a 1800 free-call telephone line and internet feedback form).

Vista Gold representatives participated in key consultation meetings, forums and briefings. This enabled the two-way exchange of information between the proponent and stakeholders, and gave Vista Gold valuable insight to stakeholder perceptions, concerns and interests.



INCREASING LEVEL OF PUBLIC IMPACT

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:
To provide the public with balanced and objective information to assist them in understanding the problems, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:
We will keep You informed.	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:
<ul style="list-style-type: none"> • Fact sheets; • Websites; • Open houses. 	<ul style="list-style-type: none"> • Public comment; • Focus groups; • Surveys; • Public meetings. 	<ul style="list-style-type: none"> • Workshops; • Deliberate polling. 	<ul style="list-style-type: none"> • Citizen Advisory Committees; • Consensus building; • Participatory decision-making. 	<ul style="list-style-type: none"> • Citizen juries; • Ballots; • Delegated decisions.

Figure 1 IAP2 Public Participation Spectrum

(Source: IAP2, 2007)



Photo 1 Katherine Shopping Centre Public Information Session

1.6 Stages of Consultation

Draft EIS consultation commenced in early 2011 and was phased to coincide with key Draft EIS milestones. Stage 1 has been completed, Stage 2 commenced and is ongoing, and Stages 3 and 4 will be undertaken following the release of the Draft EIS for public comment:

- ▶ Stage 1: EIS commencement including the release of the Notice of Intent (NOI);
- ▶ Stage 2: Release of the draft Guidelines for the Mt Todd Gold Project for Public Comment;
- ▶ Stage 3: Release of the Draft EIS; and
- ▶ Stage 4: Evaluation and Draft EIS finalisation.

The sequencing of consultation activities is shown in Figure 2.



	Q1 2011	Q1 2011 – Q2 2013	Q2 2013 – Q3 2013	Q3 2013 – Q4 2013
STAGE	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Consultation Activities	Stakeholder identification Conduct preliminary issue/risk assessment Document review Prepare Stakeholder Consultation Plan Government Agency consultations Preliminary community and key stakeholder consultations	Community Information Sessions Distribution of project information materials (fact sheets) Project briefings and focus group meetings Manage project telephone hotline, email address and stakeholder database Respond to stakeholder comments in a timely manner Analyse stakeholder comments to inform Draft EIS investigations SIA consultation activities	Promote Public Exhibition Period including public displays and Community Information Sessions Coordinate and manage public submissions Analyse public submissions and draft responses	Close out activities Consultation evaluation
Ongoing stakeholder consultation and monitoring of feedback				
Regulatory Deliverables		Prepare Stakeholder Consultation Report and Social Impact Management Plan for Draft EIS	Prepare Community Feedback Report for Supplementary Report to the Draft EIS	

Figure 2 Draft EIS Consultation Stages and Timeframes

1.7 Integration with Other Draft EIS Technical Studies

Information relating to other Draft EIS technical studies was included in public consultation materials and activities at key stages of the process, as required. Of particular significance to the consultation approach was integration with the Social Impact Assessment (SIA), in order to:

- ▶ avoid potential duplication and consultation fatigue amongst stakeholders involved in both the broader Draft EIS consultation and social research for the SIA; and
- ▶ enable the Draft EIS consultation and SIA processes help to inform each other on the basis of information gathered from stakeholders.

The SIA involved targeted stakeholder consultation to inform the social baseline study, identification of impacts and development of appropriate management strategies. Figure 3 depicts the integration of Draft EIS and SIA consultation processes.

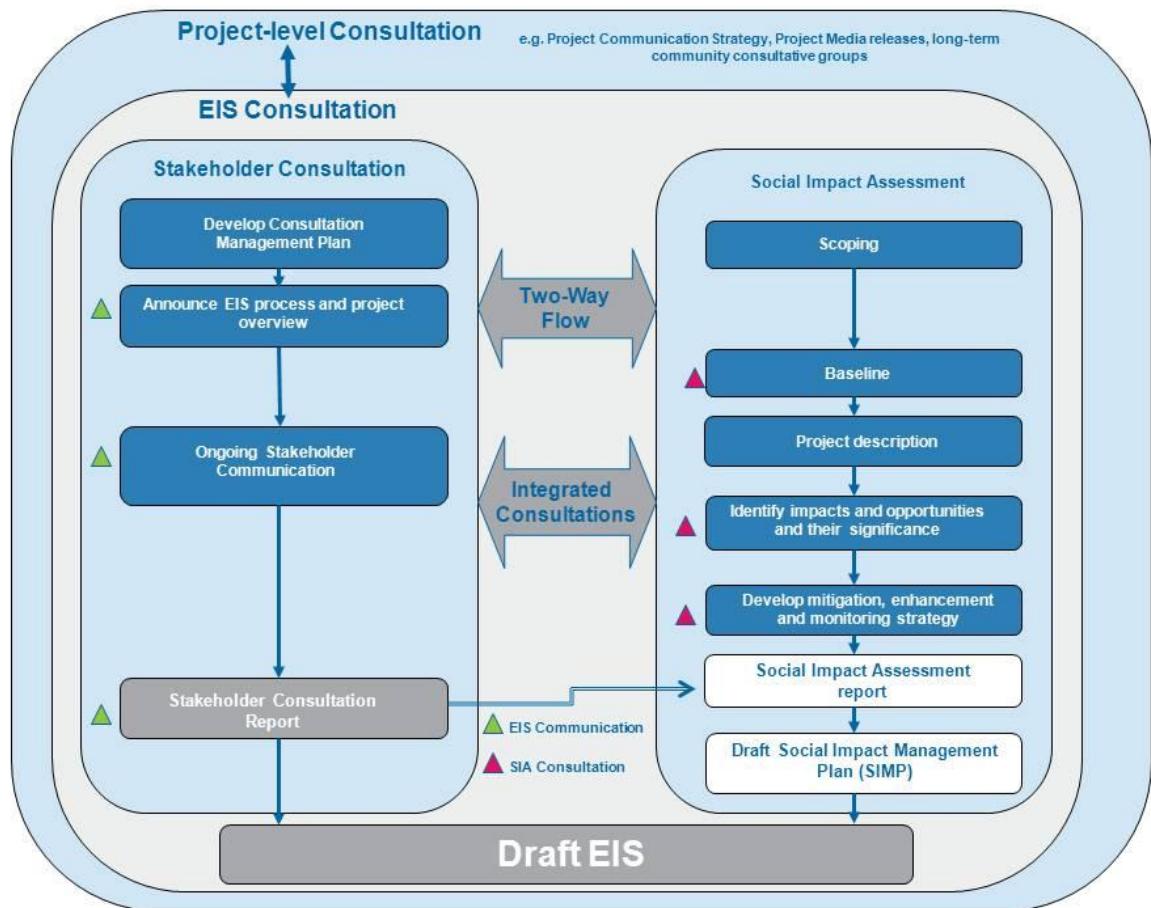


Figure 3 Links between Draft EIS and SIA Consultation

1.8 Project Stakeholders

A stakeholder is defined as “any individual, group of individuals, organisation or political entity with an interest in the outcome of a decision. They may be, or perceive that they may be, affected directly or indirectly by the outcome of a decision” (IAP2, 2007).

A preliminary stakeholder analysis was developed through desk-based research and analysis of existing information materials. This list was subject to ongoing refinement throughout the consultation process, with input from Vista Gold and other project stakeholders.

Stakeholders identified for the Project included Northern Territory Government Departments, Local Government, potentially affected landowners, local business and residents, Indigenous groups, Traditional Owners, community interest groups, industry representatives, environmental groups, media and surrounding communities.

A range of stakeholders were identified for inclusion with consultation in activities or received project-related materials during the Draft EIS process.

Key stakeholders to the Project are summarised in Table 1.



Table 1 Key Stakeholders

Stakeholder Category	Representatives
Federal Government	
Federal Government Departments	<ul style="list-style-type: none">▶ Sustainability, Environment, Water, Population and Communities (Department of)
Elected Representatives	<ul style="list-style-type: none">▶ Member of Goyder▶ Member of Katherine
Northern Territory Government	
Government Agencies	<ul style="list-style-type: none">▶ Department of Mines and Energy (formerly Department of Resources)▶ Department of Housing, Local Government and Regional Services▶ Department of Health▶ Department of Lands Planning and the Environment and NT Environment Protection Agency (formerly Department of Natural Resources, Environment, The Arts and Sport)▶ Department of Business Employment▶ Aboriginal Areas Protection Authority
Local Government	
Katherine Town Council	<ul style="list-style-type: none">▶ Mayor: Fay Miller and formerly Anne Shepherd▶ CEO: David Laugher▶ Aldermen▶ Key Council Officers
Roper-Gulf Shire Council	<ul style="list-style-type: none">▶ Mayor: Tony Jack▶ CEO: Michael Berto▶ Aldermen▶ Key Council Officers
Victoria-Daly Shire	<ul style="list-style-type: none">▶ Mayor: Major Harold Wilson▶ CEO: Sandra Cannon▶ Aldermen▶ Key Council Officers
Local Communities	
Directly Affected Landholders	<ul style="list-style-type: none">▶ Landholders directly affected by Project
Local Residents	<ul style="list-style-type: none">▶ Katherine▶ Pine Creek▶ Indigenous communities (Werenbun, Rockhole, Binjari, Gorge Camp, Kalano, Eva Valley etc.)



Stakeholder Category	Representatives
Other Key Stakeholders	
Emergency and Health Services	<ul style="list-style-type: none">▶ Police Service▶ Ambulance and Emergency Services▶ Fire and Rescue Service▶ Katherine Hospital & Health Service▶ Private Health Providers
Utility Service Providers	<ul style="list-style-type: none">▶ Power and Water Corporation
Indigenous Groups and Traditional Owners	<ul style="list-style-type: none">▶ Jawoyn Association▶ Northern Land Council▶ Nitmiluk National Park Board of Management
Community, Business and Industry Groups	<ul style="list-style-type: none">▶ Katherine Chamber of Commerce▶ Northern Territory Minerals Council▶ Amateur Fisherman's Association of the Northern Territory▶ Mt Todd Mine Site Rehabilitation Working Group▶ Katherine Land Care Group
Environmental Groups	<ul style="list-style-type: none">▶ Environment Centre Northern Territory
Media	
Print	<ul style="list-style-type: none">▶ Katherine Times
TV / Radio	<ul style="list-style-type: none">▶ ABC Radio, Katherine Community Radio



2. Consultation to Date

Consultation was undertaken over an approximate 24 month period during the Draft EIS development phase and is continuing. This approach aimed to provide multiple opportunities for both targeted and general community consultation.

Specific consultation activities undertaken are described in Figure 4.



Figure 4 Draft EIS Consultation Activities and Communication Tools

These activities and tools are described in the following sections, and supported by consultation collateral contained in Appendices A to E.

2.1 Consultation Activities

2.1.1 Community Information Sessions

Three rounds of Community Information Sessions were held to coincide with Draft EIS preparation milestones, as follows:

- ▶ Stage 1 – Draft EIS commencement, Project Introduction and Community Views Survey (July 2011)
- ▶ Stage 2 – Draft EIS development, including an update on preliminary technical findings (September 2011)
- ▶ Stage 3 – Draft EIS finalisation and Project updates.

A summary of these events is provided in Table 2.



Table 2 Summary of Community Information Sessions

Town	Venue	Date and Time	Attendance
Stage 1 (Draft EIS Commencement, Project Introduction and Community Views Survey)			
Katherine	Katherine Show Vista Gold Project Stand (Photo 2)	Friday 15 and Saturday 16 July 2011 9:00 am – 4.00 pm	Numerous
Stage 2 (Draft EIS Development and Technical Studies Update)			
Katherine	Katherine Shopping Centre Vista Gold Project Stand (Photo 3)	Saturday 24 September 2011 1.00 pm – 3.00 pm	30 - 40
Pine Creek	Pine Creek Community Hall Community Information Session (Photo 4)	Monday 26 September 2011 6.00 pm – 8.30 pm	12
Stage 3 (Draft EIS Development and Project Update)			
Katherine	Katherine Show Vista Gold Project Stand	Friday 20 and Saturday 21 July 2012	Numerous
Katherine	Community Meeting	Saturday 27 October 2012	30 - 40



Photo 2 Katherine Show Vista Gold Stand and Community Views Survey, 15 July 2011



Photo 3 Katherine Shopping Centre Community Information, 24 September 2011



Photo 4 Community Information Session in Pine Creek, 26 September 2011

Both the Katherine Show and the Katherine Shopping Centre Community Information session adopted a 'community drop-in' format with the Pine Creek Community Information Session adopting a community 'workshop' format.

For the community drop in sessions, interested members of the community were encouraged to drop in and find out more information regarding the Project. Project posters and fact sheets were also available summarising a range of information on the Project and on Vista Gold (Appendix A). Community questions were directed to either one of the Vista Gold representatives or GHD depending on the nature of the questions. Once people had had a chance to find out information on the Project, they were then asked if they would like to participate in Community Views Survey conducted by members of the GHD Project Team. Further details on this survey are provided in Appendix B.

The Pine Creek Community Information Session adopted a different format comprising a short PowerPoint presentation on the Project, community question and answer time and then attendees were allocated into two small groups for further facilitated discussion around topics of importance to the community.

All Community Information Sessions had an 'open door' policy where interested people could enter and leave at their leisure. Participants were provided with opportunities to give feedback on the Project either verbally (with notes taken by the study team), via the Community Views Survey or via email or the free-call 1800 number.

2.1.2 Government Agency Briefings and Meetings

Over the course of the consultation program a number of government agency briefings were conducted by GHD and Vista Gold. A list of these meetings is summarised in Table 3.

2.1.3 Council Briefings and Meetings

A briefing on the Project was provided to the Katherine Town Council and Roper-Gulf Shire Council on Wednesday 13 July 2011 from 9:00-10:00 am. Representatives from the Victoria-Daly Shire Council were also invited but were unable to attend.



Table 3 Summary of NT Government Agency Briefings and Meetings

Location	Venue	Date and Time
Darwin	Department of Lands Planning and the Environment, and NT Environment Protection Authority ¹ Forum (DLPE and NT EPA)	Friday 8 July 2011 10:30 am – 11:30 am
Darwin	Department of Mines and Energy ² (DME)	Monday 11 July 2011 2:30 – 3:30 pm
Darwin	DLPE and NT EPA ¹	Monday 11 July 2011 4:00 – 5:00 pm
Darwin	Department of Health	Tuesday 12 July 2011 11:00 – 12:00 pm
Darwin	DLPE and NT EPA ¹	Thursday 19 May 2011
Darwin	NT Transport Group	Friday 8 July 2011 10:30 am – 11:30 am
Darwin	DLPE and NT EPA ¹	Thursday 19 April 2012
Darwin	DLPE and NT EPA ¹ DME ²	Monday 23 April 2012
Darwin	DLPE and NT EPA ¹ DME ²	Thursday 9 August 2012
Darwin	DLPE and NT EPA ¹	Wednesday 29 August 2012

Notes: ¹ formerly Department of Natural Resources, Environment, The Arts and Sport, ² formerly Department of Resources

2.1.4 Indigenous Consultation

Consultation with Indigenous stakeholders was undertaken at a number of levels as follows:

- ▶ Vista Gold is directly negotiating with the Jawoyn Association on matters relating to the Jawoyn shareholding interests in the Project;
- ▶ Indigenous groups and communities were invited to participate in the community information sessions undertaken for the Draft EIS through public notices and community board notices and also through the Jawoyn Association and the Northern Land Council;
- ▶ specific consultations were undertaken with Traditional Owners as part of the Cultural Heritage investigations and SIA. Refer to the Cultural Heritage and SIA Reports; and
- ▶ distribution of project information through key organisations including the Northern Land Council and Jawoyn Association.

2.2 Communication Tools

2.2.1 Project Fact Sheets

Fact sheets were prepared to provide regular information on the Project and to report on progress. These were made available at public events and as downloads from the Mt Todd website. Fact sheets to date have provided information on Vista Gold Corp, Mt Todd Mine, environment, employment and the EIS. Copies of the Mt Todd Mine and EIS (1 & 2) fact sheets are provided in Appendix A. Factsheets were released at two Draft EIS milestones as follows:



- ▶ EIS fact sheet 1 – Project commencement and Katherine Show Stand (July 2011); and
- ▶ EIS fact sheet 2 – Release of Draft EIS Guidelines and update on preliminary Draft EIS studies (September 2011).

Fact sheets were distributed through the Katherine Town Council Offices, made available at key events and advertised through the Mt Todd website.

2.2.2 Project Contact Channels – Email, Free call Telephone Line

A Project-specific email address and free call telephone information line was established and will be maintained for the duration of the Draft EIS consultation process.

These provided easy access to Project information, a means to raise issues and discuss concerns about the Project. The purpose of the Contact Channels was to enable all questions, concerns and issues to be captured, reviewed and responded to.

Contact channels for the Draft EIS consultation process were featured in all Project information materials, the Mt Todd website and in public advertisements. These were:

- ▶ Email: sharon.beattie@ghd.com
- ▶ Telephone: 1800 880 035.

The total number of enquires received via project contact channels is shown in Table 4, for the period from July 2011 to December 2012.

In addition, the Mt Todd communications team receives approximately 15 calls a month regarding the Mt Todd project. The majority of these calls are from potential suppliers or enquiries regarding employment opportunities. In the last 12 months one call has been received regarding the Gouldian Finch.

Table 4 Utilisation of Project Contact Channels

Contact Channel	Number Received
Email	4
Telephone Information Line	12

2.2.3 Editorial Coverage

Editorial coverage in local newspapers and radio was undertaken to inform the community about the Project and upcoming Draft EIS consultation activities. Publication details are shown in Table 5.

Since October 2012, regular half page community update advertisements have been published in the NT News and Katherine Times. The community updates aim to provide the general community with key information on the Project, particularly on issues being raised by stakeholders in the public domain.

Table 6 provides a list of community updates published in the NT News and Katherine Times up to February 2013. Community updates are also available on the Mt Todd website. Recent community updates available on the website are shown in Table 7 and examples of community updates are provided in Appendix A.



Table 5 Summary of Editorial Coverage

Publication	Dates	Coverage
Stage 2 (Draft EIS Development) - 2011		
Northern Territory News	17 and 24 September	Northern Territory
Katherine Times	21 September	Front Page, Katherine Region
NT ABC Radio	From 17 September	Northern Territory
Katherine Community Radio	From 17 September	Katherine Region

Copies of advertisements are provided in Appendix C.

Table 6 Community update schedule

Date	Topic
3 October 2012	Water treatment plans – Batman Pit
31 October 2012	Report on community meeting
28 November 2012	Introducing the new general management
12 December 2012	Water treatment program update
19 December 2012	Fish study
16 January 2013	Water treatment – key indicators, report of water storage and pH
30 January 2013	Water treatment – report on pH level of Batman Pit
13 February 2013	Community meeting invitation

Table 7 Community updates on Mt Todd website

Date	Topic
14 November 2012	Preparing for the wet season
12 December 2012	Water treatment program
19 December 2012	Vista Gold fish study
30 January 2013	Water treatment results
27 February 2013	Katherine community meeting – presentation
10 April 2013	New site manager
24 April 2013	Major project status
8 May 2013	Water treatment success
22 May 2013	Envirotech Monitoring – Mt Todd environmental consultants

2.2.4 Website

The Mt Todd website provided a readily accessible portal for stakeholders to access information about the proponent, the Project, Draft EIS process and consultation opportunities (www.mttodd.com.au). Over



60 enquiries were received up until December 2012.

The website was periodically updated as Draft EIS preparation progressed and at various times provided details of:

- ▶ Draft EIS consultation activities; and
- ▶ Links to key documentation in a downloadable PDF format:
 - Notice of Intent via a link to the Vista Gold website;
 - project's Draft EIS Guidelines via a link to the Vista Gold website;
 - project fact sheets and community updates;
 - study Area Map;
 - Community Feedback Form; and
 - Public Notices for Community Information Sessions in the form of community information or media releases.

2.2.5 Stakeholder Database

GHD maintained records of all consultation enquiries through an Excel spreadsheet. Details including name of person, contact details, nature of query and follow-up actions were recorded.

Commencing October 2012, members of the community have been invited to register for regular updates and news regarding Mt Todd. Community members registered on the database receive copies of community updates and media releases as they are issued.

2.3 Social Impact Assessment Consultation

The following consultation activities were undertaken explicitly to inform the SIA:

2.3.1 Interviews

Twenty interviews (both by phone and in person) were conducted with representatives from the following key stakeholders to collect and validate data required to develop social baseline studies for study areas, inform impact identification and develop management strategies and monitoring programs:

- ▶ Katherine Town Council;
- ▶ Roper Gulf Shire Council;
- ▶ Victoria-Daly Shire Council;
- ▶ Amateur Fisherman's Association of Northern Territory (AFANT);
- ▶ Environment Centre Northern Territory;
- ▶ Jawoyn Association;
- ▶ NT Resources Council;
- ▶ NT Department of Health;
- ▶ Department of Mines and Energy (formerly Department of Resources);
- ▶ Katherine Hospital;
- ▶ Katherine Police;
- ▶ Katherine Schools;



- ▶ Katherine Chamber of Commerce;
- ▶ Bendigo Bank;
- ▶ Department of Defence, RAAF Base Tindal;
- ▶ Salvation Army;
- ▶ Careflight;
- ▶ Katherine Religious Organisations;
- ▶ Katherine Country Women's Association; and
- ▶ Katherine Accommodation Providers.

2.3.2 Department of Lands Planning and the Environment, and NT Environment Protection Authority Meetings

- ▶ the Project team met with representatives from Department of Lands Planning and the Environment, and NT Environment Protection Authority (formerly Department of Natural Resources, Environment, The Arts and Sport) on a number of occasions to outline proposed consultation process and identify any relevant matters for consideration through the Project.

2.3.3 Workshops for the Draft SIA Report and Draft Social Impact Management Plan (SIMP)

- ▶ four community and stakeholder workshops were conducted for input to the SIA and development of the proposed SIMP; and
- ▶ the SIA and SIMP will be released for comment as part of Draft EIS public exhibition.

Findings are summarised in the SIA Report.



3. Major Themes of the Consultation Process

During the Draft EIS consultation program, participants identified a range of potential social, environmental and economic impacts and benefits of the Project. Almost all stakeholders interviewed strongly supported the Project on the basis of economic and employment benefits for Katherine. Although feedback has differentiated between the different stakeholder groups, a number of consistent themes emerged.

Each theme is summarised below as expressed by stakeholders (in no particular order).

3.1 Housing and Accommodation

Almost all stakeholders consulted identified the current shortage in housing and accommodation in Katherine and Pine Creek and the potential for the Project to exacerbate this unless additional housing is provided for the Project workforce and projected population increase. Stakeholders cited how difficult and expensive it is to find housing currently and that this issue already impacts on key service provision. Katherine Town Council representatives highlighted the availability of land in east Katherine as providing future opportunities for new residential development but indicated that this release of land still needs to be planned and released by the Department of Lands, Planning and the Environment.

Residents of Pine Creek encouraged the Project to consider additional housing in Pine Creek area but identified that the majority of land is currently unavailable for development.

There was also considerable interest in the location and type of housing to be provided for the construction workforce. Views on two key options for this were sought from the community through the Community Views Survey:

- ▶ provision of construction workforce accommodation on the Project Site; and
- ▶ provision of construction workforce accommodation within or close to Katherine, possibly coordinated with future housing for the operational workforce.

Support for each of the above options was split for various reasons. In general there was more support for the option of locating the accommodation for the construction workforce at the Project mine site. Stakeholders who supported locating the accommodation for the construction workforce within Katherine were mostly concerned with maximising the economic benefits to Katherine. Table 8 summarises the various feedback received on these two options.

3.2 Employment and Training

Employment and training opportunities arising from the Project were of key interest to the majority of stakeholders and was also a strong message in website feedback. Key benefits perceived from the Project included:

- ▶ additional employment opportunities for both young people and people currently wanting to work within the mining industry in the Region; and
- ▶ potential for long-term career opportunities, particularly for younger people.

Stakeholders also expressed a desire for the Project to:

- ▶ focus on local employment and training opportunities and link in with local providers in establishing appropriate programs.



Table 8 Community Feedback on Accommodation Options

Option 1 – Location of Construction Workers Accommodation within or nearby to Katherine	Option 2 – Location of Construction Workers Accommodation at the Project Site
Perceived benefits	Perceived benefits
Maximise economic benefits to Katherine	Will minimise any fatigue issues for workers
Provide opportunities for coordinating with building of housing for operational workforce	Supported by Indigenous stakeholders as would assist in achieving Indigenous employment aspirations
Easy access to existing infrastructure, utilities and services	Can access existing infrastructure and services on site
Perceived concerns	Perceived concerns
Potential for fatigue issues to result from additional travel between Katherine and the Project site. i.e. 12 h shifts plus additional 2 hrs travel	Need to design workers facilities to meet worker well-being objectives including providing recreational and entertainment facilities and accommodation for partners of Indigenous workers
Concerns regarding behaviour of workforce in town such as increased anti-social behaviours	
Potential for public nuisance concerns i.e. noise, waste, lighting etc.	

3.3 Business and Economic Development

Stakeholders identified the following matters:

- ▶ the Project would potentially bring more people, particularly families to live in Katherine and surrounding areas;
- ▶ it would benefit local businesses through securing local contracts to supply goods and services; and
- ▶ it would increase spending within the local and regional economy.

Some concerns were also expressed that the Project would increase skill shortages in the region and draw workers away from other businesses. Businesses consulted with as part of the Chamber of Commerce Breakfast Workshop indicated a strong desire to work with Vista Gold in developing the Industry Participation Plan to maximise local and regional economic development.

3.4 Workforce

The region's workforce and skills shortage were highlighted as a critical consideration for the Project given the timing of the Project in relation to other major projects in the Northern Territory. Other issues raised in relation to the Project workforce were as follows:

- ▶ potential anti-social behaviours of the Project workforce, particularly any FIFO or temporary workforce;
- ▶ desire for more families to locate to the area as part of the long-term operational workforce and for workers to be part of the community;
- ▶ difficulties stemming from mining rosters in terms of workers being able to participate in community events; and
- ▶ measures to limit drain from other local industries to source the Project's workforce.



3.5 Indigenous Employment and Business Aspirations

Consultation with both Indigenous and non-Indigenous Stakeholders identified the importance of the Project for assisting in achieving Indigenous employment and business aspirations. Stakeholders also identified the following:

- ▶ the Project would provide employment and training for Indigenous people to gain long-term employment;
- ▶ the Project would provide opportunities for Indigenous businesses to supply services to the Mine; and
- ▶ an Indigenous Employment Strategy should be developed based on examples of other programs that are working in the Northern Territory.

3.6 Community Infrastructure and Service Provision

Key service providers in Katherine identified that the Project may increase existing short falls in community services and infrastructure particularly in the areas of health provision, childcare and access to health specialists such as dentists, mental health workers and physiotherapists. Other facilities such as entertainment venues, restaurants and high demand on the existing Woolworths shopping complex were also identified.

3.7 Environment

A number of concerns regarding the existing and future management of the Project and impacts on the Environment were raised by a wide range of stakeholder groups. Many of these concerns stemmed from the mine's prior owner's poor performance in terms of the environment. Key concerns raised included:

- ▶ impacts on water quality, particularly on the Fergusson and Edith Rivers;
- ▶ impacts from existing tailings dump and heap leach pad;
- ▶ loss of biodiversity;
- ▶ impacts on any sites of cultural heritage significance; and
- ▶ the risk of any future spills or contamination related to either transport of materials or flooding during a 'big wet'.

3.8 Traffic and Transport

Some concerns were raised by Stakeholders about the deteriorating condition of the Stuart Highway and the potential for the Project to exacerbate this. Other traffic concerns raised included:

- ▶ traffic increases along Edith Falls road; and
- ▶ transport of goods and supplies between the Project Site and Darwin, particularly concerns regarding the management of any potential spills.

3.9 Community

Stakeholders across all groups and interests identified the importance of establishing trust within the community, particularly given the previous historical issues associated with the mine. Stakeholders indicated wide-spread support for the project and would like to see the continuation of an open and transparent consultation process through the Draft EIS.



Table 9 summarises the major issues identified during the consultation program.

Table 9 Major Issues Identified During Draft EIS Consultation

Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community views survey
Workforce						
Concerns that Project will exacerbate existing skills shortfalls	✓	✓	✓	✓		
Potential for anti-social behaviours of workforce	✓		✓	✓	✓	
Difficulties stemming from typical mining rosters	✓	✓	✓	✓	✓	✓
Concerns regarding behaviour and integration of workforce	✓	✓	✓	✓	✓	✓
Concerns that local businesses will lose staff to Project	✓	✓	✓			✓
Health and well-being of workers				✓		✓
Lack of accommodation and housing	✓	✓	✓	✓	✓	✓
Need for additional housing to be built to accommodate workforce	✓	✓	✓	✓	✓	✓
Lack of land in Pine Creek		✓				
Preference for workers camp to be on or near Project Site	✓	✓	✓	✓	✓	✓
Concerns regarding Project driving up land and house prices	✓	✓	✓			✓
Opportunities for local business development	✓	✓	✓	✓	✓	✓
Concerns regarding the 'reliability' of the Project	✓	✓	✓	✓	✓	✓
Preference for Vista Gold to work with existing business in supply to the mine	✓	✓	✓	✓	✓	✓
Positive employment opportunities for local people	✓	✓	✓	✓	✓	✓
Concerns regarding regional/national labour skill shortages	✓	✓	✓			
Desire for more families to work at the mine	✓	✓	✓	✓	✓	✓
Training/apprenticeship opportunities for local people, particularly youth (community capacity building)	✓	✓	✓	✓	✓	✓
Impact of mining rosters on community and family life	✓	✓	✓	✓	✓	
Use local training and traineeship programs and providers			✓	✓		✓
Concerns that existing health care services are stretched	✓		✓	✓	✓	



	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
Major Themes and Issues	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community views survey
Would like to see Project investing in local community	✓	✓	✓	✓	✓	✓
Exacerbation of existing shortfalls (retail, entertainment places, doctors etc.)	✓	✓	✓	✓	✓	
Community Health, Safety and Well-being						
Establishing trust in the community is important	✓	✓	✓	✓	✓	
Alcohol issues are a big concern			✓	✓	✓	
Need for mine workers to integrate into the community	✓	✓	✓	✓	✓	✓
Concerns regarding environmental management of tailings dump and heap leach pad			✓	✓	✓	✓
Need for environmental monitoring and reporting of monitoring to community			✓	✓	✓	
Indigenous aspirations, values and resources						
Provision for Indigenous Employment Opportunities	✓	✓	✓	✓	✓	✓
Need for cultural awareness training on Project workforce	✓		✓			
Use of Indigenous mentors		✓	✓			
Traffic and Transport						
Condition of the Stuart Highway		✓	✓	✓	✓	
Increase in traffic on Edith falls road		✓	✓	✓	✓	
Transport of dangerous goods between Project and Darwin			✓		✓	
Environmental risks from transport such as spills etc.	✓	✓	✓	✓	✓	
Post-mining						
Loss of employment and economic stimulus			✓			✓



4. Results of Consultation

This section presents the findings of specific public consultation activities conducted between April 2011 and December 2012. This process is ongoing with further consultation to occur as part of the Draft EIS public release phase.

4.1 Community Information Sessions

Six Community Information Sessions were held in the Katherine Region as follows:

- ▶ July 15 and 16 2011 – Katherine Show Vista Gold Stand;
- ▶ Saturday 24 September 2011 – Katherine Shopping Centre;
- ▶ Monday 26 September 2011 – Pine Creek Community Hall;
- ▶ July 20 and 21 2012 - Katherine Show Vista Gold Stand;
- ▶ Saturday 27 October 2012 – Katherine Community Meeting; and
- ▶ Saturday 16 February 2013 – Katherine Community Meeting.

Approximately 30-40 people visited each of the Katherine Shows and Katherine community events and 12 people attended the Pine Creek Community Hall Event. Both the Katherine Show Information Stand and the Katherine Shopping Centre Event were run as 'community drop-in' style events. The Pine Creek Community Information Session was run as a community workshop.

People attending each of these events represented a wide cross-section of the community including residents, visitors, miners, teachers and members of the business community etc.

Overall attendees were very supportive of the Project citing the positive benefits for local employment and the Katherine economy as the main reasons for this support.

The October 2012 Community Meeting provided an opportunity for Vista Gold to provide an update on the Project with particular emphasis on water treatment.

Key issues are summarised in Table 10 to Table 12.

Table 10 Key Issues Raised at Katherine Show Information Stands

Theme	Issues Raised
Local Employment and Economic Benefits	▶ Support for the Project due to the local benefits such as employment and economic growth for the Region
Housing and Accommodation	▶ Concerns that there is no housing available in Katherine
Workforce	▶ One person raised a concern about anti-social behaviour of workers ▶ Concerns raised about a FIFO workforce (if used) and their ability to integrate into Katherine Community
Employment and Training	▶ The majority of people saw the Project as a positive opportunity for increased employment and training opportunities for Katherine ▶ Others noted that existing businesses in Katherine have difficulties in finding staff
Indigenous Employment	▶ Need to provide Indigenous employment opportunities but recognition that this can be challenging as need to be undertaken in culturally appropriate way



Theme	Issues Raised
Community Infrastructure and Service Provision	<ul style="list-style-type: none"> ▶ Concerns that existing health systems are stretched and additional workforce and families will place pressure on these services
Workers camps	<ul style="list-style-type: none"> ▶ Views were divided regarding whether workers camps should be located in or nearby to Katherine or on the Project Site ▶ Main reasons people preferred the Project Site was to minimise any potential for anti-social behavioural issues and due to concerns regarding worker fatigue associated with having to drive after a shift ▶ The main reason people preferred a location closer to Katherine was so that to maximise economic benefits for Katherine
Environmental	<ul style="list-style-type: none"> ▶ Concerns were raised regarding the negative environmental history of the site and the poor environmental management of previous owners ▶ Concerns regarding downstream water quality and any potential for impact on the Edith River ▶ Land rehabilitation needs to be done properly
Business Community	<ul style="list-style-type: none"> ▶ Concerns regarding the behaviour of the previous owner in not paying debts within the Katherine business community ▶ Need to have good financial management in place
Instability of Gold Prices	<ul style="list-style-type: none"> ▶ Some concerns were raised about the instability of Gold Prices and the potential for the Project to close down if gold prices go down
Traffic and Transport	<ul style="list-style-type: none"> ▶ Stuart Highway is deteriorating and there were concerns the Project may contribute to this
Community	<ul style="list-style-type: none"> ▶ Would like to see the company investing in the Community through sporting sponsorships etc.

Table 11 Key Issues Raised at Katherine Shopping Centre Community Drop In

Theme	Issues Raised
Local Benefits	<ul style="list-style-type: none"> ▶ Support for the Project citing the local benefits such as employment and economic growth for the Region
Indigenous employment	<ul style="list-style-type: none"> ▶ Need to have a good Indigenous employment and training strategy in place
Employment and training	<ul style="list-style-type: none"> ▶ Support for the project in terms of the employment and training opportunities for the Katherine Region

Table 12 Key Issues Raised at Pine Creek Community Information Centre

Theme	Issues Raised
Local Employment and Economic Development	<ul style="list-style-type: none"> ▶ Support for the Project citing local benefits such as employment and economic growth for the Region
Employment	<ul style="list-style-type: none"> ▶ Seen as positive for employment opportunities in the region but also some concerns regarding loss of existing workers to the Project (cross-over employment impacts)



Theme	Issues Raised
Community	<ul style="list-style-type: none"> ▶ Existing miners living in the area (particularly FIFO) not acting as part of the community ▶ Mt Todd needs to be part of the community ▶ Would like to see more families in the area ▶ Mining rosters impacting on workers being able to contribute to community through participation in community events
Housing and Accommodation	<ul style="list-style-type: none"> ▶ No land or housing currently available in Pine Creek ▶ Community would really like to see some new housing in the Pine Creek community but land is currently subject to Native Title or not available for sale ▶ Workers for Stuart Highway upgrades have had to be housed in 'Donga' style accommodation on the highway as there hasn't been any availability in Pine Creek ▶ Some people were saying that land speculation was already starting to occur with the possibility of the Project opening driving up land prices ▶ Concerns that the Project may drive up land and accommodation prices and force existing residents out of the area
Tourism	<ul style="list-style-type: none"> ▶ Tourists are more and more wanting to see the 'mine' emerging industry-led tourism ▶ There is a perception among tourists though that there is no accommodation
Traffic and Transport	<ul style="list-style-type: none"> ▶ Traffic and transport on Edith Falls Road likely to be an issue. This road is also used by the Werenbun community and to get to the Edith Fall National Park area
Indigenous employment and training	<ul style="list-style-type: none"> ▶ Need to look at existing programs that are working such as the Borroloola program ▶ Consider using Indigenous mentors ▶ There are real challenges around Indigenous employment

4.2 Meetings with Local Government

GHD and Vista Gold met with representatives from Katherine Town Council, Roper-Gulf Shire Council and Victoria-Daly Shire Council on a number of occasions including a dedicated meeting on 13 July 2011. Other meetings included discussions as part of the Mt Todd Rehabilitation Working Group Meeting on Thursday 22 September 2011 and during the Pine Creek Community Information Session on 26 September, 2011. Key issues raised are provided in Table 13.

Table 13 Key Issues Raised at Meetings with Local Government

Theme	Issues Raised
Housing and Accommodation	<ul style="list-style-type: none"> ▶ Katherine Town Council identified that there was a current shortage of housing in Katherine ▶ There is land identified for future development in Katherine east but this land has not yet gone through the planning approval processes led by the Department of Lands and Planning ▶ Options for accommodation for both the construction and operational workforce were discussed. Council supported new residential housing within Katherine for the operational workforce and also recognised the necessity of a workers camp for the construction workforce
Rehabilitation of the Site	<ul style="list-style-type: none"> ▶ KTC raised concerns about how the site would be rehabilitated after the mine closed



Theme	Issues Raised
Environment	<ul style="list-style-type: none"> ▶ Concerns regarding the environmental management of the site
History of the Project	<ul style="list-style-type: none"> ▶ It was noted that the Mine had a negative history in the community and that a lot of people were affected when the mine closed down previously
Workforce	<ul style="list-style-type: none"> ▶ Some concern was raised about the potential negative behaviour of the workforce and the need to manage this appropriately
Social Infrastructure	<ul style="list-style-type: none"> ▶ Katherine has good base sport and recreational facilities ▶ Existing venues for socialising and entertainment are currently at capacity. More facilities would be required to support additional population growth associated with the Project ▶ There is not currently enough doctors and dentists ▶ Existing retail opportunities are limited as there is only one supermarket
Workers camps	<ul style="list-style-type: none"> ▶ Workers camp should be designed with the well-being of workers in mind. There are some good examples around that are more village-style and also provide in-house socialising and entertainment facilities
Existing Infrastructure	<ul style="list-style-type: none"> ▶ The Katherine Town Sewage Treatment Plant has good capacity
Education and Training Providers	<ul style="list-style-type: none"> ▶ There are a number of education and training providers in Katherine including a campus of the Charles Darwin University
Tourists and Visitors to the Area	<ul style="list-style-type: none"> ▶ There is an influx of tourists and visitors to the area during the tourist season, at these times town services are often under pressure ▶ The town has approximately 250,000 visitors during the dry season
Community	<ul style="list-style-type: none"> ▶ Katherine is quite ‘cosmopolitan’ and ‘resilient’ ▶ There is a good mix in town of people from different backgrounds and cultures including the Philippines, Sudan, Africa, etc. ▶ A lot of the more long-term residents of Katherine have moved out to the outer areas rather than living in the Town itself

4.3 NT Government Briefings

Members of the Project Team met with DLPE and NT EPA (formerly NRETAS), DME (formerly DoR), Department of Health, Department of Local Government (formerly Department of Local Government and Regional Services). Key issues raised are summarised in Table 14.

Table 14 Key Issues Raised at NT Government Briefings

Theme	Issues Raised
Draft EIS Scope	<ul style="list-style-type: none"> ▶ Clarification was sought regarding the scope of the SIA and key stakeholders to be involved in the process ▶ Matters to be considered in the SIA should include the adjacent Nitmiluk National Park, involvement of the Jawoyn Association and traffic and transport impacts
Project Study Area	<ul style="list-style-type: none"> ▶ The study area for the SIA should also consider the wider area of influence as including Darwin, given the NT government's role in the Project previously and the negative view of the Project by people in Darwin
Community Consultation	<ul style="list-style-type: none"> ▶ Clarification was sought on how the views of the community would be addressed through the Draft EIS process



Theme	Issues Raised
Health services	<ul style="list-style-type: none">▶ Katherine Hospital should also be consulted as well as the Health Gains Unit within Department of Health▶ Concern that the Hospital would “burst at seams” with additional load from Project workforce and families
Health	<ul style="list-style-type: none">▶ The Department of Health would be interested in any issues impacting on potable water quality
History of Project	<ul style="list-style-type: none">▶ Many people within the Katherine community may have a negative view of the Project due to the negative history of the Project and that people were ‘hurt’ when the mine closed down previously
Workers Camps	<ul style="list-style-type: none">▶ Pine Creek is already pretty busy with existing workers camps for the Crocodile Gold Project▶ Take note of Environmental Health Fact Sheet No. 700 – Requirements for Mining, Construction and Bush Camps
Housing and Accommodation	<ul style="list-style-type: none">▶ Housing and accommodation in Katherine is likely to be very limited. Some capacity might exist with some of the larger motels
Community	<ul style="list-style-type: none">▶ Katherine has a mixed community consisting of residents, indigenous groups, RAAF personnel, visitors and tourists▶ Community relations should be open and transparent as people have long memories and there will be concerns about the history of the project
Social and Community Infrastructure	<ul style="list-style-type: none">▶ Katherine has good base infrastructure that will support the locating of new accommodation in Katherine
Indigenous Employment and Business Opportunities	<ul style="list-style-type: none">▶ There should be opportunities for the Jawoyn people to develop business and employment for Indigenous people
Environment	<ul style="list-style-type: none">▶ Important that at least the existing level of environmental management of the Mine site is maintained▶ Environmental legislation was changing to allowing community environmental reporting for Projects▶ Key environmental considerations include treatment of waste and how it will be managed, water treatment and management, energy efficiency management
Traffic and Transport	<ul style="list-style-type: none">▶ Issue of traffic and transport of cyanide between the Project Site and Darwin needed to be considered in the Draft EIS
Key Government Strategies and Policies	<ul style="list-style-type: none">▶ The Project should consider the following key Government Strategies and Policies:<ul style="list-style-type: none">– Territory 2030– Territory Growth Towns– Various health and law and order strategies

4.4 Key Stakeholder Meetings

A number of key stakeholder meetings were held during the Draft EIS development phase including workshops with the Jawoyn Association and the Katherine Chamber of Commerce, meetings with key service providers such as the Katherine Hospital and Katherine Police and interviews with interested members of the community including within some of the nearby Indigenous communities. Key issues raised are summarised in Table 15.



Table 15 Key Issues Raised at Key Stakeholder Meetings

Theme	Issues Raised
General support for the project	<ul style="list-style-type: none">▶ Most people interviewed thought the Project would be good for jobs and economic development for Katherine▶ A number of stakeholders identified that operation of the mine was the best opportunity for future rehabilitation of the site▶ Businesses in the Region would like to see the Project go ahead
Employment	<ul style="list-style-type: none">▶ Concerns that workforce requirements for the Project will exacerbate skills deficits for service providers in town▶ Concerns that the Project will take workers from existing businesses▶ Would like to see the project employ companies locally and have a training program in place to train locals▶ Many local people working at other mines in the Region will want to come back and work at Mt Todd▶ The Project will be competing with other projects in the Northern Territory such as INPEX for construction workers
Health Provision	<ul style="list-style-type: none">▶ Existing shortfalls in health services in Katherine include GP availability and some resulting in greater than necessary workload for the Katherine Hospital▶ There are a number of health centres primarily services the Indigenous communities, these operate under separate health boards▶ The Katherine Hospital is not a specialist hospital, patients need to go to Darwin for specialist care and major trauma incidents
Social Issues	<ul style="list-style-type: none">▶ Often there is an increased need for mental health services during construction and increased instances of sexually transmitted disease
Accommodation and Housing	<ul style="list-style-type: none">▶ The majority of stakeholders raised that there is an existing housing shortage in Katherine▶ Would like to see the construction of new housing in Katherine to support the operational workforce▶ Would like to see families encouraged to work at the mine and for this to be facilitated through the accommodation strategy
Environment	<ul style="list-style-type: none">▶ Indigenous owners including neighbouring groups need to be consulted during the project▶ Concerns regarding the environmental management of the mine including how water quality will be managed, flood risk, greenhouse gas emission, environmental offsets, biodiversity offsets, etc.▶ Concerns from some Indigenous people about the impact of the Mine on water quality▶ Need to factor in issues associated with the wet season and the potential for climatic variability and increased future flood risks▶ Concerns about the location of the Project being close to the Edith and Fergusson Rivers▶ Concerns were raised about habitat for the Gouldian finch▶ Concerns raised about tailings dump and heap leach pad▶ Need to consider the design of the mine to allow for the 'big wets'▶ Some concerns about the water quality of 'Batman' Pit▶ Draft EIS will need to address environmental monitoring including of fish stocks of nearby rivers. These results should be publically reported.



Theme	Issues Raised
Community	<ul style="list-style-type: none">▶ Community consultation during the wet season is difficult▶ Need to have an ongoing community consultation program so that people know where they can have a say and get feedback about the project▶ Establishing trust in the community is important▶ Concerns that the mine might be sold off to another company
Traffic and Transport	<ul style="list-style-type: none">▶ Environmental and safety risks from any transportation of dangerous goods need to be addressed▶ Buses and transport should be provided for mine workers to Katherine at regular times such as on pay nights▶ Need to consider safe use of Edith road as this area is a high use area during tourist seasons▶ Transport to Katherine and the mine site needs to be considered. Possibility for the Project to look at subsidising flights. Katherine used to have a commercial airport.
Cumulative Impacts	<ul style="list-style-type: none">▶ Cumulative impacts need to be considered in the Draft EIS
Workforce Behaviours	<ul style="list-style-type: none">▶ Some concerns were raised about the negative perceptions of the mine workforce behaviour and increased incidence of anti-social behaviours (drugs, alcohol, assault etc.)
Social Impact Management Plan	<ul style="list-style-type: none">▶ The project should have a Social Impact Management Plan in place
Indigenous Employment and Business Aspirations	<ul style="list-style-type: none">▶ Employment of Indigenous people should be given priority▶ A wider view of employment and business opportunities should be taken. Indigenous people would like to see jobs in construction, security, building accommodation, administration etc.▶ Concern that there needs to be appropriate cultural awareness measures in place▶ Would like to see employment and training programs for Indigenous people both Jawoyn and non Jawoyn people▶ Would like to see Indigenous mentors from the same tribe to support and guide younger workers▶ Traineeships are very important▶ Accommodation for Indigenous workforce needs consideration. It would be good for them to be located close to the Mine Site▶ Need for cultural awareness training for all mine workers
Education and Training	<ul style="list-style-type: none">▶ There are a number of education and training programs locally that should be utilised for the Project▶ The Charles Darwin University are already working with Rio Tinto
Workers Camps	<ul style="list-style-type: none">▶ Would like to see the construction workers camp located at the mine site or close to the mine site
Failure of previous mining companies	<ul style="list-style-type: none">▶ Many stakeholders sought clarification as to why previous mining operations had failed at the Project Site



Theme	Issues Raised
Cultural Heritage	<ul style="list-style-type: none">▶ Need to make sure cultural heritage is properly addressed in consultation with the Traditional Owners▶ Traditional Owners used to use all of the land where the mine is today for a range of activities▶ Would like to see some access continued for traditional activities
Crime, law and order	<ul style="list-style-type: none">▶ No major concerns from a policing perspective associated with the additional workforce. Police indicated they are used to responding to more people associated with key events in the Katherine▶ Some concerns that the higher wages paid to mining workers may result in more alcohol abuse and anti-social behaviours in Katherine▶ Alcohol issues are a big concern▶ Some concerns raised about workers from 'out of town' coming to work at the mine and this may cause some conflicts and 'turf' issues
Tourism	<ul style="list-style-type: none">▶ Tourist perceptions of the mine might need to be considered
Business community	<ul style="list-style-type: none">▶ Would like to see Vista Gold take responsibility for building the construction camp for the Project. This will demonstrate commitment to the Project▶ Some concerns were expressed about the reliability of the Project given the history of the mine site▶ Would like to see more 'round table' dialogue with the Project Executives

4.5 Meeting of the Mt Todd Rehabilitation Reference Group

The Mt Todd Gold Mine Rehabilitation Reference Group is a group convened by the former Department of Resources to provide stakeholder input into ongoing mine site rehabilitation. This group has been meeting for a number of years and pre-dates Vista Gold's involvement at Mt Todd. A workshop was held with members of this group and other key stakeholders on the 16 September 2011 as part of the SIA. The results of this workshop are summarised in the SIA Report. Follow up meetings were held during 2012 (24 January, 15 May and 26 October) with the Group to provide project updates, present the results of some of the technical studies, discuss outcomes from the 2011 Boxing Day flood and provide update on the progress of water treatment. Vista Gold continues to engage in the forum.

4.6 Community Views Survey

A Community Views Survey was conducted during both the Katherine Show (July 15 and 16, 2011) and the Katherine Shopping Centre Community Drop-In Event. The purpose of the survey was to collect information on community views about the proposed Mt Todd Gold Project, which included the proposed re-opening of the Mt Todd Mine and accommodation components.

4.6.1 Method

The survey was conducted using a semi-structured interview approach where members of the GHD project team asked interested persons if they would like to participate in the survey. Respondents were first given the opportunity to be informed regarding the Project and to ask any questions of clarification from Vista Gold Project representatives.

Information was collected on an anonymous basis with no personal details recorded. During the survey, notes were also recorded on any other suggestions or comments made by participants.



4.6.2 Respondents

In total 60 surveys were completed collecting information from a broad range of respondents, including 46 respondents who were Katherine residents, one a resident of a neighbouring community (within 30km of Katherine), 7 Northern Territory residents, 3 inter-state visitors and 3 tourists.

Forty of the respondents had previously heard of the project, mostly through word-of-mouth.

4.6.3 Level of Support for the Project

Of the 60 surveys that were undertaken, 54 respondents supported the Project and 5 indicated that they were neutral.

Over half of the respondents (40) were 'strongly supportive' of the project, 11 were 'supportive' and 7 were 'neutral'. None of the respondents indicated that they were not supportive of the Project.

4.6.4 Perceived Benefits of the Project

Almost all respondents identified employment and economic benefits as the main positive benefits of the project, noting that the project will stimulate employment and economic growth. Most of these respondents noted specifically that local employment and economic benefits were the most important.

Other benefits identified included tourism benefits, training for locals, Indigenous employment and training, more families coming to live in the area, more people able to contribute to community life, benefits for the Northern Territory in terms of economic returns and drawing in additional professional expertise to the Town.

4.6.5 Perceived Negative Impacts of the Project

Respondents were asked what they thought would be the potential negative impacts of the Project. Potential impacts identified were:

- ▶ leaving a 'hole' in the community if the Project closes down prematurely;
- ▶ lack of housing in Katherine and surrounding areas;
- ▶ mine workers potentially not being integrated into the community;
- ▶ environmental impacts if the rehabilitation work isn't done well;
- ▶ further deterioration of the Stuart highway;
- ▶ negative impacts if a FIFO workforce is used;
- ▶ increased traffic flow and management;
- ▶ need for comfortable accommodation for the workforce or will have impacts on workers;
- ▶ increase in rental and house prices;
- ▶ increase in homelessness in town;
- ▶ water quality impacts particularly on the quality of the nearby rivers;
- ▶ concerns about cyanide and environmental impacts; and
- ▶ concerns that the accommodation situation in Katherine could become like Port Hedland.



4.6.6 Important Issues

Participants were asked to identify the issues that were most important to them. Issues that were most important to people were clearly local employment opportunities (35 respondents) and local and regional business opportunities (34 respondents). Other issues identified were:

- ▶ protecting water quality, particularly the water quality of Edith River and Edith Falls;
- ▶ keeping younger people in town;
- ▶ traffic and traffic safety;
- ▶ loss of Gouldian finch habitat;
- ▶ cultural heritage;
- ▶ rehabilitation of mine;
- ▶ importance of the mine being there for the long term;
- ▶ reconciliation with Indigenous people through employment and training; and
- ▶ management of worker fatigue.

4.6.7 Worker Accommodation

Respondents were asked regarding their preferences for housing and accommodation for both the construction and operational workforce. Results were as follows:

- ▶ for the construction workforce:
 - 18 respondents preferred workers to be accommodated on the Project site, mainly citing worker fatigue and convenience for workers as the reasons; and
 - 13 respondents preferred the workers camp to be located in or nearby to Katherine, citing maximising the economic benefits for Katherine as the reasons.
- ▶ for the operational workforce:
 - 28 respondents indicated their preference for new residential housing to be built in Katherine to support the workforce; and
 - other respondents, were not sure or were concerned that there wasn't much land or housing currently available.
- ▶ the following comments were also made:
 - people should live in town and bus out to the site;
 - prefer to see housing in Katherine but the price of housing and accommodation is an issue;
 - concerns raised about the possibility of FIFO, citing concerns about social cohesion and alcohol etc;
 - workers and their families will also need access to local services such as hospital, schools etc; and
 - need to provide a mix of housing to provide flexibility for the workforce, some single person's quarters and some housing for families etc.

4.6.8 Community Benefits

Lastly, the participants were asked to identify any ideas they had for how the project could perform to benefit the community. The following comments were made:



- ▶ sponsorship of community events;
- ▶ take locals on a tour to see the mine and how it works;
- ▶ support local landcare and waterwatch groups;
- ▶ try to attract families to the area;
- ▶ support sporting organisations;
- ▶ live locally and be part of the community;
- ▶ local employment;
- ▶ support for local businesses;
- ▶ long-term scholarships;
- ▶ support country music festival;
- ▶ stop workforce cross-over, be sensitive to existing businesses;
- ▶ new training for 'green' workers;
- ▶ supply housing in town;
- ▶ invest money in the National Park through fire management, carbon abatement etc.;
- ▶ provide an mine education facility at the Project site where school groups can visit; and
- ▶ have regular reporting to the community as the last owners didn't tell the community about the issues that were there.



5. Future Consultation with Stakeholders

Following acceptance by the Northern Territory Government of the Draft EIS, the document will be placed on public exhibition for a minimum of six weeks. As part of the public exhibition period the following will occur:

- ▶ public notices will be placed in local newspapers to provide details about:
 - timing of the public exhibition period;
 - locations where people can view the document, including static and staffed display points together with web-based information; and
 - how to make public submissions on the Draft EIS.
- ▶ information about the public exhibition period and submission requirements on the Mt Todd Website;
- ▶ a final Project Newsletter will be prepared to publicise release of the Draft EIS, provide information on the public exhibition process and call for submissions;
- ▶ key stakeholders recorded on the Project's database will be notified about the Draft EIS and review period; and
- ▶ agency briefings and community information sessions held to present findings of the Draft EIS.

5.1 Post Draft EIS Public Exhibition Period

Following completion of the public exhibition period, all stakeholder and community feedback will be reviewed by NT EPA. A Supplement to the Draft EIS will be prepared if required.

A decision by the Northern Territory Government about a future development of the Project will be made public through the NT EPA and the Mt Todd Websites. It is envisaged that Vista Gold will provide future updates about the progress and status of the Project through its website.

5.2 Ongoing Consultation Activities

Plans for longer term consultation as part of the Project's construction and operational phases will be included in the Environmental Management Plan and Social Impact Management Plan.

Consultation will continue throughout the life of the Project to ensure due consideration of all project-related opportunities and concerns. This program will involve:

- ▶ maintaining the current good relationships between Vista Gold, landholders, Traditional Owners and government (at all levels);
- ▶ establishing contact with other key stakeholders as new issues arise;
- ▶ disseminating information to, and having discussions with, stakeholders on key issues raised during the Draft EIS assessment;
- ▶ identifying and responding to key issues and concerns of all stakeholders;
- ▶ preparing relevant documents for review by government agencies and other stakeholders;
- ▶ addressing specific concerns of various stakeholders on an ongoing basis;
- ▶ maintain project website, including reporting on water quality and discharges;
- ▶ regular community meetings; and
- ▶ proactive media program.



6. References

EPA (formerly NRETAS), 2011, *Guidelines for the Preparation of an Environmental Impact Statement: Mt Todd Gold Project, Katherine Region, NT (September 2011)*, Northern Territory Government

GHD, 2011, *Mt Todd Gold Project Notice of Intent*, Prepared for Vista Gold Australia Pty Ltd, April 2011.

International Association for Public Participation (IAP2), 2007, *Core Values for Public Participation Processes*, Accessed at <http://www.iap2.org>



Appendix A

Project Fact Sheets and Community Updates



Mt Todd Mine, Northern Territory



The Mt Todd project site is located approximately 50km north of Katherine and 250 kms south of Darwin. It covers a mine tenement of 160,878ha, which includes both the Batman and Quigleys gold deposits.

Currently not in production, the site was acquired by Vista Gold and its wholly owned subsidiary Vista Gold Australia in 2006.

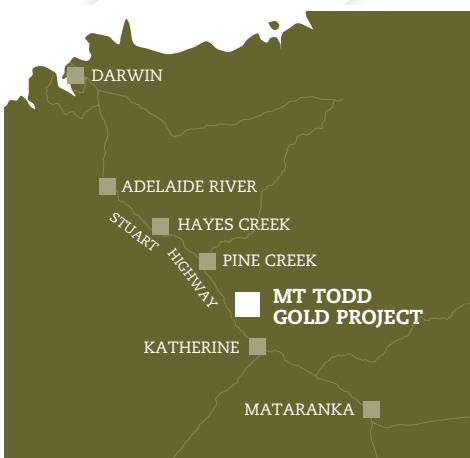
On January 1, 2007, Vista Gold Australia was entrusted with care and maintenance of the site and accepted the obligations to maintain the assets of the NT Government on the site, and in conjunction with the NT Government, to manage Mt Todd in an environmentally sound manner.

As a "brownfield development" the Mt Todd Gold Mine has significant existing infrastructure including paved access from the major transportation corridor, a natural gas pipeline to the site and medium-tension power lines, and a fresh water reservoir.

Vista Gold Australia has installed a water treatment plant as part of its water management plan and ongoing environmental stewardship for the Mt Todd site.

Vista Gold is encouraged by the potential of the Mt Todd project and is advancing plans to redevelop Mt Todd as a producing gold mine. Current plans contemplate an open pit mine with conventional open pit mining methods. Ore would be processed on site to recover the contained precious metals prior to disposal of the tailings in one of two tailings impoundment facilities. The development plans also consider the closure and reclamation of some of the existing facilities in the early years of the project.

Recent assessments of the gold resources at Mt Todd have estimated reserves at the Batman deposit to be in the order of 4.1 million ounces of gold. Work to date has been encouraging and Vista Gold has recently announced that it believes that the project can now support a 40-45,000 tonne per day process facility. A definitive feasibility study at this throughput rate is expected in late 2012 or early 2013.



History of the site

The Batman deposit is part of a goldfield that was worked from early in the twentieth century. Gold and tin were discovered in the Mt Todd area in 1889 and most deposits were worked in the period from 1902 to 1914.

In the 1950s the area was explored for uranium without any economic success and mining leases were granted in 1975 for exploration for a variety of commodities.

From the late 1980s the mine was operated by a number of companies with varying degrees of success with the most recent operator closing due to bankruptcy. The causes of the failure of the previous operation include: low gold prices, higher than expected operating costs, lower than expected metallurgical recoveries and lower than expected processing rates. Vista Gold has dedicated much of its effort in the last 5 years to gaining a better understanding of the deposit and mineralisation in the Batman deposit and evaluating metallurgical processing alternatives. The company believes it has adequately addressed all of the technical issues that caused problems for the previous operators.

Future development of the site

Vista Gold understands the legacy of the site and is committed to not making the same mistakes. Over the past five years, Vista Gold has taken an orderly, methodical and conservative approach to determine if the property can be re-opened.

Only after the project demonstrates an acceptable rate of return with proven and readily available technology will the decision be made to re-open the mine.

Recent improvements in gold prices, in mining equipment and processing techniques, has allowed Vista Gold to initiate a series of studies aimed at gaining regulatory approvals to redevelop the mine and reach a final investment decision point.

In November 2010, the Northern Territory Government renewed its agreement with Vista Gold for the care and maintenance of the mine for a further five years, demonstrating both the Government's and Vista Gold's commitment to developing the site.

Vista Gold has also entered into a separate agreement with the Jawoyn traditional owners of the site to ensure an appropriate use and protection of the Jawoyn freehold.

Vista Gold is in the process of completing an environmental impact study of Mt Todd. In the event that Vista Gold does commence mining at Mt Todd, it will assume full responsibility for the existing and any future rehabilitation.

Construction on the site is likely to take from one to two years, suggesting the first gold could be poured in mid 2015.

The Mt Todd project will create employment and economic growth opportunities for the local region of Katherine, with an estimated work force of 200 – 270 employees

Timeline

2006	Site acquired by Vista Gold
2007	Vista Gold is entrusted with care and maintenance of the site
2010	NT Government renews agreement with Vista Gold for the continued care and maintenance of the mine site
2011	Vista Gold release pre-feasibility study indicating estimated reserves at the site of 4.1 million ounces of gold
3rd Quarter 2012	Complete new resource estimate
4th Quarter 2012 to 1st Quarter 2013	Complete feasibility study, with new resource and larger process facility
1st Quarter 2013	Receive final EIS approval

in operations, maintenance, engineering and geology to be based in the region.





Mt TODD

Environmental Impact Statement

About this Study

In 2006 Vista Gold acquired mining and exploration leases for the Mt Todd Gold Mine located approximately 50 km north-west of Katherine and 250 km south of Darwin in the Northern Territory, Australia. The Mt Todd mine site contains several mineral leases covering approximately 5,365 ha.

Vista Gold has engaged an independent consultant, GHD Pty Ltd, to undertake an Environmental Impact Statement (EIS) to identify potential environmental, social, transport,

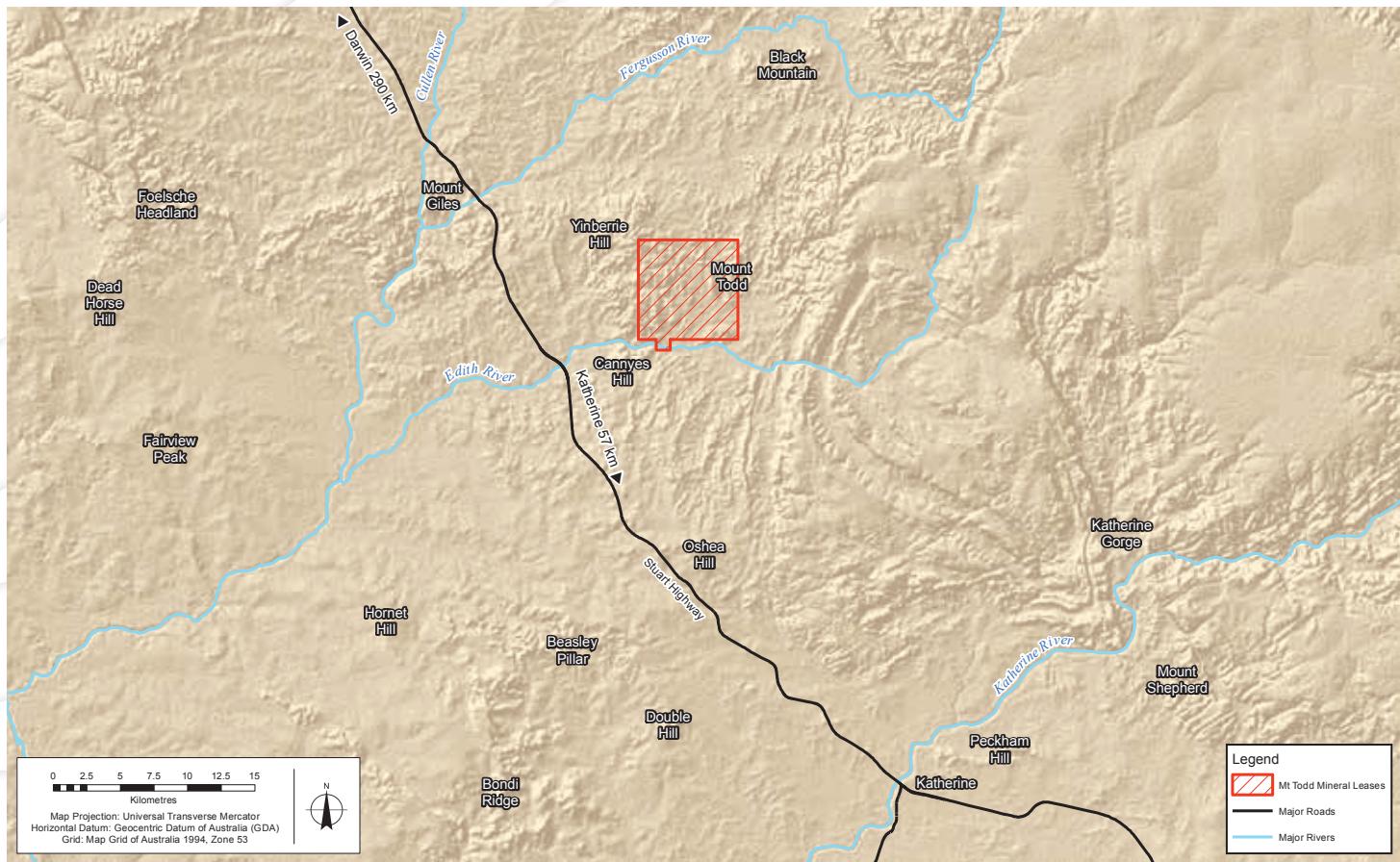
accommodation, cultural and economic impacts associated with reopening and operating the Mt Todd Gold Mine.

The Environmental Impact Statement – what's involved?

The NT Department of Natural Resources Environment the Arts and Sport (NRETAS) has determined the Mt Todd Gold Project will be assessed under the NT Environmental Assessment Act 1982 with a subsequent Environmental Impact Statement (EIS) required.



Locality Map



© 2011. Whilst every care has been taken to prepare this map, GHD, NRETAS, ESRI and Geoscience Australia make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

The Federal Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) has declared the Project to be a “controlled action” requiring assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). A number of other legislative acts are also relevant to the Project and will be considered as part of the EIS. One EIS will be prepared for the Project and assessed by both the Northern Territory and Federal Governments.

An EIS describes the potential positive and negative impacts of the proposed activities of the Project. These impacts need to be considered in relation to:

- The natural and physical environment – land, water, air, infrastructure, services, ecology, environmental values at the site and the surrounding areas
- The social and cultural environment including people, places, social networks, community services, heritage, cultures and way of life
- The economic environment

The EIS will recommend ways to reduce or remove potential negative impacts and enhance potential positive impacts from the Project.

EIS Consultation

Consultation with stakeholders commenced in January 2011 and has included:

- Discussions with representatives from Northern Territory Government Departments and local government.
- Discussions with representatives from non-government groups and key organisations in Katherine including NT Minerals Council, NT Environment Centre, Jawoyn Association, Katherine Hospital and the Katherine Police.
- An information stand at the Katherine Show where members of the Project team talked to the community and conducted a community perception survey on issues relevant to the Project.

The purpose of this consultation has been to seek community views on the proposed project and to gain an appreciation of issues, concerns and suggestions they may have for the project. A majority of people surveyed have indicated support for the project on the basis of the potential local and regional economic benefits.

Key areas of interest identified by the community included:

- local and regional employment opportunities
- environmental management and protection
- additional housing to support the project work force
- appropriate planning of associated support infrastructure including planning for additional population associated with the operational workforce

This valuable information will inform the EIS including the Social Impact Assessment (SIA).

Consultation is ongoing and there are a number of ways in which community members can become involved.

Community Input

Community input is an important part of the EIS. It will help the Project team understand what issues are important to the community and potentially causes social, economic or environmental impacts. It will also allow the Project team to identify ways to avoid, mitigate or manage any potential negative impacts and maximise positive ones.

EIS Public Consultation

April 2011	Mt Todd Gold Project Notice of Intent lodged with the NT Government
July 2011	Commencement of community consultation on EIS including stand at Katherine Show
August 2011	Environmental investigations and studies progressing
September 2011	Draft EIS Guidelines released for public comment (27 August – 12 September, 2011)
	Public Information Sessions (Katherine and Pine Creek)
	Final EIS Guidelines released
	Draft EIS Released for public comment

Have your say on the Project

Visit: www.mttodd.com.au for more information on Vista Gold and the Mt Todd Gold Project
Email: drwmail@ghd.com
Telephone: 1800 880 035
Write: Mt Todd Gold Project, GHD Pty Ltd, PO Box 351, Darwin NT 0801





Environmental Impact Statement



About this Study

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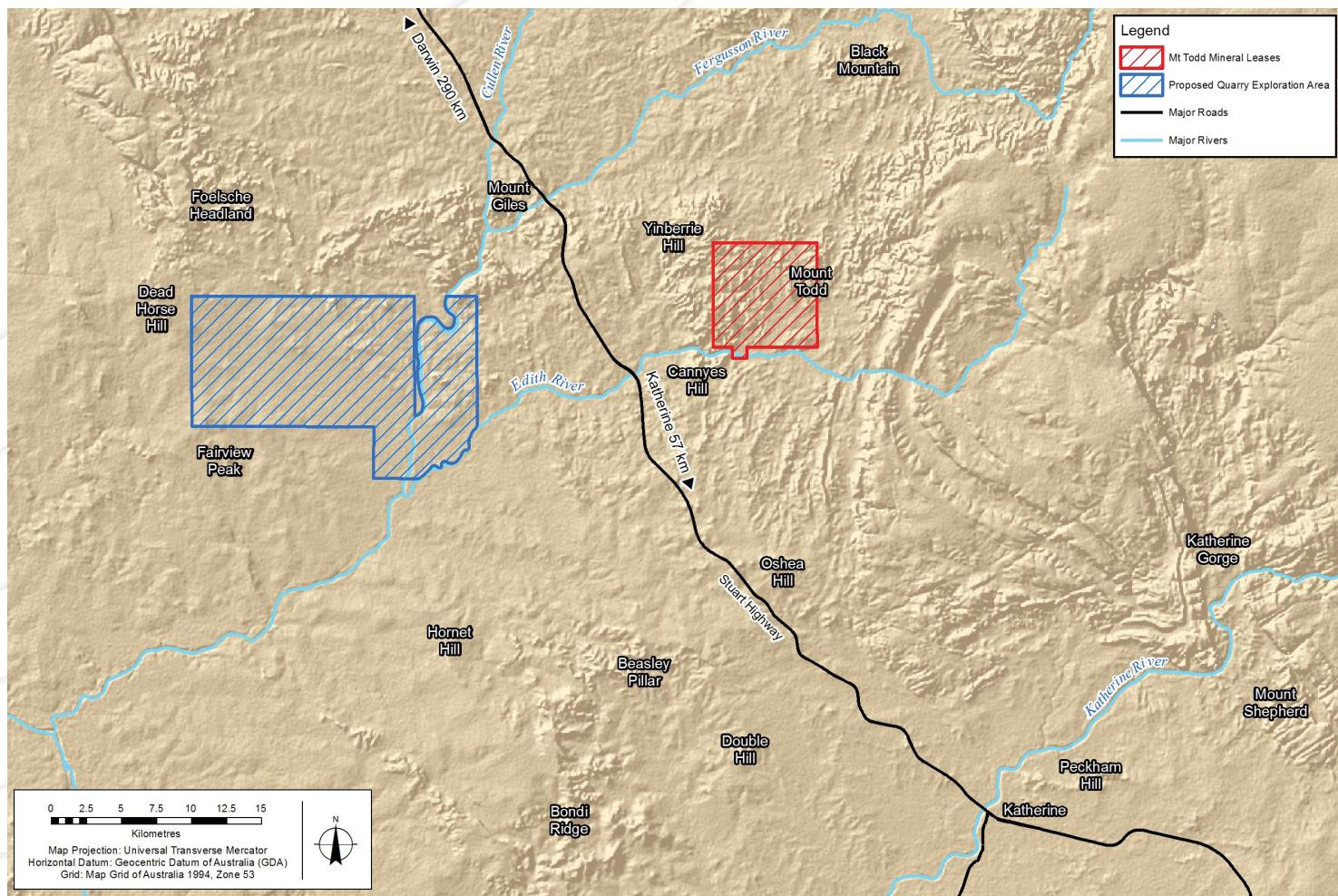
Vista Gold has engaged an independent consultant,

GHD Pty Ltd, to undertake an Environmental Impact Statement (EIS) to identify potential environmental, social, transport, accommodation, cultural and economic impacts associated with reopening and operating the Mt Todd Gold Mine and establishment of a limestone quarry approximately 20 km to the west of the site. Limestone will be used as a neutralising agent in mining operations and rehabilitation.

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Locality Map



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Data Source: NRETAS - Waterways (2011), Geoscience Australia - Locations (2008), Navteq - Major Roads (2008), Vista Gold - Mt Todd Mineral Lease Boundaries (2011), ESRI - SRTM (2008), GHD - Proposed Quarry Exploration Area (2011).

© 2011. Whilst every care has been taken to prepare this map, GHD, NRETAS, ESRI and Geoscience Australia make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

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Key areas of interest identified by the community included:

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Consultation is ongoing and there are a number of ways in which community members can become involved.

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EIS Public Consultation

April 2011	Mt Todd Gold Project Notice of Intent lodged with the NT Government
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	Public Information Sessions (Katherine and Pine Creek)
	Final EIS Guidelines released
	Draft EIS Released for public comment

Have your say on the Project

There are a number of opportunities for the community to become involved in the EIS process.

- Visit: www.mttodd.com.au for more information on Vista Gold and the Mt Todd Gold Project, or www.nt.gov.au/nreta/environment.assessment.register.comment to comment on the draft EIS Guidelines released by NRETAS
- Attend: a Community Information Session – visit www.mttodd.com.au for details
- Email: sharon.beattie@ghd.com
- Telephone: 1800 880 035
- Write: Mt Todd Gold Project, GHD Pty Ltd, PO Box 351, Darwin NT 0801
- All feedback is important and will be incorporated into the decision making process.





Community Update

27 February 2013



Vista Gold would like to thank members of the Katherine community who attended the Mt Todd Community Update on Saturday, 16 February 2013.

The meeting provided a valuable opportunity for Vista Gold to share information, particularly relating to the recently issued Waste Discharge Licence and the water treatment program at the mine site.

Items raised at the meeting included the following:

- The water treatment program for water stored in Batman Pit is progressing very well, with the pH level of the water rising from 3.3 to 6.3. The target is a pH level of 7.2.
- The Northern Territory Government has issued a Waste Discharge Licence for the release of water from the mine site. A copy of the Licence and Vista Gold's Discharge Plan can be found on our website.
- Vista Gold will only release water when the quality of the water and the flow of the Edith River meet the 80% species protection level.



- An 80% species protection level means - 80% of all species are protected and unaffected. The remaining 20% of species may experience a temporary 10% reduction in reproductive potential and/or growth within the mixing zone during discharge. Outside the mixing zone and after discharge ceases, the 95% species protection level is met.
- So far this Wet Season, Vista Gold has not released any water from the mine site, in fact water levels have decreased due to evaporation.
- As part of the licence conditions daily monitoring results are now required to be posted on our website every month, when releasing water.
- Vista Gold is a responsible member of the local community and remains committed to safeguarding the environment.

For further information on the Mt Todd project or to download a copy of the presentation please visit our website.

Brent Murdoch
General Manager



Community Update

24 April 2013



Vista Gold is pleased to announce that the Northern Territory Government has awarded the Mt Todd gold project Major Project Status.

Major Project Status is awarded by the Government to projects that have the potential to deliver significant economic opportunities to the Northern Territory.

Speaking with the Minister for Mines and Energy, Willem Westra Van Holte, Vista Gold President and CEO, Frederick Ernest said that he was extremely pleased with the NT Government's continued support for the redevelopment of the Mt. Todd gold project.

"Major Project Status is an indication of the Government's continued focus on the Mt Todd gold project and commitment to regional development in the Katherine region. Areas of shared interest – whether related to the departments of

Mines and Energy, Treasury, Lands and Planning or Environment – will now be handled at the highest level within the NT Government, with coordination provided by the office of the Chief Minister.

"This decision recognises the significance of the project and its benefit to the future development of the Northern Territory. We look forward to our continued work with the NT Government in the development of the Mt. Todd gold project," he said.

Vista Gold is encouraged by the potential of the Mt Todd gold reserve and genuinely sees an opportunity of bringing the mine back to life as a world-class gold mine.

For further information about the Mt Todd gold project visit our website.

**Brent Murdoch
General Manager**





Appendix B

Community Views Survey



Mt Todd Gold Project – Community Views Questionnaire

Purpose

The purpose of this survey is to collect information on community views on the proposed Mt Todd Gold Project. This includes the proposed re-opening of the Mt Todd Mine and accommodation components. This information will be used to inform the Environmental Impact Statement for the Project.

Questionnaire

Q1. Are you a:

- ▶ Katherine resident
- ▶ Neighbour (residing within 30km of Katherine)
- ▶ Northern Territory Resident
- ▶ Inter-state visitor
- ▶ Tourist

Q2. Have you heard of this project previously? Yes/No

Q2a. How did you hear of it?

Q3. What is your level of support for this project?

- ▶ Strongly not supportive
- ▶ Not supportive
- ▶ Neutral
- ▶ Supportive
- ▶ Very supportive

Q4. What do you think will be the positive benefits from the Project?

Q5. What do you think will be the negative impacts from the Project?

Q6. What issues are most important to you?

- ▶ Local employment opportunities
- ▶ Local and regional business opportunities
- ▶ Environmental management of the mine
 - Water quality
 - Loss of Gouldian Finch habitat



- Traffic
- Noise
- Dust
- Cultural heritage
- Management of the mine workforce to minimise any increase in anti-social behaviours
- Other, please identify.....
- None

Q7. In terms of accommodation for any additional workers for the Project, what would be your preference?

For construction workers,

- Fly In/Fly workers using temporary accommodation in Katherine or nearby areas
- Fly in Fly accommodation at a work camp located at the Project Site

For operational workers,

- New housing located in Katherine and nearby areas
- Other, please describe

Q8. Do you have any ideas for how the Project could perform to benefit the community?

Thank you for your time.



Appendix C

Public Notices and Advertising



Media Release

Call for Mt Todd Environmental Impact Statement

Friday 26 August 2011

Vista Gold Corp. welcomes the release of the Draft Guidelines for an Environmental Impact Statement (EIS) for the Mt Todd Gold Project.

Company President and Chief Operating Officer, Mr Frederick Ernest said the release of the guidelines was a major milestone in the process of their assessment of the site as a producing gold mine.

"We are encouraged by the potential of the Mt Todd site and are currently conducting a definitive feasibility study to determine if the property can be re-opened."

The "brownfield" site is located approximately 50km north of Katherine and 250 kms south of Darwin in the Northern Territory, Australia. The mine tenement is approximately 160,800ha.

Over the past five years, Vista Gold has taken an orderly, methodical and conservative approach to determine the future of the site.

In November 2010, The Northern Territory Government renewed its agreement with Vista Gold for the care and maintenance of the site, demonstrating both the Government's and Vista Gold's commitment to assessing the feasibility of developing the site.

The Northern Territory Minister for Natural Resources, Environment and Heritage, Karl Hampton MLA recently determined the requirement for an EIS under the Environmental Assessment Act.

The Draft EIS Guidelines are available from Saturday, 27 August 2011 for public comment until Monday, 12 September 2011 and are available at:
<http://www.nt.gov.au/nreta/environment/assessment/register/index.html>

Members of the public wishing to gain more information on the site may contact Vista Gold through the Mt Todd project website at mttodd.com.au

"We are working closely with authorities and are committed to managing this site in an environmentally sound manner," Mr Ernest said.

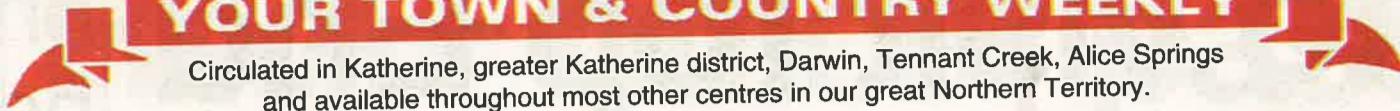
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Twittercue: Vista #Gold Corp. welcomes release of Draft EIS Guidelines for the Mt Todd Gold Project. #mining #resources #topend

Media enquiries: Jeannette Button +61 8 89419169, +61 407 727 080

Katherine Times

YOUR TOWN & COUNTRY WEEKLY



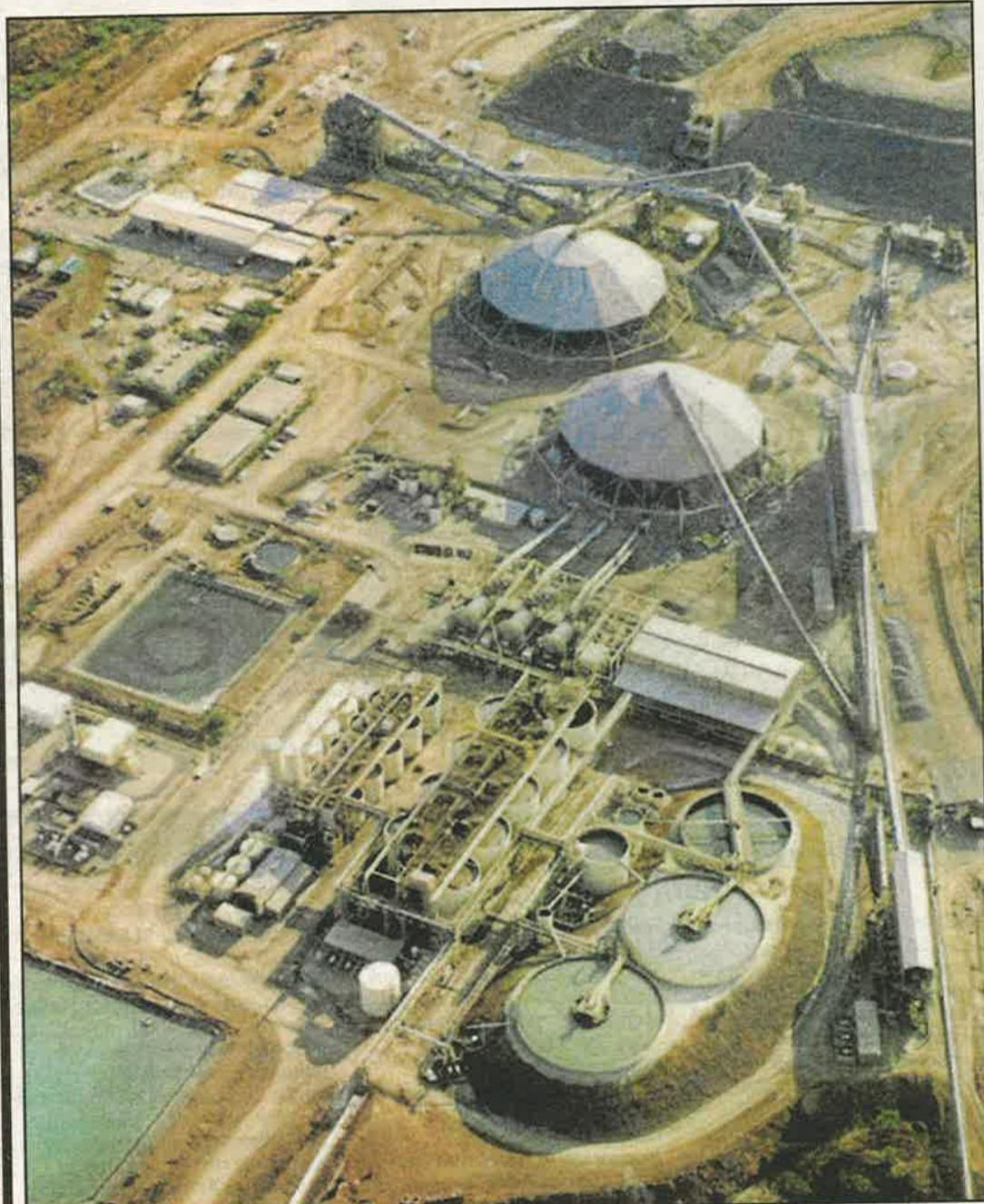
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Ph 8972 1111 Fax 8971 0120

WEDNESDAY, SEPTEMBER 21, 2011

Vol 29 Issue 36 \$1.10

400 jobs if old gold mine opens



The bad old days ... the Mt Todd Gold site processing plant before it was closed down

Public meetings set to be held

THE potential re-opening of the MT Todd gold mine would provide an economic boon for the Katherine region.

US company Vista Gold, which acquired the unused site for \$2.1million in 2006 has signalled its intention to reopen the mine with its feasibility study set to be complete this year.

Vista Gold has also engaged independent consultant, GHD Pty Ltd, to undertake an Environmental Impact Statement to identify potential environmental, social, transport, accommodation, cultural and economic impacts associated with reopening and operating the gold mine.

Under the planned timeline, production at the mine would be in full swing in about 2.5 years, Vista Gold environmen-

tal manager Andrew Sawicki told Territory media this week.

Mr Sawicki said the mine, which currently employs about 70 people, would employ about 400 by then.

Vista Gold has decided to forge ahead with its plan to re-open the mine because of the high price of gold.

According to the company the total mineral resource estimate for the MT Todd deposit is now almost 6 million ounces.

Vista Gold also believes there are more reserves at other sites close to the mine that could potentially yield better returns. The Mt Todd mine, 50km north of Katherine, was closed over a decade ago and the Territory Government was

Continued Page 3

**Another UFO
spotted over Katherine
- Page 5 -**

**New piece of
history for museum
- Page 3 -**

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The Public Notices ran in the NT News on Saturday 17 and 24 September and the Katherine Times on Wednesday 21 September.

Media coverage included ABC Radio, Katherine Community Radio and the Katherine Times.



Public Notice

Vista Gold Australia will hold community information sessions regarding progress to date and proposed plans for the Mt Todd Gold Project, 50 kms north-west of Katherine, on:

- Saturday 24 September, 9am – 12 noon, at the Woolworths Shopping Centre, Katherine
- Monday 26 September, 6.30pm – 8.30pm, at the Pine Creek Community Hall
- Tuesday 27 September, 7.30am at the Katherine Chamber of Commerce Business Breakfast

Local community members are encouraged to attend and participate.

For further information telephone 1800 880 035 or visit www.mttodd.com.au



Community Information Session

Vista Gold Australia will hold community information sessions regarding progress to date and proposed plans for the Mt Todd Gold Project, 50 km north-west of Katherine, on:

- Saturday 24 September, 9am – 12 noon, at the Woolworths Shopping Centre, Katherine
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Local community members are encouraged to attend and participate.

For further information telephone 1800 880 035 or visit www.mttodd.com.au

Public Notice

The Public Notices ran in the NT News on Saturday 17 and 24 September and the Katherine Times on Wednesday 21 September.

Media coverage included ABC Radio, Katherine Community Radio and the Katherine Times.



Appendix D

Media Release



Media Release

Vista Gold Australia invites local community to have their say

Friday 16 September 2011

Vista Gold Australia will hold a number of community information sessions regarding the Mt Todd Gold Project, 50 kms north-west of Katherine, starting next week.

Ray Iacono, Managing Director Vista Gold Australia says that the information sessions will enable Vista Gold to update the community on their progress to date and provide opportunities for the public to comment on aspects of the project.

"To date, we have received very positive feedback from the community based on their support for the potential local and regional economic benefits. We encourage the communities of Katherine and Pine Creek to participate in these information sessions so that we have a clear understanding of the issues that are important to them," Mr Iacono said.

Vista Gold has engaged independent consultant, GHD Pty Ltd, to undertake an Environmental Impact Statement (EIS) to identify potential environmental, social, transport, accommodation, cultural and economic impacts associated with reopening and operating the gold mine.

"The EIS will recommend ways to reduce or remove potential negative impacts and enhance potential positive impacts from the mine project."

The community information sessions will be held on:

- Saturday 24 September, 9am – 12 noon, at the Woolworths Shopping centre, Katherine
- Monday 26 September, 6.30pm – 8.30pm, at the Pine Creek Community Hall
- Tuesday 27 September, 7.30am at the Katherine Chamber of Commerce Business Breakfast

Since acquiring the Mt Todd project in 2006, Vista Gold has taken an orderly, methodical and conservative approach to determine the future of the site.

In November 2010, The Northern Territory Government renewed its agreement with Vista Gold for the care and maintenance of the site, demonstrating both the Government's and Vista Gold's commitment to assessing the feasibility of developing the site.

With an improvement in the gold price, Vista Gold Australia is working towards getting the site back to production, with approvals and permits expected to be in place during 2012.

-ends-

Media enquiries: Jeannette Button 89419169, 0407 727 080



Appendix E

Mt Todd Web Page



Current Gold Price

International gold news,
commentary and prices.

[View Now](#)

Quick Links

- > [Vista Gold Website](#)
- > [Gold Price Australia](#)
- > [View Technical Reports](#)

Welcome to the Mount Todd Gold Mine

The Mt Todd gold mine is located approximately 50km north of Katherine and 250 km south of Darwin. The Mt Todd mine site contains several mineral leases covering approximately 5,365 ha.

The site was acquired by Vista Gold and its wholly owned subsidiary Vista Gold Australia in 2006.

In November 2010, The Northern Territory Government renewed its agreement with Vista Gold for the care and maintenance of the site, demonstrating both the Government's and Vista Gold's commitment to assessing the feasibility of developing the site.

Vista Gold is currently working through and investigating the environmental, technical and economic factors of the project in order to make a sound and informed decision regarding the future of the mine.

**GHD**

Level 5, 66 Smith Street

Darwin NT 0800

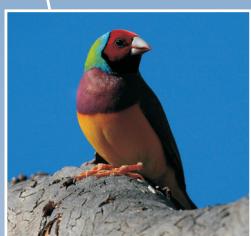
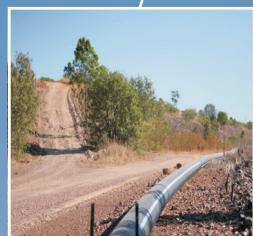
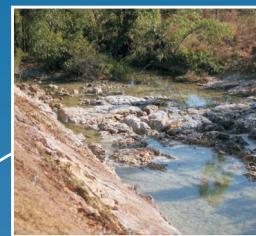
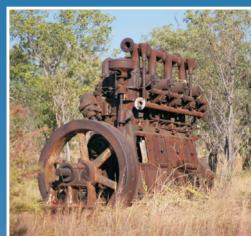
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		Name	Signature	Name	Signature	Date
1	N Dommisce	I McCardle K Fitzpatrick	 	I McCardle		04/06/13



APPENDIX F

Social Impact Assessment



CLIENTS | PEOPLE | PERFORMANCE

Vista Gold Australia Pty Ltd

Mt Todd Gold Project Social Impact Assessment

June 2013





This Social Impact Assessment (“Report”):

1. *has been prepared by GHD Pty Ltd (“GHD”) for Vista Gold Australia Pty Ltd;*
2. *may only be used and relied on by Vista Gold Australia Pty Ltd;*
3. *must not be copied to, used by, or relied on by any person other than Vista Gold Australia Pty Ltd without the prior written consent of GHD;*
4. *may only be used for the purpose of Review (and must not be used for any other purpose).*

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Vista Gold Australia Pty Ltd arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- *were limited to those specifically detailed in section 1.2 of this Report;*
- *did not include section 2.7*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report (“Assumptions”), including (but not limited to) section 2.7.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation and may be relied on for 6 months, after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.



Contents

Executive Summary	i
1. Introduction	1
1.1 Proponent	1
1.2 Purpose of the SIA	1
1.3 Objectives of the SIA	1
1.4 Statutory Requirements	1
1.5 Overview of the SIA Approach	2
1.6 Policies, Plans and Guidelines	2
1.7 Project Overview	3
1.8 Factors Influencing Scope	4
1.9 Defining the Study Area	4
2. SIA Methodology	7
2.1 Introduction and Background	7
2.2 SIA Guiding Principles	7
2.3 Overview of the SIA Methodology	8
2.4 Public Consultation Program	9
2.5 SIA Conceptual Framework – Social Change vs. Social Impact	13
2.6 Impact Identification, Description and Significance Assessment	13
2.7 Assumptions/Limitations/Exclusions for this Study	15
3. Workforce Profile	16
3.1 Construction Phase	16
3.2 Estimated Operation Workforce	18
4. Social Baseline	21
4.1 Introduction	21
4.2 Planning context	21
4.3 Local Study Area	24
4.4 Lower Top End/Katherine – Regional Study Area	60
5. Social Impact Assessment	73
5.1 Impact Assessment Steps	73
5.2 Social Changes and Social Impacts	73



5.3	Summary of Key Issues Identified During Stakeholder Consultation	75
5.4	Social Impacts Construction and Operations Phase	77
5.5	Summary of Social Impacts	96
6.	Social Impact Management Strategies	100
6.1	Workforce Management Strategy	100
6.2	Housing and Accommodation	101
6.3	Employment, Education and Training	101
6.4	Community and Stakeholder Engagement	101
6.5	Vista Gold Sponsorship Program	101
6.6	Near Neighbour Program	101
6.7	Industry Participation Plan	102
6.8	Jawoyn Partnership Agreement	102
7.	Monitoring and Reporting	103
8.	References	104

Table Index

Table 1	Summary of SIA Activities	10
Table 2	Summary of Literature Review Documents	12
Table 3	Assessment of Likelihood and Consequence of Identified Negative Social Impacts	15
Table 4	Resident population (2001, 2006, 2011)	26
Table 5	Indigenous Population Katherine LGA 2011 Census	31
Table 6	Family Structures by Type, 2011	32
Table 7	Highest Level of School Attended	34
Table 8	Level of Post-School Qualifications Achieved: Percentage of Total Population Aged 15 Years and over	35
Table 9	Educational Institution Attendance, Katherine	35
Table 10	Technical Fields of Study: 15 Years and over Katherine	36
Table 11	VET Students Katherine Region (2003-2007)	36
Table 12	Jobseeker Characteristics (September 2007)	37
Table 13	Labour Force, Employment and Unemployment 2010	38



Table 14	Time Series Labour Force Data for Katherine and Northern Territory	38
Table 15	Disaggregated Employment by Industry Katherine Region 2011	41
Table 16	Occupation of Employed Persons as a Percentage of Total Employed Persons, Katherine 2011	41
Table 17	Skills Shortages in Northern Territory at March, 2011	42
Table 18	Katherine Indigenous Population Labour Force in 2011	44
Table 19	Katherine Median Property Prices (June Quarter)	46
Table 20	List of Temporary Accommodation in Katherine	47
Table 21	Building Approvals, Year ended 30 June	48
Table 22	Summary of health facilities and services	51
Table 23	List of Schools in Katherine	55
Table 24	Training and Employment Services	56
Table 25	Childcare Centres	56
Table 26	List of Facilities for Socialising	58
Table 27	Resident Population (2001, 2006, 2011)	67
Table 28	Indigenous Population Katherine LGA 2011 Census	68
Table 29	Highest Level of School Attended	70
Table 30	Level of Post-school Qualifications: Percentage of Total Population Aged 15 Years and Over	70
Table 31	Type of Educational Institution Attending – Lower Top End	71
Table 32	Non-school Field of Study 15 Years and over Lower Top End	71
Table 33	Social Aspects, Project Activities and Social Changes	74
Table 34	Major Issues Identified During Public Consultation	75
Table 35	Summary Social Impact and Significance Assessment	97
Table 36	Descriptions of Likelihood	108
Table 37	Indicative Criteria for Negative Social Impacts	108
Table 38	Indicative Criteria for Positive Social Impacts	109
Table 39	Assessment of Likelihood and Consequences of Identified Negative Social Impacts	111
Table 40	Duration of the Social Impact	111
Table 41	Spatial Extent of the Spatial Impact	111
Table 42	Acceptability of the Social Impact	112



Figure Index

Figure 1	Local Study Area	5
Figure 2	Regional Study Area	6
Figure 3	SIA and Public Consultation Overview	9
Figure 4	EIS Consultation Stages and Timeframes	11
Figure 5	Population by Residents and Visitors, Katherine 2011	27
Figure 6	Number of persons moving to Katherine, within 1 and 5 years prior to 2011	28
Figure 7	Population by Age and Sex, Katherine and Northern Territory, 2011	28
Figure 8	Population by Age and Sex, Pine Creek and Northern Territory, 2011	29
Figure 9	Indigenous Age and Sex, Katherine and Northern Territory	29
Figure 10	Indigenous Age and Sex, Pine Creek and Northern Territory	30
Figure 11	Male-Female Ratio, Katherine, Pine Creek, Northern Territory, Alice Springs	31
Figure 12	Household Income (\$/week) by Family Composition, Katherine	39
Figure 13	Household Income for Households with Indigenous Persons, Katherine 2011	39
Figure 14	Industry of Employment by Sex, Katherine 2011	40
Figure 15	Wage and Salary Earners by Age and Sex, Katherine LGA 2011	43
Figure 16	Industry of Employment Indigenous Persons, Katherine 2011	43
Figure 17	Household Types, Katherine 2011	45
Figure 18	Housing Types, Katherine 2011	45
Figure 19	Katherine Regional Health Clinics	49
Figure 20	Katherine Health Clinics	50
Figure 21	Jawoyn Country	62
Figure 22	Age-Gender Composition Lower Top End 2011	68
Figure 23	Indigenous Population Age-Gender Distribution, Lower Top End NT 2011	69
Figure 24	Industry by Employment, Lower Top End 2011	72



Appendices

- A Significance Assessment Methodology
- B EIS Preparation Guidelines
- C Social Impact Management Plan



Executive Summary

Vista Gold proposes to re-establish and re-open the Mt Todd Gold Mine, located 55km northwest of Katherine and 250km south of Darwin. The proposed operations involve open cut mining and processing of up to 19 Million tonnes of ore per annum (Mtpa) to produce gold Dore (unrefined gold). Gold Dore would be transported by secure containment to Darwin and shipped to a refinery.

The majority of social impacts associated with the Project will occur within the Katherine Local Government Area and the town of Katherine. Some wider social impacts are also likely to occur at a regional level defined by the Lower Top-end Northern Territory region and within the Northern Territory more broadly.

The Project will be undertaken in three phases spanning an estimated 19 years. The Project will commence in 2014 with a two year pre-construction construction phase followed by a 13 year operations phase and four year closure and rehabilitation phase.

The construction and operations workforces will peak at approximately 450 and 350 personnel respectively.

Social Impact Assessment

A social impact assessment (SIA) has been completed as part of the Project's Draft Environmental Impact Statement. The SIA has been undertaken based on robust methodology and in accordance with the International Association for Impact Assessment (IAIA) principles for SIA. The SIA was undertaken using a range of social research methods including desktop assessment, analysis of quantitative and qualitative information sources, undertaking a community views survey, key stakeholder interviews, field research, focus group sessions and a workshop.

The purpose of the SIA was to identify and assess the significance of likely social impacts and benefits arising from the Project, and to develop appropriate mitigation, management and monitoring strategies. These strategies are detailed in a Social Impact Management Plan.

Public consultation and engagement activities were coordinated with SIA research activities to maximise stakeholder involvement and input to the SIA.

Key social impacts identified were in relation to: workforce management; housing and accommodation; economic and employment opportunities; community infrastructure and services; community health, safety and wellbeing; Indigenous resources, values and aspirations; and mine closure and rehabilitation.

Key social benefits arising from the project include significant employment and economic development opportunities for the Katherine Region; and opportunities for Indigenous employment and economic development. In addition, there are significant positive social and environmental benefits arising from the opportunity to address the negative historical legacy of the Mt Todd Gold Mine through improved environmental and financial management.



Social Impact Management

A Social Impact Management Plan (SIMP) has been developed (Appendix C). The purpose of this plan is to describe Vista Gold's commitment to minimising negative social impacts and enhancing the overall benefits of the Project. This plan identifies:

- ▶ Purpose and methodology;
- ▶ A summary of the Project;
- ▶ Social impacts and benefits and their significance;
- ▶ Impact management strategies, including the mechanism for ongoing Stakeholder engagement;
- ▶ Action plans for key impact areas; and
- ▶ Mechanisms for implementation, monitoring and reporting against these action plans.

The mitigation strategies and action plans included in the SIMP are developed around the following themes:

- ▶ Community Values and Change;
- ▶ Local Industry Participation, Employment and Training;
- ▶ Housing and Accommodation;
- ▶ Environmental Impact Statement Management Plan (Roads, Traffic and Safety);
- ▶ Workforce Management Strategy;
- ▶ Near Neighbour Program; and
- ▶ Social Infrastructure and Services.



1. Introduction

1.1 Proponent

The Proponent for this Project is Vista Gold Australia Pty Ltd (Vista Gold).

1.2 Purpose of the SIA

The purpose of the Social Impact Assessment (SIA) is to assess the potential social impacts and benefits of the Project on affected communities consistent with Section 4.8 of the *Guidelines for Preparation of an Environmental Impact Statement: Mt Todd Gold Project, Katherine Region NT* (Guidelines). This SIA has been undertaken as part of preparing a Draft Environmental Impact Statement (EIS) for the Project.

1.3 Objectives of the SIA

The objectives of the SIA were to:

- ▶ Identify and evaluate the ways that the Project may impact on the community and other stakeholders, including both positive and negative impacts;
- ▶ Describe the existing social environment (social baseline) including local and regional communities potentially affected by the Project;
- ▶ Identify potential social impacts and opportunities arising from the Project;
- ▶ Assess the potential significance of social impacts and benefits of the Project; and
- ▶ Recommend mitigation and management measures to avoid, mitigate or manage adverse impacts or to enhance opportunities related to the Project.

1.4 Statutory Requirements

The Northern Territory Environment Protection Agency (formerly the Department of Natural Resources, Environment, The Arts and Sport) has determined that the Project requires formal assessment, under the *NT Environmental Assessment Act 1982* (EA Act), at the level of an Environmental Impact Statement (EIS). The proposal has also been referred to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and has been determined to be a controlled action, requiring formal assessment. This SIA has been prepared in accordance with Section 4.8 of the *Guidelines for Preparation of an Environmental Impact Statement: Mt Todd Gold Project, Katherine Region NT*.



1.5 Overview of the SIA Approach

The SIA was conducted as part of the Project EIS and approvals process. The approach to the SIA was as follows:

- ▶ Initial scoping, involving:
 - Determining a study area for the SIA based on the likely geographical extent of social impacts and benefits of the proposed Project; and
 - Preliminary screening of potential social impacts;
- ▶ Developing a social baseline for the study area to understand the existing social conditions and characteristics of the communities therein. This included a detailed description of the demography, lifestyle, community values, health, housing, environment and economic factors that characterise the communities;
- ▶ Identifying potential social impacts (positive and negative) and evaluating the potential significance of these impacts to stakeholders;
- ▶ Developing mitigation and management strategies and monitoring mechanisms to minimise negative impacts and maximise the benefits for affected communities and documenting these in a Social Impact Management Plan (SIMP) (Appendix C); and
- ▶ Undertake stakeholder engagement activities to:
 - Inform and validate social baseline data collection;
 - Identify current issues in relation to social impacts; and
 - Respond to issues and concerns raised by stakeholders and seek stakeholder input in developing mitigation measures.

1.6 Policies, Plans and Guidelines

The following policies, plans and guidelines have been referred to in developing the SIA:

1.6.1 International Best Practice

- ▶ International Principles for Social Impact Assessment (International Association for Impact Assessment – IAIA, 2003); and
- ▶ International Association for Public Participation, Core Values for Public Participation Processes (IAP2, 2007).

1.6.2 Northern Territory Plans and Policies

- ▶ Consultation Paper for the Katherine Land Use Study (under development);
- ▶ *Territory: 2030 Strategic Plan (2009)*.



1.6.3 Local Government

- ▶ Local Government Regional Management Plan – Big Rivers Region (Department of Local Government, 2012);
- ▶ Katherine Town Council Municipal Plan 2013;
- ▶ Roper Gulf Shire Plan 2012-2013; and
- ▶ Victoria Daly Shire Plan 2012-13.

1.7 Project Overview

Vista Gold proposes to re-establish and re-open the Mt Todd Gold Mine, located 55km northwest of Katherine and 250km south of Darwin.

The main proposed Project components comprise:

- ▶ Extension of the existing Batman Pit;
- ▶ Expansion of the existing Waste Rock Dump;
- ▶ Existing Tailings Storage Facility (TSF1);
- ▶ Proposed new Tailing Storage Facility (TSF2);
- ▶ Raising of the Raw Water Dam and an increase in the area of inundation;
- ▶ Construction of haul roads and possible realignment of the existing access road;
- ▶ Rehabilitation of the existing heap leach pad (HLP); if residual HLP material is not processed through the new plant;
- ▶ Diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection;
- ▶ Construction and processing of low grade ore stockpiles;
- ▶ New water treatment plant;
- ▶ Clay borrow area;
- ▶ Process plant workshops, administration and plant site buildings;
- ▶ Chemical and reagent storage and handling facility;
- ▶ Anaerobic treatment wetlands; and
- ▶ Process plant construction.

The proposed operations involve open cut mining and processing of up to 17.8 Million tonnes of ore per annum (Mtpa) to produce gold Dore (unrefined gold). Gold Dore would be shipped by secure containment to a refinery.

The Project will occur in three phases:

- | | |
|--|----------|
| ▶ Construction Phase | 2 years |
| ▶ Operations Phase | 13 years |
| ▶ Decommissioning and rehabilitation Phase | 4 years |

The construction and operations workforces will peak at approximately 450 and 350 personnel respectively.



1.8 Factors Influencing Scope

Scoping of the SIA involved:

- ▶ Determining the geographical boundaries of the assessment;
- ▶ Identifying the range of potential issues that may need consideration. This initial issues scoping ensures that:
 - Appropriate social baseline information is collected to support assessment of potential impacts on stakeholders; and
 - The full-range of potentially affected stakeholders are identified.

1.9 Defining the Study Area

The study area provides a spatial boundary to the Project. Key considerations include the nature and scale of potential social impacts and their interaction with:

- ▶ Landholders who have land within the Project boundaries and/or within the immediate area of the Project site (Local Study Area);
- ▶ Nearby communities and service centres affected by the Project (Local Study Area); and
- ▶ Communities more distant from the immediate area of Project influence which may also be affected in terms of indirect or induced social impacts (Regional and Wider Study Area).

1.9.1 Local Study Area

The local study area includes those communities located in close proximity to the Project Site where the majority of direct social impacts will be experienced. This area is determined to be the Town of Katherine which is located approximately 55km from the Project site. 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 operational workforce.

Figure 1 shows the local government administrative boundary of Katherine. This administrative boundary defines the Local Study Area for the purposes of this SIA Report.

1.9.2 Regional Study Area

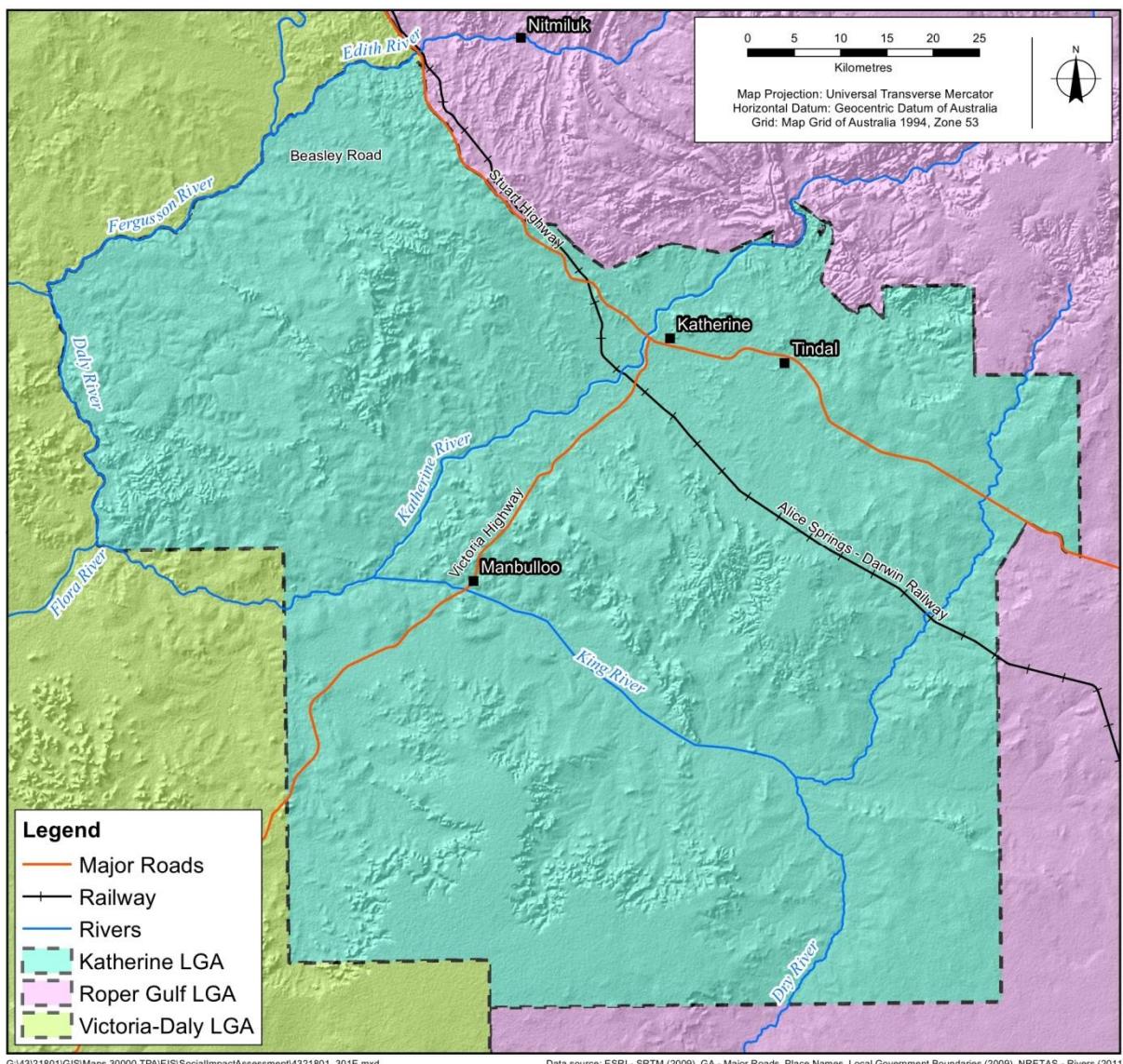
The regional study area (Figure 2) is determined as the Lower Top-end Northern Territory (an area spatially defined by the Australian Bureau of Statistics Statistical Subdivision). This area includes the local government areas of Roper Gulf Shire and Victoria Daly Shire.

Katherine is a regional hub for the Lower Top-End due to its strategic location within the Northern Territory. The Project will have an impact regionally through the supply of goods and services, provision of employment and generation of community interest and investment across the region.

The Regional Study Area also includes traditional land of the Jawoyn Aboriginal People. This land is referred to as Jawoyn Country.

1.9.3 Wider Study Area

The wider area for the Project includes the Northern Territory and Darwin.



(Source: http://www.localgovernment.nt.gov.au/shire_boundaries)

Figure 1 Local Study Area

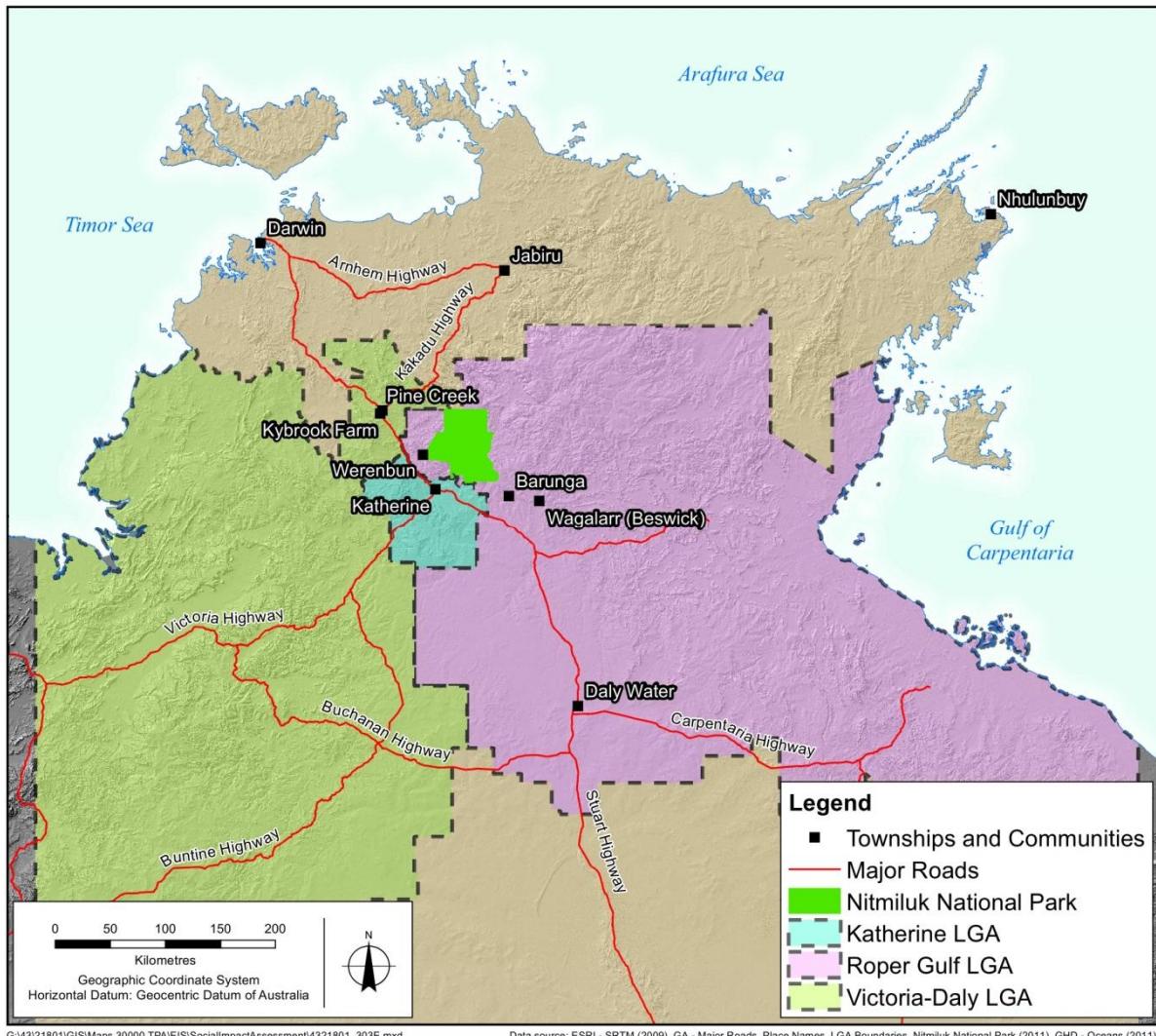


Figure 2 Regional Study Area



2. SIA Methodology

2.1 Introduction and Background

This section describes the methodology adopted for the SIA including key SIA stages and activities. The methodology has been informed by established SIA theory and practice described by Goldman (2000), van Schooten et al. (2003) and Vanclay (2002). The SIA has also been conducted in accordance with the IAIA guiding principles.

2.2 SIA Guiding Principles

The IAIA guiding principles are as follows:

- ▶ **Precautionary Principle**

In order to protect the environment, a concept which includes people's way of life and the integrity of their communities, the precautionary approach shall be applied. Where there are threats or potential threats of serious social impact, lack of full certainty about those threats should not be used as a reason for approving the planned intervention or not requiring the implementation of mitigation measures and stringent monitoring.

- ▶ **Uncertainty Principle**

It must be recognised that our knowledge of the social world and of social processes is incomplete and that social knowledge can never be fully complete because the social environment and the processes affecting it are changing constantly, and vary from place to place over time.

- ▶ **The Prevention Principle**

It is generally preferable and less expensive in the long-term to prevent negative social impacts and ecological damage from happening than having to restore or rectify damage after the event.

- ▶ **The Protection and Promotion of Health and Safety**

Health and safety are paramount. All planned interventions should be assessed for their health impacts and their accident risks, especially in terms of assessing and managing the risks from hazardous substances, technologies or processes, so that harmful effects from these are minimised, including not bringing them into use at all or phasing them out as soon as possible. Health impacts cover the physical, mental and social wellbeing and safety of all people, paying particular attention to those groups of the population who are more vulnerable and more likely to be harmed, such as the economically deprived, Indigenous groups, children and women, the elderly, the disabled, as well as to the population most exposed to risks from the planned intervention.



2.3 Overview of the SIA Methodology

The SIA methodology comprised the following key stages:

1. **Project Scoping** – This involved developing an understanding of the Project, defining the SIA scope and study area, identifying relevant SIA stakeholders and social baseline indicators and developing an outline structure for the SIA.
2. **Project Baseline** – This involved desktop research to inform the social baseline and included gathering and collating data from the Australian Bureau Statistics and relevant NT Government Departments, reviewing planning documents, community plans, reports and websites to develop a community profile. Gaps in information were identified so that this information could be collected during stakeholder consultations. Baseline stakeholder consultations were undertaken over seven days in Katherine and Darwin targeting the range of key stakeholder groups who have an interest in the Project.
3. **Project Description** – During this stage the Project description was refined based on stakeholder consultation and the outcomes of the scoping/baseline stage of the Project. A key area of Project refinement was the location of proposed accommodation facilities for the operations workforce.
4. **Impact Identification and Assessment** – A preliminary assessment of the potential Project impacts and opportunities informed the Project baseline and baseline stakeholder consultations. Stakeholder consultation on potential social impacts occurred during a second round of public consultation in Darwin, Pine Creek and Katherine including nearby Aboriginal Communities. The results of this consultation then informed the finalisation of the social impact assessment.
5. **Development of Mitigation, Enhancement and Monitoring Strategies for the Project** – Mitigation, enhancement and monitoring strategies were developed to address identified high priority social impacts in conjunction with Vista Gold and the Project Design Team.
6. **Development of Social Impact Management Plan**

A SIMP was developed for construction, operation and closure stages of the Project (Appendix C).

Figure 3 outlines these stages. They are presented in a linear fashion but were often conducted iteratively.

Table 1 outlines specific SIA activities and timing. These activities were also coordinated with EIS public consultation as these closely align, although have different objectives and purposes. Section 2.4 describes the public consultation program in general terms. For further detail refer to the Public Consultation Report.

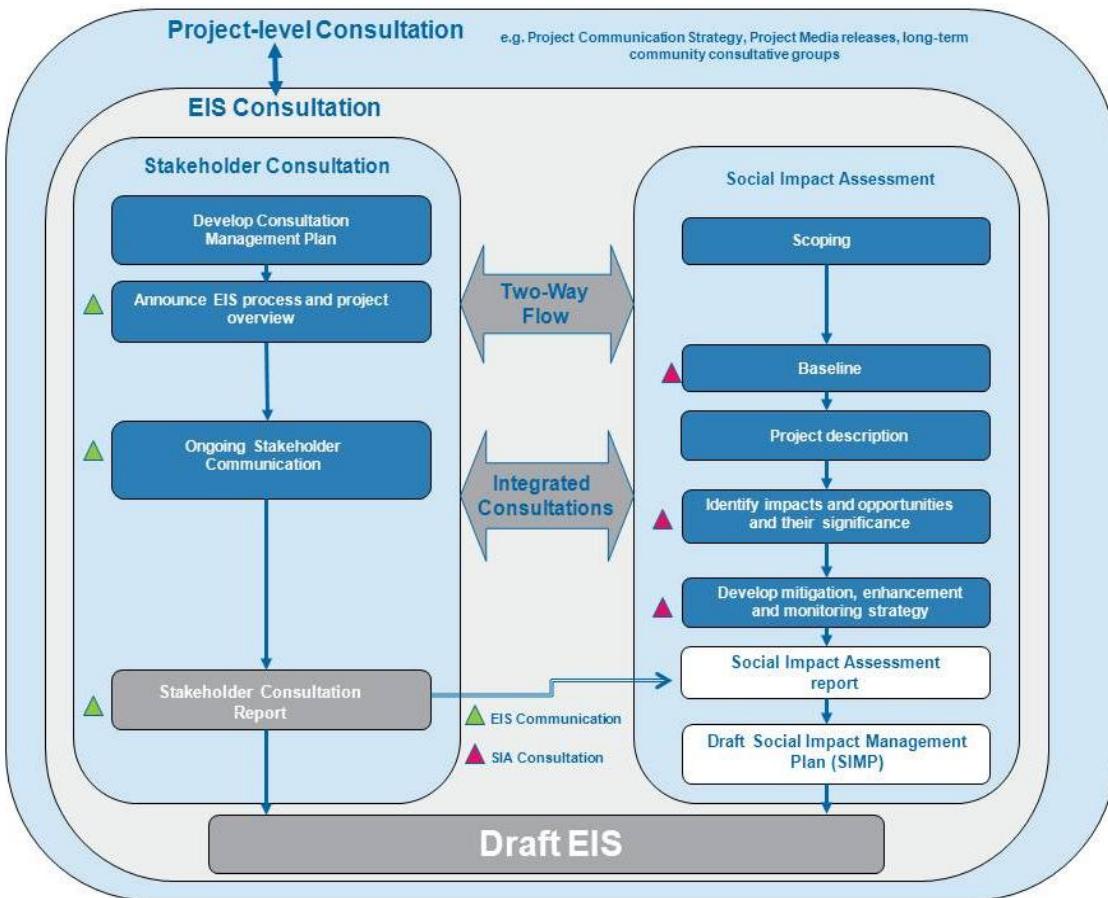


Figure 3 SIA and Public Consultation Overview

2.4 Public Consultation Program

EIS consultation commenced in early 2011 and was timed to coincide with key EIS milestones. Stages 1 and 2 below have been completed. Stage 3 and 4 will be undertaken following the release of the Draft EIS for public comment:

- ▶ Stage 1: EIS commencement including the release of the Notice of Intent (NOI);
- ▶ Stage 2: Release of the draft Guidelines for the Mt Todd Gold Project for Public Comment;
- ▶ Stage 3: Release of the Draft EIS; and
- ▶ Stage 4: Evaluation and EIS finalisation.

The sequencing of consultation activities is shown in Figure 4.



Table 1 Summary of SIA Activities

SIA Stage	Step	Month*	Task
Scoping	1	March 2011	SIA scope and methodology development Literature review of social impacts of mining Review of key Project background information including the Mt Todd Gold Project Draft Environmental Impact Statement prepared for Zappapan (NRS Environmental, 1993)
	2	April 2011	Identification of the Local, Regional and Wider Study Area (Section 1.9)
Baseline	3	April 2011	Community Information Stand at Katherine Show Conduct Community Views Survey (Katherine Show) Interviews with key Project stakeholders including Health Providers, Police and relevant NT Agencies and NGOs
	4	May/June 2011	Follow-up discussions with key Stakeholders
	5	September 2011	Community Information Sessions Katherine and Pine Creek Community Views Survey – Katherine Shopping Centre Interviews/Focus Groups with key Stakeholders including accommodation providers, RAAF Base Tindal and Environment Council NT.
Identify impacts and opportunities	6	September 2011	Workshop with Mt Todd Rehabilitation Reference Group Workshop with the Katherine Chamber of Commerce
Develop mitigation, management and enhancement strategies	7	January 2012	Develop housing and accommodation strategy
	8	July 2012	Finalise Draft SIA Report and proposed SIMP.
	9	December 2012	Update Draft SIA Report to incorporate 2011 census data and reflect changes to the Project.

* These dates represent the starting time for each activity.



	Q1 2011	Q1 2011 – Q2 2013	Q2 2013 – Q3 2013	Q3 2013– Q4 2013
STAGE	STAGE 1	STAGE 2	STAGE 3	STAGE 4
	Commencement of EIS process	Draft EIS Development	Public Exhibition of DRAFT EIS	Evaluation and EIS Conclusion
Consultation Activities	Stakeholder identification Conduct preliminary issue/risk assessment Document review Prepare Stakeholder Consultation Plan Government Agency consultations Preliminary community and key stakeholder consultations	Community Information Sessions Distribution of project information materials (fact sheets) Project briefings and focus group meetings Manage project telephone hotline, email address and stakeholder database Respond to stakeholder comments in a timely manner Analyse stakeholder comments to inform Draft EIS investigations SIA consultation activities	Promote Public Exhibition Period including public displays and Community Information Sessions Coordinate and manage public submissions Analyse public submissions and draft responses	Close out activities Consultation evaluation
Ongoing stakeholder consultation and monitoring of feedback				
Regulatory Deliverables		Prepare Stakeholder Consultation Report and Social Impact Management Plan for Draft EIS	Prepare Community Feedback Report for Supplementary Report to the Draft EIS	

Figure 4 EIS Consultation Stages and Timeframes

Details of the community consultation program are summarised in the Public Consultation Report.

Data Sources and Collection Methods

A range of qualitative and quantitative data sources were used to inform the SIA, including:

- ▶ Primary sources such as stakeholder interviews, focus groups and workshops;
- ▶ A Community Views Survey;
- ▶ Secondary sources such as relevant reports, ABS Census and other statistical data; and
- ▶ Literature review of other comparable projects and social impacts and mining (Table 2).

For statistical data, the ABS Census 2011 has been used as the key source of data for this report. Unless otherwise stated, the ‘place of usual residence’ for census night data has been used.



Table 2 Summary of Literature Review Documents

SIA Phase	Literature Review Documents
Scoping and Impact Assessment	AHURI 2009. Housing market dynamics in resource boom towns, Report prepared for the Australian Housing and Urban Research Institute, July 2009 Bauman, T & Smyth D, 2007. Indigenous Partnerships in Protected Area Management in Australia: Three case studies, Report for the Australian Institute of Aboriginal and Torres Strait Islander Studies Central Queensland University, 2003. <i>Economic and social impacts of the Coppabella Mine on the Nebo Shire and the Mackay Region: Part II: Economic Impacts Study</i> Di Milia, L, 2006. "Shift work, sleepiness and long distance driving" (in) <i>Transportation Research</i> Part F:278-285 Di Milia, L. and Bowden, B. 2007. "Unanticipated safety outcomes: shiftwork and drive in, drive out workforce in Queensland's Bowen Basin" (in) <i>Asia Pacific Journal of Human Resources</i> 45(1):100-112 Kaczmarek, E. A. and Sibbel, A. M., 2008. "The psychosocial well-being of children from Australian military and fly-in-fly-out (FIFO) mining families" (in) <i>Community, Work and Family</i> Vol. 11, no. 3, pp.297-312 Murray, G. and Peetz, D., 2008. <i>The Big Shift: The gendered impacts of twelve hour shifts on mining communities</i> presentation at the International Sociological Association, Barcelona, Spain Rolfe et al, 2007. "Lessons from the social and economic impacts of the mining boom in the Bowen Basin 2004-2006" <i>Australasian Journal of Regional Studies</i> 13(2):134-153 Lockie et al, 2009. "Coal mining and the resource community cycle: A longitudinal assessment of the social impacts of the Coppabella mine" (in) <i>Environmental Impact Assessment Review</i> 29:330-339 Petkova et al, 2009. "Mining developments and social impacts on communities: Bowen Basin case studies" (in) <i>Rural Society</i> 19(3):211-228 Murray and Peetz, 2008. The Big Shift: The gendered impact of twelve hour shifts on mining communities Paper presented at the International Sociological Association Conference, Barcelona, Spain Hubinger, Parker and Clavarino, 2002. "The intermittent husband: impact of home and away occupations on wives/partners" (in) Conference Proceedings of the Queensland Mining Industry Health and Safety Conference 2002 Storey, K., 2001. "Fly-in/fly-over: mining and regional development in Western Australia" (in) <i>Australian Geographer</i> 32(2):133-148
Identification of possible management strategies and monitoring programs	CSRIM, 2009. Community Complaints and Grievance Mechanisms and The Australian Minerals Industry, Second Discussion Paper commissioned by the Minerals Council of Australia Barclay, M and Pattenden, C, 2007. "Retention of Women in the Minerals Industry" (in) <i>Unearthing New Resources: attracting and retaining women in the Australian minerals industry</i> Beach, R. and Cliff, D., 2003. "Turnover and FIFO operations: some facts, opinions and theories" AusIMM Bulletin Sept/Oct 5:64-65 Haslam McKenzie, F., 2007. Attracting and retaining skilled and professional staff in remote locations DKCRC Report 21, Desert Knowledge Cooperative Research Centre, Alice Springs Kemp, D., 2009. "Mining and community development: problems and possibilities of local-level practice" (in) <i>Community Development Journal</i> 1-21

This baseline information has been further supplemented with qualitative data from semi-structured stakeholder interviews and focus group sessions with key stakeholder groups. Full details of this qualitative research are described in the Public Consultation Report.



2.5 SIA Conceptual Framework – Social Change vs. Social Impact

GHD has adopted the van Schooten *et al* (2003) conceptual framework for identifying social impacts. This approach has been peer reviewed by Vanclay (2002, p193) and identified as a useful way of thinking about social impacts. This model makes a clear distinction between social change processes and social impacts.

Social change processes are set in motion by Project activities or policies and can be measured objectively, independent of the local context. For example, in-migration of outside workers as a result of Project commencement is a social change process due to Project activities. This social change process may, or may not, lead to negative social impacts. This depends on the local context and how this social change affects the local community and key stakeholders. A positive social impact from this social change process may be increased community spirit from additional families moving to the area; whereas a negative social impact could be increased competition for limited housing.

While social change processes can be clearly and objectively defined, the way that these processes are perceived or valued, and the extent to which these processes lead to positive or negative changes in the lives of individuals, will depend on the societal context in which various social groups exist. Some sectors of society, or groups in society, are quite resilient to social changes, are able to adapt quickly and even exploit the opportunities of a new situation such as the commencement of a mining project. Other groups may, for various reasons, be less able to adapt to social changes and are more vulnerable to the negative consequences of change. Higher income groups may be able to make investments that allow them to take advantage of business opportunities arising from a new situation. Conversely, groups with limited financial resources may be vulnerable to rises in rental housing costs and other living costs.

2.6 Impact Identification, Description and Significance Assessment

Impact identification, description and significance assessment was carried out for the construction and operation phases of the Project. This assessment was based on information from multiple sources. Where necessary, data triangulation methods were used to cross-correlate this information. Data triangulation for SIA involves analysing data from a variety of sources (qualitative and quantitative) to validate findings.

The impact identification process was informed by the following sources:

- ▶ Knowledge developed from the social baseline;
- ▶ Project description;
- ▶ SIA literature review;
- ▶ In-depth interviews with stakeholders;
- ▶ Issues and concerns raised through public consultation activities; and
- ▶ Impacts identified for similar projects or projects being undertaken in the region.



The significance of social impacts has been identified using a social risk matrix, taking into consideration the likelihood and consequence of impacts, stakeholder group, duration of impact and the spatial extent of the impact. Social impacts are described in terms of:

- ▶ The potential change in existing conditions or characteristics of the local, regional or wider study area that might arise from the Project;
- ▶ The extent to which this change might impact on communities or social infrastructure identified, having regard to:
 - Community characteristics
 - The current status of community services and infrastructure.

2.6.1 Impact Identification

Potential impacts have been identified by analysing the proposed Project activities, social change processes expected and the views and perceptions of stakeholders. Potential impacts were identified in relation to the following social environment aspects:

- ▶ Workforce;
- ▶ Housing and accommodation;
- ▶ Economic and employment;
- ▶ Community infrastructure and services;
- ▶ Community health, safety and well-being;
- ▶ Land use and property;
- ▶ Indigenous peoples aspirations and resources;
- ▶ Traffic and transport; and
- ▶ Post-mining.

2.6.2 Impact Significance Assessment

As social systems are very complex, indirect and flow-on impacts can be difficult to assess due to the complex chain of events that may give rise to such impacts. Where such interactions are identified, indirect and flow-on effects are examined by:

- ▶ Clearly identifying the cause/effect relationships between each action and impact;
- ▶ Considering a conservative approach or “worst-case” approach;
- ▶ Exploring a “likely case” based on expert judgement of reasonably likely values and consequences; and
- ▶ Clearly stating factors which affect the worst case and likely case scenarios.

Social impacts and their significance were identified based on the Project information at the time of writing the SIA report and take into consideration the information provided through consultation. The predicted social impacts and their significance may change as more information about the Project is known and the Project is being constructed and operated. A monitoring program has been developed in order to verify if potential social impacts actually occur or not.



The significance of social impacts were assessed using the social risk matrix in Table 3. Further information explaining this methodology is provided in Appendix A.

Table 3 Assessment of Likelihood and Consequence of Identified Negative Social Impacts

Likelihood of Social Impact	Consequence of Social Impact				
	Insignificant	Minor	Moderate	Major	Extreme
Almost Certain	Medium	Medium	High	Excessive	Excessive
Very Likely	Low	Medium	High	High	Excessive
Likely	Low	Low	Medium	High	Excessive
Possible	Negligible	Low	Medium	High	High
Unlikely	Negligible	Low	Low	Medium	High
Very Unlikely	Negligible	Negligible	Low	Medium	Medium

2.7 Assumptions/Limitations/Exclusions for this Study

- ▶ The SIA has been developed as a ‘snapshot’ in time to provide a baseline for assessment of potential social impacts arising from the Project. Whilst every effort has been made to provide up to date and relevant data in this SIA, communities are in constant states of change and the information contained in this SIA can change rapidly;
- ▶ A large part of this report is based on 2011 Census data from the ABS. Where possible and relevant to the SIA data has also been confirmed through other qualitative sources including interviews with key stakeholders and knowledgeable persons;
- ▶ Data contained in this report has been drawn from publicly available sources, SIA stakeholders and advice from Vista Gold. Whilst care has been taken when using data provided by third parties, GHD accepts no responsibility for its accuracy;
- ▶ A medical practitioner has not been contracted to undertake any medical or psychological testing as part of this study. Any reference to medical, health, wellbeing or psychological impacts are based on the opinions of the person providing the information.



3. Workforce Profile

The Project is anticipated to run for 19 years with the construction workforce peaking at approximately 450 and an operational workforce of up to 350 personnel. Vista Gold has indicated a preference for a residential work force, and has a strong desire for their employment demographics to not consist of Fly-in / Fly-out (FIFO) or Drive-in / Drive-out (DIDO) employees. This objective was supported by Project Stakeholders in community consultation undertaken between April 2011 and September 2011.

3.1 Construction Phase

A contractor will be appointed to manage the construction phase. The appointed construction contractor will be responsible for determining the final workforce arrangement. For the purposes of this SIA the following construction workforce profile has been used for social impact assessment. This profile is based on current industry practice:

- ▶ The construction workforce will consist of a maximum of 450 and minimum of 270 workers.
- ▶ The majority of the construction workforce will be non-resident workers employed by the contractor. Whilst Vista Gold is committed to maximising local employment the temporary nature of the construction workforce means that it is likely that the majority of the workforce will be from outside Katherine. There is the potential for local people to access employment as part of the Project, but the majority of employment would be with the nominated contractor.
- ▶ Construction works will be normally carried out in 12 hour rotating shifts from approximately 6am to 6pm, 7 days per week.
- ▶ Night works may be required (for example for concrete pours during hotter months, or to catch up on schedule delays).
- ▶ Administration and management personnel will work a standard 5 x 2 day roster.

The range of skills required during construction will include the following:

- ▶ Construction Manager;
- ▶ Specialist Managers;
- ▶ Specialist engineers;
- ▶ Tradespersons (e.g. carpenters, electricians, boiler makers);
- ▶ Civil construction;
- ▶ Machine operators;
- ▶ Mobile plant operators;
- ▶ Labourers; and
- ▶ Health, safety and environment personnel.



3.1.1 Construction Accommodation

Vista Gold has undertaken a separate study into accommodation options to support the operational workforce. The results of this study have informed the following construction workforce accommodation strategy assessed in this report:

- ▶ Workers will be housed in a construction camp located within 25km of the Project Site. The location of this camp has not yet been decided. Vista Gold, or its contractor, will be responsible for providing the contracted workers accommodation. Workers will not be allowed to make their own arrangements.
- ▶ A small number of Vista Gold managerial and administration staff may choose to reside locally in the Katherine area.
- ▶ Vista Gold employees (managerial) and other support workers not employed directly by the contractor may use other forms of temporary accommodation available in Katherine and Pine Creek (such as caravan parks, holiday rentals and motels). This is expected to be on a periodic and temporary basis.
- ▶ Workers will be present on the Project site while on roster, and will return to the construction camp when off roster. Workers are also likely to visit Katherine and Pine Creek, on a limited basis, for shopping and entertainment purposes.

3.1.2 Recruitment

Construction will be undertaken by one or more contractors who will be responsible for:

- ▶ Recruitment of the workforce;
- ▶ Training, including apprenticeships and trade certificates as well as job specific requirements such as health and safety.

Due to the limited duration, the construction workforce is likely to be engaged on a FIFO or DIDO basis. Vista Gold will specify a preference for local and regional recruitment which will ultimately depend on the availability of workers locally and regionally with appropriate skills as well as the contractor's existing workforce.

3.1.3 Transport

Transportation arrangements for the workforce will be the responsibility of the selected contractor(s). It is expected that:

- ▶ Workers residing within driving distance will drive to site at the start of each roster;
- ▶ Workers residing beyond driving distance, will fly to Darwin at the start of each roster period and will be transported to site by bus;
- ▶ Workers residing in the construction camp will be transported to the site by bus for each shift.

There will be a small number of specialist trades people who will likely travel in their own vehicles to and from the mine site to bring specialist equipment. Similarly, a small number of managerial and advisory staff making occasional short-term visits to the site will travel to site in their own or rented vehicles.



3.2 Estimated Operation Workforce

An operational workforce of approximately 350 full-time workers is expected to be required. Vista Gold is committed to this workforce living and residing locally rather than operating on a FIFO or DIDO basis. The following operational workforce profile has been developed based on information provided by Vista Gold for impact assessment purposes:

- ▶ The required workforce of 350 full-time workers is estimated to comprise approximately 60 workers who are currently permanent residents of the local area and approximately 290 workers will be sourced from elsewhere;
- ▶ The operations phase of the mine is 13 years followed by subsequent closure and rehabilitation activities; and
- ▶ Operation workforce numbers are expected to increase to a peak of 350 over the life of the mine and will then be scaled down significantly to include only workers associated with closure and rehabilitation.

Operational staff will include the following skills:

- ▶ General Manager and executive assistant;
- ▶ Commercial Manager, accountants and administrative assistants;
- ▶ Manager of mining and mining superintendents;
- ▶ Mining engineers, mine planners, geologists and surveyors;
- ▶ Manager of Plant Process, metallurgical superintendents, production superintendents and plant staff;
- ▶ Laboratory superintendent and lab staff;
- ▶ Maintenance Manager, Mechanical engineers and plant maintenance staff;
- ▶ Electrical Superintendents, electricians, instrumentation technicians;
- ▶ Truck drivers;
- ▶ Stationary plant operators;
- ▶ Mobile plant operators;
- ▶ Mining labourers; and
- ▶ Other specialist support roles including health, safety and environment personnel and Human Resources.

3.2.1 Operational Staff Accommodation

Vista Gold has undertaken a separate study into accommodation options to support the operational workforce. The results of this study have informed the operational workforce accommodation strategy assessed in this report.



Vista Gold has indicated their desire for a residential work force but that they do not wish to own houses. They prefer their operational staff to not include FIFO or DIDO workers and would prefer their people (and therefore housing) to be integrated into the community, with an emphasis on making the accommodation both attractive and comfortable. To support this intent, a number of options for accommodation were investigated including either a fully residential or fully FIFO / DIDO option. The final recommendation from this study was that a 'hybrid' accommodation solution should be considered. This would consist of:

- ▶ 70 workers at the construction camp. This would accommodate mainly FIFO / DIDO personnel and provide an ability to quickly increase capacity and house overflow peak period personnel to meet mining needs or maintenance shut downs;
- ▶ A combination of both new and existing housing to support approximately 120 workers (family households with or without children). Workers would be accommodated in a mixture of:
 - New three and four bedroom houses located on existing vacant Katherine and region land
 - Existing (renovated if required) houses located in the Katherine and region land
 - Subject to real estate availability at the time of arrangement, a small contained development on Katherine land;
- ▶ 100 workers located in a Katherine based single person accommodation facility

This would provide for the 290 additional Vista Gold employees that would require accommodation (the remaining 60 personnel would be sourced locally).

The ultimate accommodation strategy adopted will be developed following further discussions with local and territory government agencies. For the Closure and Rehabilitation stage, accommodation for the 40 workers (plus catering, cleaning, facilities management staff) would be accommodated in either the previous FIFO / DIDO accommodation or in the Katherine based single person accommodation. This 'hybrid' solution has been used as the basis for impact assessment in this report.

3.2.2 Recruitment

Vista Gold has specified a preference for a local residential workforce. The extent to which that this can be achieved will depend on the availability of workers with appropriate skills and their desire to live on a permanent basis in the Katherine area.

Vista Gold is aware of the local and regional recruitment/employment agencies and will consult with them in facilitating local and regional employment opportunities.

Vista Gold will develop appropriate human resource policies for the residential workforce, local and regional employment opportunities, equal opportunity and Aboriginal and Torres Strait Islander employment issues.

Recruitment will commence approximately 6 months before start of operations, and will be ongoing during operations as the workforce continues to scale up and down to replace workers who retire or resign.

Indigenous Employment Opportunities

- ▶ Vista Gold will develop an Indigenous employment strategy.
- ▶ Vista Gold has committed to work with the Jawoyn Association to engage as many Jawoyn as possible in the mine workforce.



3.2.3 Transport

Vista Gold will negotiate with an appropriate contractor to supply transportation services to the Project however it is expected that:

- ▶ Most of the workforce residing in Katherine will be bussed to site at the start of each shift. A small number will use private vehicles; and
- ▶ Workers residing further afield will travel to Katherine at the start of each rostered period by driving personal vehicles to Katherine.

There will be a small number of specialist trades people who will be required to travel in their own vehicles to and from the mine site. Similarly, a small number of managerial and advisory staff making occasional short-term visits to the site will travel to site in their own or rented vehicles.

3.2.4 Training Opportunities

The provision of training opportunities during construction will be the responsibility of the selected construction contractor(s).

For operational staff, Vista Gold will develop appropriate training and employment policies and targets.

The training will be done in concert with both local and Territory government's agencies when possible. A list of those agencies identified to date are listed below in Table 24.



4. Social Baseline

4.1 Introduction

This section describes the existing social baseline characteristics for the communities of interest (including the Local and Regional Study Areas). This social baseline provides the basis on which social impacts will be assessed.

4.2 Planning context

4.2.1 Regional Planning

A summary of plans and policies that establish the regional planning context for the Project is provided below:

- ▶ **Katherine Land Use Study (under development):** - This study is under development by the recently formed NT Planning Commission (constituted 1 January 2013). The main objectives of the Planning Commission are to develop strategic plans to cater for growth, facilitate infill development through planning controls and to address housing affordability. A Consultation Paper for the Katherine region was released to the public on 14 June 2013. Vista Gold has provided input into the Discussion Paper¹

The Commission will undertake community engagement on this Consultation Paper in developing integrated strategic plans, guidelines and assessment criteria. In preparing an integrated strategic plan for Katherine, the Commission may identify future transport and utility corridors, provide guidance through master plans and support urban renewal². For further information see: <http://www.planningcommission.nt.gov.au/home>.

- ▶ **Territory 2030: Strategic Plan 2009** (NTG, 2009) – This plan set out the former Territory Government's direction for the next 20 years and was applicable to the Project during the major periods of public consultation on social impacts. Some key immediate priorities include a balanced housing market (appropriate availability and affordability), reforming education and health sectors and making genuine progress in regional and remote areas in terms of economic development.

The NT Government does not support the Territory 2030 as current policy. It does, however, support the use of the Plan as a guide and has developed its own set of policies relating to the key priority areas around housing, growing and working in the NT. There is currently no replacement for Territory 2030 as an overarching strategic document.

¹ James Teh, pers comm, 30 May 2013 – Manager Secretariat, Planning Commission

² <http://www.planningcommission.nt.gov.au/priorities>



- ▶ **Closing the Gap.** Closing the Gap is a commitment by all Australian governments to work towards a better future for Aboriginal and Torres Strait Islander peoples. It aims to close the gap of Indigenous disadvantage in areas such as health, housing, education and employment. As the Department responsible for Indigenous affairs, the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) is the lead Australian Government agency for *Closing the Gap*. Within the NT there is a Partnership Agreement between the Australian and Territory Governments that commits them to working together on this initiative. The NT Government is pursuing measures for *Closing the Gap* in the following areas: income management and welfare reform, law and order, family support, early childhood, improving child and family health, enhancing education and remote service delivery³.

4.2.2 Local Government

Local government areas within the Northern Territory were reformed in 2008 resulting in two classifications – Municipalities and Shires. The mine is located in the Roper Gulf Shire. The nearest townships are Katherine within the Katherine Municipality and Pine Creek within Victoria Daly Shire. The following local government plans have been referred to as part of this SIA.

Local Government Regional Management Plan – Big Rivers Region

This is a statutory instrument under the *Local Government Act 2008*. The Regional Management Plan (RMP) is a product of consultation between interested councils and the Department of Local Government (DLG)). The RMP (DLG, 2012) sets out the challenge for delivering services to the Katherine, Victoria Daly and Roper Gulf Shires, future opportunities, relevant local government legislation, local government cooperative arrangements and core local government services. Some key challenges for the region relevant to this Project include:

- ▶ Employment and training of Indigenous people providing services;
- ▶ Recruitment and retention of staff;
- ▶ Provision of sufficient housing for staff and sub-contractors, particularly in remote areas;
- ▶ Lack of all-weather roads; and
- ▶ Securing ownership of land.

Katherine Town Council Municipal Plan

The Katherine Municipal area covers an area of 7421 square kilometres⁴. The Katherine Town Council Municipal Plan 2013 (Katherine Town Council – (KTC), 2013) identifies the following Vision for Katherine: '*Katherine to be recognised as an innovative, vibrant and inclusive community*'.

³ <http://www.fahcsia.gov.au/sa/indigenous/progserv/ctg/Pages/default.aspx>

⁴ Katherine Town Council Website, Welcome to Katherine, viewed 26/15/2013 from <http://www.ktc.nt.gov.au/>



The following values are identified:

- ▶ Service: Council will strive to achieve excellence, quality and pride of service to the community in a cost effective, common sense and courteous way;
- ▶ Responsiveness: Council will be responsive to the needs of the community;
- ▶ Involvement: Council will provide avenues of participation for and be accessible to the community;
- ▶ Responsibility: Council will act with integrity and in a financially responsible, sustainable manner in the interests of the community;
- ▶ Equity: Council will treat and provide services to the community in an equitable manner; and
- ▶ Accountability: Council will make decisions on behalf of the community in an open and accountable way.

The plan identifies specific goals relating to the Council's key responsibilities under the *Local Government Act 2008*. These include infrastructure, community development, environment, and economic development. Katherine Town Council has identified the need to prepare for what is expected to be a major population and economic boom within the region, largely driven by the mining sector. This includes reference to the Mt Todd Gold Mine, and the likely residence of the workforce in Katherine. . The Council is working towards the release of a Katherine Strategic Land Use Plan with the Department of Lands, Planning and the Environment, and the NT Planning Commission to support well considered growth to match demand (KTC, 2013).

Roper Gulf Shire Plan 2012-2013

The Roper Gulf Shire covers an area of 186,000 square kilometres. The Roper Gulf Shire Plan 2012-2013 (Roper Gulf Shire, 2012) identifies the Council's priorities and responsibilities which include nine major Service Delivery Centres (Barunga, Beswick, Borroloola, Bulman, Jikminggan, Manyallaluk, Mataranka, Ngukurr, Numbulwar). This plan identifies priority community projects and commitments to improving regional service delivery. The vision for the region is "*Roper Gulf Shire Council – Sustainable, Viable, and Vibrant*". Key values identified are: Honest, Equality, Accountability, Respect and Trust.

The plan identifies a number of goals including:

- ▶ Strengthen quality of life in the Shire;
- ▶ Move towards sustainability;
- ▶ Care for our environment;
- ▶ Improve our infrastructure; and
- ▶ Good governance.

In 2010 the Council made a commitment to focus on building expertise and expanding their reputation over three years in four key areas: local jobs for local people, environment, counter disaster planning and youth.



Victoria Daly Shire Plan 2012-13

The Victoria Daly Shire covers an area of approximately 168,27km². The Shire Plan (Victoria-Daly Shire, 2012) describes the Council's direction and key goals to be achieved in the life of the plan. The Victoria Daly Shire includes the service delivery centres of Kalkarindji/Dagurangu, Nauiyu, Nganmariyanga (Palumpa), Peppinmenarti, Pine Creek, Timber Creek Wadeye and Yarralin. The Vision for the shire is "*Victoria Daly Shire: Moving Forward Together*" and the core values are respect, integrity, honesty, openness and equality. The plan identifies the following strategic goals:

- ▶ To provide good governance, leadership and advocacy;
- ▶ To promote local employment and a strong regional economy;
- ▶ To provide high quality services within financial resources;
- ▶ To maintain and develop shires assets, natural resources and country; and
- ▶ To ensure strong, safe, healthy communities that respect culture and heritage.

4.3 Local Study Area

4.3.1 Katherine

Katherine has developed because of its strategic location on the transcontinental trade route that terminates in Adelaide at one end and Darwin's deep water port at the other. It is situated on the Katherine River and is a popular stop for many visitors and tourists to the Region. Its geographic location is a major influence on its economy and the town is a significant transport hub, tourist centre and service centre for a wide variety of regional industries including the mining and cattle industries (Northern Territory Government, 2007). It is a key Government administration centre providing health, education, housing and business development services to towns to the broader region, pastoral properties and outlying Aboriginal communities.

It is approximately three hours from Darwin and a major road junction, providing access west to the Ord River and Kimberley region of WA, north to Kakadu and Darwin and south to Alice Springs, South Australia and Queensland. Katherine will be the key service centre for the supply of resources to the Project and is located 55km from the Project Site.

4.3.2 Pine Creek

Pine Creek was established in the late 1800s as a result of the discovery of gold by the crew of the Overland Telegraph Line. Geographically the town is situated 220km south of Darwin and 90km north of Katherine at the junction of the Stuart and Kakadu Highways. Pine Creek will be a secondary service centre for the supply of goods and services to the Project and is located approximately 60km from the Project Site.

Pine Creek is part of the Victoria Daly Shire and includes the Aboriginal community of Kybrook Farm.

4.3.3 Community Values and Aspirations

Community values for Katherine and the adjoining shires of Roper Gulf and Victoria Daly are expressed through the community plans summarised in Section 4.2.2.



4.3.4 Demography (Population, Age, Gender, Family)

Key Points - Demography

- ▶ Katherine is the third largest urban area in the Northern Territory after Darwin and Alice Springs.
- ▶ According to the 2011 Census, the urban centre of Katherine has an area of 17.3km² with a resident population of 6,094 people. The town services a much wider regional area which include the local government areas of Roper Gulf Shire and Victoria Daly Shire.
- ▶ The town has a significant Indigenous community comprising 30% of the town's population. This percentage varies considerably depending on the season and key events of importance to the Indigenous population.
- ▶ Katherine's population has fluctuated historically for a variety of reasons which include population growth associated with key projects (such as the prior opening of the Mt Todd Gold Mine, rail infrastructure projects and population decline (associated with project closures and natural disaster events such as the floods of 1998). In the last five years the town has experienced a population increase of 3.6%.
- ▶ Katherine has low cultural diversity in terms of the percentage of residents who were born overseas (20.7%). It has a significant influx of visitors to the region as a result of tourism, mining fly-in-fly-out (FIFO) workers and seasonal workers.
- ▶ The community comprises a number of distinct groups: Non-residents including tourists, seasonal workers and FIFO workers; workers and families associated with the RAAF Base Tindal, some of whom live on base and some who live in Katherine; Indigenous people and non-Indigenous persons.
- ▶ The gender balance for the resident population within Katherine Local Government Area is relatively balanced with 50.8% of the population being male and 49.2% females.
- ▶ The Indigenous population demographic profile is very different to the non-Indigenous profile with a much higher proportion of people below 15 years of age and significantly lower proportions of the population surviving beyond middle ages.
- ▶ Family structures by type are comparable with Northern Territory and Alice Springs populations with the most common being couple families with children under the age of 15.

Historical Population Change

Historically, population growth in Katherine has varied. Katherine had strong population growth in the 1970s and 1980s and experienced major changes in size and composition between 1996 and 2001 census years due to the combined effects of closure of the Mt Todd Gold Mine by Pegasus in 1997 and flooding caused by Cyclone Les in January 1998. Following these combined events the population declined by 15% between 1996 and 2001 and has not recovered substantially since.

The floods and mine closure caused a major setback in the economic and social development of the town, and recovery has been slow. Population changes during this time included a large decline in people aged 15-44 years, ageing of the population, and an increase in the proportion of people who identify as Indigenous. By 2001 the employment profile had changed with mining down 80%, manufacturing down 45%, and public administration and defence down 7% (Australian Bureau of Statistics - ABS, 2007a).



Population

Katherine is the third largest urban area in the Northern Territory after Darwin conurbation including Palmerston and surrounds at 120,000 people and Alice Springs at approximately 25,000 (School for Social and Policy Research, 2008). The resident population for the Katherine Local Government Area, according to the 2011 census was 10,104 persons (ABS, 2011). This population includes the RAAF Base Tindal (15km South-east of Katherine) and the adjacent rural area.

Table 4 presents the resident population for the 2001, 2006 and 2011 census for the urban centres of Alice Springs, Darwin, Katherine, Pine Creek and the Northern Territory.

Table 4 Resident population (2001, 2006, 2011)

Urban Centre/locality	2001	2006	2011	2001-2006	2006-2011
	no.	no.	no.	%	%
Alice Springs	24,640	21,622	24,208	-12.2	10.5
Darwin	71,347	66,291	72,930	-7.1	9.3
Katherine	6,719	5,849	6,094	-12.9	3.6
Pine Creek	472	345	380	-26.9	7.4
Northern Territory	202,729	192,898	211,945	-4.8	9.9

NB: (a) Average annual growth rate (p) preliminary

Source: ABS (2011)

Between 2001 and 2006 there was population decline throughout the Northern Territory. This impacted some areas more than others, for instance Pine Creek declined by 26.9% and Katherine by 12.9%. Despite this, in recent years the population has experienced significant growth enabling most areas to exceed the 2001 population. These include the Northern Territory (which had a population growth of 9.9%) and Darwin 9.3%. Katherine experienced a population decline between 2001 and 2006 that was significantly larger than that experienced by the Northern Territory (12.9% in comparison to 4.8%). Although in the past five years it has experienced growth at a rate of 3.6% this is significantly slower than the Northern Territory rate of 9.9%.

Residents versus Visitors

The number of residents in Katherine in comparison to the number of visitors and FIFO⁵ workers was compared using 2011 Census data. There were 9,187 persons (based on place of usual residence) and 10,698 (based on place of enumeration). This difference of just over 1500 persons (approximately 16% of the resident population) between those people who were recorded in Katherine on the night of the census and those who actually resided in Katherine at this time illustrates the temporary/seasonal nature of a significant proportion of the population (Figure 5). The temporal population when compared to the residential population are predominantly between the 25 and 64 year age group which is reflective of the numbers of FIFO workers.

⁵ Place of usual residence data excludes visitors and people working in the region on a "fly-in-fly-out" arrangement including a proportion of RAAF Base Tindal workers

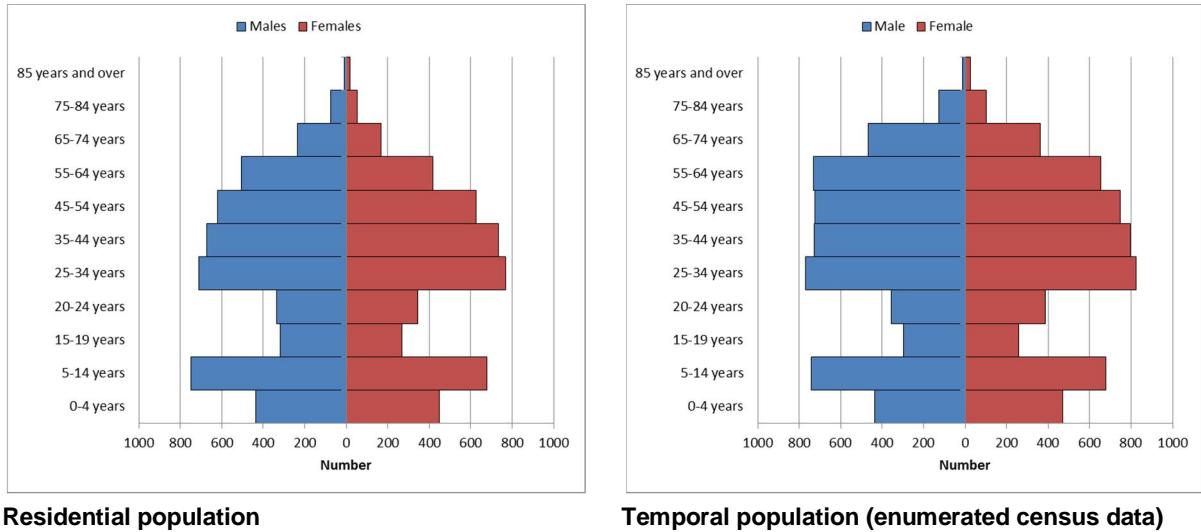


Figure 5 Population by Residents and Visitors, Katherine 2011

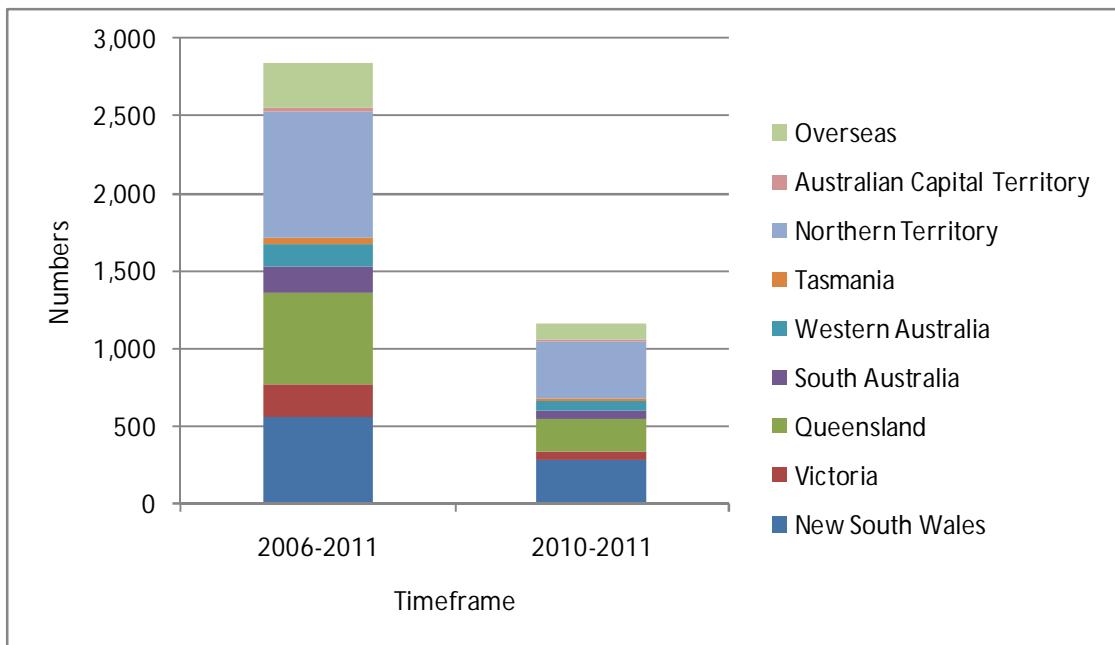
The RAAF Base Tindal is located 15km east of Katherine. RAAF personnel and their families are estimated to constitute around 2,000⁶ people, approximately one fifth of the Katherine population. Katherine's growth over recent years is partly attributed to RAAF Base Tindal.

Mobility

Katherine has a highly mobile population with a high percentage of persons who had changed their residence within one and five years previous to the 2011 census. Of Katherine residents a total of 60.99% of people had changed addresses in the last 5 years compared to 53.14% of people in the Northern Territory. Of these people, 61.57% had moved to Katherine from another location within Australia; 29.54% had changed addresses within the Katherine SLA and 7.12% moved from outside of Australia.

Figure 6 shows the number of persons moving to Katherine from the various states and overseas categories for the time periods 2006-2011 and 2010-2011. The most significant contributor to migration inflows to Katherine are from New South Wales and Queensland. Consistent with Australian demographic trends the most likely reasons for these in-migrations are work related.

⁶ Based on SIA Consultation undertaken during September, 2011

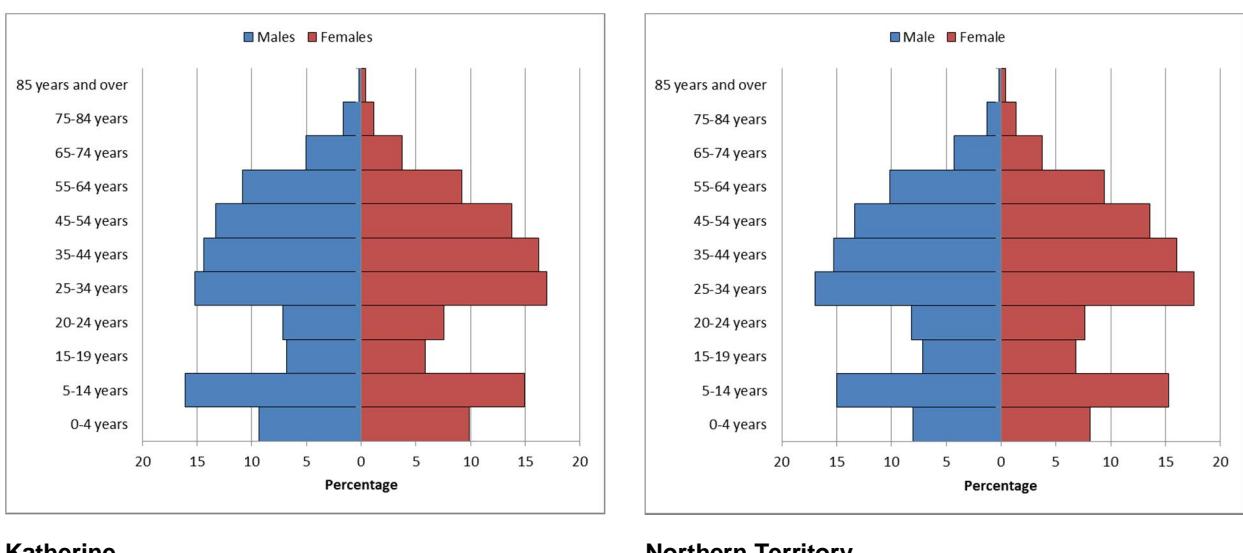


Source: ABS (2011)

Figure 6 Number of persons moving to Katherine, within 1 and 5 years prior to 2011

Age-Sex Composition

The age composition of the Katherine residential population is consistent with that of the greater Northern Territory, as illustrated in Figure 7. Katherine has a slightly higher percentage of children aged between 0 and 14 years. Although the population of working age (25 to 65 years) is slightly lower for the Katherine area these numbers are supported by the temporal population due to the numbers of FIFO workers.

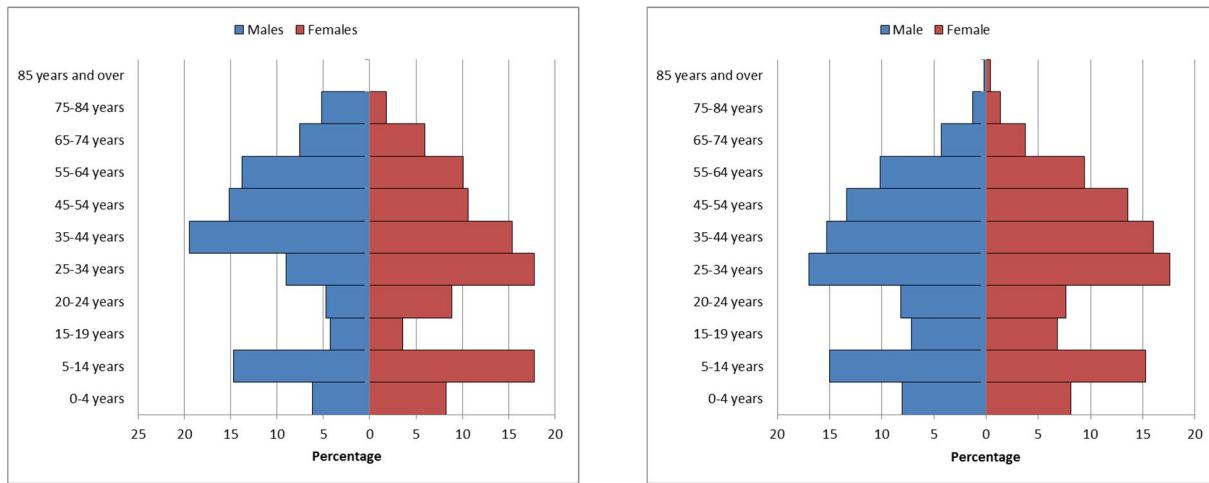


Katherine

Northern Territory

Figure 7 Population by Age and Sex, Katherine and Northern Territory, 2011

The residential population of Pine Creek has a median age of 37, this is significantly higher than that for the greater Northern Territory which is 31. The population composition of Pine Creek compared to the Northern Territory presented in Figure 8 illustrates a higher percentage of residents in the age range of 65 to 84 years and a smaller percentage in the age range of 15 to 24 years when compared to the Northern Territory.



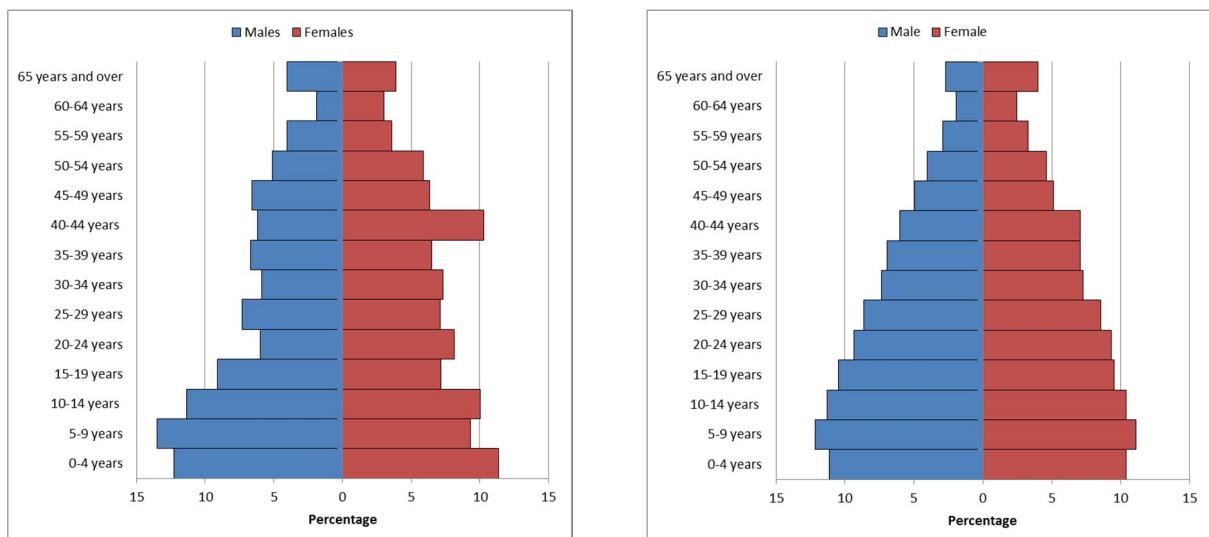
Pine Creek

Northern Territory

Source: 2011 Census

Figure 8 Population by Age and Sex, Pine Creek and Northern Territory, 2011

Figure 9 shows the Katherine Indigenous population by age and sex in 2011 in comparison to the Northern Territory. The median age of the indigenous population of Katherine is 25 while for the Northern Territory it is slightly younger at 23. Overall the population composition is similar between the two areas, although there are slightly fewer residents in Katherine between the ages of 25 to 44 years. The Northern Territory has a greater proportion of residents aged 10 to 24 years.



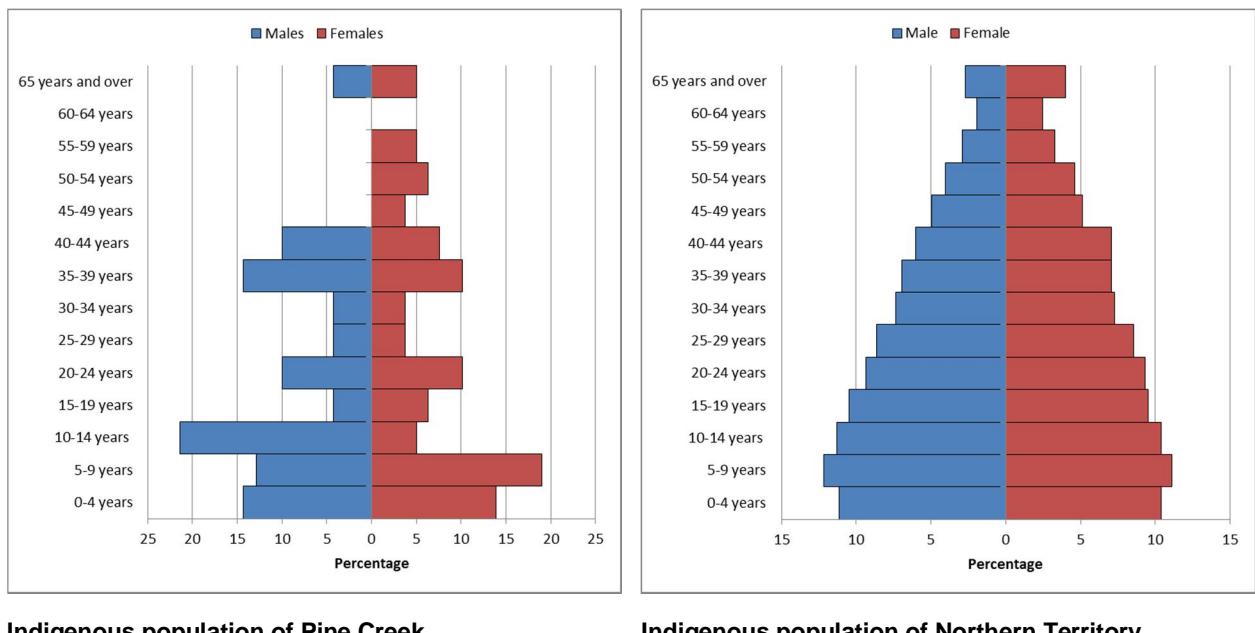
Indigenous population of Katherine

Indigenous population of Northern Territory

Source: 2011 Census

Figure 9 Indigenous Age and Sex, Katherine and Northern Territory

Figure 10 shows the Pine Creek Indigenous population by age and gender in 2011 compared to that of the greater Northern Territory. The population number is significantly smaller than that of the greater Northern Territory and this has slightly distorted the data with a number of age groups (particularly males) not having any residents. The population composition however does reveal a very young population when compared to the Northern Territory, particularly below the age of 19.



Indigenous population of Pine Creek

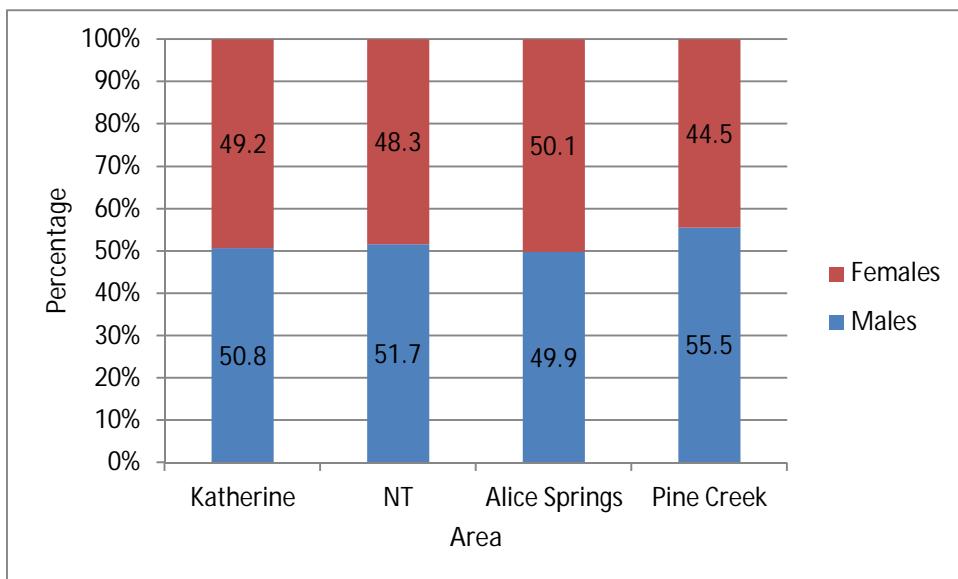
Indigenous population of Northern Territory

Source: 2011 Census

Figure 10 Indigenous Age and Sex, Pine Creek and Northern Territory

The above figures show the percentage of Indigenous people by age and gender for Katherine and Pine Creek in comparison to the Northern Territory. Overall, there are generally less people who are of Aboriginal and Torres Strait Islander (ATSI) descent in older age groups and a higher percentage of people of ATSI descent in the younger age groups. This is consistent with differences in mortality and life expectancy between the Indigenous populations and non-Indigenous populations in the Northern Territory with the Indigenous populations having a larger proportion of the population in the younger age groups and significantly less of the population surviving through to older age groups.

Figure 11 shows the balance between males and females in Katherine for residents. Katherine has slightly more males than females and this was consistent with the gender balance for the Northern Territory. Pine Creek has the highest percentage of males to females at 55.5%. This is likely to reflect the location of the Crocodile Gold Mine in Pine Creek and the higher instance of male FIFO workers.



Source: 2011 Census

Figure 11 Male-Female Ratio, Katherine, Pine Creek, Northern Territory, Alice Springs

Indigenous Population

The Indigenous population in 2011 constituted just fewer over 25% of the population in Katherine and 39% of the population in Pine Creek (Table 5). This is significantly higher than for the Northern Territory at 26.8% of the population stating themselves as being Indigenous.

Table 5 Indigenous Population Katherine LGA 2011 Census

Indigenous/Non-Indigenous	Katherine				Pine Creek			
	Male	Female	Total	%	Male	Female	Total	%
Indigenous	1,118	1,226	2,344	25.5	70	79	149	39.1
Non-Indigenous	3,088	2,912	6,000	65.3	135	85	220	57.7
Indigenous status not stated	456	387	843	9.2	6	6	12	3.1
Total	4,662	4,525	9,187	100	211	170	381	100

Source: 2011 Census

Cultural Diversity

Katherine has a slightly lower proportion of persons born overseas (20.7%), when compared to the Northern Territory 25.4%. The main countries of birth of those born overseas were the United Kingdom (2.2%), Philippines (1.9%) and New Zealand (1.8%). Over 20% of residents speak a language other than English including those that spoke Australian Indigenous languages.

Although Katherine has a low relative percentage of persons born overseas, it has a high proportion of Indigenous people (25.5%) and a seasonally high influx of visitors and tourists with just over 1500 additional people recorded on census night in 2011. This seasonal population adds to the existing cultural diversity of the Town which was described by one stakeholder as being 'very cosmopolitan'.



Family Composition

Table 6 summarises family composition within both Katherine and Pine Creek. In summary there were 2,116 families in Katherine and 67 families in Pine Creek. The most common type of family in Katherine and Pine Creek is couple families with children under 15 followed by couple families without children under the age of 15. Generally the family composition in both Katherine and Pine Creek is comparable with those of the Northern Territory. The key areas of difference are a relatively higher proportion of couple families without children and one-parent families in Katherine.

Table 6 Family Structures by Type, 2011

Type	Katherine	Pine Creek	Northern Territory	Alice Springs
Couple families with children under 15 and/or dependent students	805 (38.0%)	21 (31.3%)	17,712 (36.9%)	2,076 (35.1%)
Couple families with no children under 15 and/or dependent students	151 (7.1%)	4 (6.0%)	4,533 (9.4%)	580 (9.8%)
Couple families without children	771 (36.4%)	28 (41.8%)	16,310 (34.0%)	2,117 (35.8%)
One parent families with children under 15 and/or dependent students	263 (12.4%)	10 (14.9%)	5,734 (11.9%)	689 (11.6%)
One parent families with non-dependent children only	100 (4.7%)	4 (6.0%)	2,876 (6.0%)	335 (5.7%)
Other families	26 (1.2%)	0	866 (1.8%)	120 (2.0%)
Total families	2116 (100%)	67 (100%)	48,031 (100%)	5,917 (100%)

Source: 2011 Census

4.3.5 Labour Market (Education, Training and Employment)

Key Points Labour Market

Education and training

- 42.0% of the Katherine population aged 15 and over had some type of post-school qualification. This is similar to the Northern Territory population (41.3%), however qualifications tended to be of Certificate and Diploma levels than university qualifications such as Bachelor Degrees and Postgraduate qualifications.
- Of the Katherine population aged 15 years and over, 36.8% had attended year 12. There was no significant difference between male and female attendance.
- The most common field of study was Engineering and related technologies, followed by Management and Commerce. This mirrors data for the Northern Territory with the most common field of study being Engineering and Related Technologies (17.43%) followed by Management and Commerce (11.43%).

- ▶ The Katherine Region accounts for 11% of Vocational Education and Training (VET) Students in the NT in 2007. Since 2004 the number of students studying in the region has increased at an average rate of 11% per annum which is significantly higher than the rate for the NT rate at 1.3%. VET participation in Katherine is concentrated more in the lower-level qualifications than is the case for the NT as a whole. Certificate I and II represent 58% of training undertaken in the Region compared to 43% for the NT.
- ▶ The supply of skills since 2002 has increased to the Region through education and training. Training is generally occurring in areas linked to major industries in the Region. While the supply of skills has increased so has the number of job-seekers.
- ▶ The estimated average wage in 2008 for individual income earners was \$41,295 per annum, or \$794.13 per week. Based on 2011 Census data, the median individual income was \$759 per week and the median household income was \$1,534 per week. In contrast these figures were significantly lower for the indigenous population. The median individual income was \$301 and median household income \$921.

Labour demand

- ▶ Employment is concentrated in the service centre of Katherine.
- ▶ The growth of jobseekers is concentrated in the Indigenous population (approximately 88% of unemployed job seekers in the Katherine Region) because there has been a strong decline in the overall number of non-Indigenous jobseekers. Unemployment rates have steadily decreased since 1996 to the current rate of around 3.2% unemployment in 2010.
- ▶ 25-34 years was the most common age bracket for currently employed people. Around 12% of the labour force in Katherine in 2011 was Indigenous.
- ▶ Public administration and safety (including Defence) was the largest industry of employment in Katherine accounting for 25.5% of employment. Of this approximately 503 were employed in Defence in 2011. Katherine also has high proportions of people employed in Health Care & Social Assistance and Retail Trade.
- ▶ The main occupations of employment in Katherine are Technicians and Trades Workers (19.6%) and Managers (12.6%). The main industries of employment for Indigenous people in Katherine in 2011 were Health Care and Social Assistance, Public Administration and Retail.
- ▶ There were a range of identified skill shortages in the Katherine Region including in the Public Administration and Safety, Defence, Health care social and assistance and Education and Training industries.
- ▶ The majority of job advertisements for the Katherine Region were for semi-skilled and unskilled positions, not identified as being in short supply in Katherine or the Northern Territory. This may indicate that currently employers look elsewhere for skilled labour.
- ▶ In the neighbouring areas Victoria Daly and Roper Gulf Commonwealth Development Employment Projects is a major source of employment.



The labour market can be viewed in terms of supply and demand factors. The supply of labour can be profiled using information on the availability of both skills and jobseekers in a region. The following characteristics of supply are provided:

- ▶ Education;
- ▶ Vocational education and training;
- ▶ Apprenticeships and traineeships; and
- ▶ Jobseekers.

Education

The education profile of Katherine adults over 15 years was generally lower than for Alice Springs and the Northern Territory (Table 7 and Table 8) with 36.8% of residents having completed year 12 compared to 39.9% for Northern Territory and 45.0% for Alice Springs. Overall, residents of Katherine had a level of post school qualifications that was consistent with the rest of Northern Territory (42.0% compared to 41.3%), however these tended to be more at the certificate and diploma level than at the postgraduate and graduate certificate level.

The numbers and percentages of attendees at educational institutions in Katherine are profiled in Table 9.

Table 7 Highest Level of School Attended

Level of school attended	Katherine	Pine Creek	Northern Territory	Alice Springs
Year 12 or equivalent	2,442 (36.8%)	74 (26.1%)	62,499 (39.9%)	8,429 (45.0%)
Year 11 or equivalent	772 (11.6%)	39 (13.7%)	18,447 (11.8%)	2,396 (12.8%)
Year 10 or equivalent	1,466 (22.1%)	58 (20.4%)	29,879 (19.1%)	3,361 (17.9%)
Year 9 or equivalent	441 (6.6%)	35 (12.7%)	11,996 (7.7%)	1,030 (5.5%)
Year 8 or below	518 (7.8%)	36 (12.7%)	11,996 (7.7%)	1,030 (5.5%)
Did not go to school	85 (1.3%)	6 (2.1%)	2,390 (1.5%)	2,439 (13.0%)
Highest year of school not stated	909 (13.7%)	36 (12.7%)	21,953 (14.0%)	2,439 (13.0%)
Total	6,633	284	156,504	18,746

Source: 2011 Census



Table 8 Level of Post-School Qualifications Achieved: Percentage of Total Population Aged 15 Years and over

Qualification	Katherine	Pine Creek	Northern Territory	Alice Springs
Total population over the age of 15	6877	292	162,809	19,613
Postgraduate Degree	105 (1.5%)	0	4,308 (2.6%)	718 (3.7%)
Graduate Diploma and Graduate Certificate	102 (1.5%)	9 (3.1%)	2,920 (1.8%)	479 (2.4%)
Bachelor Degree	639 (9.3%)	12 (4.1%)	16,959 (10.4%)	1,483 (13.1%)
Advanced Diploma and Diploma	481 (7.0%)	9 (3.1%)	10,656 (6.5%)	1,483 (7.6%)
Certificate	1,492 (21.7%)	65 (22.3%)	30,750 (18.9%)	3,819 (19.5%)
Inadequately Described/Not Stated	81 (1.0%)	4 (1.4%)	1,614 (1.0%)	212 (1.1%)
Total with qualifications	3,594 (42.0%)	99 (33.9%)	67,207 (41.3%)	9,275 (47.3%)

NB: Excludes schooling up to Year 12, excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED) and includes 'Certificate III & IV, nfd'. (d) Includes 'Certificate I & II, nfd'.

Source: 2011 Census

Table 9 Educational Institution Attendance, Katherine

Education Institution	Persons	Percentage
Pre-school	137	4.2
Infants/Primary	933	28.9
Secondary	426	13.2
Technical or Further Educational Institution	126	3.9
University or other Tertiary Institutions	200	6.2
Other type of educational institution	29	0.9
Type of educational institution not stated	1,380	42.
Total	3,231	100

Source: 2011 Census

The most popular field of study in 2011 in Katherine was engineering and related technologies at 17.43% followed by management and commerce at 11.46% (Table 10).



Table 10 Technical Fields of Study: 15 Years and over Katherine

Technical Field of Study	Male	Female	Total	Percentage
Engineering & Related Technologies	650	33	683	17.43%
Management & Commerce	142	307	449	11.46%
Health	68	299	367	9.36%
Society & Culture	114	236	350	8.93%
Education	74	242	316	8.06%
Food, Hospitality & Personal Services	91	99	190	4.85%
Agriculture, Environmental & Related Studies	98	63	161	4.11%
Architecture & Building	155	3	158	4.03%
Creative Arts	28	32	60	1.53%
Information Technology	35	14	49	1.25%
Natural & Physical Sciences	22	26	48	1.22%
Field of study inadequately described	35	12	47	1.20%
Mixed Field Programmes	0	3	3	0.08%
Field of study not stated	556	482	1,038	26.49%
Subtotal	556	1,851	3,919	100.00%

Source: 2011 Census

Vocational Education and Training

The number of VET students in the Katherine region (including Victoria -Daly, Katherine and Elsey Shires) for the period 2004 to 2007 is shown in Table 11.

Table 11 VET Students Katherine Region (2003-2007)

	2004	2004	2006	2007
Katherine Region	1962	2435	2651	2707
NT	22579	23409	23019	24376

Source: Department of Business and Employment – DET, 2008, p167

Apprenticeships and Traineeships

Apprenticeships/traineeships offer opportunities for anyone of working age to train, study and earn an income in a wide range of occupations and trades. They are available in more than 500 occupations and provide nationally recognised training, developed by industry.

For the Katherine Region there were 238 apprentice/trainee commencements in the region in 2007, an increase of 17% from 2002. The region accounts for 9% of total commencements in the NT for 2007, the same proportion as five years ago (DET, 2008).



In 2007, 270 apprenticeships/trainees were in training in the Region. Of these 16% were in automotive, 14% in building and construction, 14% in business and clerical, 14% in utilities. The overall number of students in training has increased at a rate of 61% between 2002 to 2007 suggesting that the supply of skills will increase in the coming years (DET, 2008).

Job Seekers

Profiles of job seekers in the Region compared to the Northern Territory and Australia is shown in Table 12. This shows a higher percentage of long-term unemployed and a higher percentage of Indigenous job-seekers.

In 2010 Katherine had approximately 168 persons identified as unemployed or 3.2% of the population. This percentage was slightly higher than for Alice Springs of 2% but lower than for the Northern Territory of 4% (Table 13).

Time Series Labour Force Data for Katherine show declining unemployment rates between 1996 and 2006 (Table 14).

Table 12 Jobseeker Characteristics (September 2007)

Jobseeker Characteristics	Katherine Region (Victoria, Gulf Katherine and Elsey Shire)	Northern Territory	Australia
Duration			
Short-term	188	1,766	130,292
Long-term	482	3,668	170,398
Total	670	5,434	300,690
% Long-term	71.9	67.5	56.7
Indigenous status			
Indigenous	87.8	75.6	10.6
Non-Indigenous	12.2	24.4	89.4
Gender			
Male	60.3	59.3	61.8
Female	39.7	40.7	38.2
Age (%)			
15-19	9.7	10.2	12.3
20-24	13.4	16	17.1
25-44	54.9	52.1	41.1
45+	21.9	21.7	29.5

NB: Region is based on postcode mapped to ABS regions. Data are an approximation only. Jobseekers are derived from Newstart Allowance and youth allowance recipients by excluding all people who did not receive a payment due to their own and/or their partner's income, or where applicable parental income and all those known not to be required to search for work. It is optional for customers to identify as Indigenous, therefore these Indigenous indicators may represent an undercount. Short-term income support duration is defined as less than 1 year.

Source: (Department of Education, Employment and Workforce Relations – DEEWR, 2008)



Table 13 Labour Force, Employment and Unemployment 2010

Location	No. Persons Unemployed/ Percentage		Labour Force 2010
	December 2009	December 2010	
Katherine	233 (4.4%)	168 (3.2%)	5,261
Alice Springs - Charles	77 (2.5%)	61 (2.0%)	3106
Northern Territory	4,800 (3.8%)	3,700 (4.0)	125,000

Source: DEEWR (2010)

Table 14 Time Series Labour Force Data for Katherine and Northern Territory

Census Figures	Katherine (T)			Katherine (non-urban)			Lower Top End			Northern Territory		
	1996	2001	2006	1996	2001	2006	1991	2001	2006	1991	2001	2006
Total Labour Force	4,941	4,583	4,386	3,241	3,493	3,487	8,182	8,076	7,873	89.6	96.1	98.4
Employed ('000)	4,584	4,274	4,192	2,985	3,265	3,264	7,569	7,569	7,456	83	90.4	94.2
Unemployed ('000)	357	309	194	256	228	223	613	537	417	6.6	5.7	4.2
Unemployment Rate (%)	7.1	6.7	4.5	7.9	6.5	6.4	7.5	6.6	5.3	7.4	5.9	4.3
Participation Rate (%)	64.3	65.6	59.4	52.7	49.4	48.5	59.2	57.5	54.0	63.0	63.0	61.0

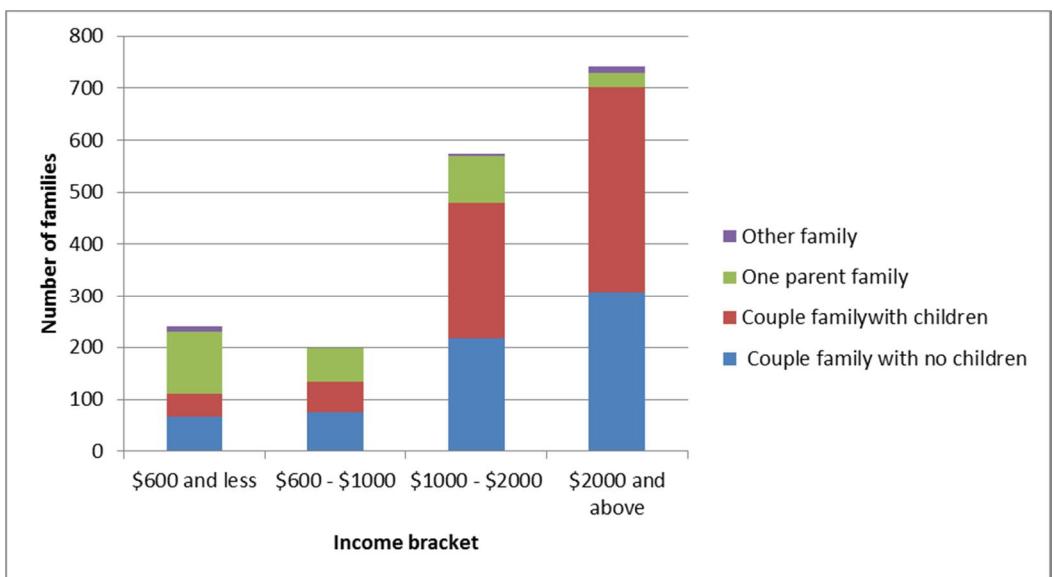
NB: Based on ABS (2007a)

Source: Northern Territory Government (2008)

4.3.6 Income

According to the 2011 Census data, the median individual income was \$759 per week and the median household income was \$1,534 per week. For Pine Creek the median individual income was \$681 and the median household income \$1,142.

Figure 12 shows the median weekly household income by income category and family type. The largest number of families earn over \$2,000 per week, however significant proportions of the population also earn less than \$1,000 per week.

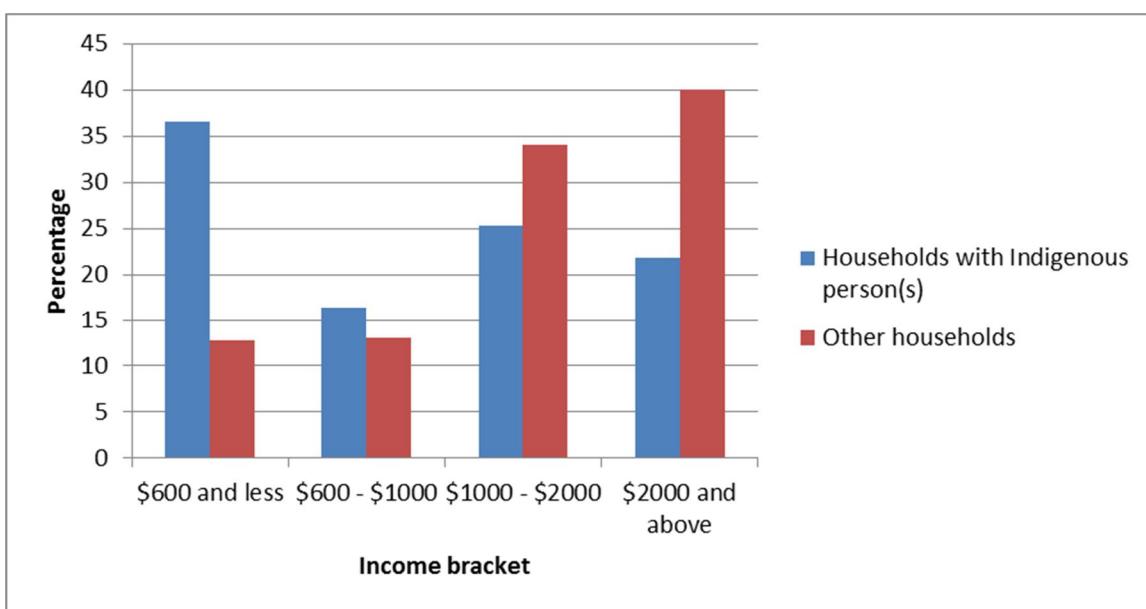


Source: 2011 census

Figure 12 Household Income (\$/week) by Family Composition, Katherine

According to the 2011 census, the median individual income for Indigenous persons was \$301 per week and the median household income was \$921 per week.

Figure 13 shows the median weekly household income for households with Indigenous persons compared to other households. This shows the significant difference between these two populations in terms of income. Households with Indigenous person had larger relative proportions within the household income brackets of <\$600 and \$600-\$1,000 per week.



Source: 2011 census

Figure 13 Household Income for Households with Indigenous Persons, Katherine 2011

Labour Demand

Labour markets function through the interaction of workers and employees. Regional labour markets in the NT are small and concentrated in certain sectors. Employers in mining, infrastructure and other projects are often unable to find sufficient numbers of local workers with the required skills in the region and there is often a long lead time in training new workers. Labour demand in the Katherine region has been profiled in terms of the following indicators:

- ▶ Skill profile; and
- ▶ Job advertisements.

The Katherine region occupation and industry profiles show the types of skills that were in the region's workforce at the time of the 2011 census.

Industry by Employment for Katherine

Employment by industry data shows the industry sections where people are employed and where employment opportunities lie within the region (Figure 14). The data is influenced by factors such as rate of economic growth, structural change in the economy, the effects of technology, labour market flexibility and changes in local and global demand. Currently employment within the mining sector is a very small part of the overall existing employment profile for Katherine.

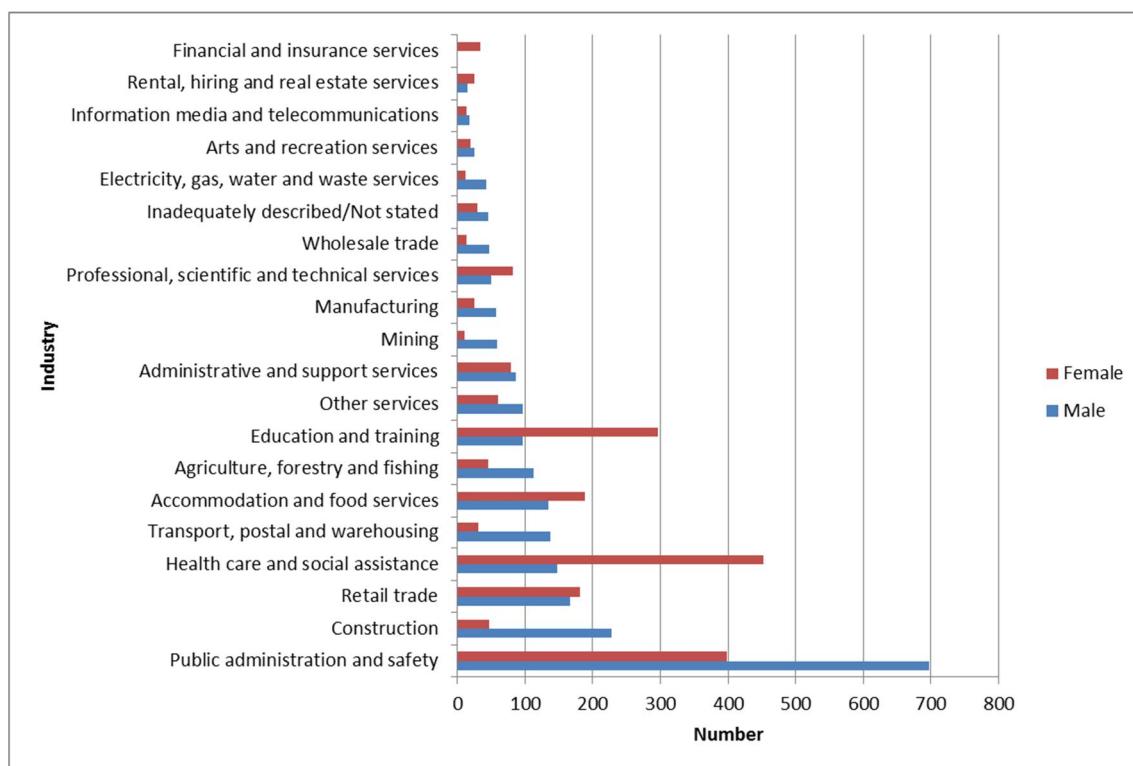


Figure 14 Industry of Employment by Sex, Katherine 2011

Table 15 shows that the majority of people in Katherine are employed in Public Administration and Safety namely Defence and State Government Administration.



Table 15 Disaggregated Employment by Industry Katherine Region 2011

Industry	No. of People Employed	% of Total Employment
Public Administration and Safety		
Defence	503	12.5
Public Administration	441	11.0
Public Order and Safety Services	110	2.7
Health Care and Social Assistance		
Other Social Assistance Services	222	5.5
Medical and other Health Services	171	4.3
Hospitals	149	3.7
Residential Care Services	58	1.4
Retail Trade		
Other store based retailing	155	3.9
Food retailing	120	3.0
Motor vehicle retailing	53	1.3
Fuel retailing	13	0.3

Occupation of employed workers

Katherine has slightly higher percentages of Managers, Community and Personal Service Workers and Technicians and Trades Workers to the Northern Territory population and lower percentages of Professionals and Labourers (Table 16).

Table 16 Occupation of Employed Persons as a Percentage of Total Employed Persons, Katherine 2011

Occupation of Employed Persons	Katherine (%)	Northern Territory (%)
Managers	11.4	12.0
Professionals	17.1	19.9
Technicians and Trades Workers	17.9	15.1
Community and Personal Service Workers	15.3	13.4
Clerical and Administrative Workers	14.4	14.7
Sales Workers	6.4	6.8
Machinery Operators and Drivers	5.6	6.1
Labourers	9.4	9.6
Inadequately Described/Not Stated	2.6	2.4
Total	100	100

Source: 2011 Census



Skills Shortages

The Northern Territory Labour Economics Office, under the auspices of the Department of Education, Employment and Workplace Relations (DEEWR, 2010) publishes the *Skills Shortages: Northern Territory* report. Table 17 identifies the skills shortages of possible relevance to the Project based on the NT Occupation Shortage List 2011 (Department of Business and Employment – DEB, 2008).

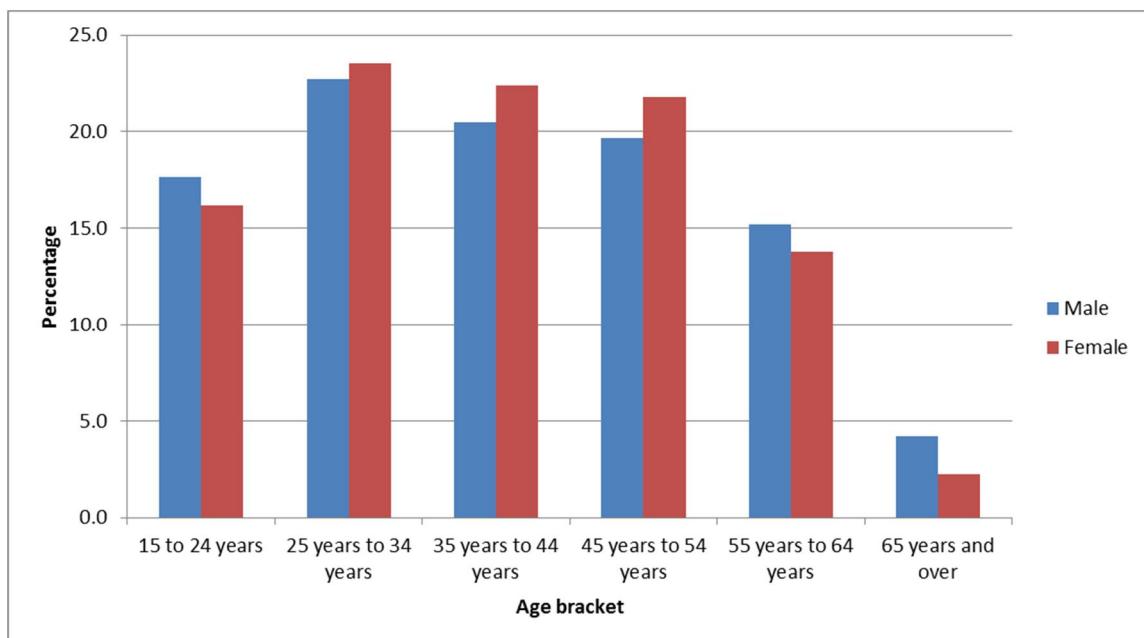
The number of job advertisements shows which skills are needed and where shortages exist. In the year 2006/2007 nearly 1,420 jobs were advertised for the Katherine Region with the most common ones being Public servants (9.3%), Farm hands (8.5%), General labourers (6.9%), and Sales representatives (6.3%). Other jobs advertised included construction plant operators, truck drivers, car parts and accessories fitters, carpenters and joiners.

The NT Department of Education has committed to improving the education and employment opportunities for people living in the NT. It offers incentive payments for employers of apprentices within areas of skills shortages or from disadvantaged groups.

Figure 15 shows the relative proportion of wage and salary earners by age and gender for Katherine. The largest proportions of wage and salary earners were in the age brackets of 25 to 34 years and 35 to 44 years.

Table 17 Skills Shortages in Northern Territory at March, 2011

Professional occupations in shortage (of possible relevance to the Project)	Technicians and trades workers occupations in shortage (of possible relevance to the Project)
Construction project manager	Carpenters
Engineering manager	Electricians
Production manager (mining)	Plumber
Child Care centre manager	Child care worker
Nursing clinical director	Cabinet maker
Licenced club manager	Dental assistant
Engineers (electrical, structural, mechanical, mining)	Earthmoving plant operator
Early childhood pre-primary school teacher	
Primary school teacher	
Dental specialist	
Physiotherapist	
General medical practitioner	

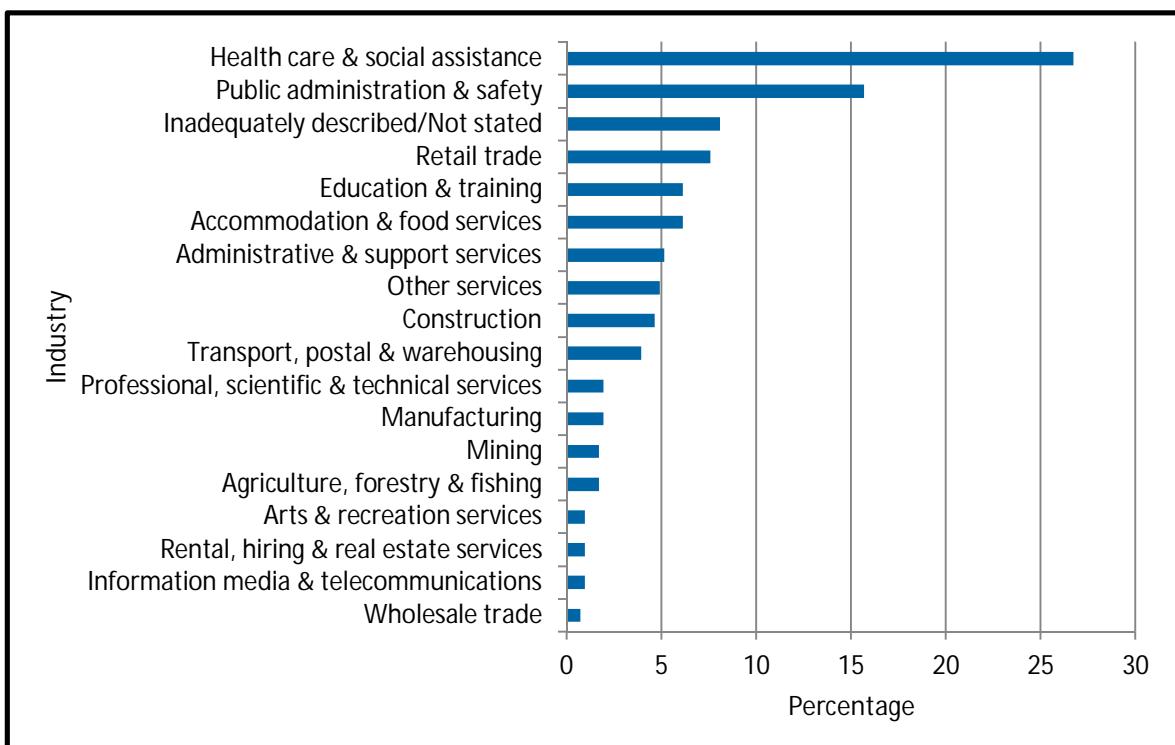


Source: 2011 Census

Figure 15 Wage and Salary Earners by Age and Sex, Katherine LGA 2011

Indigenous Employment and Labour Force

The most common industry of employment for Indigenous persons in Katherine is Health care and social assistance (Figure 16).



Source: 2011 Census

Figure 16 Industry of Employment Indigenous Persons, Katherine 2011



Table 18 shows a summary of the Indigenous Labour Force in Katherine by age and employment status.

Table 18 Katherine Indigenous Population Labour Force in 2011

Age Bracket	Employed	Unemployed	Total Labour Force	Not in Labour Force	Labour Force Not Stated	Total
15-24 years	100	57	157	183	15	512
25-34 years	118	55	173	127	26	499
35-44 years	146	38	184	143	26	537
45-54 years	105	24	129	134	13	405
55-64 years	42	4	46	89	9	190
65 years and over	6	3	9	81	7	106
Total	517	181	698	757	96	2,249

Source: 2011 Census

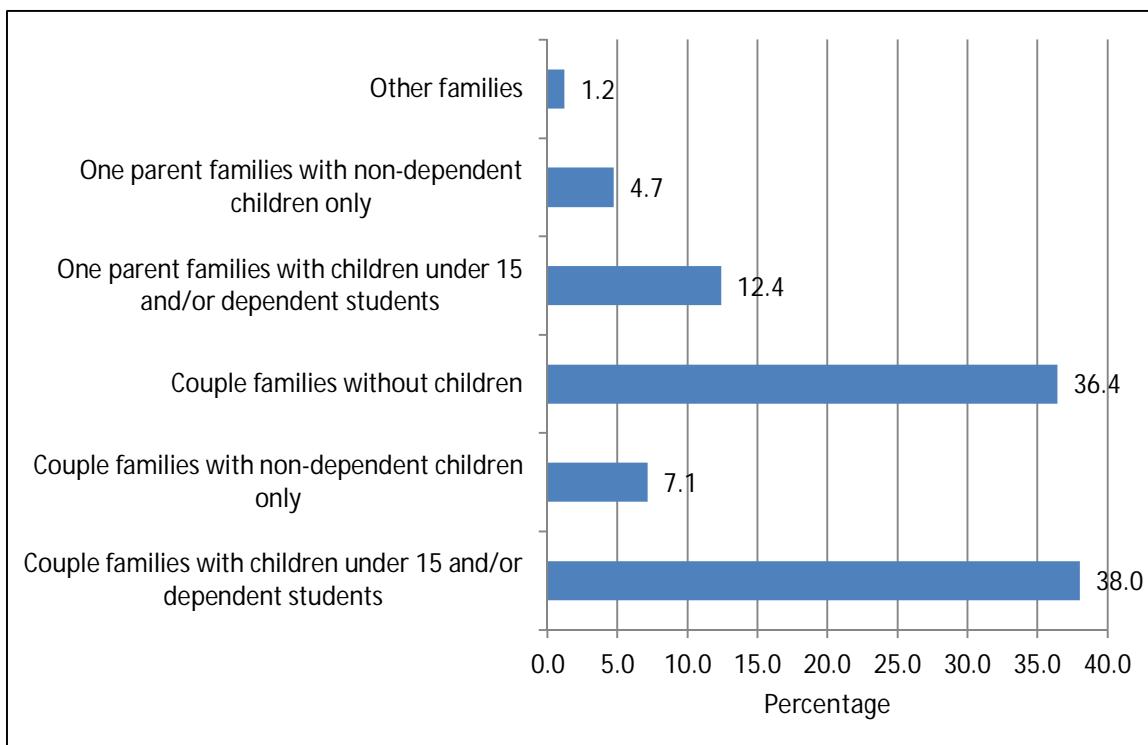
4.3.7 Housing and Accommodation

Key points Housing and Accommodation

- ▶ The most common household type in Katherine is couple families with children under 15 years followed by couple families without children.
- ▶ 51.3% of housing in Katherine is rented and 14.5% is fully owned.
- ▶ Rental accommodation in Katherine is extremely limited and very expensive.
- ▶ The number of properties sold has declined since 2006.
- ▶ There is limited availability of housing for purchase.
- ▶ Sale prices for houses and units have risen on average approximately 12% and 17% per annum respectively.
- ▶ The median price for three bedroom house is \$268,000. This is 60% lower than comparable Darwin prices and 16% lower than Alice Springs for June 2008.
- ▶ Vacancy rates for residential properties remain low consistent with the rental market across the Northern Territory.
- ▶ There is limited availability of other temporary accommodation in Katherine. Hotels, backpackers and other temporary accommodation is generally booked out during peak events and peak visitor seasons.
- ▶ There is limited current availability of land for purchase. There is some future land available in Katherine East but this land is yet to go through concept planning and release by the Department of Lands, Planning and Environment.

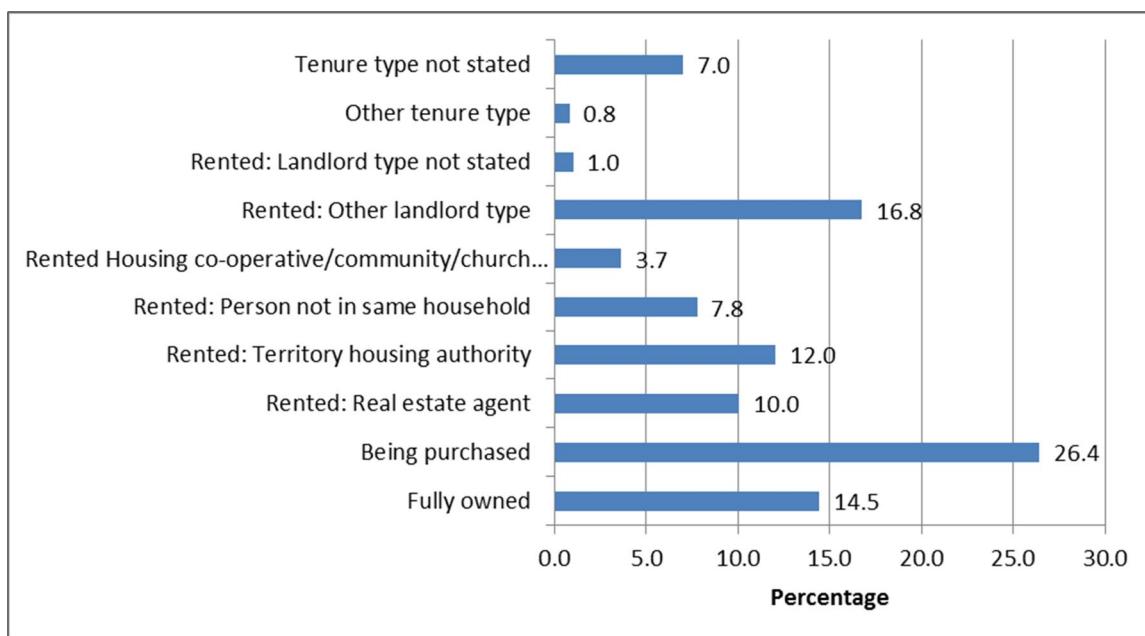
Household Types

The most common household type in Katherine is couple families with children under 15 years followed by couple families (Figure 17). 51.3% of houses in Katherine are rented, 14.5% are fully owned and 26.4% are being purchased (Figure 18).



Source: 2011 Census

Figure 17 Household Types, Katherine 2011



Source: 2011 Census

Figure 18 Housing Types, Katherine 2011



Consultation with Local Government confirmed that shortage of housing is an issue in Katherine. There is limited existing availability of housing for either purchase or rent. There is limited land currently available for purchase. Katherine Town Council referred to some land possibly available in the future in Katherine East but that this land had yet to undergo concept planning and was still at least a few years away for release⁷.

Housing costs

Table 19 details median property prices in Katherine based on 2006 to 2008 information. This information shows that vacancy rates have declined over this period and that costs for both purchasing a house and renting a house have risen.

Table 19 Katherine Median Property Prices (June Quarter)

	2006	2007	2008	Avg. Annual Change
Sales				
House (no)	180	110	133	-13.1
Unit (no)	48	25	20	-29.2
Sale Price (median)				
House (\$'000)	216	267	268	12.0
Unit (\$'000)	156	215	211	17.6
Rent per week (median)				
3 Bedroom House (\$)	275	300	310	6.4
2 Bedroom House (%)	200	370	280	20.0
Vacancy rates				
3 Bedroom House (%)	5.2	1	1.8	n/a
2 Bedroom Unit (%)	3.8	1	2.1	n/a
Yield				
3 Bedroom House (5)	6.6	5.8	6.0	n/a
2 Bedroom House (%)	6.7	6.5	6.9	n/a

Source : ABS, 2010

Affordability

Affordability of housing is defined as the proportion of median weekly income required to meet weekly rent for a 3 bedroom house (NT Government, 2010). In general, members of the community which are over the 30% or 35% thresholds are considered to be under housing stress.

There is limited recent statistical data available for Katherine on housing affordability but based on the above criteria and using a conservative median rental cost for a three bedroom home in 2008 of \$310 (Table 19), families with a combined gross income of less than \$1,033 (i.e. housing costs accounting for greater than 30% of income) per week would potentially be subject to rental stress. This is likely to be the case for a significant proportion of Katherine residents (approximately 20.7%) and particularly the Indigenous population (42.5%), based upon 2011 income information (Section 4.3.6).

⁷ SIA baseline consultation September 2011



More recent secondary information confirms that rental accommodation in Katherine is limited and expensive – often around \$400-\$480 for a three-bedroom home (Talbot, 2011; DLGRS, 2011).

Temporary accommodation

Table 20 provides a list of other temporary accommodation available in Katherine. SIA consultation with key stakeholders and accommodation owners identified that this accommodation often becomes fully-booked during the peak tourist season and for key events such as the Katherine Show weekend.

Table 20 List of Temporary Accommodation in Katherine

Name	Type of Accommodation	Capacity
Aboriginal Hostels Limited	Backpackers	-
All Seasons Katherine	Motel / Caravan Park	100 rooms
Aussies Bistro	Hotel	-
Best Western Pine Tree Motel	Motel	51 rooms
BIG4 Katherine Low Level Caravan Park	Caravan Park	8 cabins
Coco's House	Backpackers	-
Edith Falls Kiosk	Caravan Park	-
Katherine Motel	Motel	40 rooms
Katherine River Lodge Motel	Motel	38 rooms
Knotts Crossing Resort	Motel / Caravan Park	126 rooms
Kookaburra Lodge	Backpackers	-
Manbulloo Homestead	Caravan Park	-
Mataranka Cabins and Camping	Motel / Caravan Park	4 cabins
Nitmiluk National Park	Caravan Park	-
North Bank Park	Caravan Park	-
Palm Court Kookaburra Backpackers	Backpackers	-
Paraway Motel	Motel	56 rooms
Redgum Tourist Park	Caravan Park	-
Riverview Tourist Village	Caravan Park	-
Shady Lane Tourist Park	Caravan Park	-
Springvale Homestead	Motel / Caravan Park	28 rooms
St Andrews Serviced Apartments	Hotel	14 apartments
Stuart Hotel	Hotel	19 rooms
Territory Manor	Motel / Caravan Park	26 rooms
Timber Creek Hotel and Circle F Caravan Park	Hotel / Caravan Park	-

Building approvals for the period 2005 to 2009 are provided in Table 21.



Table 21 Building Approvals, Year ended 30 June

Building Approvals		2005	2006	2007	2008	2009
Private sector houses	no.	14	18	19	24	19
Total dwelling units	no.	21	27	34	24	25
Value of private sector houses	\$m	2.6	3.1	3.7	6.5	3.6
Value of new residential building	\$m	4.1	6.6	8.6	6.5	4.8
Value of total residential building	\$m	8.1	8.3	11.8	12.9	11.7
Value of total non-residential building	\$m	2.1	2.5	2.8	10.3	4.3
Value of total building	\$m	10.3	10.8	14.7	23.2	16.0
Average value of private sector houses	\$'000	182.9	178.9	195.7	266.8	190.9

Source: ABS 2010

Future housing opportunities

SIA consultation with Katherine Town Council identified that there is currently some land available for development in East Katherine and future land that has been identified for future development. This land provides an opportunity for Vista Gold to develop future additional housing for the Project.

4.3.8 Health, Safety and Security

Key Points Health, Safety and Security

- ▶ Katherine has good base services and community infrastructure including a 60-bed hospital that services both regional and defence needs; an airport shared with the RAAF Base Tindal, several private and community medical clinics, five university campuses, training providers and a range of recreational and leisure facilities.
- ▶ The provision of healthcare in the Katherine Region is characterised by the significant gap between Indigenous and non-Indigenous people.
- ▶ Existing health care provision is challenged by the remoteness of Katherine and the extreme remoteness of smaller communities spread throughout the region. Indigenous employment levels are generally very low and Indigenous employment is limited almost entirely to Aboriginal Health Workers. It is difficult to recruit and retain health workers in all disciplines and difficult to maintain resident professionals in the remote communities.
- ▶ Access to specialist facilities is very limited and relies upon visiting clinicians or patient transport to Darwin.
- ▶ Gaps and issues have been identified in providing healthcare services in the Katherine Region. These include: inadequate availability of Aboriginal Health Workers, lack of resident doctors and specialists, no Indigenous doctors and few Indigenous nurses, challenges around provision of education and training in remote areas, lack of affordable and suitable housing and cultural mentoring and training issues.

Health Services in Katherine

The Katherine region (for healthcare purposes) includes Katherine, Roper Gulf and Victoria Daly Local Government areas covering approximately 340,000 square kilometres. Key health services in both Katherine Region and Katherine are identified in Figure 19 and Figure 20. The following discussion on health services was based on information obtained in 2011. The status of services is unlikely to have changed significantly since this time.



Source: Katherine Centre of Excellence Report (2011)

Figure 19 Katherine Regional Health Clinics



Source: Katherine Centre of Excellence Report (2011)

Figure 20 Katherine Health Clinics

Katherine District Hospital

The Katherine District Hospital is a 60-bed public hospital, one of just five in the NT. It services an area of approximately 340,000km² and a catchment population of approximately 19,000 plus a seasonal tourist population. Approximately 85% of the patients are Indigenous. Services include 24-hour Emergency, 14-bed Maternity Unit with 3 birthing rooms, 28 bed general medical/surgical ward, 18-bed children's ward, renal unit with 7 dialysis units, Radiology (X-ray and ultrasound only) and pathology.

There are approximately 87 nurses on the hospital staff. Turnover is not as high as might be imagined for the remote location. One reason is the existence of on-site accommodation (48 units) and on-site amenities including tennis courts and a swimming pool. Doctor services are provided by General Practitioners, Junior Medical Officers and International Medical Graduates with support services from Visiting Medical Officers. Obstetric and Anaesthesia services are provided by the GP's from the Kintore Clinic. There are currently 13 full time equivalent (FTE) doctors at the hospital. There are no resident specialists. There are visiting services from physicians, paediatricians, cardiologists, ophthalmologists and renal specialists, generally for a few days every month to six weeks. Visiting specialists come from larger centres including Darwin, Adelaide, Newcastle, Melbourne and Canberra. Katherine District Hospital is currently not accredited for Registrar training. As with most rural and remote hospitals, the biggest challenge facing the hospital is to maintain sufficient and adequately skilled staff.



Wurli Wurlinjang Health Service

The Wurli Wurlinjang Health Service serves the Indigenous community of Katherine and the immediate vicinity. The main Wurli Clinic is located on Third Street in central Katherine and has 6 consulting rooms, a procedure room and a pharmacy. It is staffed largely by Aboriginal Health Workers, one of whom is the Clinic Coordinator. There are 5 doctors who service the Wurli Clinic. Wurli runs a sexual health program which is shared with Sunrise and Katherine West. The Wurli Wurlinjang AMS also currently hosts Medical Students, Junior Doctors, GP Registrars and trainee Aboriginal Health Workers. It has the relative advantage of enabling trainees to be accommodated in central Katherine.

Katherine West Health Board

The Katherine West Health Board services an area of approximately 162,000 square kilometres to the west of Katherine. Katherine West owns and operates 7 Community Health Centres (Table 22).

Table 22 Summary of health facilities and services

Name of Facility	Type of Facility	Service/s
Active Physiotherapy Katherine	Private	Physiotherapy
Billings Family Life – Natural Family Planning	Private	Family Planning
Blue Sky Therapies	Private	Physiotherapy, alternative & natural therapy,
Chiropractic Health Centre of Katherine	Private	Chiropractic
Clinic 34	NT government	Sexual – assessment and treatment of STIs and blood borne viruses
Katherine Dental Surgery	Private	Dentistry
Katherine Diagnostic Imaging	Private	Diagnostic ultrasound service
Katherine District Hospital	NT government - Hospital	Non-specialist, medical, diagnostic and treatment facility.
Katherine Health Centre	NT government	Infant, maternal, nutrition, ear, oral, drug and alcohol, education and training, women, children, mental health
Kintore Clinic	Private	General Practice
Laubman & Pank	Private	Optometry
OPSM	Private	Optometry
Rocky Ridge Nursing Home	Private	Aged Care
Somerville Community Services	Non-government, not-for-profit	Disability, family
Wurli Wurlinjang	Community-run, indigenous health	Substance abuse, child, maternal, women, men, chronic disease, sexual, optometry, aged
Government Centre	NT government	Mental Health



Name of Facility	Type of Facility	Service/s
Sunrise Health Services Aboriginal Corporation	Community-run, indigenous health	Men's, child, aural, aged, nutrition, drug & alcohol, environment, emotional, chronic disease.
Team Health Top End Association for Mental Health		Mental Health

A mobile team also services around 15 outstations and cattle stations in the region. Katherine West has approximately 4 full-time GPs, 1 GP Registrar, 16 Nurses, 6 registered Aboriginal Health Workers and 2 trainees. Katherine West has chosen to integrate Allied Health into its own staff. There is currently 1 FTE Diabetes Educator plus locums in podiatry and speech therapy. There is a high turnover of nursing staff. Remoteness is the primary factor and suitable accommodation in the communities is an issue.

The recent trend is for nurses to choose to work with agencies rather than as direct employees. 90% of nurses are female. All communities are E-health Connected. Katherine West runs an anti-smoking program which is shared with Wurli and Sunrise. Katherine West has a history of training placements and some existing infrastructure.

Sunrise Health Service

Sunrise Health Service provides healthcare services to remote largely indigenous communities across an area of approximately 75,000 square kilometres to the east of Katherine. Services are based from nine health centres and there are around 3,500 regular patients of whom approximately 85% are Indigenous. The community clinics were mostly built in the 1960s and 1970s. They are generally busy and crowded. The communities are all accessible by road, but not all by paved roads and some communities (including the significant population at Ngukurr/Urapunga) often become inaccessible by road for parts of the wet season.

Medical evacuations are frequent with 2-3 evacuations per week from Ngukurr and 1-2 per fortnight from other sites. Dialysis machines are planned for Ngukur and Barunga. Sunrise has 6 doctors (4.5 FTE). All the doctors live in the town of Katherine and travel out to serve the communities. Ngukurr, Minyeri and Bulman have visiting paediatricians, general physicians and hearing specialists. There are 20-25 nurses of whom 8-9 are long-term providers and the remainder experience high turnover. There are 16 Aboriginal Health Workers and Sunrise would prefer there to be more. Sunrise believes that community support is the key for increasing numbers of AHW's. There is 1 mental health professional. The vast majority of the Nurses and AHW's live in the communities with just one nurse living in Katherine. There are 6 AHW's based in Katherine to provide regional programs in chronic disease management, environmental health, aural health and aged care. Sunrise runs a trachoma program which is shared with Wurli and Katherine West.

Binjari Health Service

Binjari is an Indigenous community of approximately 300 people located 18km south of Katherine. The Binjari clinic is managed by a nurse and staffed by Aboriginal Health Workers. The Binjari Health Service is independently constituted and managed but its finance is auspiced by Wurli Wurlinjang Health Service.

Katherine General Practice Clinics

Until recently, there has been only one GP Clinic in the town of Katherine – the Kintore Clinic. The Kintore Clinic has recently had two full-time GP's and in the past has employed up to 5 GP's and GP registrars. The GP's at Kintore, Dr David Brummitt and Dr Jim Scattini also perform obstetric and



anaesthesia services at the hospital for which they are called in several times per week. Dr Brummitt and Dr Scattini have practiced in Katherine for 19 and over 30 years respectively. The clinic has no practice nurse and rents space to visiting specialists and Allied Health professionals. The Kintore Clinic takes in medical students for clinical training but finds the associated administration to be onerous. In October 2010, a second clinic "Gorge Health Services" was opened in Katherine with Dr PJ Spafford as the sole practitioner. Dr Spafford has practiced in Katherine for many years and was until recently the Director of Medical Services at Katherine District Hospital.

Katherine Regional Aboriginal Health & Related Services - KRAHRS

KRAHRS is a non-profit organisation based in Katherine which provides Allied Health services to Aboriginal communities. It is funded by the Department of Health and Ageing for three allied health positions. KRAHRS is not funded for in-town services.

RAAF Base Tindal

RAAF Base Tindal is located 15 kilometres south of Katherine on the site of a World War II airfield. The base is home to around 600-700 service personnel in addition to civilian staff and families. Medical Services at the Tindal RAAF base change over time with the relatively high turnover of personnel. There have been up to three doctors at RAAF Base Tindal in various stages of training. The majority of family members are believed to seek medical care from the town clinics and the Katherine District Hospital.

Katherine Region Aged & Disability Service

Services provided include assessment, therapy, case management, respite, supported accommodation and care, community access, information and training, equipment and subsidies and guardianship

Centre for Disease Control (CDC)

CDC operates from the hospital campus and provides a range of services to prevent, monitor and control selected communicable and non-communicable diseases.

Community Health Centre

Katherine Community Health Centre is located in the Government Centre on First Street.

Services provided include:

- ▶ Immunisation clinics;
- ▶ Maternal health services;
- ▶ Infant health services and clinics;
- ▶ School medical screening;
- ▶ Domiciliary nursing;
- ▶ NT hearing services;
- ▶ Oral hygiene (dental clinic); and
- ▶ Nutrition counselling.

Pharmacy

There is one Pharmacy business in the town of Katherine with two retail outlets employing 4 Pharmacists.



Northern Territory Aerial Medical Service (NTAMS)

Katherine is one of three bases for NTAMS in the Top End – the others being Darwin and Gove. The service conducts medical evacuations from remote communities and work sites, hospital transfers and international retrievals from parts of South East Asia. NTAMS has doctors on call in Darwin.

Mental Health Services

Katherine Mental Health Service has a Psychiatrist, a Psychologist, a Mental Health Nurse and an Aboriginal Health Worker. The service is located in the Government Centre on First Street and services the whole region. General Practice Network Northern Territory (GPNNT) also operates a mental health service for remote communities called “Healthy Minds”.

Alcohol and Drugs Program

This service offers a range of community education services including accredited training in Community Services Alcohol and other Drugs Work. The service also assists communities with development and implementation of capacity building and diversionary activity projects.

Dental Services

There is only one private dental practice in Katherine. The practice consists of the owner dentist who is sometimes supplemented by another dentist. There is a funded public dentist position and dental facilities at the Government Centre but the position is often unfilled.

Healthcare Education and Training

Whilst underserved from the perspective of healthcare services, the Katherine region is also generally under-utilised as a resource for clinical training. Reasons include the lack of accommodation, lack of clinical space for students at remote sites and the need to collaborate and coordinate with multiple education and training providers to make efficient use of central resources and infrastructure.

There are two physiotherapy clinics, one natural therapy clinic and one chiropractic clinic. Katherine has one dentist and two optometrists; and a specialist sexual health clinic (Clinic 34). Katherine has a diagnostic imaging clinic that performs sonograms and ultrasounds and a general practice. Katherine's two main health facilities are Katherine District Hospital which is a non-specialist, general, 60-bed hospital. The other main health facility is Katherine Health Centre which specialises in infant, maternal, nutrition, ear, oral, drug and alcohol, education and training, women, children, mental health. A community-run, indigenous healthcare service is run out of the Katherine region.

Key Health Care Gaps

A number of gaps and issues have been identified (Talbot, 2011) in providing healthcare services to the Katherine Region. These include:

- ▶ Inadequate availability of Aboriginal Health Workers;
- ▶ Lack of resident doctors and specialists;
- ▶ No Indigenous doctors and few Indigenous nurses;
- ▶ Challenges around provision of education and training in remote areas;
- ▶ Lack of affordable and suitable housing ; and
- ▶ Cultural mentoring and training issues.



4.3.9 Other Social Infrastructure

Key Points Other Social Infrastructure

- ▶ Katherine has four state primary schools situated in town and one special school, servicing children with special learning needs. There are 13 primary schools in remote areas in the Katherine region with the head office located in Katherine. Katherine School of the Air is run from Katherine and services primary school students in remote areas in the Katherine region.
- ▶ There is good training and education infrastructure in Katherine supporting VET programs and further education.
- ▶ Childcare facilities in Katherine are currently considered to be at capacity.
- ▶ There are a range of restaurants, bars and cafes in Katherine providing opportunities for socialising.
- ▶ There is one supermarket in Katherine servicing the needs of a wider regional population.
- ▶ Katherine has good base sport and leisure opportunities and facilities as well as a range of existing social and sporting clubs.

The following section provides a summary of existing social infrastructure and services in Katherine in 2011. They are unlikely to have changed substantially since this time. Key community service delivery areas for Katherine include Booloola, Ngukurr, Barunga, Wugularr (Beswick), Bulman, Manyallaluk (Eva Valley), Numbulwar, Jikminggan and Matanka.

Schools

Katherine has four state primary schools and one school servicing children with special learning needs. Katherine Regional Group Schools consists of 13 primary schools in the Katherine region with the head office located in Katherine (Table 23). Katherine School of the Air is run from Katherine and services primary school students in remote areas in the Katherine region. Children who use this service live in very remote areas such as cattle stations. Katherine has one secondary education facility which is a state run school. Three tertiary education facilities have four campuses in the Katherine region.

Katherine has good social infrastructure supporting further education and training opportunities including VET training and a campus of the Charles Darwin University (Table 24).

Table 23 List of Schools in Katherine

School	Level of Education	Number of Students
Casuarina Street Primary School	Primary	280
Clyde Fenton Primary School	Preschool & Primary	285
Katherine High School	Secondary	585
Katherine Regional Group Schools		
Katherine School of the Air	Primary	214
Katherine South Primary School	Primary	319
Kintore Street School (Special)	Preschool & Primary	9
MacFarlane Primary School	Primary	231
St Joseph's College	College	-



School	Level of Education	Number of Students
Tindal Preschool	Preschool	-

Table 24 Training and Employment Services

Name	Type	Website	Contact Details
Australian Apprenticeships NT	Training	www.australianapprenticeshipsnt.com.au	08 8971 2839
Byron Employment	Employment agency	www.gtn.com.au	08 8971 1688
Batchelor Institute of Indigenous Tertiary Education, Katherine Annex	Tertiary education	www.batchelor.edu.au	08 8966 2010
Centre for Remote Health	Tertiary education, training, research centre (remote health)	www.crh.org.au	08 8971 2758
Chamber of Commerce NT	Tertiary education (business)	www.chambernt.com.au	08 8972 3830
Charles Darwin University, Katherine Rural Campus	Tertiary education	www.cdu.edu.au	08 8973 8311
Charles Darwin University, Katherine Town Centre	Tertiary education	www.cdu.edu.au	08 8973 9900
CRS Australia	Employment agency	www.crsaustralia.gov.au	08 8973 0300
IS Australia	Employment agency, training	www.isaustralia.com.au	08 8971 0030
ITEC	Health workers employment agency	www.itechealth.com.au	08 8923 9923
Jobfind Centre Katherine	Employment agency	www.jobfindcentre.com.au	08 8972 9200
Katherine Training Centre	Training	www.deetnt.gov.au	08 8972 5300
Northern Territory Rural College	Tertiary education		08 8973 8311

SIA consultation identified that existing childcare facilities in the area were at capacity (Table 25).

Table 25 Childcare Centres

Name of Centre	Services Offered	Ages	Capacity	Availability
Katherine East Childcare & Early Learning Centre	Long day care, occasional care	6 weeks – 5 years	-	Vacancies
Katherine Regional Family Child Care Inc, Family Day Care & After School Care	Family day care, after school care	0 – 5 years	45 children per day	No vacancies



Name of Centre	Services Offered	Ages	Capacity	Availability
Little Joeys	Long day care, after school care	3 – 5 years	44 children per day	No permanent vacancies, come casual vacancies
Little Mangoes	Long day care	6 weeks – 5 years	86 children per day	No vacancies
YMCA Katherine	Vacation care	-	-	-

Public Transport

Katherine has two private taxi service operators who, together, operate 23 taxis in Katherine. Taxis include mini buses that hold up to 10 people as well as sedans. Consultation with the taxi service indicated that they were not running at capacity except during peak periods.

Katherine has a school bus and there are usually a number of buses that operate between Katherine and surrounding communities. SIA baseline consultation indicated that some of these services had been cancelled recently due to funding issues.

Leisure and Entertainment Amenities

Katherine has good base leisure and facilitates provided and maintained by the Katherine Town Council. These include:

- ▶ Sportsgrounds;
- ▶ Four ovals;
- ▶ BMX track;
- ▶ Basketball court;
- ▶ Netball court;
- ▶ Tennis courts;
- ▶ Skate park;
- ▶ Children's adventure playground;
- ▶ Aquatic centre;
- ▶ Swimming pool;
- ▶ Library;
- ▶ Museum; and
- ▶ Four art and cultural organisations.

Parks and Reserves

- ▶ Twenty parks in the Katherine region;
- ▶ One Hot Springs Reserve.

Community events in the region include the:

- ▶ Sports Expo;
- ▶ National Youth Week;
- ▶ Katherine Festival;



- ▶ Doggy Day;
- ▶ Katherine & District Show Society Inc.;
- ▶ Katherine Community Markets; and
- ▶ Nixon X-ing Campdraft.

Restaurants, Cafes, Food Outlets, Bars

There are a range of existing restaurants, cafes and food outlets currently in Katherine (Table 26).

Table 26 List of Facilities for Socialising

Name	Venue Type	Facilities	Capacity	Opening Hours
All Seasons Katherine – Galloping Jacks Steakhouse & Bar	Hotel restaurant	Restaurant, swimming pool, conference room, bar	Seats 100 people	6:30 pm – 9 pm 7 days
Arcade Internet Cafe	Cafe	Cafe, internet use	-	8:30 am – 5 pm Mon – Fri 8:30 am – 1 pm Sat
Brumbys	Takeaway	Bakery	-	7 am – 7 pm Sun – Fri 7 am – 6 pm Sat
Bucking Bull	Cafe	Cafe	500 people (takeaway and seating)	6:30 am – 4:30 pm Mon – Fri
Barra Cafe	Cafe	Cafe	Seats 25 people	4 pm – 8 pm Dry season only
Eagle Boys	Takeaway	Fast food	-	
Happy Corner Store	Takeaway	Fast food	-	
Jade Cafe	Cafe	Cafe	-	9 am – 5 pm Mon – Fri 9 am – 3 pm Sat
Katherine Club	Restaurant	Restaurant, RSL sub-branch, bar	Seats 280 people	11:30 am – 2 pm Mon – Fri 6 pm – 8:30 pm Mon – Sat
Katherine Country Club	Restaurant	Restaurant, bar, pokies	Seats 300 people	10 am – late 7 days
Katie's Bistro	Restaurant	Restaurant	Seats 120 people	
Marksie's Museum Cafe	Cafe	Cafe	Seats 100 people	8 am – 4 pm Mon – Fri
McDonald's Katherine	Takeaway	Fast food Restaurant	-	4 am – 3:45 am 7 days
Mini Mart Cafe	Cafe	Cafe	-	8 am – 4 pm Mon – Fri 9:30 am – 2 pm Sat
New Shanghai	Restaurant /	Restaurant,	Seats 70 people	11 am – 1:30 pm Mon – Sat



Name	Venue Type	Facilities	Capacity	Opening Hours
Restaurant & Takeaway	Takeaway	takeaway		5 pm – 9 pm Mon - Sat
Ninos Pizza	Takeaway	Fast food restaurant	-	4 pm – 8:30 pm 7 days
Red Rooster	Takeaway	Fast food restaurant	-	9 am – 9 pm Mon – Wed 9 am – 10 pm Thurs – Sat 10 am – 10 pm Sun
River Restaurant	Restaurant	Restaurant, catering, function room	Seats 90 people	6 pm – 8:30 pm 7 days
RJ Bar & Restaurant	Restaurant	Restaurant, bar	Seats 40 people	6 pm – close Mon – Sat
Savannah Restaurant	Restaurant	Restaurant	Seats 115 people	
Silver Screen Cafe	Cafe	Café, catering	-	8 am – 4 pm Mon – Fri 8 am – 3 pm Sat
Subway Katherine	Takeaway	Fast food Restaurant,	-	8:30 am – 9 pm Sun – Wed 8:30 am – 10 pm Thurs – Sat
Terrace Cafe	Cafe	Cafe	-	7 am – 6 pm Mon – Fri 7:30 am – 3 pm Sat 8 am – 1 pm Sun
The Coffee Club	Restaurant / Cafe	Restaurant / Cafe	-	6:30 am – 5:30 pm Mon – Fri 7 am – 4 pm Sat 7:30 am – 4 pm Sun



Social Clubs

There are 12 Social clubs in Katherine, 10 are sporting clubs.

- ▶ Katherine Never Never Ladies Beefsteak & Burgundy;
- ▶ Rotary Club of Katherine;
- ▶ YMCA Katherine;
- ▶ Australian Football League NT;
- ▶ Hash House;
- ▶ Katherine Athletics Centre;
- ▶ Katherine Bowls Club;
- ▶ Katherine Game Fishing Club;
- ▶ Katherine Golf Club;
- ▶ Katherine Judo Club Inc.;
- ▶ Katherine Krocs Rugby Union Club; and
- ▶ Katherine Motor Sports Club.

4.4 Lower Top End/Katherine – Regional Study Area

There were a number of changes in the census collection areas in the 2011 census. The area referred to in the 2006 census as the Lower Top End Regional Area of the Northern Territory was re-named the Katherine SA3 level area (the boundaries have remained the same). To ensure there is a distinction between the Katherine Local Government Area data (also referred to as Katherine SA2 area) which has been referenced in Section 4.3 of this report, and the Katherine SA3 area which will be used for the analysis of the Regional Area, the report will refer to the SA3 Area as the Lower Top End Regional Study Area.

Key Points Lower Top End - Regional Study Area

- ▶ The Lower Top End Region includes the local government areas of Victoria Daly, Roper Gulf and Elsey.
- ▶ The Regional Study area includes Jawoyn Country which is the traditional land for the Jawoyn People.
- ▶ Key industries in the region include defence, mining, tourism, pastoral, horticultural, agricultural, construction and retail.
- ▶ Jawoyn Governance Structures have changed and evolved since the successful land claim was recognised under the *Aboriginal Land Rights Act* (Northern Territory) 1976 (ALRA). Existing structures of relevance to the Project include the Jawoyn Association, Northern Land Council, Jawoyn Business entities including Nitmuluk Tours and Jawoyn Land Management partnerships including the partnership with the NT Government through the Nitmuluk Board of Management.

- ▶ The population for the Lower Top End in 2011 was 17,823 persons. The annual growth rate for the region between 2006-2011 was 8.25% which was lower than for the Northern Territory (9.3%). This period of growth follows a period of decline where the population decreased by 1.5% between 2001 and 2011.
- ▶ The Region has a high percentage of non-resident people within the region including FIFO and seasonal workers estimated in 2011 to be approximately 3,556 persons or 20% of the resident population.
- ▶ The age-sex distribution of the population is very similar to that of the Northern Territory in having higher percentages of teenagers 15 to 19 years and a lower proportion in the age group 25 to 64.
- ▶ The Indigenous population in the Region was approximately 9,262 persons in 2011 representing 52.0% of the regional population.
- ▶ The educational profile for the region was lower than for Northern Territory with a lower proportion of adults having completed year 11 and/or 12 or equivalent and lower percentages of adults over 15 years with some type of post school qualification.
- ▶ Key industries for employment in the region were Public Administration and Safety, Agriculture, Forestry and Fisheries, and Construction.

The Lower Top End Region includes the local government areas of Victoria Daly, Roper Gulf and Elsey. This region includes the towns of Pine Creek, Mataranka, Larrimah, Timber Creek, Daly Waters and Borroloola as well as Indigenous communities including Ngukurr, Barunga, Bulman, Lajamanu, Kybrook and Kalkarindji.

Key industries in the region include defence, mining, tourism, pastoral, horticultural, agricultural, construction and retail.

4.4.1 Jawoyn Country

The regional study area also includes Jawoyn Country which is the traditional land for the Jawoyn people. The Jawoyn people are also the local Traditional Owners and custodians of the land for the Project site Figure 21. The following information has been taken from the Jawoyn Association website and describes their way of life and culture⁸.

⁸ Downloaded from the Jawoyn Association Website www.jawoyn.org



Figure 21 Jawoyn Country

Jawoyn People

Jawoyn is an all-encompassing expression used in reference to language, culture, people and territory. Jawoyn heritage and traditional ownership of country is passed down from a Jawoyn father and in some cases, through a Jawoyn mother. It is the affiliation of one or both parents to Jawoyn country, connectedness to and knowledge of ancestral lands that makes one Jawoyn. Prior to contact with European settlers there were 43 clans making up the Jawoyn tribe, however many of these clans are now extinct or subsumed into other clan groups. Today, there are 17 distinct clans making up the Jawoyn Nation and each of these clans lay claim to specific territory on Jawoyn country. There are about 600 adult Jawoyn people living today. The majority of Jawoyn live on or close to Jawoyn traditional lands, with the majority living close in or around Katherine the communities of Werenbun, Barunga, Wagalarr (Beswick), Barunga, Mataranka (Pine Creek). Werenbun is the closest community to the Project Site. A number of Jawoyn also live in Darwin, Alice Springs and beyond (Bauman, 2007).

There is much movement as Jawoyn people maintain the complex and dense family kinship networks and the cultural priorities around land which were determined by the travels of ancestral beings in the *Burr* or Dreaming, and which give meaning to Jawoyn society. In and around Katherine Jawoyn are closely related through intermarriage with a number of neighbouring Aboriginal groups, including the Wardaman, Yangman, Dagoman, Manggarayi, Mayali and Ngalkbon (Dalabon). Although at least 33 Aboriginal languages have been identified by linguists throughout the Katherine region, most Jawoyn speak Kriol, Aboriginal English and/or English.



Jawoyn people history is recounted as follows⁹:

Dreaming

The history of our country began during the period we call Buwurr, sometimes written as Burr, often called the Dreaming or Dreamtime.

It was during this time the world was made and the rules for proper behaviour were laid down. During this period, beings in the form of humans, animals and plants brought the landscape to life by 'putting themselves' into the country.

They travelled the land above and below the ground, giving names to places and specifying special areas, along with dangerous sites to avoid. They gave the country its language and in doing so designated which people would belong to it.

In travelling on to neighbouring countries they established relationships across language group boundaries with some far away people.

We tell of these travels in stories and songs, some of which are public and others which are used in secret ceremonies.

The temporal use of the Buwurr or dreaming should not be interpreted as something only from the past. Buwurr is as significant today to our people as it always has been.

It encompasses all aspects of life. It is the past, the present and the future. "It is the land, its gorges, its plants and animals, its rocks and rivers, and the people all living creatures".

Bula - The Creator

Our land was first created by Bula, who came from the salt water country in the north. With his two wives, he hunted across the land and in doing so transformed the landscape through his actions.

In a number of places Bula finally went underground in an area north of Katherine known to us as the 'sickness country'. In a number of places, Bula left his image as paintings in rock shelters. It is called this because the area is very dangerous and should not be disturbed for fear that earthquakes and fire will destroy the world. We regard Bula as the most important figure in our dreaming.

Nagorrko – Spiritual Being from the North

Another important dreaming figure was Nagorrko, a tall spiritual being from the salt water country in the north. Nagorrko divided our people into two main groups or moieties – Yirritja and Dhuwa. Through this social grouping, he taught us much about proper behaviour and correct marriage relationships.

Nagorrko also gave us the law about mowurrwurr, or clan groups, and showed us what foods different mowurrwurr could or could not eat.

⁹ Downloaded from the Jawoyn Association Website www.jawoyn.org

Bolung – The Rainbow Serpent

Bolung, who is believed to inhabit the deep green pools on our land, is an important life giving figure but may also act as a destroyer. This can take the form of lighting and may bring monsoonal floods. Our people do not fish in the pools where Bolung sits. When fishing close to these pools, we can take only a small portion of the fish caught. We throw back the rest in order to appease Bolung. Drinking water must not be taken from these deep pools but rather from the shallow, associated waters.

Pregnant women and new initiates may not swim in the Katherine River for fear of disturbing Bolung. Unlike other Jawoyn Dreaming figures, which may be called upon for assistance in hunting and foraging, Bolung must not be spoken to and must be left undisturbed.

Kinship

Moiety

Moiety is a social division that is derived by the way indigenous people perceive the world around them.

During the Dreaming, ancestral beings assigned everything in the world - people, animals, plants, and places - to either the Dhuwa or Yirritja moiety.

Each moiety is associated with particular colour and proportions:

- ▶ Dhuwa colours are darker (red and black) and associated with shortness
- ▶ Yirritja colours are lighter (yellow and white) and associated with tallness

For example, the black cockatoo is Dhuwa, the white cockatoo is Yirritja, the short neck turtle is Yirritja, and the long neck turtle is Dhuwa.

People, like the birds and animals mentioned above, are born with moiety. One of the most important principles within Jawoyn society is that of joining Yirritja and Dhuwa moieties, to bring "balance" within the natural and cultural world.

To the outside world this is recognised primarily through the traditional marriage system. The basic rules are that a child's moiety will be the same as his/her father and opposite to his/her mother. Simply a Dhuwa person should marry a Yirritja person.

Anthropologists have documented the complexities of the marriage rules (see attached example for the Ngalkpon social system) where the rules for marriage are broken into sixteen social divisions (or "skin").

Skin

Skin is inherited from the mother and has a cycle which continues through several generations and provides comparable inherited links between mother and children for other skin groups.

Historically the two circles of skin relationships were joined through marriage and through a reciprocal relationship between "owners" and "custodians of cultural knowledge". Marriage partners were selected from two skin group categories from the opposite skin group circle only to minimise the possibility of incest within the mother's line.

In brief, this means that three-quarters of the opposite sex were prohibited as marriage partners. These rules were to regulate social interaction, cement kinship relationships, and ensure there was no marriage between biologically close relations.

Penalties for marriage "outside skin" were harsh and included death. Most people today still marry according to skin but if children are born from a "wrong" marriage involving two Yirritja or Dhuwa people, they take the skin group and consequently their moiety from their relationship to their mother.

Moiety

<u>MALE</u>	<u>FEMALE</u>
Dhuwa Wamut	Yirritja Kotjok
Gela	Burlain
Gammerang	Bungardi
Balang	Narritj
Dhuwa Wamutjan	Yirritja Kotjan
Kalidjan	Burlainjan
Gamayn	Bungirn
Beliyn	Narritjan

Source: <http://www.jawoyn.org/jawoyn-people/kinship> (downloaded 30-03-2011)

Owners ('gidjan') and Custodians ('junggayi')

Each skin group has a primary custodial "looking after" relationship with another skin group in the opposite skin group circle. Reciprocal rights and responsibilities relate to land and ceremony and generally Yirritja people will be workers in ceremonies owned by Dhuwa people and vice versa.

In general, a person's first-choice 'junggayi' is the brother or sister of their first-choice wife or husband, while the brother or sister of their second-choice wife or husband is the second-choice 'junggayi' and so on. The arrangement of choosing a 'junggayi' from an opposite moiety but within the same skin group ties families to each other and to ceremony.

Language

Jawoyn is the language of the Katherine area, and of country north and east of Katherine. Jawoyn belongs to a family that has been called 'Gunwinyguan', after one of the most widely spoken dialect clusters. It was not spoken in isolation from its sister languages, multilingualism was usual among speakers of the Arnhem Land languages.

Most people learned and used several languages throughout their lifetimes, and came to have something like equal fluency in most of them. It has been characteristic of older Jawoyn speakers up to the present that they spoke at least two Arnhem Land languages with equal or near fluency, and many spoke three or more. They understood a number of languages, at least partially, beyond those they spoke.

Most common in the repertoires of people of Katherine, Barunga and Beswick (Wugularr) area who spoke Jawoyn natively were Mayali and/or Ngalkbon, and in some instances Rembarrnga. Today, however, multilingualism is not the norm.

"Though people have varying degrees of understanding of Jawoyn and other languages, younger people are no longer using Jawoyn actively. It is endangered" (<http://www.jawoyn.org/jawoyn-people/language>



The most vital language of the Katherine and Barunga area is now Mayali, which is not indigenous to this area, but has a large reserve of active speakers extending into Arnhem Land. There are social and historical reasons for this decline. One is the long-term historical disruption of Aboriginal people in the Katherine region. There were early reductions of Aboriginal populations. Aboriginal people were pulled towards mining camps and other places of outsider settlement, where their routines came to revolve around working for outsiders and their patterns of living and movement were accommodated to settler regimes, with all the dislocations this entailed.

Jawoyn remains, however, the identity of a large number of people of the Katherine and Barunga area who see themselves affiliated to Jawoyn country. For these people, Jawoyn remains the language they consider theirs, to whatever degree of proficiency. A Jawoyn dictionary and thesaurus was produced by linguists Francesca Merlan and Pascale Jacq in 2005.

Governance

Jawoyn Governance structures have changed and evolved significantly since the Jawoyn land claim was recognised under the ALRA. The relationships and more formal partnerships that are involved in the management of Jawoyn Country are complex, multi-layered and have evolved for different purposes.

The key entities of relevance to the Project are as follows:

Jawoyn Association

The Jawoyn Association Aboriginal Corporation was established in 1985 as the representative body for the Jawoyn Aboriginal Traditional Owners. The vision for the Jawoyn Association is

“To achieve a growing sense of identify amongst the Jawoyn as a strong united people steadily working towards achieving sustainable improvements in economic, social, cultural, health, education and other indicators of overall quality of life.”

The Jawoyn Association work is dedicated towards relief of poverty, provision of general membership welfare support benefits, and expansion of Indigenous employment, advancement of education, training and learning and the continuation and preservation of traditional Aboriginal culture.

Ordinary and foundation membership of the Association is decided by a Council of Elders against eligibility criteria for membership which includes recognised genealogical affiliations with the Jawoyn, membership of a Jawoyn mowwurrwurr and maintenance of social connectedness. The tiers of governance within the association includes: a Board of Directors, Council of Elders and Executive/Staff. Members are elected to represent the geographical spread of communities on Jawoyn lands and the sizes of their populations.

Northern Land Council

There is currently politics between the Jawoyn Association and the Northern Land Council as in 2010 the Jawoyn joined four other Aboriginal tribal groups to develop a proposal to launch a Katherine Region Land Council. However, the Northern Land Council still has a critical role under the ALRA to consult traditional owners of Aboriginal regarding any projects that affect their interests prior to these projects proceeding. The NLC also represented Jawoyn Traditional Owners in the Jawoyn (Katherine Area) Land Claim and was instrumental in putting forward the ‘all Jawoyn one mob’ model of land ownership that was accepted by the Aboriginal land Commissioner and which subsequently fostered a discourse of Jawoyn nationhood.



Jawoyn Business

Nitmuluk Tours is owned by the Jawoyn Association as a commercial venture and undertakes a range of commercial operations in the park including offering visitors a range experiences such as boat tours, canoe hire, walks and helicopter tours. There is also a range of accommodation available ranging from camping and caravans through to fully-equipped cabins. Overall executive management of the business is undertaken by Nitmuluk Tours via its Board of Directors. This Board comprises a majority of Jawoyn members together with its financial advisors.

Jawoyn business ventures have also extended to partnership in the Mt Todd mining enterprise. In 1993 the Jawoyn signed the "Mt Todd Agreement" with the Federal and Northern Territory Governments previous mining company Zapopan NL. Under the agreement, the Jawoyn allowed the extinguishment of their native title rights to the mine area and the Werenbun-Barnjarm area in exchange for title to lands, undertakings on jobs and training and community infrastructure. When the mine opened in 1994, approximately 27% of the mine work force was made up by Aboriginal people. In 1996, Aboriginal employment at Mt Todd reached 32%.

Jawoyn Land Management

The Jawoyn jointly manage Nitmuluk National Park with the Northern Territory Government through the Nitmuluk Board of Management established under legislation. There are thirteen positions on the board; eight are nominated by the executive committee of the Jawoyn Association, three by Parks and Wildlife Commission NT (formerly NRETAS); one representative nominated by the Mayor of Katherine; and one by the Kakadu National Park Board. The Chair is selected from the Board's Jawoyn members and appointed by the Minister.

4.4.2 Demography (Population, Age, Gender, Family)

Population

The Lower Top End Region is an area that covers 326,326km² and according to the 2011 Census has a population of 17,823. Table 27 presents the statistical trends of population in the area from data collected from 2001, 2006 and 2011 census.

Table 27 Resident Population (2001, 2006, 2011)

Location	2001	2006	2011	2001-2011		2006-2011	
	no.	no.	no.	%	no.	%	no.
Katherine/Lower Top End	18,743	16,464	17,823	-4.9%	-920	8.25	1,359
Northern Territory	197,768	210,627	226,207	4.5	9,216	9.87	19,047

Source: 2011 Census

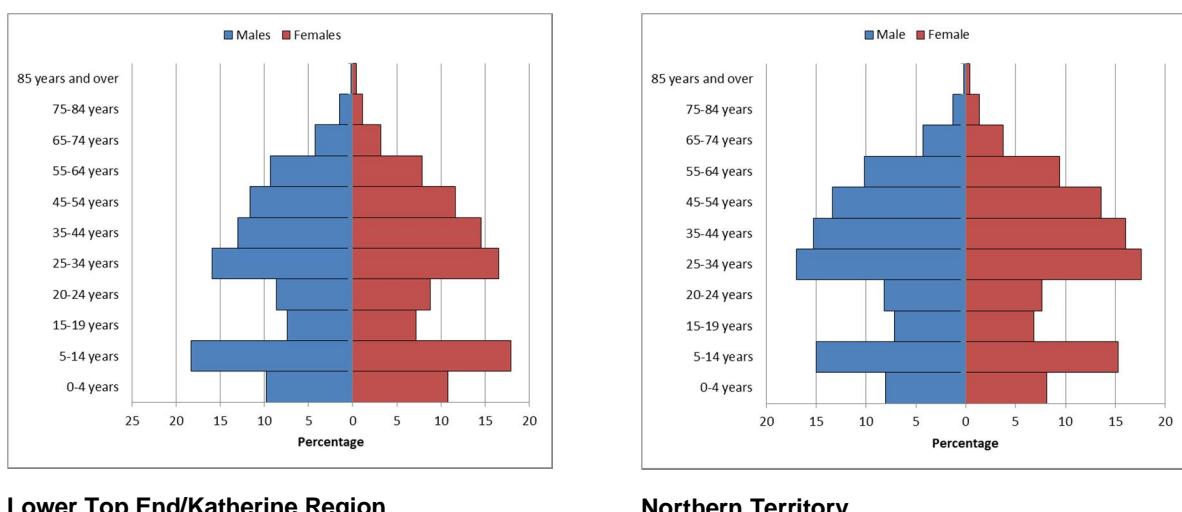
The population of the Lower Top End Region experienced a significant decline between 2011 and 2006 despite overall growth in the Northern Territory. In recent years the population has increased to almost the 2011 level. The Northern Territory overall has seen significant growth throughout the past decade with this accelerating between 2006 and 2011.

Residents versus Visitors

According to the 2011 Census the resident population for the Lower Top End Region (also referred to as the Katherine Statistical Region) was 17,823 persons and 21,379 (including visitors to the Region such as seasonal workers and Fly-in-Fly-out workers) (ABS, 2011). Place of usual residence data excludes visitors and people working in the region on a Fly-in-Fly-out arrangement. This is a difference of around 3,556 persons or around 20% of the resident population. This reflects the high visitation to the region as well as the growing FIFO workforce including those based at RAAF Base Tindal.

Age Gender Composition

The age and gender composition for the Lower Top End is very similar to that of the Northern Territory (as depicted in Figure 22). There is a slightly higher population of teenagers between the ages of 15 to 19 years and a slightly lower population between the age group of 25 – 64 years. It is anticipated that the FIFO population would compensate for the difference in the working population.



Lower Top End/Katherine Region

Northern Territory

Source 2011 Census

Figure 22 Age-Gender Composition Lower Top End 2011

Indigenous Population

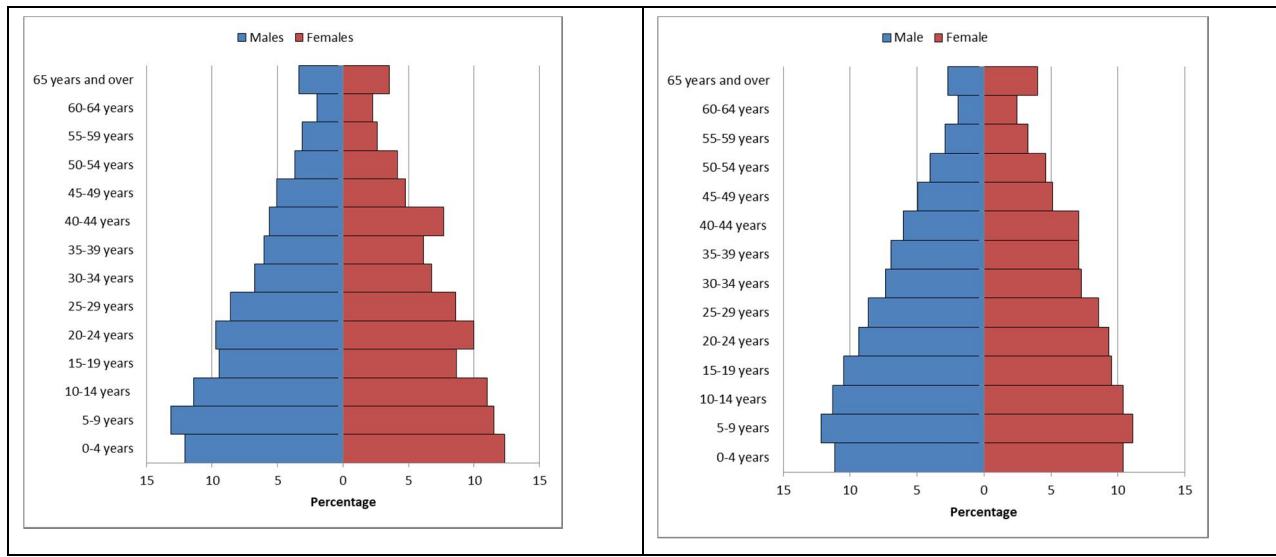
The Indigenous population in 2011 constituted 52% of the population of people in the Lower Top End NT region (Table 28). This is significantly higher than the proportion for the Northern Territory at 26.7%.

Table 28 Indigenous Population Katherine LGA 2011 Census

Indigenous/Non-Indigenous	Male	Female	Total	Percentage
Indigenous	4,467	4,795	9,262	52.0
Non-Indigenous	3,948	3,611	7,559	42.4
Indigenous status not stated	547	456	1,003	5.6
Total	8,962	8,862	17,824	100

Source: 2011 Census

Figure 23 shows the differences in life expectancy and mortality between the Indigenous population within the Lower Top End and the Northern Territory.



Lower Top End/Katherine Region

Northern Territory

Source: 2011 Census

Figure 23 Indigenous Population Age-Gender Distribution, Lower Top End NT 2011

4.4.3 Labour Market (Education, Training and Employment)

The labour market can be described in terms of supply and demand factors. The following characteristics of supply are provided:

- ▶ Education;
- ▶ Vocational education and training;
- ▶ Apprenticeships and traineeships; and
- ▶ Jobseekers.



Education

Table 29 Highest Level of School Attended

Level of school attended	Lower Top End	Lower Top End percentage	Northern Territory	Northern Territory Percentage
Year 12 or equivalent	3,501	28.3	62,499	39.9
Year 11 or equivalent	1,388	11.2	18,447	11.8
Year 10 or equivalent	2,794	22.6	29,879	19.1
Year 9 or equivalent	1,205	9.8	9,340	6.0
Year 8 or below	1,485	12.0	11,996	7.7
Did not go to school	352	2.8	2,390	1.5
Highest year of school not stated	1,632	13.2	21,953	14.0
Total	12,357	100	156,504	100

Source: 2011 Census

Table 30 Level of Post-school Qualifications: Percentage of Total Population Aged 15 Years and Over

Qualification	Lower Top End NT No.	Lower Top End percentage	Northern Territory No.	NT Percentage
Total population over the age of 15	12,763	-	162,801	-
Postgraduate Degree	142	1.1	4,308	2.0
Graduate Diploma and Graduate Certificate	145	1.1	2,920	1.5
Bachelor Degree	876	6.9	16,959	8.9
Advanced Diploma and Diploma	645	5.1	10,656	5.8
Certificate	2339	18.3	30,750	17.2
Inadequately Described/Not Stated	107	0.8	1,614	17.1
Total with qualifications	2055	16.1	67,207	52.6

NB: Excludes schooling up to Year 12. Excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). Includes 'Certificate III & IV, nfd'. (d) Includes 'Certificate I & II, nfd'

Source: 2011 Census



Table 31 Type of Educational Institution Attending – Lower Top End

Education Institution	No. of Persons	Percentage
Pre-school	339	5.5
Infants/Primary	2,065	33.7
Secondary	921	15.0
Technical or Further Educational Institution	220	3.6
University or other Tertiary Institutions	303	4.9
Other type of educational institution	183	3.0
Type of educational institution not stated	2,102	34.3
Total	6,133	100.0

Source: 2011 Census

Table 32 Non-school Field of Study 15 Years and over Lower Top End

Non-school Qualification: Field of Study	Male	Female	Total	Percentage
Engineering & Related Technologies	837	40	877	13.9
Management & Commerce	207	430	637	10.1
Education	131	407	538	8.5
Society & Culture	172	336	508	8.1
Health	103	395	498	7.9
Agriculture, Environmental & Related Studies	210	114	324	5.1
Architecture & Building	275	6	281	4.5
Food, Hospitality & Personal Services	109	134	243	3.9
Creative Arts	49	42	91	1.4
Field of study inadequately described	56	17	73	1.2
Natural & Physical Sciences	29	38	67	1.1
Information Technology	36	23	59	0.9
Mixed Field Programmes	13	9	22	0.3
Field of study not stated	1,108	984	2,092	33.2
Subtotal	3,335	2,975	6,310	100.0

Source: 2011 Census

Labour Demand

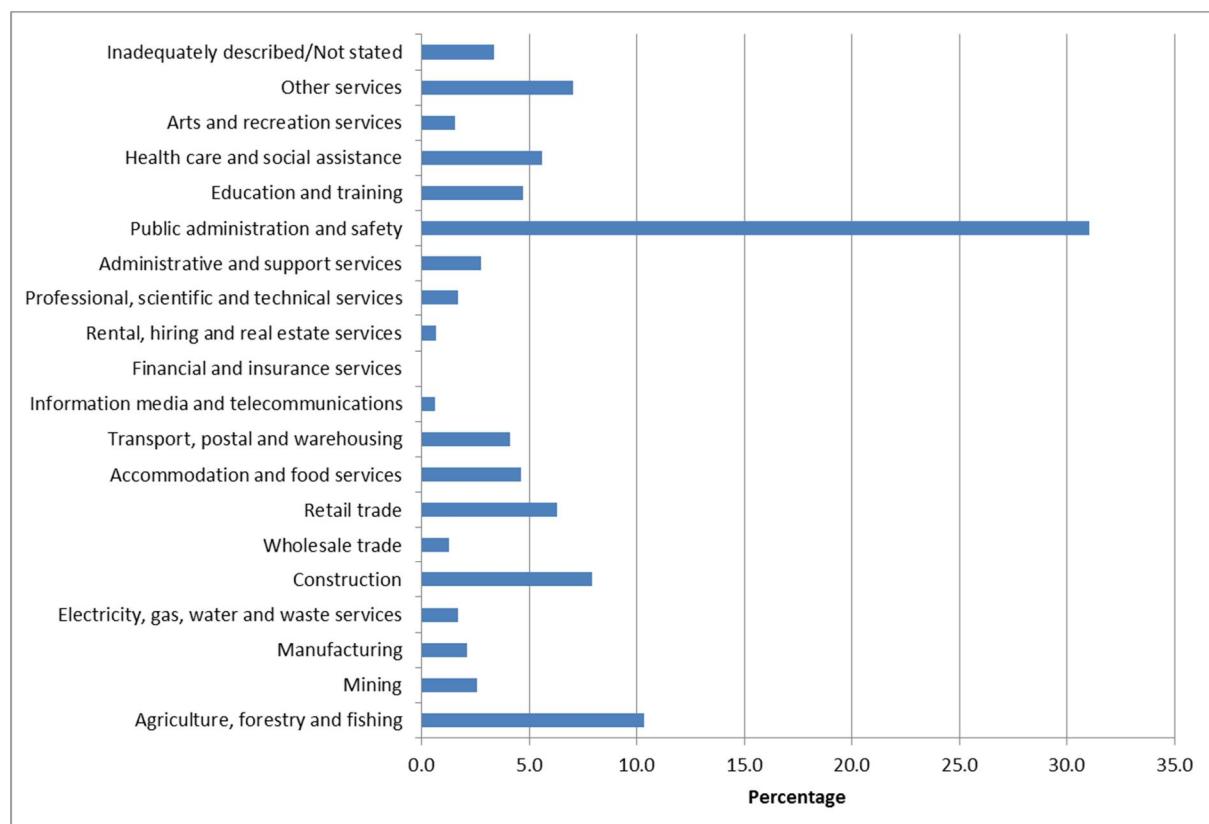
Labour markets function through the interaction of workers and employees. Regional labour markets in the NT are small and concentrated in certain sectors. Employers in mining, infrastructure and other projects are often unable to find sufficient numbers of local workers with the required skills in the region and there is often a long lead time in training new workers. Labour demand in the Lower Top End NT has been profiled in terms of the following indicators:

- ▶ Skill profile; and
- ▶ Job advertisements.

The Lower Top End NT occupation and industry profiles show the types of skills that were in the region's workforce at the time of the 2011 census.

Industry by Employment for Lower Top End NT

Employment by industry data shows the industry sections where people are employed and where employment opportunities lie within the region (Figure 24). The data is influenced by factors such as rate of economic growth, structural change in the economy, the effects of technology, labour market flexibility and changes in local and global demand.



NB: Based on place of usual residence, population aged 15 and over , total figures include CDEP Figures, Defence is part of the Public Administration and Safety, other services includes repairs and maintenance, personal services and private households.

Source: ABS (2007)

Figure 24 Industry by Employment, Lower Top End 2011



5. Social Impact Assessment

This section identifies the potential social impacts and opportunities for both the construction and operational phases of the Project. The identification and assessment of impacts has been developed with consideration of the potential positive, negative, direct and indirect and cumulative impacts. Impacts are also described in terms of their scale (local, regional, territory-wide) and significance.

The overarching approach to identifying social impacts and opportunities is described in Section 2.3. The key impact assessment steps were as follows.

5.1 Impact Assessment Steps

The key steps were:

1. Identify the local, regional and wider study area for the social impact assessment (Section 1.9)
2. Identify the Project activities that may have an effect on Project stakeholders (Table 33)
3. Identify the social change processes that are expected to occur as a result of the Project (Section 5.2)
4. Undertake social research to identify the potential social impacts and opportunities that may occur (Section 5.4)
5. Undertake community and stakeholder consultation to verify social impacts and opportunities
6. Assess the significance of potential impacts and opportunities using the social impact significance assessment methodology described in section 2.3 and Appendix A
7. Identify impact avoidance, mitigation and management strategies (Section 7)
8. Assess the residual social impact.

5.2 Social Changes and Social Impacts

The Project will cause a number of social change processes to occur within the Study Area. These social changes occur where Project activities interact with aspects of the social environment and lead to a range of both positive and negative social impacts and opportunities. Impacts may be perceived as either positive or negative by stakeholders depending on their own capacity to capitalise or respond to the social change.

At a broad level, the Project will initiate a number of social change processes that include:

- ▶ Demographic processes (changes in the number and composition of people)
- ▶ Economic processes (changes in the way in which people make a living)
- ▶ Geographical processes (changes in land use)
- ▶ Institutional and legal processes (relating to the efficiency and effectiveness of institutional structures)
- ▶ Socio-cultural processes (affecting the culture and way of life of communities).



Table 33 identifies the social environment aspect, Project activities that interact with this aspect and expected social change processes.

Table 33 Social Aspects, Project Activities and Social Changes

Social Environment Aspect	Project Activities	Social Change Processes
Workforce	<p>Requirement for a FIFO or DIDO construction workforce of up to 450 persons (peak) during the construction period (approx. 2 years).</p> <p>Requirement for an operational workforce of up to 350 full-time positions comprising a mix of FIFO or DIDO contract workers and a permanent residential workforce.</p> <p>Requirement for additional community infrastructure and services to support workforce.</p>	<p>Population and demographic change</p> <p>Economic change</p> <p>Geographic change</p> <p>Socio-cultural change</p>
Housing and accommodation	<p>Construction camp to be located within 25km of mine.</p> <p>Additional housing and accommodation in Katherine to support operational workforce requirement.</p>	<p>Population and demographic change</p> <p>Economic change</p> <p>Geographic change</p> <p>Socio-cultural change</p> <p>Institutional and legal change</p>
Economic and employment	<p>Capital expenditure of approximately \$1.5 billion will occur during the construction phase, and will increase and peak at \$330 million annual spend during the operations phase, when the mine is in full production.</p> <p>Requirement for additional goods and services for the Project.</p>	<p>Population and demographic change</p> <p>Economic change</p>
Community Infrastructure and services	<p>Additional requirement for community infrastructure (utilities and services) and services (health, entertainment, food etc.) to support operational workforce.</p> <p>Requirement for after hours and emergency care for construction workforce.</p> <p>Requirement for access to health services for operational residential workforce.</p>	<p>Socio-cultural change</p> <p>Institutional and legal change</p>
Community health and safety	<p>Requirement for Project (resource extraction) and environmental management.</p> <p>Requirement for workforce and accommodation.</p> <p>Requirement for infrastructure.</p>	<p>Socio-cultural change</p> <p>Institutional and legal change</p>



Social Environment Aspect	Project Activities	Social Change Processes
	Transportation and supply of goods and services.	
Indigenous, resources, values and aspirations	Partnership with the Jawoyn People in the Project. Workforce requirement.	Economic change Geographic change Socio-cultural change Institutional and legal change
Traffic and transport	Traffic generation associated with both construction, operation and closure. Worker transport to and from Project Site.	Economic change Socio-cultural change Institutional and legal change
Post- mining	Closure of mine. Rehabilitation of Project site.	Population and demographic change Economic change Geographic change Socio-cultural change Institutional and legal change

5.3 Summary of Key Issues Identified During Stakeholder Consultation

Key social issues identified during stakeholder consultations are summarised in Table 34. The Public Consultation Report provides further detail on these (GHD 2013).

Table 34 Major Issues Identified During Public Consultation

Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community Views Survey
Workforce						
Concerns that Project will exacerbate existing skills shortfalls	✓	✓	✓	✓		
Potential for anti-social behaviours of workforce	✓		✓	✓	✓	
Difficulties stemming from typical mining rosters	✓	✓	✓	✓	✓	✓
Concerns regarding behaviour and integration of workforce	✓	✓	✓	✓	✓	✓
Concerns that local businesses will lose staff to Project	✓	✓	✓			✓



Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community Views Survey
Health and well-being of workers				✓		✓
Lack of accommodation and housing	✓	✓	✓	✓	✓	✓
Need for additional housing to be built to accommodate workforce	✓	✓	✓	✓	✓	✓
Lack of land in Pine Creek		✓				
Preference for workers camp to be on or near Project Site	✓	✓	✓	✓	✓	✓
Concerns regarding Project driving up land and house prices	✓	✓	✓			✓
Opportunities for local business development	✓	✓	✓	✓	✓	✓
Concerns regarding the 'reliability' of the Project	✓	✓	✓	✓	✓	✓
Preference for Vista Gold to work with existing business in supply to the mine	✓	✓	✓	✓	✓	✓
Positive employment opportunities for local people	✓	✓	✓	✓	✓	✓
Concerns regarding regional/national labour skill shortages	✓	✓	✓			
Desire for more families to work at the mine	✓	✓	✓	✓	✓	✓
Training/ apprenticeship opportunities for local people, particularly youth (community capacity building)	✓	✓	✓	✓	✓	✓
Impact of mining rosters on community and family life	✓	✓	✓	✓	✓	
Use local training and traineeship programs and providers			✓	✓		✓
Concerns that existing health care services are stretched	✓		✓	✓	✓	
Would like to see Project investing in local community	✓	✓	✓	✓	✓	✓
Exacerbation of existing shortfalls (retail, entertainment, doctors etc.)	✓	✓	✓	✓	✓	
Community Health, Safety and Well-being						
Establishing trust in the community is important	✓	✓	✓	✓	✓	
Alcohol issues are a big concern			✓	✓	✓	
Need for mine workers to integrate into the community	✓	✓	✓	✓	✓	✓
Concerns regarding environmental management of tailings dump and heap leach pad			✓	✓	✓	✓
Need for environmental monitoring and reporting of monitoring to community			✓	✓	✓	
Indigenous aspirations, values and resources						



Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community Views Survey
Provision for Indigenous Employment Opportunities	✓	✓	✓	✓	✓	✓
Need for cultural awareness training on Project workforce	✓		✓			
Use of Indigenous mentors		✓	✓			
Traffic and Transport						
Condition of the Stuart Highway		✓	✓	✓	✓	
Increase in traffic on Edith falls road		✓	✓	✓	✓	
Transport of dangerous goods between Project and Darwin			✓		✓	
Environmental risks from transport such as spills etc.	✓	✓	✓	✓	✓	
Post-mining						
Loss of employment and economic stimulus				✓		✓

5.4 Social Impacts Construction and Operations Phase

5.4.1 Workforce (Requirement, Availability, Sourcing, Shift Management, Cumulative)

Construction Phase

Up to 450 persons will be needed during the peak construction period. Due to the short-term nature of the construction period (2 years) and current mining industry practice, the workforce is likely to be predominantly male and between the ages of 15-45 years. A purpose-built construction camp will be built close to the Project Site. This will avoid or minimise many of the negative impacts typically associated with male-dominated workforces. Workers are still likely to utilise facilities and services in the Katherine/Pine Creek area but this will be on a limited basis i.e. when workers are off-roster or in the event of an accident or emergency.

Operational Phase

An operational workforce of approximately 350 full-time workers will be required for the Project. This is likely to include approximately 60 people sourced locally and the remainder sourced from outside the Katherine Region. The life of mine operations is estimated to be 13 years.



Vista Gold's preference is for this workforce to reside locally as part of the local community rather than operating on a FIFO/DIDO basis. However, it is recognised that achieving this outcome, whilst desirable from a community and Stakeholder perspective, is challenging due to:

- ▶ The remote nature of Katherine and Pine Creek
- ▶ Current shortfalls within the Australian and Northern Territory mining industry for skilled and semi-skilled workers
- ▶ The current industry preference for using FIFO workforce
- ▶ A lack of housing and land of an appropriate size and standard available within the current Katherine/Pine Creek real-estate market.

Vista Gold recognises that achieving a residential workforce is also dependent on being able to attract workers and their families to come and live in the local area. This is dependent on the availability of sufficient housing, community services (health, education, retail, entertainment) and infrastructure to support a residential workforce. A separate study commissioned by Vista Gold investigated a number of options for accommodation of the operational workforce and recommended a 'hybrid' option comprising the following:

- ▶ 70 workers at the construction camp. This would accommodate mainly FIFO / DIDO personnel and provide an ability to quickly increase capacity and house overflow peak period personnel to meet mining needs or maintenance shut downs;
- ▶ A combination of both new and existing housing to support approximately 120 workers (family household with or without children). Workers would be accommodated in a mixture of:
 - New three and four bedroom houses located on existing vacant Katherine and region land
 - Existing (renovated if required) houses located in the Katherine and region
 - Subject to real estate availability at the time of arrangement, a small contained development on Katherine land
- ▶ 100 workers located in a Katherine based single person accommodation facility.

On this basis, the following social impact risks and opportunities have been identified:

Potential Impact	Explanation	Description of Impact
Lack of social integration of workforce	<p>Social issues and concerns associated with integration of the Project Workforce into the community.</p> <p>The community of Katherine and Pine Creek currently comprise a mix of different socio-economic groups. Existing levels of social cohesion are mixed. For many residents, this is part of the 'multi-cultural' appeal of the area that contributes to its attractiveness as a place to live.</p> <p>In this social context, the focus for the Project is on not exacerbating existing social integration issues. Some concerns by Stakeholders have been raised regarding the integration of the Project's Workforce</p>	<p>Stakeholders: Residents, Workforce, Police, Council</p> <p>Perceived¹⁰ status of impact: Negative</p> <p>Scale: Local/Regional</p>

¹⁰Impact described from perspective of Stakeholders identified



Potential Impact	Explanation	Description of Impact
	<p>into the community. The accommodation strategy proposed by Vista Gold has been designed to address these concerns.</p> <p>Management and Mitigation:</p> <p>Housing of the temporary construction workforce in a construction camp located outside of existing communities will reduce the risk of significant social impacts occurring.</p> <p>The ‘hybrid’ accommodation option proposed for the operational workforce provides for a large proportion of the operational workforce to include families.</p> <p>Specific management and mitigation strategies to address this impact will also include: a Workforce Management Strategy governing standards of behaviour and containing appropriate controls and a Community and Stakeholder Engagement Strategy to provide a mechanism for ongoing feedback from the community during both construction and operation stages.</p> <p>Vista Gold will also encourage its workforce to be a part of the local community and will implement a community Sponsorship Program to contribute to local community development.</p>	
Increased incidence of anti-social behaviour arising from Project Workforce	<p>Intermittent incidence of anti-social behaviour of Project Workforce whilst off-roster and visiting nearby Towns and communities (Katherine, Pine Creek etc.).</p> <p>This social impact is identified as a concern in relation to the non-resident single-male component of the workforce (during both construction and operation phases).</p> <p>Management and Mitigation:</p> <p>The housing and accommodation strategy adopted by Vista Gold has been designed to minimise the risk of this social impact.</p> <p>Other specific management and mitigation strategies that will be implemented include: a Workforce Management Strategy (including behaviour policies and codes of conduct linked to employee contracts, random alcohol and other drug-testing to discourage heavy drinking or other anti-social behaviours); design of the construction accommodation to include on-site recreational facilities; and an ongoing community and stakeholder feedback mechanism.</p>	<p>Stakeholders: Local residents, Health providers, Police</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>
Exacerbation of existing labour and skills	<p>The Project will have an increased requirement for mine workforce leading to potential exacerbation of existing skills shortfalls locally and regionally.</p>	<p>Stakeholders: Employers</p> <p>Perceived status of</p>



Potential Impact	Explanation	Description of Impact
shortfalls	<p>This impact is not specific to this Project but is a reflection of the increase in mining activity generally across Australia. Where demand exceeds availability, this can lead to difficulties recruiting workers, and to inflationary effects on wages. Mining is the highest paid sector in Australia (www.clarius.com.au) and mining jobs tend to have higher wages compared to non-mining jobs, this can lead to movement of workers into the mining sector to the detriment of non-mining business (refer also to Cross-over employment impacts).</p> <p>There are a range of existing mining skills shortfalls identified for the Northern Territory by the NT Government. These include construction project managers and engineering managers as well as technicians and trades workers in various occupations.</p> <p>Offsetting this however, the supply of skills to the Katherine region has increased since 2002 through education and training. Opportunities exist for partnering with education and training providers to increase local and regional employment.</p> <p>Timing of the construction period is likely to overlap with construction of the INPEX Project which will require between 2000-3000 construction workers. However, this is not considered to be a significant issue for potential construction contractors as consultation has indicated that they will bring their workforce in from outside the Northern Territory for the duration of the two-year construction period.</p> <p>The contribution of this Project to existing workforce shortfalls is not considered to be significant.</p> <p>Refer also to cross-over employment impacts.</p>	<p>Impact: Negative and Positive</p> <p>Scale: Local/Regional</p>
Cross-over employment impacts	<p>Management and Mitigation:</p> <p>In relation to the operation workforce, a flexible 'hybrid' option is proposed by Vista Gold that offers workers a choice with regard to potential FIFO or residential options. This flexible workforce option has been designed to both facilitate the achievement of desired social outcomes for Katherine (such as bringing more families to the area) as well as providing some flexibility for the Project to respond to the existing market.</p> <p>No specific mitigation and management proposed. Refer to overall management and mitigation strategies.</p>	<p>Stakeholders:</p> <p>Local and Regional employers</p>



Potential Impact	Explanation	Description of Impact
	<p>This issue has been raised as a concern by stakeholders during consultations. There is potential for this impact to occur, particularly in relation to the previous workers at the Mt Todd Mine who have had to travel further afield to find work when the mine previously closed. It is likely that many of these workers may wish to return to work at the Mt Todd Mine.</p> <p>Some stakeholders viewed this impact as negative as it contributed to difficulties experienced by employers in attracting and maintaining local staff. Other stakeholders identified this as a positive opportunity, as it resulted in lesser-skilled positions becoming more readily available locally, and opened up employment opportunities in other areas.</p> <p>This issue is not considered to be a significant risk during the construction phase of the Project due to the temporary nature of the construction work and the likelihood that the contractor will bring their own workforce.</p> <p>An aspect of Australian society is that employees are able to exercise individual choice with regard to their workplace. It would not be appropriate for Vista Gold to implement any recruitment policies that would negatively affect this.</p> <p>With regard to Project operation there may be some cross-over impacts in the early phases of Project operation. However, this will stabilise over time and will also provide opportunity for new workers to move into the Katherine Region to take up vacated positions. A key component of this impact, raised by businesses during consultation, was for appropriate notice to be given to employers enabling employers more time to find replacements.</p>	<p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>
Management and Mitigation:	Vista Gold will adopt recruitment policies that allow for appropriate notice periods to be served for new employees.	
Decline in worker well-being associated with a FIFO or DIDO workforce	<p>Vista Gold has a preference for a residential operational workforce.</p> <p>This issue relates to the decline in overall worker well-being as a result of the nature of FIFO work.</p> <p>Impacts of FIDO/DIDO rosters have been analysed in several recent studies. Research by Petkova <i>et al.</i> (2009) identified the following negative impacts:</p> <ul style="list-style-type: none">▶ Increased likelihood of a traffic accident associated with travel times (for DIDO workers), fatigue and speeding	<p>Stakeholders: FIFO/DIDO workers</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>



Potential Impact	Explanation	Description of Impact
	<ul style="list-style-type: none"> ▶ Wellbeing impacts such as obesity, depression and alcohol and substance abuse ▶ Reduced participation in day to day family life, family rhythms and family events, loss of contact or affinity with family, and reduction of associated emotional support. Reduced ability to participate in community activities either at home or in the host community due to changing rosters ▶ Financial difficulties particularly associated with over-commitment and indebtedness. <p>There is potential for the workforce accommodation camps to have either positive or negative impacts on worker well-being.</p> <p>Negative impacts that have been linked to workers camps include increased instance of drug and alcohol abuse, drugs, mental-health issues, loneliness and disconnection from family.</p> <p>Management and Mitigation:</p> <p>Vista Gold is currently considering options for a well-designed construction camp that includes individual rooms for workers, en-suite accommodation, air conditioning, built-in robe, television and table in each room. Rooms will be serviced on a weekly basis and full catering will be provided. Other services include a gymnasium, dining hall and landscaped recreational areas. The final design of the construction camp will be determined by the construction contractor.</p> <p>Other specific management and mitigation strategies include the: accommodation camp code of conduct and behavioural policies; fatigue management strategies, counselling service and overall Workforce Management Strategy.</p>	
Increase in worker lifestyle opportunities associated with FIFO workforce	<p>Positive benefits to workers and their families from increased opportunities associated with FIFO/DIDO work.</p> <p>Research by Petkova <i>et al.</i> (2009) identified the following positive opportunities for FIFO/DIDO workers. These include:</p> <ul style="list-style-type: none"> ▶ Financial benefits ▶ Lifestyle (longer breaks away from work) ▶ Longer continuous periods of family interaction. <p>Management and Mitigation:</p> <p>No further specific mitigation and management proposed. Refer to overall management and mitigation strategies.</p>	<p>Stakeholders: Construction workers</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local/Regional</p>



Potential Impact	Explanation	Description of Impact
Fatigue and increased risk of accidents - related issues associated with worker travel between place of work and home	<p>Increase in worker fatigue from travel to, and from, place of work.</p> <p>This social impact has mainly been identified as a concern with regard to the operational workforce the majority of whom will likely reside in Katherine. For this component of the workforce this will likely involve 40 mins to one hour travel each way to the Project site. This may lead to fatigue-related impacts for employees who would generally work 12 hour shifts. The quality of the Stuart highway has been identified as a concern through public consultation and may also affect this issue.</p> <p>Management and Mitigation:</p> <p>As part of the Workforce Management Strategy, Vista Gold will adopt industry-appropriate workplace health and safety policies which will include driver safety requirements for employees who need to travel between their home and their place of work. Vista Gold will also investigate options for bus transportation for employees travelling in from Katherine.</p>	<p>Stakeholders: Project workforce residing off-site</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>

5.4.2 Housing and Accommodation

A concern for the local community is that the Project will exacerbate existing shortages in housing and land supply and decrease housing affordability. This leads to higher living costs for residents, and particularly affects those on lower to middle incomes who don't own their own home. Lack of short-term rental housing has been identified as a concern for service providers including Government, Health and Education workers who travel to Katherine on a short-term basis to provide essential services.

Section 5.4.1 describes the housing and accommodation strategy adopted for the Project. This housing and accommodation strategy identifies options at a concept planning level. On this basis, social impact risks and opportunities have been identified.

Potential Impact	Explanation	Description
Increase in demand for short-term accommodation ¹¹	<p>Increase in demand for short-term accommodation (rental houses, hotels/motels etc.) during the Project construction and operations phase.</p> <p>Social baseline research and consultations with key stakeholders have identified concerns that the Project will increase demand for short-term accommodation if additional accommodation is not provided. Vista Gold has responded to these concerns by developing a housing and accommodation strategy that aims to minimise the risk of this social impact.</p> <p>It is expected that the risk of this social impact occurring is greater during the construction phase due to the indirect and flow-on effects of</p>	<p>Stakeholders: Council, Businesses, Government Agencies, Residents particularly those on low to medium income levels</p> <p>Perceived status</p>

¹¹ Only negative elements have been assessed here. Positive impacts are likely to accrue to short-term housing landlords in terms of increased demand for housing.



Potential Impact	Explanation	Description
	<p>the Project. These effects are expected to stabilise during the operations phase as the housing and accommodation market responds to demand and the additional housing proposed by Vista Gold becomes available.</p> <p>Overall this impact will have both positive and negative elements. Positive impacts may accrue to accommodation providers. Negative impacts may impact on existing renters or people looking to move into the area for other reasons. Only the negative dimensions of this impact have been assessed for the purposes of developing Project mitigations.</p> <p>Management and Mitigation:</p> <p>The housing and accommodation strategy proposed is outlined in Section 5.4.1 and will include a purpose-built construction camp to accommodate the construction workforce. For the operations workforce, a 'hybrid' solution is proposed with the provision of additional housing and accommodation for the operations phase. If these strategies are implemented, this social risk will be significantly reduced. It is difficult however to completely address inflationary pressure on the accommodation market from indirect and flow-on impacts. It is also possible that rental stress may occur in the short-term for some stakeholders. Addressing this issue requires a partnership approach between relevant NT Government Agencies, not-for-profit organisations, Council and other employers in the Katherine region.</p> <p>Vista Gold will encourage a 'whole-of-government' approach to this issue and will continue to work with key Project stakeholders to further develop the housing and accommodation strategy for the Project Operations Phase.</p>	<p>of impact: Negative and Positive</p> <p>Scale: Local /Regional</p>
Increase in demand for long-term housing and accommodation	<p>Increase in demand for long-term housing and land during both construction and operation.</p> <p>There is currently limited availability of housing and unconstrained land within Katherine. It is anticipated that additional land would need to be released and additional housing built to accommodate the increased population associated with the Project. Vista Gold commissioned the development of an accommodation and housing strategy. This strategy recommended that for the operations phase a 'hybrid' housing and accommodation solution be implemented. If this solution is implemented then the risk of this impact being negative is greatly reduced in favour of being an overall positive outcome for the Katherine Regional community.</p> <p>Demand for long-term housing associated with the Project during the construction phase is likely to be limited due to the nature of the construction workforce. It is likely that there may be some short-term</p>	<p>Stakeholders: Council, Businesses, Government Agencies, Residents particularly those on low to medium income levels</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local /Regional</p>



Potential Impact	Explanation	Description
	<p>inflationary impacts on land and housing prices due to speculation within the property market.</p> <p>The provision of additional housing is viewed positively by the local community and local Stakeholders as it would lead to a range of positive economic and community impacts. These include flow-on effects in terms of construction jobs and economic stimulus, improving the standard of housing generally available within the area and attracting more families.</p> <p>Management and Mitigation:</p> <p>The housing and accommodation strategy proposed is outlined in Section 5.4.1</p>	
Reduction in affordability of rental housing	<p>Reduction in rental housing affordability from increased demand for housing for Project (direct and indirect).</p> <p>Housing stress occurs when rent or mortgage costs constitute more than 30% of income. Median rent in 2008 was \$310 for a three bedroom house and median household income in 2011 was \$1534. For the population who stated they were Indigenous, the median household income was \$921. Social baseline information for Katherine identified that approximately 42.5% of the Indigenous population and 20.7% of the non-Indigenous population was potentially subject to housing stress. This finding was confirmed anecdotally through the SIA consultations where the relative rental costs were cited as being very high. This information indicates that Katherine is already subject to pressures of rental stress along with other locations in the Northern Territory due to factors unrelated to the Project.</p> <p>Vista Gold's proposed housing and accommodation strategy is described in Section 5.4.1. Vista Gold recognises that timing for implementation of the housing and accommodation strategy is critical to minimise the risks of short-term demand outstripping supply.</p> <p>Management and Mitigation:</p> <p>Refer to Section 5.4.1.</p> <p>Vista Gold will encourage a 'whole-of-government' approach to address this social risk and will continue to work with key Project stakeholders to further develop their housing and accommodation strategy for the Project.</p>	<p>Stakeholders: Council, Businesses, Government Agencies, Residents particularly those on low to medium income levels</p> <p>Perceived status of impact: Positive and Negative</p> <p>Scale: Local /Regional</p>



5.4.3 Economic and employment (Direct and Indirect)

An economic assessment has been undertaken for the Project (Appendix W). Key findings are:

- ▶ Capital expenditure of approximately \$1.5 billion will occur during the construction phase, and will increase and peak at \$330 million annual spend during the operations phase, when the mine is in full production.
- ▶ Over the life of the mine, 11 per cent of the construction expenditure of the mine will be spent in the Katherine region¹²; and in 2020, at full production, 20 per cent of operating expenditure will be spent in the Katherine region.
- ▶ During the construction phase, the direct and flow-on Gross Regional Product in the Katherine region is expected to be around \$27.8 million the peak year for construction (2015). During the operation phase, the direct and flow-on Gross Regional Product in the Katherine region is expected to be \$40.6 million at full production (2020).
- ▶ Total (direct plus flow-on) employment in the Katherine region is expected to increase to 245 full time jobs the peak year for construction (2015). Total (direct plus flow-on) employment in the Katherine region is expected to reach 139 full time jobs when the mine is at full production (2020).

In addition to these, social impacts arising from the expected change in economic and employment opportunities within the Local and Regional Study Area are identified below:

Potential Impact	Explanation	Description
Increase in business opportunities and regional spend	<p>Increase and/or expanded business opportunities associated with economic stimulus from the Project.</p> <p>The Project construction and operations phase will result in an increase in local and regional business opportunities, arising from:</p> <ul style="list-style-type: none">▶ Local subcontracts relating to the supply of goods and services to the construction contractor. Opportunities may include the supply of services relating to trades, earthmoving, cleaning, accommodation and catering, transportation, and civil construction services. As mining activity is already a key economic activity of the local and regional study area, there are existing businesses providing goods and services to the mining and construction sector. These opportunities will maintain or potentially grow revenue and profits for existing local and regional businesses as well as potentially provide impetus for new businesses to become established;▶ Additional expenditure in the local Katherine/Pine Creek area by non-resident workers. This will particularly benefit retail, food and beverage and entertainment providers. <p>To benefit from these business opportunities, local and regional</p>	<p>Stakeholders: Local and Regional businesses</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local/Regional</p>

¹² In the economics assessment, the Katherine region is defined as the Katherine Statistical Area Level 3 as used by the Australian Bureau of Statistics (code: 70205). This statistical region includes the Local Government Areas of Katherine, Roper Gulf Shire and Victoria-Daly Shire. The Katherine region for the purposes of the economic assessment is therefore broader than the Katherine region profiled in the demographic profile presented in the social impact assessment (Appendix F).



Potential Impact	Explanation	Description
	<p>businesses will need to be competitive with businesses from outside the local and regional study areas.</p> <p>As the construction phase is relatively short, and the operation of the mine has a limited life, businesses will need to be cautious regarding any expansions to meet Project demands. Katherine businesses have expressed an element of 'distrust' in regards to the long-term viability of the Project due to past experiences and so are very aware of these risks.</p> <p>Management and Mitigation:</p> <p>Vista Gold will develop an Industry Participation Plan in consultation with the Northern Territory Industry Capability Network.</p>	
Potential for local inflationary impacts	<p>The potential for the prices for some goods and services to increase due to the increased demand from the Project. Note risks in relation to the housing and accommodation market are addressed under these headings.</p> <p>Some stakeholders expressed concerns that the Project will contribute to local inflationary pressure particularly in relation to housing and accommodation. Although this may occur for some goods and services providers, others (such as retail and food and beverage) may actually reduce or stabilise due to economies of scale. This impact has both positive and negative elements. These potential effects cannot be quantified accurately due to the wide range of variables affecting servicing and pricing. It is also difficult to address these impacts on a project by project basis. These effects will generally correct with time, particularly as the Project moves into the operation phase.</p> <p>Management and Mitigation:</p> <p>No specific management or mitigations are proposed to address this impact. However, Vista Gold will develop an Industry Participation Plan in consultation with the Northern Territory Industry Capability Network. Implementation of this plan will maximise local and regional economic benefits to the region.</p>	<p>Stakeholders : Local and Regional businesses and Residents</p> <p>Perceived status of impact: Positive and Negative</p> <p>Scale: Local/Regional</p>
Reduced focus on traditional customer base	<p>Potential for reduced service provision locally arising from businesses prioritising business associated with the Project, over their existing customer base.</p> <p>While business opportunities for local and regional businesses will generally be positive, some limited adverse impacts may occur. In particular, for small business providing services to the general community, the level of service to existing customers may be reduced if businesses prioritise service to the Project over providing local</p>	<p>Stakeholders: Local and Regional businesses and Residents</p> <p>Perceived status of impact: Positive and Negative</p>



Potential Impact	Explanation	Description
	<p>services.</p> <p>Management and Mitigation:</p> <p>No specific management or mitigations are proposed to address this impact. However, Vista Gold will develop an Industry Participation Plan in consultation with the Northern Territory Industry Capability Network. Implementation of this plan will maximise local and regional economic benefits to the region.</p>	<p>Scale: Local/Regional</p>
Increased employment opportunities	<p>The Project will result in increased direct and indirect employment opportunities associated with both the construction and operations phase.</p> <p>During construction, the majority of direct employment opportunities will be with the nominated construction contractor with limited opportunities available locally. However, for the operations phase an estimated full-time workforce of up to 350 staff is required.</p> <p>Employment opportunities are also likely to arise with local businesses who win sub-contracts to supply goods and services, or through flow-on business activity linked to increased spending in town. Increased employment opportunities may also result in employees working longer hours to meet demand thus benefiting in terms of increased income from overtime and increased job stability.</p> <p>Although the unemployment rate for Katherine is reasonably low at 3.2% in 2010, an increase in employment opportunities in the region is viewed by stakeholders as positive to the region's economic development.</p> <p>Management and Mitigation:</p> <p>Vista Gold will develop and implement an Industry Participation Plan in accordance with the requirements of the Northern Territory Government for major projects. This plan will be based on preferentially sourcing people, goods and services from within the Katherine Region and the Northern Territory to build business, industry and community capability</p> <p>As part of their partnership with the Jawoyn Association, Vista Gold will also develop an Indigenous Employment Strategy.</p>	<p>Stakeholders: Businesses, Unemployed, Residents</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local/Regional</p>

5.4.4 Traffic and Transport Impacts

Potential Impact	Explanation	Description
Increased traffic and transport on	Increased traffic to and from the Project Site along the Stuart Highway.	<p>Stakeholders: Road users and the</p>



Potential Impact	Explanation	Description
Stuart Highway	<p>Stakeholder consultation to date has identified that there is a community perception that the Stuart Highway is 'falling apart' and there are concerns that the Project will exacerbate this. The Project will lead to increased traffic and transport on the Stuart Highway.</p> <p>Project construction will have short-term adverse effects on the existing road network through the addition of construction related traffic. These impacts would be temporary and of a short-term nature.</p> <p>Transport investigations conducted for the Project indicate that the construction and use of the mine will have no adverse impacts on the road network in terms of safety or performance. The existing conditions of the road pavements should be established and the NT Department of Infrastructure will undertake a program of road pavement monitoring and maintenance to mitigate the impacts on road surfaces of mining activities.</p> <p>Management and Mitigation:</p> <p>A detailed Traffic Management Plan will be prepared and approved prior to construction works taking place.</p>	<p>Department of Infrastructure</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>
Increased risk of spill of hazardous substances	<p>Concerns regarding the increased potential for a spill of hazardous substances was raised as a concern during public consultation. As this issue has been in the Territory media recently there is heightened awareness of this issue which may lead to negative perceptions regarding the Project.</p> <p>Management and Mitigation:</p> <p>There are international standards for the movement of hazardous substances and the movement of these substances will be carried out in accordance with the relevant legislation.</p> <p>Vista Gold will consult with NT Worksafe on how to minimise the risk associated with the movement of hazardous substances.</p>	<p>Stakeholders: Road users</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>

5.4.5 Community Infrastructure and Services Impacts

Potential Impact	Explanation	Description
Increased demand for community infrastructure and utilities leading to local/regional	<p>Increases in resident population will contribute to the 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.</p> <p>Building of worker accommodation and mine infrastructure will require some additional community infrastructure supply such as</p>	<p>Stakeholders Council, Utility Providers (Power and Water Corporation) and the Department of Lands, Planning and Environment.</p>



Potential Impact	Explanation	Description
shortfalls	<p>power, water, waste removal and roads. The details of these depend on the location for the worker accommodation. This impact also includes the additional requirement for appropriate design and approval of infrastructure by relevant approval agencies.</p> <p>This impact will have both positive and negative elements depending on stakeholder perspectives. Positive elements may include opportunities for community infrastructure improvements and flow-on economic stimulus. Negative elements include increasing pressure on existing infrastructure including social infrastructure such as schools, recreational facilities, shopping facilities and entertainment venues.</p> <p>Consultation with utility providers is ongoing to further assess these issues.</p> <p>Management and Mitigation:</p> <p>Vista Gold will continue to work with Utility Providers and Key Stakeholders to address this issue and minimise any potential risks of infrastructure shortfalls.</p>	<p>Perceived status of impact: Positive and Negative</p> <p>Scale: Local/Regional</p>
Exacerbation of existing health services shortfalls	<p>Workforce and population increase leading to increased requirement and demand for health services beyond capacity.</p> <p>The majority of the construction workforce is likely to be comprised of FIDO/DIDO workers who will address their health requirements in their place of origin. Impacts on health services and providers for this group will be limited to emergency treatment requirements.</p> <p>With regard to the operation workforce as a significant percentage of these are likely to live in Katherine and nearby areas with their families this will lead to increased pressure on local health services if this population increase is not planned for.</p> <p>Consultation and baseline data establishes that there are existing health shortages within Katherine and the regional community. The Project is likely to exacerbate these unless additional services are provided. Key existing shortage areas include doctors, dentists, physiotherapists and the availability of other specialists which is in turn is leading to increased pressure on emergency services and the Katherine Hospital when people are unable to access private doctors.</p> <p>The composition of the future operational workforce was estimated based on analysis of existing Katherine demographic information, and comparison with other mining towns in the Northern Territory and Western Australia. Based on this, the following demographic composition of the workforce using ABS categories was estimated</p>	<p>Stakeholders affected: Council, Government Agencies, Health Providers, Not-for-Profit Organisations</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local</p>

Potential Impact	Explanation			Description
together with the total impact on the community:				
Category	Workforce Number	Multiplier	Total	
Persons already residing locally	60	-	-	
Additional single persons	135	1	135	
Couple families	49	2	98	
Couple families with children	77	2.6	200	
Other family type	29	2.6	75	
Total	350		508	

Management and Mitigation:

The following management and mitigation controls will be implemented to minimise the potential impacts on health provision:

- ▶ First aid capability on the mine site during both construction and operational phases of the Project;
- ▶ Vista Gold will work closely with the Katherine police, fire and emergency services to effectively plan for any emergencies;
- ▶ An emergency response plan will be developed and emergency response teams will be established for both construction and operation;
- ▶ Vista Gold will encourage a ‘whole-of-government’ approach to this issue and will continue to work with key Project stakeholders to assist in mitigating health service shortfalls.

5.4.6 Community Health, Safety and Wellbeing Impacts

Consultations with key stakeholders representing the various community health and service sectors in Katherine identified a number of concerns regarding potential impacts on health provision arising from the Project Workforce. In addition to this, stakeholders also identified concerns regarding the environmental legacy of the Mt Todd Mine particularly in relation to water quality and lack of reporting to the community on issues.



On this basis, the following social impact risks and opportunities have been identified:

Aspect	Impact	Explanation	Description
Community health, safety and wellbeing	Benefits to local/region and national community from rehabilitation of existing mine site	<p>Positive benefits accruing to the local/regional and wider community from rehabilitation of the Mt Todd Mine as a working mine and improved overall environmental management.</p> <p>There are a number of environmental legacy issues associated with the Mt Todd Mine from previous operators. A wide range of stakeholders identified that the re-establishment of the mine would benefit the environment and community through enabling additional resources to be committed to rehabilitation of the Mine.</p> <p>Management and Mitigation:</p> <p>The EIS documents Vista Gold's proposed approach to mine closure and rehabilitation. This, in time, will remove the legacy issues associated with the current site.</p>	<p>Stakeholders: Council, relevant Government Agencies, Residents, Wider community</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local/Regional/Wider</p>
	Decrease in community health, safety and wellbeing (whether real or perceived)	<p>Decline in components of community health and well-being associated with Project (both real and perceived).</p> <p>Consultation with health providers in Katherine have identified that anecdotally, construction workforces are associated with increased instance of mental health issues and sexually transmitted diseases. This concern is also identified in baseline literature reviewed for other mining projects across Australia (Table 2).</p> <p>Management of this potential social impact is through workforce management strategies, codes-of-conduct, provision of information on health and well-being and a partnership approach between health providers and employers.</p> <p>Management and Mitigation:</p> <p>Specific management and mitigation strategies to address this impact will also include: a Workforce Management Strategy governing standards of behaviour and containing appropriate controls. Vista Gold will also implement a community and stakeholder engagement strategy to provide a mechanism for ongoing feedback from the community including service providers both during construction and operation stages.</p>	<p>Stakeholders: Council, Relevant Government Agencies, health providers, not-for-profit organisations</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional</p>
	Increase in community	Increase in community concerns regarding water quality at the site and of the Edith River.	<p>Stakeholders Council, Government</p>



Aspect	Impact	Explanation	Description
	<p>concerns regarding water quality and risk of environmental contamination</p>	<p>The Project Site has existing environmental and water quality issues that require on-going management. The Mt Todd Mine has an existing historical legacy of poor environmental management under prior operators. This has contributed to a community concerns regarding potential for environmental impacts to occur as a result of the Project. Consultation has confirmed that these concerns currently exist among a large part of the community. These issues, whether real or perceived can have negative impacts on the general community's health, safety and wellbeing.</p> <p>A key aspect in managing perceived concerns regarding environmental impacts is establishing mechanisms for regular reporting and education of the community. These are typically established through a community and stakeholder engagement plan and monitoring strategy that are provided as publically accessible documents.</p> <p>In addition, stakeholder consultation identified the importance of a community reference group that could provide a bridge between the Project and the broader community. This mechanism is well-established within the mining industry and generally consists of an independent chair with representation from the council, NT Government and key stakeholders to the Project.</p> <p>Management and Mitigation:</p> <p>Management and mitigation measures proposed include:</p> <ul style="list-style-type: none"> ▶ A community and stakeholder engagement plan identifying opportunities for the community to be informed regarding the Project ▶ Community feedback mechanism establishing a system for members of the community to raise questions, concerns or complaints regarding the Project ▶ A dedicated staff member to support community engagement ▶ Regular reporting to the community on the Project including on environmental issues. 	<p>Agencies, Health providers, landholders, community</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local/Regional / National</p>
	Negative impacts on vulnerable	This impact relates to negative impacts that may be experienced by vulnerable groups within the community, over and above what may be experienced by the	<p>Stakeholders</p> <p>Council, Government Agencies, Health</p>



Aspect	Impact	Explanation	Description
	groups such as women and Indigenous groups	<p>community generally.</p> <p>As described above, construction workforces are associated with increased instance of anti-social behaviours which can have significant impacts on vulnerable groups such as women, Indigenous people and particularly Indigenous women. Community consultation on this issue identified that this was not a concern for the majority of people consulted but that it was a concern for some individuals. This issue requires careful management and attention due to its perceived sensitivity.</p> <p>Management and Mitigation:</p> <p>Management and mitigation measures proposed include:</p> <ul style="list-style-type: none"> ▶ Community feedback mechanism establishing a system for members of the community to raise questions, concerns or complaints regarding the Project ▶ Dedicated staff member to support community engagement ▶ Agreement with Jawoyn Association including regular reporting and consultation on arrangements to be established ▶ Establishment of community reference group including ensuring representation of women and vulnerable groups ▶ Workforce behaviour strategies 	<p>providers, not-for-profit organisations</p> <p>Perceived status of impact: Negative</p> <p>Scale: Local</p>

5.4.7 Land Use and Property Impacts

Impact	Explanation	Description
Impacts on downstream and near neighbours	<p>This impact relates to impacts that may be experienced either downstream of the Project site or to adjacent properties. This includes the Aboriginal community of Werenbun who are the closest community to the Project Site.</p> <p>Potential impacts may include spread of weeds, disturbance, loss of amenity, concerns regarding water quality etc. A range of positive benefits may also accrue to landholders from Project implementation of a 'Near Neighbour' policy including assistance with shared land management responsibilities.</p>	<p>Stakeholders Council, landholders</p> <p>Perceived status of impact: Negative and Positive</p> <p>Scale: Local</p>



Impact	Explanation	Description
	<p>Management and Mitigation:</p> <p>Management and mitigation measures proposed include the development of a 'Near Neighbour' program in consultation with nearby landholders. This will include a regular system of contact with landholders to monitor any changes on properties and the road network and to implement mitigation measures as agreed.</p>	

5.4.8 Indigenous resources, values and aspirations

Consultation with residents of Indigenous decent, the Jawoyn Association and residents of nearby Aboriginal communities identified a range of potential positive and negative impacts associated with the Project. Refer to the Public Consultation Report (GHD 2013) for further detail on consultation activities undertaken.

On this basis, the following social impact risks and opportunities have been identified.

Potential Impact	Explanation	Description
Indigenous employment and business opportunities	<p>Positive employment and business opportunities arising from the Project for Indigenous people.</p> <p>Vista Gold is committed to providing employment and business opportunities for Indigenous people in the Katherine region. The Jawoyn Board (representing Jawoyn Traditional Owners) are partners in the Project and are negotiating with Vista Gold through a separate contractual agreement regarding specific employment and business opportunities.</p> <p>It is anticipated that the Project will lead to increased opportunities for Jawoyn Traditional Owners and other Indigenous people to engage in business ventures either directly or indirectly related to the Project. These opportunities' may include providing goods and services to the Project such as transportation of mine workers, provision of construction workers.</p> <p>The provision of these opportunities is viewed positively by the Jawoyn Association and Traditional Owners consulted.</p> <p>Management and Mitigation:</p> <p>Negotiation and agreement of partnership agreement between Vista Gold and the Jawoyn Association.</p>	<p>Stakeholders: Jawoyn Traditional Owners, Jawoyn Association, people of Indigenous descent</p> <p>Perceived status of impact: Positive</p> <p>Scale: Local/Regional</p>
Potential for exacerbation of existing community conflicts	At the time of undertaking this SIA there remained some uncertainty and community conflict regarding how Indigenous people would benefit from the Project. There was a perception that some groups would benefit and others would be left out. Although a lot of people consulted were supportive of the project on the basis of the	<p>Stakeholders: Indigenous groups and individuals</p> <p>Perceived status of</p>



Potential Impact	Explanation	Description
	<p>employment and economic development opportunities it provided there were also significant tensions within the Indigenous community regarding the Project.</p> <p>There is potential for the Project to exacerbate existing tensions and conflict within Indigenous groups in the region depending on how partnership, engagement and employment activities are undertaken.</p> <p>Management and Mitigation:</p> <ul style="list-style-type: none">▶ Negotiation and agreement of partnership agreement between Vista Gold and the Jawoyn Association.▶ A specific Indigenous consultation strategy developed as a component of community and stakeholder engagement initiatives that clearly identifies how Indigenous groups and communities in the region will be consulted.	Impact: Negative Scale: Local/Regional
Traditional Owner Cultural Heritage and Resources	<p>Surveys have identified the presence of a number of aboriginal and European sites on the mineral leases. Some of these sites have high cultural heritage significance.</p> <p>Management and Mitigation:</p> <ul style="list-style-type: none">▶ Ensure all Aboriginal Areas Protection Authority Certificates are current for the Mt Todd Project Area.▶ Avoid where possible the major sites identified.▶ Implement a Cultural Heritage Management Plan prior to commencement of invasive exploration and mining works.▶ For the Aboriginal archaeological sites located in proposed work areas which cannot be avoided, commence application for a work approval under the <i>Northern Territory Heritage Act 2011</i>. Consultations with the Traditional Owners should be a part of the management, permitting and possible salvage of these sites.	Stakeholders: Jawoyn Traditional Owners Perceived status of impact: Negative Scale: Local/Regional

5.5 Summary of Social Impacts

A summary of social impacts and their significance assessment is provided in Table 35.

Table 35 Summary Social Impact and Significance Assessment

Aspect	Potential impacts and opportunities	Project Phase	Perceived status of impact ¹³	Mitigation and Management Strategies										Residual Social Risk (Likelihood/Consequence/Significance)	
				Land Compensation Program	Project Design	Community and Stakeholder Engagement	Workforce Management Strategy	Housing and Accommodation Strategy	Industry Participation Plan	Vista Gold Sponsorship	EIS Technical Environmental Management	Jawoyn Partnership Agreement	Monitoring Program	Near Neighbour Program	
Workforce	Lack of social integration of workforce	Construction	Negative			√	√	√		√			√		Possible/Minor/Low
		Operation	Negative			√	√	√		√			√		Possible/Minor/Low
	Increased incidence of anti-social behaviour	Construction	Negative			√	√	√		√			√		Possible/Minor/Low
		Operation	Negative			√	√	√		√			√		Possible/Minor/Low
	Exacerbation of existing labour and skills shortages ¹⁴	Construction	Negative			√	√		√				√		Possible/Minor/Low
		Operation	Negative			√	√		√				√		Possible/Minor/Low
	Cross-over employment impacts	Construction	Negative		√				√				√		Possible/Minor/Low
		Operation	Negative						√				√		Possible/Minor/Low
	Decline in worker well-being	Construction	Negative		√		√	√					√		Possible/Moderate/Medium
		Operation	Negative		√		√	√					√		Possible/Moderate/Medium
Increase in worker life-style opportunities	Construction	Positive					√	√					√		Likely/Moderate/Medium
		Operation	Positive				√	√					√		Likely/Moderate/Medium
	Construction	Negative					√				√		√		Possible/Minor/Low
	Fatigue-related impacts associated with worker travel (non Fly-in-Fly-out impacts)	Operation	Negative				√	√			√		√		Likely/Moderate/Medium
		Construction	Negative		√	√		√					√		Likely/Moderate/Medium
Housing and accommodation	Increase in demand for short-term accommodation ¹⁵	Operation	Negative		√	√		√					√		Possible/Minor/Low
		Construction	Negative		√		√	√					√		Likely/Moderate/Medium
	Increase in demand for long-term accommodation	Operation	Positive		√		√	√					√		Very Likely/Major/High
		Construction	Negative		√		√	√					√		Possible/Moderate/Medium

¹³ Status is based on the perspective of affected stakeholders

¹⁴ Only negative elements assessed

¹⁵ Only negative elements assessed

Aspect	Potential impacts and opportunities	Project Phase	Perceived status of impact ¹³	Mitigation and Management Strategies										Residual Social Risk (Likelihood/Consequence/Significance)	
				Land Compensation Program	Project Design	Community and Stakeholder Engagement	Workforce Management Strategy	Housing and Accommodation Strategy	Industry Participation Plan	Vista Gold Sponsorship	EIS Technical Environmental Management	Jawoyn Partnership Agreement	Monitoring Program	Near Neighbour Program	
	Reduction in affordability of rental housing ¹⁶	Operation	Negative		√		√	√					√		Possible/Minor/Low
		Construction	Positive		√			√	√				√		Very Likely/Major/High
Economic and Employment	Increase in business opportunities and local/regional spend	Operation	Positive		√		√		√				√		Very Likely/Major/High
		Construction	Positive and Negative						√				√		Possible/Minor/Low
	Potential for local inflationary impacts ¹⁷	Operation	Positive and Negative						√				√		Possible/Minor/Low
		Construction	Negative			√			√				√		Possible/Minor/Low
	Reduced focus on traditional customer base ¹⁸	Operation	Negative			√			√				√		Possible/Minor/Low
		Construction	Positive		√				√				√		Very Likely/Moderate/High
	Increased employment opportunities	Operation	Positive		√				√				√		Very Likely/Extreme/Excessive
		Construction	Negative ¹⁹		√			√			√		√		Possible/Minor/Low
Community infrastructure and services	Increased demand for community infrastructure and utilities leading to local/regional shortfalls	Operation	Negative		√			√			√		√		Possible/Minor/Low
		Construction	Negative				√	√			√		√		Likely/Minor/Low
	Exacerbation of existing health shortfalls	Operation	Negative				√	√			√		√		Likely/Moderate/Medium
		Construction	Positive			√					√		√		Likely/Moderate/Medium
Community health, safety and wellbeing	Benefits to local/region and national community from rehabilitation of existing mine site	Operation	Positive			√					√		√		Likely/Moderate/Medium
		Construction	Negative		√	√		√			√		√		Possible/Minor/Low

¹⁶ Only the negative elements of this impact are assessed given the early stage of investigations into site-specific components of housing and accommodation provision

¹⁷ Positive aspects of this impact are considered under increased regional/local spend

¹⁸ Only negative elements assessed

¹⁹ Only the negative elements of this impact are assessed given the early stage of investigations into site-specific components of housing and accommodation provision

Aspect	Potential impacts and opportunities	Project Phase	Perceived status of impact ¹³	Mitigation and Management Strategies										Residual Social Risk (Likelihood/Consequence/Significance)	
				Land Compensation Program	Project Design	Community and Stakeholder Engagement	Workforce Management Strategy	Housing and Accommodation Strategy	Industry Participation Plan	Vista Gold Sponsorship	EIS Technical Environmental Management	Jawoyn Partnership Agreement	Monitoring Program	Near Neighbour Program	
	Decrease in community health, safety and wellbeing (whether real or perceived)	Operation	Negative		√	√		√			√		√		Possible/Minor/Low
		Construction	Negative			√	√	√					√		Possible/Moderate/Medium
	Negative impacts on vulnerable groups within community including those on lower incomes; women and children (particularly those of Aboriginal and Torres Strait Islander descent)	Operation	Negative			√	√	√					√		Possible/Moderate/Medium
		Construction	Negative			√	√				√		√		Possible/Minor/Low
	Increase in community concerns regarding water quality and risk of environmental contamination	Operation	Negative			√	√				√		√		Possible/Minor/Low
		Construction	Negative and Positive										√		Likely/Minor/Low
Property and Land use impacts	Impacts on downstream and near neighbours	Operation	Negative and Positive										√		Likely/Minor/Low
		Construction	Positive			√						√	√		Very Likely/Major/High
Indigenous resources, values and aspirations	Indigenous employment and business opportunities	Operation	Positive			√						√	√		Very Likely/Major/High
		Construction	Negative			√						√	√		Likely/Moderate/Medium
	Potential for exacerbation of existing community conflicts	Operation	Negative			√						√	√		Likely/Moderate/Medium
		Construction	Negative										√		Likely/Moderate/Medium
	Traditional Owner cultural heritage and resources	Operation	Negative										√		Likely/Moderate/Medium
		Construction	Negative										√		Likely/Minor/Low
Traffic and Transport	Increased traffic and transport on Stuart Highway	Operation	Negative										√		Likely/Minor/Low
		Construction	Negative										√		Likely/Minor/Low
	Increased risk of spill of hazardous substances	Operation	Negative										√		Likely/Minor/Low



6. Social Impact Management Strategies

The social impact assessment has informed Project design decisions in relation to the following matters:

- ▶ Selection of appropriate contractors based on their ability and commitment to the social impact management strategies detailed in this section;
- ▶ Development of the proposed housing and accommodation strategy for the Project including the decision to locate construction work camps away from Katherine and Pine Creek;
- ▶ Development and implementation of Occupational Health and Safety Policies for construction and operation;
- ▶ Development of a Construction Environmental Management Plan (CEMP) to address noise and dust and other potential environmental impacts associated with construction activities;
- ▶ Development of a Traffic Management Plan to address:
 - Potential safety issues associated with construction related traffic; and
 - Management of traffic to avoid delays to existing traffic
- ▶ Preparation of a Site Safety Plan that will include preventative measures for a range of on and off-site incidents that might impact on community health and safety; and
- ▶ Provision of an Emergency Response Plan that will include measures to address any emergency incidents that might involve members of the public.

The following section provides additional information on potential social impact management and mitigations strategies for consideration by Vista Gold or its contractors.

6.1 Workforce Management Strategy

A Workforce Management Strategy should be developed for both construction and operations phases of the Project. It should include:

- ▶ Workforce sourcing;
- ▶ A workforce Code of Conduct, incorporating behavioural standards, linked to employee contract conditions. Clear consequences for workers not adhering to behavioural standards will be set out, including dismissal for serious non-conformances or repeated offences;
- ▶ Workforce health, safety and wellbeing policies including strategies to manage worker fatigue associated with travel and well-being of workers within accommodation camps;
- ▶ Adopting industry standard Code of Conduct as part of regular tool-box meetings for the construction and operation workforce where workers are reminded of the Code of Conduct and consequences for not meeting it;
- ▶ Employee induction (covering aspects of worker behaviour, company expectations, community perceptions of behaviour etc.); and
- ▶ Occupational health and safety for employees, contractors and sub-contractors.



6.2 Housing and Accommodation

Further develop and refine the housing and accommodation strategy as described in Section 5.4.1.

6.3 Employment, Education and Training

- ▶ Develop and implement an Industry Participation Plan in accordance with the requirements of the Northern Territory Government for major projects;
- ▶ This plan will be based on preferentially sourcing people, goods and services from within the Katherine Region and the Northern Territory to build business, industry and community capability;
- ▶ Aim to use local (Katherine Region) businesses to fill contract positions (e.g. catering, cleaning, fuel supply, light vehicle maintenance etc.) provided contractors are competitive and appropriately skilled; and
- ▶ Work with local and Territory training providers to ensure that local training programs will give unskilled people the skills and training necessary to gain employment in the Project. A list of those currently identified is included in Table 36 Training and Employment Service.

6.4 Community and Stakeholder Engagement

The following strategies relating to community and stakeholder engagement may be undertaken:

- ▶ Develop a community and stakeholder engagement plan detailing mechanisms for ongoing community consultation and feedback on the Project including establishing a community reference group;
- ▶ Continue to work with key Project stakeholders including the NT Government, Katherine Town Council, Victoria Daly Shire Council and Roper Gulf Shire Council, the Jawoyn Association and others as required to minimise social issues;
- ▶ Continue to develop and operate the Mt Todd Project Website and toll-free number to provide a point of contact for interested members of the community to obtain information on the Project;
- ▶ Establish an incident/action management system to provide a transparent and equitable mechanism for responding to any community suggestions or concerns; and
- ▶ Establish a Community and Stakeholder Relations Role for the Project prior to Project construction.

6.5 Vista Gold Sponsorship Program

- ▶ Establish a community sponsorship fund to contribute to community development initiatives. This will include the development of criteria for sponsorship and a clear and transparent selection process advertised through the Project web page.

6.6 Near Neighbour Program

- ▶ Develop a 'Near Neighbour' program to be implemented with adjacent and downstream landholders. This will be a regular system of contact with landholders to monitor any changes on properties and the road network and implement mitigation measures as agreed. Landholders will have a single point of contact with a structured communication system in place to ensure a quick and efficient response to any issues that may arise. Any required mitigation measures will be implemented within agreed timeframes.



- ▶ The 'Near Neighbour' program will be developed in consultation with landholders, identifying the respective roles and responsibilities of the Proponent and landholders.

6.7 Industry Participation Plan

- ▶ Prepare an Industry Participation Plan for the Project. This plan will be prepared consistent with the template provided by the Northern Territory Government.
- ▶ The plan will include the following matters:
 - How services, suppliers and labour will be utilised;
 - How the Project will enhance local business and industry capability;
 - What the regional economic benefits will be;
 - Opportunities for Indigenous participation;
 - Communication with local industry; and
 - How success will be reported on.

6.8 Jawoyn Partnership Agreement

- ▶ As part of the partnership agreement with the Jawoyn Association continue to work with the Jawoyn Traditional Owners towards the achievement of economic and employment aspirations of the Jawoyn people;
- ▶ Establish clear mechanisms for ongoing collaboration, communication and reporting between Vista Gold and the Jawoyn Association including mechanisms for any dispute resolution.



7. Monitoring and Reporting

Refer to the Social Impact Management Plan (Appendix C) for monitoring and reporting information.



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Appendix A

Significance Assessment Methodology



Social Impact Significance Matrix

A social impact significance matrix was employed as the main tool for assessing the significance of the potential social impacts. The matrix is a table which lists and describes the various impacts that have been identified as possibly resulting from the proposed Project. The table does not weight impacts against each other, rather they are displayed and assessed individually, to paint a picture of the impacts and allow an overall discussion regarding the proposal. The purpose of the significance matrix is also to identify priority areas for mitigation and management actions.

It is acknowledged that assessing the significance of social impacts involves subjective judgements on behalf of the assessor (Vanclay, 2001). Social impacts are felt or experienced by stakeholders, and different stakeholders may therefore assign differing significances to the same impacts, depending on their particular situation. Two strategies have been used to manage and reduce the subjective nature of the assessment process:

- ▶ By clearly outlining the assessment processes, criteria and arguments the SIA team have used to assign significance a larger degree of transparency in the process is achieved;
- ▶ By basing the assessment on a variety of sources, including extensive consultation with directly impacted stakeholders, the robustness of the significance assessment is augmented.

All the data sources used throughout the previous steps in the SIA have been analysed to determine impact significance.

The completion of the social impact significance matrix involves the following components:

- ▶ Identification of impacted stakeholders;
- ▶ Likelihood/consequence rating;
- ▶ Status of impact;
- ▶ Duration of impact;
- ▶ Spatial extent of the impact;
- ▶ Stakeholder importance.

The process of assessing the significance of the social impacts is undertaken for the current Project design. Based on this, a social impact management plan is developed, involving impact mitigation and enhancement. A second assessment is then carried out taking proposed mitigation and enhancement measures into account, identifying whether there is a risk of a residual impact.

Significance Assessment Process

Step 1: Identification of Impacted Stakeholders

This considers the stakeholders likely to be impacted by the proposed Project. The stakeholder groups are not ranked but used for descriptive purposes only. Each impact is linked to at least one stakeholder group.

Step 2: Likelihood / Consequence Rating

This step involves, first, assessing the likelihood that the impact will occur (Table 37). Second, it involves assessing the consequence of each of the identified social impacts. It is important to remember here that the consequence refers to the consequence *on the impacted stakeholder*.



As the consequence refers to the consequence on the impacted stakeholder, it is not possible to provide an exhaustive definition for each rating and for all stakeholders. Rather the proposed descriptions consist of indicative criteria for a number of stakeholder groups.²⁰ Table 38 and Table 39 show indicative criteria for assessing the consequences on the stakeholders.

The results are then combined into a likelihood/consequence matrix, assigning a significance rating to the social impact (Table 40).

Table 37 Descriptions of Likelihood

Likelihood	Description
Certain	The identified social impact will definitely occur (100%)
Very likely	There relative certainty that the impact will occur (75% certain)
Likely	The identified social impact is likely to occur (60% certain)
Possible	It is possible for the social impact to occur (40% certain)
Unlikely	The identified social impact is unlikely to occur (25% certain)
Very unlikely	It will be very unlikely for the social impact to occur (5% certain)

Table 38 Indicative Criteria for Negative Social Impacts

Rating	Indicative criteria
Extreme	<i>Individuals and families:</i> Death and serious injury, disability, personal bankruptcy, severe stress and mental illness, severance of strong connections to places and communities <i>Businesses:</i> bankruptcy, close down of business <i>Communities:</i> Tensions leading to widespread violence, rapid geographic change of large proportion of local area, rapid large scale population changes such as relocation of majority of population, destruction of cultural objects of large significance <i>Project proponent:</i> multiple fatalities caused by Project, serious nation-wide impact to Projects reputation, media coverage at the state level by more than one source
Major	<i>Individuals and families:</i> Injury, serious illness, severe financial hardship, long-term unemployment, severance of connections to places and communities, severe stress <i>Businesses:</i> Severe financial hardship, large noticeable impact to business in terms of changing revenue, number of employees <i>Communities:</i> Large scale social tensions, rapid geographic and social change to a significant proportion of area or population, rapid change to way of life or, profanation of important cultural objects <i>Project Proponent:</i> Single fatality or permanent major disability of a member of the public or construction workforce, improvement or damage to the Project's reputation at the local level, media coverage at the state level by one source or local level by more than one source. Proliferous calls from dissatisfied or supportive stakeholders

²⁰ While every reasonable care has been taken to remain neutral, the indicative criteria are still likely to exhibit a bias related to the context in which they have been developed. It is important to remember that they constitute a professional judgement based on the experience of the SIA team. Groups of stakeholders may assign different ranks to the criteria identified.

Rating	Indicative criteria
Moderate	<p><i>Individuals and families:</i> Recoverable but long-term illness, severe nuisances and disruptions, short-term financial hardship, short-term unemployment, disruption to family life, stress</p> <p><i>Businesses:</i> Short-term financial hardship, noticeable impacts to business in terms of changing revenue, number of employees</p> <p><i>Communities:</i> localised or occasional social tension, geographic change to part of the area, social change to small proportion of community such as relocation of a minority of community, loss of some important areas/buildings such as parks and meeting places</p> <p><i>Project proponent:</i> Recoverable accidents, improvement or damage to the Project's reputation, media coverage at the local level by more than one source, several calls from dissatisfied or supportive stakeholders</p>
Minor	<p><i>Individuals and families:</i> Short-term recoverable illness, manageable nuisances and disruptions, changing employment situations (but not deteriorating), easily manageable stress</p> <p><i>Businesses:</i> Changing but not deteriorating business conditions, practical challenges with minor financial implications</p> <p><i>Communities:</i> Social tension between individual members of community, social or geographic change to small part of community</p> <p><i>Project proponent:</i> Incident leading to medical treatment, improvement or damage to the Project's reputation within industry, media coverage at the local level, calls from a few dissatisfied or supportive stakeholders</p>
Insignificant	<p><i>Individuals and families:</i> minor nuisance or disruptions, no accidents or illness</p> <p><i>Businesses:</i> Practical challenges, no financial implications</p> <p><i>Communities:</i> harmoniously managed social changes, localised (very small proportion of community) change to geographic or social set up</p> <p><i>Project proponent:</i> On site first aid incident, improvement or damage to the Project's reputation, no media coverage, no calls from dissatisfied or supportive stakeholders</p>

Table 39 Indicative Criteria for Positive Social Impacts

Rating	Indicative criteria
Extreme	<p><i>Individuals and families:</i> Significantly increased health and social and emotional wellbeing. Sustainable increase in economic prosperity, such as long-term employment opportunities and career prospects to men and women. Significantly increased access to training and education. Significantly increased access to services</p> <p><i>Businesses:</i> Significantly increased business opportunities and profits for the long-term</p> <p><i>Communities:</i> Significantly increased general community wellbeing. Significant and sustainable reduction in violence and crime, and positive changes to community aspirations. Recognition of, support for and long-term preservation of cultural objects, artefacts and practices</p> <p><i>Project proponent:</i> Very strong and widespread community support for the Project. Sustained positive nationwide media coverage</p>
Major	<p><i>Individuals and families:</i> Increased health and social and emotional wellbeing. Widespread employment opportunities. Increased access to training and education</p>



Rating	Indicative criteria
	<p><i>Businesses:</i> Noticeable increase in business opportunities, increased profits</p> <p><i>Communities:</i> Strongly increased community wellbeing, significant reduction in crime and violence, positive changes to community aspirations. Recognition of and support for cultural practices, objects and artefacts</p> <p><i>Project Proponent:</i> Strong support for the Project. Nationwide positive media coverage</p>
Moderate	<p><i>Individuals and families:</i> Increase to health and wellbeing for some individuals. Some employment, training and education opportunities</p> <p><i>Businesses:</i> Increased revenues and profits</p> <p><i>Communities:</i> Increased community wellbeing, reduction in crime and violence. Recognition of cultural practices, objects and artefacts.</p> <p><i>Project proponent:</i> Some local support for the Project, some local, regional and nationwide positive media coverage</p>
Minor	<p><i>Individuals and families:</i> Increased access to services, short-term employment opportunities. Some training opportunities.</p> <p><i>Businesses:</i> Business conditions changing slightly to the positive</p> <p><i>Communities:</i> Slightly increased community wellbeing</p> <p><i>Project proponent:</i> Occasional local and regional positive media coverage</p>
Insignificant	<p><i>Individuals and families:</i> Some short-term employment opportunities. Health and social wellbeing virtually unchanged</p> <p><i>Businesses:</i> Practical benefits, no financial implications</p> <p><i>Communities:</i> Community wellbeing virtually unchanged. Some changes (not negative) to cultural practices, objects and artefacts</p> <p><i>Project proponent:</i> Localised neutral media coverage</p>



Table 40 Assessment of Likelihood and Consequences of Identified Negative Social Impacts

Likelihood of Social Impact	Consequence of Social Impact				
	Insignificant	Minor	Moderate	Major	Extreme
Almost Certain	Medium	Medium	High	Excessive	Excessive
Very Likely	Low	Medium	High	High	Excessive
Likely	Low	Low	Medium	High	Excessive
Possible	Negligible	Low	Medium	High	High
Unlikely	Negligible	Low	Low	Medium	High
Very Unlikely	Negligible	Negligible	Low	Medium	Medium

Step 3: Status of Impact

The status of the impact considers whether the impact is positive, negative or neutral. It is important to remember that the same impact can have a different status for different stakeholders.

Step 4: Duration

The duration of the impact refers to how long the social impact will potentially occur (Table 41).

Table 41 Duration of the Social Impact

Rating	Description
Long	Lasting beyond the construction phase of the Project
Medium	Lasting for the full duration of the construction phase of the Project
Short	Less than the full duration of the construction phase of the Project

Step 5: Spatial Extent

This considers the geographical scale of the proposed impact. The social impacts of the Project may be felt within the physical extent of the Project, or at the local, regional, or state/national level (Table 42).

Table 42 Spatial Extent of the Spatial Impact

Rating	Proposed Description
State/National	In all levels of study areas
Regional	In both the local and regional study areas
Local	In the local study area
Project footprint	Only within the physical footprint of the Project



Step 6: Stakeholder Importance

The stakeholder importance describes how important an impact is to the affected stakeholders. Establishing the importance of an impact complements the significance determination as it allows the affected stakeholders themselves to describe how important an impact is to them. A social impact identified as being non-significant by the SIA practitioner may be very important to the affected stakeholders, and vice versa.

Information regarding stakeholder importance has been gathered solely during consultation. Importance ratings are provided in Table 43.

Table 43 Acceptability of the Social Impact

Rating	Proposed Description
High	A majority of the affected stakeholders have indicated that the social impact is very important to them.
Medium	Some stakeholders have indicated that the social impact is important to them, some have indicated it is of little importance.
Low	A majority of affected stakeholders have indicated that the impact is of little importance to them. Few stakeholders have indicated it is important.



Appendix B

EIS Preparation Guidelines

NT Environment Protection Authority (formerly NRETAS) Guidelines – September 2011	Response
Section 4.8 Social Impact Assessment	
<p>Conduct a Social Impact Assessment (SIA) to gauge community values and opinions on the potential impacts of the Mt Todd Gold Project in the region. The SIA should:</p> <p>Identify key stakeholders, regional community structure and community vitality (including demography, health, education and social well-being, access to services and housing etc)</p>	<p>Social Impact Assessment Report and Public Consultation Report</p> <p>Social infrastructure section of SIA Report (Section 4.3.9)</p>
<p>Include ongoing consultation with stakeholder groups to ensure the full range of community viewpoints are sought. The proponent is to outline its proposed methods for community consultation, including how it will respond to community feedback, questions and concerns in a formal, publicly accessible communication plan for the Project.</p>	<p>Public Consultation Report - Community and Stakeholder Consultation (Section □)</p>
<p>Estimate local employment including a breakdown of skills/trades required and specific opportunities for skills development</p> <p>Indicate where the workforce will be sourced and commute arrangements for non-local workforce personnel.</p> <p>Direct and indirect employment, training and business opportunities associated with the Project particularly in relation to Indigenous employment and training programs and how this would be managed and implemented.</p> <p>Recreational users, local health services, etc.</p>	<p>Social Impact Assessment Report – Workforce Impacts (Section 5.4.1)</p> <p>Economic Assessment Report</p> <p>Social infrastructure section of SIA Report (Section 4.3.9)</p>
<p>Outline accommodation requirements and arrangements for construction and</p>	<p>Accommodation and housing</p>

<p>operation activities and associated infrastructure and services required;</p> <p>Discuss the potential negative social impacts that could arise from the Project including the impacts of the Project on affected landowners and communities.</p>	<p>Community Infrastructure</p> <p>Section 5 Social Impact Assessment</p>
<p>Discuss the potential positive social benefits that could be realised from the Project;</p> <p>Provide information on impacts from additional road transport that may affect the community;</p> <p>Identify and discuss expected regional, Territory or national benefits and costs (including those that cannot be adequately described in monetary or physical terms e.g. effects on cultural and aesthetic amenity), in the short and long-term;</p> <p>Develop management controls to minimise the negative social impacts and optimise the positive opportunities.</p>	<p>Section 5 Social Impact Assessment</p> <p>Traffic and Transport Impacts</p> <p>Section 5 Social Impact Assessment</p> <p>Social Impact Management Plan</p>
<p>Section 4.8.2 Socio- Economics</p>	
<p>The EIS should describe the socio-economic characteristics of the local, regional and Northern Territory communities (including a prediction of trends- over the expected operational life of the Project);</p> <p>The section should present a balanced broad summary of the Project's impact on the local, regional and Northern Territory economies in terms of direct effects on employment, income and production;</p> <p>It should outline the overall economic benefits of the Project, the likely contribution of the Project to the development of mining industry, regional economic development; and</p> <p>Indigenous economic development in the Northern Territory, employment and skills development outcomes and linkages with</p>	<p>Section 4 Social Baseline</p> <p>Economic Impact Assessment Report</p>

other Northern Territory business and sectors, including suppliers and other service providers.	
<p>The EIS should specify:</p> <p>Estimated value of expenditure during the construction and operation, highlighting the proportion to be spent in the Northern Territory;</p> <p>Estimated value of annual expenditure on goods and services from the Northern Territory;</p> <p>Estimated quantity and value of production/exports;</p> <p>Anticipated markets for products;</p> <p>Estimated royalties and taxes to be paid to the Northern-Territory Government;</p> <p>A description of anticipated socio-economic impacts upon local residents, communities and towns;</p> <p>Any proposals to contribute to community benefit including improved services and infrastructure for relevant communities involved;</p> <p>Potential local business and employment opportunities and opportunities for synergistic facilities and infrastructure development;</p> <p>Specify the mechanisms that would be utilised to inform the local business community and workers of business and employment opportunities; and</p> <p>Detail the socio-economic parameters that would be monitored on an ongoing basis.</p>	<p>Economic Assessment Report</p> <p>Social Impact Assessment (Section 5)</p> <p>Social Impact Management Strategies (Section 6)</p> <p>Social Impact Monitoring and Reporting (Section 7)</p>



Appendix C

Social Impact Management Plan



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Vista Gold Australia Pty Ltd
Mt Todd Gold Project
Social Impact Management Plan

June 2013



This MT Todd Gold Project: Social Impact Management Plan ("Report"):

1. *has been prepared by GHD Pty Ltd for Vista Gold Australia Pty Ltd;*
2. *must not be copied to, used by, or relied on by any person other than Vista Gold Australia Pty Ltd;*
3. *may only be used for the purpose of the Mt Todd Gold Project, and must not be used for any other purpose.*

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Vista Gold Australia Pty Ltd arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

- *information provided by Vista Gold Australia Pty Ltd at the time of writing the Report*

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation and may be relied on for 6 months, after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.



Contents

Executive Summary	iii
1. Introduction	1
1.1 Proponent	1
1.2 Purpose of the SIMP	1
1.3 Statutory Requirements	1
1.4 Project Overview	2
1.5 Defining the Study Area	3
1.6 Social Impact Management Plan Methodology	6
1.7 Stakeholder Engagement for the SIA and SIMP	6
2. Project Summary	9
2.1 Construction Phase	9
2.2 Estimated Operation Workforce	10
2.3 Potential Contribution to Regional Development	13
2.4 Summary of Social Values	13
2.5 Key Social Issues in the Project Area	13
3. Social Impact Mitigations and Management	17
3.1 Social Impacts in the Project Area	17
3.2 Impact Management Strategies	19
3.3 Summary of Impacts and Key Mitigation Strategies	21
4. Action Plans	25
5. SIMP Implementation, Monitoring and Reporting	28
5.1 SIMP Implementation	28
5.2 Monitoring and Reporting	28



Table Index

Table 1	Summary of SIA Activities	6
Table 2	Sequencing of Consultation Activities	7
Table 3	Potential Major Issues Identified During Public Consultation	14
Table 4	Summary of Potential Key Social Impacts and Significance	17
Table 5	Potential Impacts and Key Mitigations Matrix	23

Figure Index

Figure 1	Local Study Area	4
Figure 2	Regional Study Area	5



Executive Summary

Summary of Potential Social Impacts

The potential key social impacts identified through the SIA process are summarised below (and detailed in Appendix F):

Impact	Status of Impact	Impacted Party
Workforce (Requirement, Availability, Sourcing, Shift Management, Cumulative)		
Lack of social integration of workforce	Negative	Local community
Increased incidence of anti-social behaviour	Negative	Local community
Exacerbation of existing labour and skills shortfalls	Negative and Positive	Employers
Cross-over employment impacts	Negative	Employers
Decline in worker well-being associated with a FIFO or DIDO workforce	Negative	Workforce
Increase in worker life-style opportunities associated with a FIFO workforce	Positive	Workforce
Fatigue related risk of accidents – related issues associated with worker travel between place of work and home residence	Negative	Workforce Local community
Housing and Accommodation Impacts		
Increase in demand for short-term accommodation	Negative and Positive	Local community
Increase in demand for long-term accommodation	Positive	Local community
Reduction in affordability of rental housing	Negative and Positive	Local community
Economic and employment (Direct and indirect)		
Increase in business opportunities and regional spend	Positive	Local and regional businesses
Increased local capability to service large projects	Positive	Local and regional businesses
Local inflationary impacts	Positive and Negative	Local community
Reduced focus on traditional customer base	Negative and Positive	Local and regional businesses
Increased employment opportunities	Positive	Local community
Traffic and Transport		
Increased traffic and transport on Stuart Highway	Negative	Road users
Increased local capability to carry freight	Positive	Local and regional businesses
Increased risk of spill of hazardous substances	Negative	Local and regional community



Impact	Status of Impact	Impacted Party
Community Infrastructure and Services		
Increased demand for community infrastructure and utilities leading to local/regional shortfalls	Positive and Negative	Local community
Increased demand for school placements	Negative and positive	Local community
Exacerbation of existing health services shortfalls	Negative	Local community
Impacts on Community Values		
Benefits to local/regional and national community from rehabilitation of existing contaminated mine site	Positive	Local community
Decrease in community health, safety and wellbeing (whether real or perceived)	Negative	Local community
Increase in community concerns regarding water quality and risk of environmental contamination	Negative	Local community
Negative impacts on vulnerable groups such as women and Indigenous groups	Negative (some individuals)	Vulnerable groups
Land Use and Property Impacts		
Impacts on downstream and near neighbours	Negative and Positive	Adjacent landholders
Indigenous resources, values and aspirations		
Indigenous employment and business opportunities	Positive	Jawoyn Association Indigenous groups and individuals
Potential for exacerbation of existing community conflict	Negative	Indigenous groups and local community
Traditional Owner cultural heritage and resources	Negative	Indigenous groups and individuals

To address the potential impacts the following management strategies and actions will be considered:

Workforce Management Strategy

A Workforce Management Strategy should be developed for both construction and operations phases of the Project. It should include:

- ▶ Workforce sourcing;
- ▶ A workforce Code of Conduct, incorporating behavioural standards, linked to employee contract conditions. Clear consequences for workers not adhering to behavioural standards will be set out, including dismissal for serious non-conformances or repeated offences;
- ▶ Workforce health, safety and wellbeing policies including strategies to manage worker fatigue associated with travel and well-being of workers within accommodation camps;



- ▶ Adopting industry standard Code of Conduct as part of regular tool-box meetings for the construction and operation workforce where workers are reminded of the Code of Conduct and consequences for not meeting it;
- ▶ Employee induction (covering aspects of worker behaviour, company expectations, community perceptions of behaviour etc.); and
- ▶ Occupational health and safety for employees, contractors and sub-contractors.

Housing and Accommodation Strategy

The housing and accommodation strategy will be further developed in consultation with the NT Government and key regional stakeholders such as the Local Council

Employment, education and training

- ▶ Develop and implement an Industry Participation Plan in accordance with the requirements of the Northern Territory Government for major projects;
- ▶ This plan will be based on preferentially sourcing people, goods and services from within the Katherine Region and the Northern Territory to build business, industry and community capability;
- ▶ Aim to use local (Katherine Region) businesses to fill contract positions (e.g. catering, cleaning, fuel supply, light vehicle maintenance) provided contractors are competitive and appropriately skilled; and
- ▶ Work with local training providers to ensure that local training programs will give unskilled people the skills and training necessary to gain employment in the Project.

Community and Stakeholder Engagement

- ▶ Develop a Community and Stakeholder Engagement Plan detailing mechanisms for ongoing community consultation and feedback on the Project including establishing a community reference group;
- ▶ Continue to work with key Project stakeholders including the NT Government, Katherine Town Council, Victoria Daly Shire Council and Roper Gulf Shire Council, the Jawoyn Association and others as required to minimise social issues;
- ▶ Continue to develop and operate the Mt Todd Project Website and toll-free number to provide a point of contact for interested members of the community to obtain information on the Project;
- ▶ Establish an incident/action management system to provide a transparent and equitable mechanism for responding to any community suggestions or concerns; and
- ▶ Establish a Community and Stakeholder Relations Role for the Project prior to Project construction.

Vista Gold Sponsorship Program

- ▶ Establish a community sponsorship fund to contribute to community development initiatives. This will include the development of criteria for sponsorship and a clear and transparent selection process advertised through the Project web page.



Near Neighbour Program

- ▶ Develop a 'Near Neighbour' program to be implemented with adjacent and downstream landholders. This will be a regular system of contact with landholders to monitor any changes on properties and the road network and implement mitigation measures as agreed. Landholders will have a single point of contact with a structured communication system in place to ensure a quick and efficient response to any issues that may arise. Mitigation measures will be implemented within agreed timeframes; and
- ▶ The 'Near Neighbour' program will be developed in consultation with landholders, identifying the respective roles and responsibilities of the Proponent and landholders.

Industry Participation Plan

- ▶ Prepare an Industry Participation Plan for the Project. This plan will be prepared consistent with the template provided by the Northern Territory Government and guidance from the Northern Territory Industry Capability Network.
- ▶ The plan should include the following matters:
 - How services, suppliers and labour will be utilised;
 - How the Project will enhance local business and industry capability;
 - What the regional economic benefits will be;
 - Opportunities for Indigenous participation;
 - Communication with local industry;
 - How success will be reported on.

Jawoyn Partnership Agreement

- ▶ As part of the partnership agreement with the Jawoyn Association, continue to work with the Jawoyn Traditional Owners towards the achievement of economic and employment aspirations of the Jawoyn people; and
- ▶ Establish clear mechanisms for ongoing collaboration, communication and reporting between Vista Gold and the Jawoyn Association including mechanisms for any dispute resolution.

SIMP Monitoring and Reporting

A social impact monitoring program should be developed in consultation with the key stakeholders during the finalisation of this Plan. The key objectives of the monitoring program should be able to demonstrate:

- ▶ Compliance with the EIS and SIMP commitments;
- ▶ Track the identified impacts and the delivery of their mitigation strategies;
- ▶ Identify new impacts arising from changing conditions and develop responses; and
- ▶ Enable regular stakeholder contact and feedback.

To facilitate the monitoring process various reporting mechanisms should be put in place such as:

- ▶ Community and stakeholder newsletters;
- ▶ Reporting on a regular basis to a community reference group; and
- ▶ Internal reporting by Vista Gold on a regular basis.



1. Introduction

1.1 Proponent

The Proponent for this Project is Vista Gold Australia Pty Ltd (Vista Gold).

1.2 Purpose of the SIMP

The Social Impact Management Plan (SIMP) has been developed to:

- ▶ Summarise social impacts and affected stakeholders identified through the social impact assessment process;
- ▶ Describe Vista Gold's impact management activities and commitments to minimise the negative social impacts and enhance the benefits to the communities and other stakeholders;
- ▶ Describe the mechanisms to monitor the impacts and adjust mitigation strategies;
- ▶ Identify and establish stakeholder partnerships to develop and implement the mitigation strategies throughout the life of the project;
- ▶ Determining a timeframe for the development and implementation of management strategies; and
- ▶ Provide guidance to Vista Gold's social performance activities.

1.3 Statutory Requirements

The former Northern Territory Minister for Natural Resources, Environment, and Heritage determined the Project requires formal assessment, under the NT *Environmental Assessment Act 1982* (EA Act), at the level of an Environmental Impact Statement (EIS). The proposal has also been referred to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and has been determined to be a controlled action.

This SIMP has been prepared as part of the SIA to address Section 4.8 of the *Guidelines for Preparation of an Environmental Impact Statement: Mt Todd Gold Project, Katherine Region NT* (NRETAS, 2011):

- ▶ Conduct a Social Impact Assessment (SIA) to gauge community values and opinions on the potential impacts of the Mount Todd Gold Project in the region. The SIA should:
 - Identify key stakeholders, regional community structure and community vitality (including demography, health, education and social well-being, access to services and housing etc);
 - Include ongoing consultation with stakeholder groups to ensure the full range of community viewpoints is sought. The proponent is to outline its proposed methods for community consultation, including how it will respond to community feedback, questions and concerns In a formal, publicly accessible communication plan for the Project;
 - Estimate local employment including a breakdown of skills/trades required and specific opportunities for skills development;
 - Indicate where the workforce will be sourced and commute arrangements for non-local workforce personnel;



- Consider direct and indirect employment, training and business opportunities associated with the Project particularly in relation to Indigenous employment and training programs and how this would be managed and implemented;
- Outline accommodation requirements and arrangements for construction and operation activities and associated infrastructure and services required;
- Discuss the potential negative social impacts that could arise from the Project including the impacts of the Project on affected landowners and communities, recreational users, local health services, etc;
- Discuss the potential positive social benefits that could be realised from the Project;
- Provide information on impacts from additional road transport that may affect the community;
- Identify and discuss expected regional, Territory or national benefits and costs (including those that cannot be adequately described in monetary or physical terms e. g. effects on cultural and aesthetic amenity), in the short and long term; and
- Develop management controls to minimise the negative social impacts and optimise the positive opportunities.

1.4 Project Overview

Vista Gold proposes to re-establish and re-open the Mt Todd Gold Mine, located 55km northwest of Katherine and 250km south of Darwin. The proposed Project comprises:

- ▶ Extension of the existing Batman Pit;
- ▶ Expansion of the existing Waste Rock Dump;
- ▶ Existing Tailings Storage Facility (TSF1);
- ▶ Proposed new Tailing Storage Facility (TSF2);
- ▶ Raising of the Raw Water Dam and an increase in the area of inundation;
- ▶ Construction of haul roads and possible realignment of the existing access road;
- ▶ Rehabilitation of the existing heap leach pad (HLP); if residual HLP material is not processed through the new plant;
- ▶ Diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection;
- ▶ Construction and processing of low grade ore stockpiles;
- ▶ New water treatment plant;
- ▶ Clay borrow area;
- ▶ Process plant workshops, administration and plant site buildings;
- ▶ Chemical and reagent storage and handling facility;
- ▶ Anaerobic treatment wetlands; and
- ▶ Process plant construction.

The proposed operations involve open cut mining and processing of up to 17.8 million tonnes of ore per annum (Mtpa) to produce gold dore (unrefined gold). Gold dore would be shipped by secure containment to a refinery.



The Project will occur in three phases:

- | | |
|--|----------|
| ► Construction Phase | 2 years |
| ► Operations Phase | 13 years |
| Decommissioning and rehabilitation Phase | 4 years |

The construction and operations workforces will peak at approximately 450 and 350 personnel respectively.

1.5 Defining the Study Area

The study area provides a spatial boundary to the Project. Key considerations include the nature and scale of potential social impacts and their interaction with:

- Landholders who have land within the Project boundaries and/or within the immediate area of the Project site (Local Study Area);
- Nearby communities and service centres affected by the Project (Local Study Area); and
- Communities more distant from the immediate area of Project influence which may also be affected in terms of indirect or induced social impacts (Regional and Wider Study Area).

1.5.1 Local Study Area

The local study area includes those communities located in close proximity to the Project Site where the majority of direct social impacts will be experienced. This area is determined to be the Town of Katherine which is located approximately 50 km from the Project site. 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 operational workforce.

Figure 1 shows the local government administrative boundary of Katherine. This administrative boundary defines the Local Study Area for the purposes of the SIA Report (Appendix F) and this Plan.

1.5.2 Regional Study Area

The regional study area (Figure 2) is determined as the Lower Top-end Northern Territory (an area spatially defined by the Australian Bureau of Statistics Statistical Subdivision). This area includes the local government areas of Roper Gulf Shire and Victoria Daly Shire.

Katherine is a regional hub for the Lower Top-End Northern Territory, due to its strategic location within the Northern Territory. The Project will have an impact regionally through the supply of goods and services, provision of employment and generation of community interest and investment across the region.

The Regional Study Area also includes traditional land of the Jawoyn Aboriginal People. This land is referred to as Jawoyn Country.

1.5.3 Wider Study Area

The wider area for the Project includes the Northern Territory and Darwin.

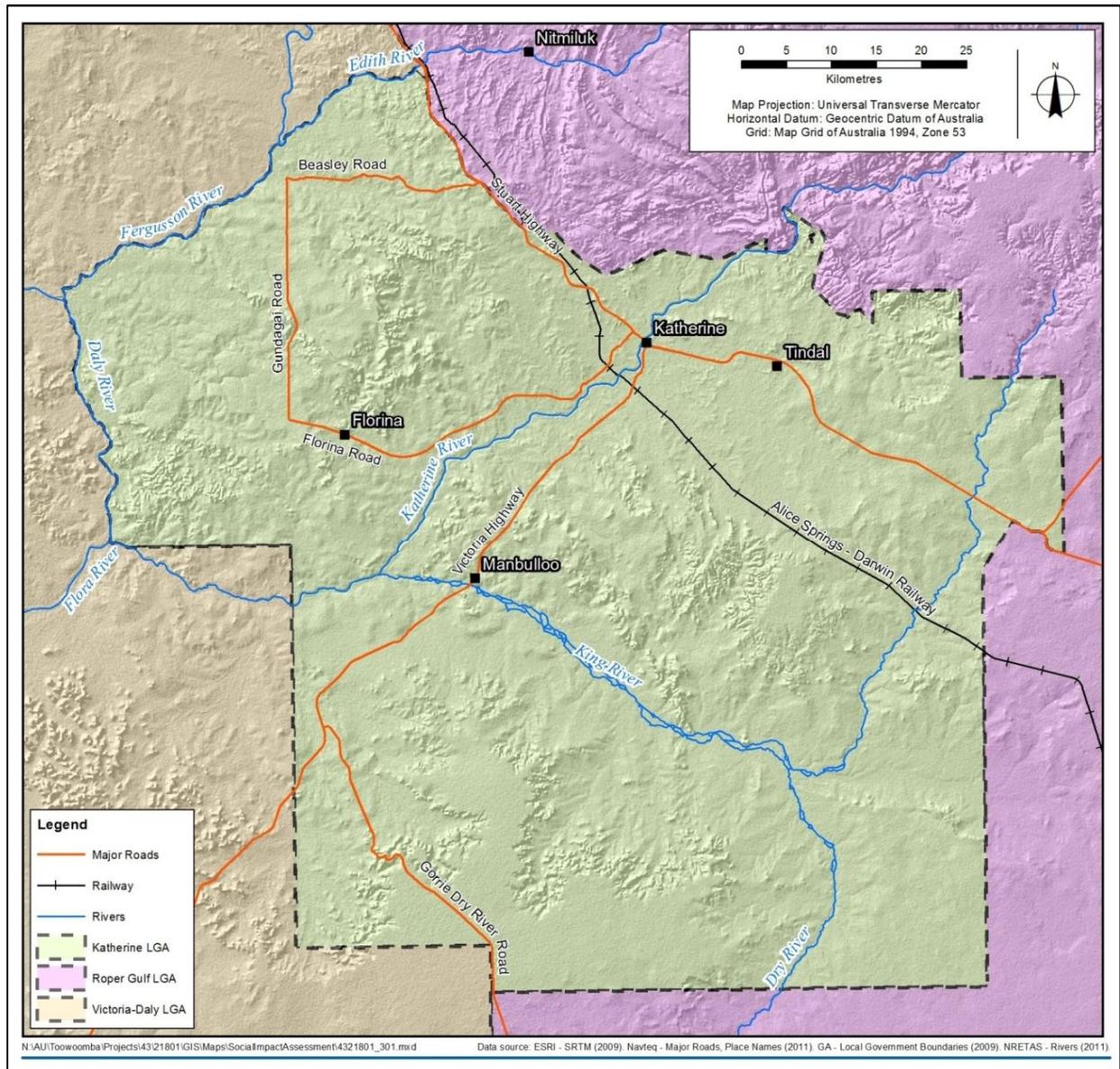


Figure 1 Local Study Area

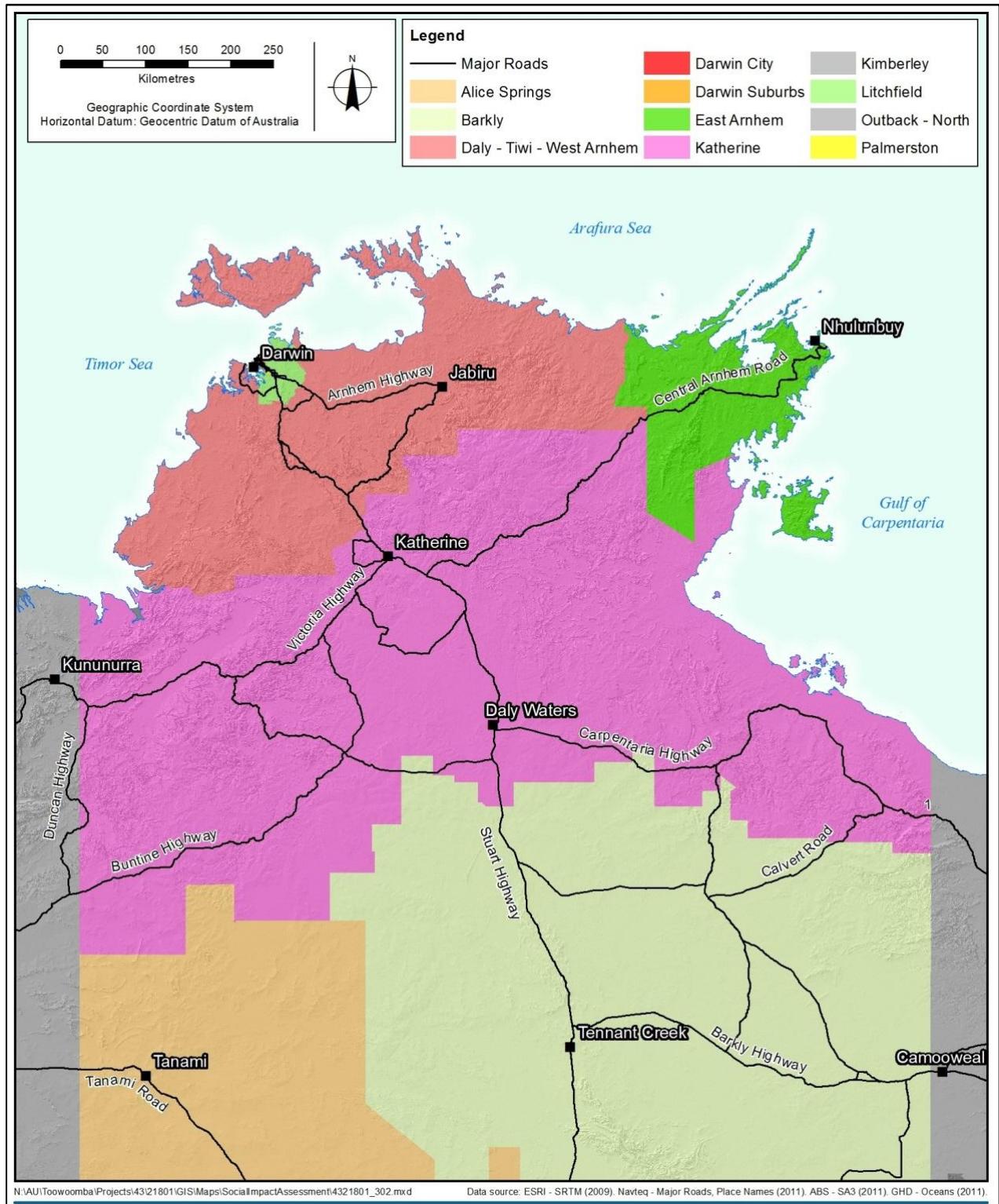


Figure 2 Regional Study Area



1.6 Social Impact Management Plan Methodology

The SIMP is based on rigorous and methodical foundations of the SIA process (SIA Report – Appendix F). The SIA process identified and prioritised impacts and identified a set of preliminary mitigations through consultation with the NT Government, local government, communities and service providers.

Specific engagement about the strategies identified in the SIMP was undertaken in the following:

- ▶ Vista Gold's technical teams, which included ongoing discussions to identify mitigation strategies and possible commitments; and
- ▶ Workshops and consultations with local government, key representative groups from the Katherine and regional community and service providers.

This SIMP is based on the outcomes of consultation undertaken to date and described in the Public Consultation Report (Appendix E). The SIMP is developed for a 10 year rolling period and should be reviewed on an annual basis.

1.7 Stakeholder Engagement for the SIA and SIMP

Table 1 outlines specific SIA activities and timing.

Table 1 Summary of SIA Activities

SIA Stage	Step	Month*	Task
Scoping	1	March 2011	SIA scope and methodology development Literature review of social impacts of mining Review key Project background information including the previous Mt Todd Gold Project Draft EIS in 1993
	2	April 2011	Identification of the Local, Regional and Wider Study Area
Baseline	3	April 2011	Community Information Stand at Katherine Show Conduct Community Views Survey (Katherine Show) Interviews with key Project stakeholders including Health Providers, Police and relevant NT Agencies and NGOs
	4	May/June 2011	Follow-up discussions with key Stakeholders
Identify impacts and opportunities	5	September 2011	Community Information Sessions Katherine and Pine Creek Community Views Survey – Katherine Shopping Centre Interviews/Focus Groups with key Stakeholders including accommodation providers, RAAF Base Tindal, and Environment Council NT.
	6	September 2011	Workshop with Mt Todd Rehabilitation Reference Group Workshop with the Katherine Chamber of Commerce
Develop mitigation, management and enhancement strategies	7	January 2012	Develop housing and accommodation strategy
	8	May 2012	Finalise Draft SIA Report and proposed SIMP.
	9	December 2012	Update Draft SIA Report to incorporate 2011 census data and reflect changes to the Project.

* These dates represent the starting time for each activity.



EIS consultation commenced in early 2011 and was timed to coincide with key EIS milestones. Stages 1 and 2 below have been completed. Stage 3 and 4 will be undertaken following the release of the Draft EIS for public comment:

- ▶ Stage 1: EIS commencement including the release of the Notice of Intent (NOI)
- ▶ Stage 2: Release of the draft Guidelines for the Mt Todd Gold Project for Public Comment
- ▶ Stage 3: Release of the Draft EIS
- ▶ Stage 4: Evaluation and EIS finalisation.

The sequencing of consultation activities is shown in Table 2.

Table 2 Sequencing of Consultation Activities

	Q1 2011	Q1 2011 – Q2 2013	Q2 2013 – Q3 2013	Q3 2013 – Q4 2013
STAGE	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Consultation Activities	Commencement of EIS process	Draft EIS Development	Public Exhibition of Draft EIS	Evaluation and EIS Conclusion
Ongoing stakeholder consultation and monitoring of feedback				
Regulatory Deliverables		Prepare Stakeholder Consultation Report and Social Impact Management Plan for Draft EIS	Prepare Community Feedback Report for Supplementary Report to the Draft EIS	



1.7.1 Structure of the SIMP

The SIMP includes the following:

- ▶ Introduction, purpose and methodology;
- ▶ Project summary;
- ▶ Summary of social impacts identified through the SIA process;
- ▶ Impact management strategies, including stakeholder engagement;
- ▶ Action plans for key impact areas; and
- ▶ Mechanisms for SIMP implementation, monitoring and reporting.



2. Project Summary

The Project is anticipated to run for 19 years with the construction workforce peaking at approximately 450 and an operational workforce of up to 350 personnel. Vista Gold has indicated a preference for a residential work force, and has a strong desire for their employment demographics to not consist of Fly-in / Fly-out (FIFO) or Drive-in / Drive-out (DIDO) employees. This objective was supported by Project Stakeholders in community consultation undertaken between April 2011 and September 2011.

2.1 Construction Phase

A contractor will be appointed to manage the construction phase. The appointed construction contractor will be responsible for determining the final workforce arrangement. For the purposes of this SIA the following construction workforce profile has been used for social impact assessment. This profile is based on current industry practice:

- ▶ The construction workforce will consist of a maximum of 450 and minimum of 270 workers;
- ▶ The majority of the construction workforce will be non-resident workers employed by the contractor. Whilst Vista Gold is committed to maximising local employment the temporary nature of the construction workforce means that it is likely that the majority of the workforce will be from outside Katherine. There is the potential for local people to access employment as part of the Project, but the majority of employment would be with the nominated contractor;
- ▶ Construction works will be normally carried out in 12 hour rotating shifts from approximately 6am to 6pm, 7 days per week;
- ▶ Night works may be required (for example for concrete pours during hotter months, or to catch up on schedule delays); and
- ▶ Administration and management personnel will work a standard 5 x 2 day roster.

The range of skills required during construction will include the following:

- ▶ Construction Manager;
- ▶ Specialist Managers;
- ▶ Specialist engineers;
- ▶ Tradespersons (e.g. carpenters, electricians, boiler makers);
- ▶ Civil construction;
- ▶ Machine operators;
- ▶ Mobile plant operators;
- ▶ Labourers; and
- ▶ Health, safety and environment personnel.

2.1.1 Construction Accommodation

Accommodation options to support the operational workforce were considered by Vista Gold and were considered in developing the following construction workforce accommodation strategy:



- ▶ Workers will be housed in a construction camp located within 25 km of the Project Site. The location of this camp has not yet been decided. Vista Gold, or its contractor, will be responsible for providing the contracted workers accommodation. Workers will not be allowed to make their own arrangements.
- ▶ A small number of Vista Gold managerial and administration staff may choose to reside locally in the Katherine area;
- ▶ Vista Gold employees (managerial) and other support workers not employed directly by the contractor may use other forms of temporary accommodation available in Katherine and Pine Creek (such as caravan parks, holiday rentals and motels). This is expected to be on a periodic and temporary basis; and
- ▶ Workers will be present on the Project site while on roster, and will return to the construction camp when off roster. Workers are also likely to visit Katherine and Pine Creek, on a limited basis, for shopping and entertainment purposes.

2.1.2 Recruitment

Construction will be undertaken by one or more contractors who will be responsible for:

- ▶ Recruitment of the workforce; and
- ▶ Training, including apprenticeships and trade certificates as well as job specific requirements such as health and safety.

Due to the limited duration, the construction workforce is likely to be engaged on a FIFO or DIDO basis. Vista Gold will specify a preference for local and regional recruitment which will ultimately depend on the availability of workers locally and regionally with appropriate skills as well as the contractor's existing workforce.

2.1.3 Transport

Transportation arrangements for the workforce will be the responsibility of the selected contractor(s). It is expected that:

- ▶ Workers residing within driving distance will drive to site at the start of each roster;
- ▶ Workers residing beyond driving distance, will fly to Darwin at the start of each roster period and will be transported to site by bus; and
- ▶ Workers residing in the construction camp will be transported to the site by bus for each shift.

There will be a small number of specialist trades people who will likely travel in their own vehicles to and from the mine site to bring specialist equipment. Similarly, a small number of managerial and advisory staff making occasional short-term visits to the site will travel to site in their own or rented vehicles.

2.2 Estimated Operation Workforce

An operational workforce of approximately 350 full-time workers is expected to be required. Vista Gold is committed to this workforce living and residing locally rather than operating on a FIFO or DIDO basis.

The following operational workforce profile has been developed based on information provided by Vista Gold for impact assessment purposes:



- ▶ The required workforce of 350 full-time workers is estimated to comprise approximately 60 workers who are currently permanent residents of the local area and approximately 290 workers will need to be sourced from elsewhere;
- ▶ The life of mine operations is estimated to be 13 years followed by subsequent closure and rehabilitation activities; and
- ▶ Operation workforce numbers are expected to increase to a peak of 350 over the life of the mine and will then be scaled down significantly to include only workers associated with closure and rehabilitation.

Operational staff will include the following skills:

- ▶ General Manager and executive assistant;
- ▶ Commercial Manager, accountants and administrative assistants;
- ▶ Manager of mining and mining superintendents;
- ▶ Mining engineers, mine planners, geologists and surveyors;
- ▶ Manager of Plant Process, metallurgical superintendents, production superintendents and plant staff;
- ▶ Laboratory superintendent and lab staff;
- ▶ Maintenance Manager, Mechanical engineers and plant maintenance staff;
- ▶ Electrical Superintendents, electricians, instrumentation technicians;
- ▶ Truck drivers;
- ▶ Stationary plant operators;
- ▶ Mobile plant operators;
- ▶ Mining labourers; and
- ▶ Other specialist support roles including health, safety and environment personnel and Human Resources.

2.2.1 Operational Staff Accommodation

Vista Gold has undertaken a separate study into accommodation options to support the operational workforce. The results of this study have informed the operational workforce accommodation strategy assessed in this report.

Vista Gold has indicated their desire for a residential work force but that they do not wish to own houses. They prefer their operational staff to not include FIFO or DIDO workers and would prefer their people (and therefore housing) to be integrated into the community, with an emphasis on making the accommodation both attractive and comfortable. To support this intent, a number of options for accommodation were investigated including either a fully residential or fully FIFO / DIDO option. The final recommendation of a 'hybrid' accommodation solution consists of:

- ▶ 70 workers at the construction camp. This would accommodate mainly FIFO / DIDO personnel and provide an ability to quickly increase capacity and house overflow peak period personnel to meet mining needs or maintenance shut downs;



- ▶ A combination of both new and existing housing to support approximately 120 workers (family households with or without children). Workers would be accommodated in a mixture of:
 - New three and four bedroom houses located on existing vacant Katherine and region land;
 - Existing available (renovated if required) houses located in the Katherine and region land. Subject to real estate availability at the time of arrangement, a small contained development on Katherine land
- ▶ 100 workers located in a Katherine based single person accommodation facility

This would provide for the 290 additional Vista Gold employees that would require accommodation.

The ultimate accommodation strategy adopted will be developed following further discussions with local and territory government agencies. For the Closure and Rehabilitation stage, accommodation for the 40 workers (plus catering, cleaning, facilities management staff) would be accommodated in either the previous FIFO / DIDO accommodation, or in the Katherine single-person accommodation facility.

This 'hybrid' solution has been used as the basis for impact assessment in this report.

2.2.2 Recruitment

Vista Gold has specified a preference for a local residential workforce. The extent to which that this can be achieved will depend on the availability of workers with appropriate skills and their desire to live on a permanent basis in the Katherine area.

Vista Gold is aware of the local and regional recruitment/employment agencies and will consult with them in facilitating local and regional employment opportunities.

Vista Gold will develop appropriate human resource policies for the residential workforce, local and regional employment opportunities, equal opportunity and Aboriginal and Torres Strait Islander employment issues.

Recruitment will commence approximately 6 months before start of operations, and will be ongoing during operations as the workforce continues to scale up and down to replace workers who retire or resign.

Indigenous Employment Opportunities

- ▶ Vista Gold will develop an Indigenous employment strategy.
- ▶ Vista Gold has committed to work with the Jawoyn Association to engage as many Jawoyn as possible in the mine workforce.

2.2.3 Transport

Vista Gold will negotiate with an appropriate contractor to supply transportation services to the Project however it is expected that:

- ▶ Most of the workforce residing in Katherine will be bussed to site at the start of each shift. A small number will use private vehicles; and
- ▶ Workers residing further afield will travel to Katherine at the start of each rostered period by driving personal vehicles to Katherine.



There will be a small number of specialist trades people who will be required to travel in their own vehicles to and from the mine site. Similarly, a small number of managerial and advisory staff making occasional short-term visits to the site will travel to site in their own or rented vehicles.

2.2.4 Training Opportunities

The provision of training opportunities during construction will be the responsibility of the selected construction contractor(s).

For operational staff, Vista Gold will develop appropriate training and employment policies and targets. The training will be done in concert with both local and Territory government's agencies when possible.

2.3 Potential Contribution to Regional Development

Key potential regional development contributions of the Project will include opportunities for local businesses to service the Project by provision of goods and services. These opportunities will drive new employment, apprenticeships and training (long term career pathways) by which the local businesses will be able to attract and retain staff and people within the local community, leading to more sustainable businesses and communities.

2.4 Summary of Social Values

Refer to the Social Impact Assessment Report (Appendix F) for a summary of social values.

2.5 Key Social Issues in the Project Area

Key social issues identified during stakeholder consultations are summarised in Table 3. The Public Consultation Report (Appendix E) provides further detail on these.



Table 3 Potential Major Issues Identified During Public Consultation

Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community views survey
Workforce						
Concerns that Project will exacerbate existing skills shortfalls	✓	✓	✓	✓		
Potential for anti-social behaviours of workforce	✓		✓	✓	✓	
Difficulties stemming from typical mining rosters	✓	✓	✓	✓	✓	✓
Concerns regarding behaviour and integration of workforce	✓	✓	✓	✓	✓	✓
Concerns that local businesses will lose staff to Project	✓	✓	✓			✓
Health and well-being of workers				✓		✓
Lack of accommodation and housing	✓	✓	✓	✓	✓	✓
Need for additional housing to be built to accommodate workforce	✓	✓	✓	✓	✓	✓
Lack of land in Pine Creek		✓				
Preference for workers camp to be on or near Project Site	✓	✓	✓	✓	✓	✓
Concerns regarding Project driving up land and house prices	✓	✓	✓			✓
Opportunities for local business development	✓	✓	✓	✓	✓	✓
Concerns regarding the 'reliability' of the Project	✓	✓	✓	✓	✓	✓
Preference for Vista Gold to work with existing business in supply to the mine	✓	✓	✓	✓	✓	✓
Positive employment opportunities for local people	✓	✓	✓	✓	✓	✓
Concerns regarding regional/national labour skill shortages	✓	✓	✓			
Desire for more families to work at the mine	✓	✓	✓	✓	✓	✓
Training/ apprenticeship opportunities for local people, particularly youth (community capacity building)	✓	✓	✓	✓	✓	✓
Impact of mining rosters on community and family life	✓	✓	✓	✓	✓	
Use local training and traineeship programs and providers			✓	✓		✓
Concerns that existing health care services are stretched	✓		✓	✓	✓	
Would like to see Project investing in local community	✓	✓	✓	✓	✓	✓
Exacerbation of existing shortfalls (retail, entertainment, doctors etc.)	✓	✓	✓	✓	✓	



Major Themes and Issues	COMMUNITY CONSULTATION			GOVERNMENT BRIEFINGS AND MEETINGS		
	Katherine Community Information Sessions	Pine Creek Community Information Sessions	Key Stakeholders	Local Government	NT Government	Community views survey
Community Health, Safety and Well-being						
Establishing trust in the community is important	✓	✓	✓	✓	✓	
Alcohol issues are a big concern			✓	✓	✓	
Need for mine workers to integrate into the community	✓	✓	✓	✓	✓	✓
Concerns regarding environmental management of tailings dump and heap leach pad			✓	✓	✓	✓
Need for environmental monitoring and reporting of monitoring to community			✓	✓	✓	
Indigenous aspirations, values and resources						
Provision for Indigenous Employment Opportunities	✓	✓	✓	✓	✓	✓
Need for cultural awareness training on Project workforce	✓		✓			
Use of Indigenous mentors		✓	✓			
Traffic and Transport						
Condition of the Stuart Highway		✓	✓	✓	✓	
Increase in traffic on Edith falls road		✓	✓	✓	✓	
Transport of dangerous goods between Project and Darwin			✓		✓	
Environmental risks from transport such as spills etc.	✓	✓	✓	✓	✓	
Post-mining						
Loss of employment and economic stimulus			✓			✓



3. Social Impact Mitigations and Management

3.1 Social Impacts in the Project Area

Table 4 presents a summary of the potential social impacts associated with the Project as identified through the SIA. For detailed SIA refer the Social Impact Assessment Report (EIS Appendix F).

Table 4 Summary of Potential Key Social Impacts and Significance

Impact	Project Phase	Status of Impact	L/C Rating ¹	Impacted Party
Workforce(Requirement, Availability, Sourcing, Shift Management, Cumulative				
Lack of social integration of workforce	Construction and operation	Negative	Low	Local community
Increased incidence of anti-social behaviour arising	Construction and operation	Negative	Low	Local community
Exacerbation of existing labour and skills shortfalls	Construction and operation	Negative	Low	Local community
Cross-over employment impacts	Construction and operation	Negative	Low	Local community
Decline in worker well-being associated with a FIFO or DIDO workforce	Construction and operation	Negative	Medium	Local community
Increase in worker life-style opportunities associated with a FIFO workforce	Construction and operation	Positive	Medium	Local community
Fatigue related risk of accidents – related issues associated with worker travel between place of work and home	Construction and operation	Positive	Medium	Local community
Housing and accommodation				
Increase in demand for short-term accommodation	Construction and operation	Negative	Medium	Local community
Increase in demand for long-term accommodation	Construction and operation	Positive and negative	Medium	Local community
Economic and employment (Direct and indirect)				
Increase in business opportunities and regional spend	Construction and operation	Positive	High	Local and regional businesses
Local inflationary impacts	Construction and operation	Positive and negative	Low	Local community
Increased employment opportunities	Construction and operation	Positive	High	Local community

¹ Likelihood/Consequence Rating



Impact	Project Phase	Status of Impact	L/C Rating	Impacted Party
Traffic and Transport				
Increased traffic and transport on Stuart Highway	Construction and operation	Negative	Low	Road users
Increased risk of spill of hazardous substances	Construction and operation	Negative	Low	Local and regional community
Community Infrastructure and Services				
Increased demand for community infrastructure and utilities leading to local/regional shortfalls	Construction and operation	Negative and Positive	Low	Local community
Exacerbation of existing health shortfalls	Construction and operation	Negative	Low	Local community
Impacts on Community Values				
Benefits to local/regional and national community from rehabilitation of existing contaminated mine site	Construction and operation	Positive	Medium	Local community
Decrease in community, health, safety and wellbeing (whether real or perceived)	Construction and operation	Negative	Low	Local community
Increase in community concerns regarding water quality and risk of environmental contamination	Construction and operation	Negative	Low	Local community
Negative impacts on vulnerable groups such as women and Indigenous groups	Construction and operation	Negative	Medium	Local community Vulnerable groups
Land Use and Property Impacts				
Impacts on downstream and near neighbours	Construction and operation	Negative	Low	Near neighbours
Indigenous resources, values and aspirations				
Indigenous employment and business opportunities	Construction and operation	Positive	High	Jawoyn Association Indigenous groups and individuals
Potential for exacerbation of existing community conflict	Construction and operation	Negative	Medium	Indigenous groups and local community
Traditional Owner cultural heritage and resources	Construction and operation	Negative	Medium	Indigenous groups and individuals



3.2 Impact Management Strategies

Social impact management strategies to address identified potential social impacts are described below.

3.2.1 Project Design Changes

The social impact assessment has informed Project design decisions in relation to the following matters:

- ▶ Selection of appropriate contractors based on their ability and commitment to the social impact management strategies detailed in this section;
- ▶ Development of the proposed housing and accommodation strategy for the Project including the decision to locate construction work camps away from Katherine and Pine Creek;
- ▶ Development and implementation of Occupational Health and Safety Policies for construction and operation;
- ▶ Development of a Construction Environmental Management Plan to address noise and dust and other potential environmental impacts associated with construction and operations;
- ▶ Development of a Traffic Management Plan to address:
 - Potential safety issues associated with construction related traffic
 - Management of traffic to avoid delays to existing traffic
- ▶ Preparation of a Site Safety Plan that will include preventative measures for a range of on and off-site incidents that might impact on community health and safety; and
- ▶ Provision of an Emergency Response Plan that will include measures to address any emergency incidents that might involve members of the public.

The following section provides additional information on proposed social impact management and mitigations strategies to be implemented by Vista Gold or its contractors.

3.2.2 Workforce Management Strategy

A Workforce management strategy should be developed for both construction and operations phases of the Project. It should include:

- ▶ Workforce sourcing;
- ▶ A workforce Code of Conduct, incorporating behavioural standards, linked to employee contract conditions. Clear consequences for workers not adhering to behavioural standards will be set out, including dismissal for serious non-conformances or repeated offences;
- ▶ Workforce health, safety and wellbeing policies including strategies to manage worker fatigue associated with travel and well-being of workers within accommodation camps;
- ▶ Adopting an industry Code of Conduct as part of regular tool-box meetings for the construction and operation workforce where workers are reminded of the Code and consequences of not meeting it;
- ▶ Employee induction (covering aspects of worker behaviour, company expectations, community perceptions of behaviour etc.); and
- ▶ Occupational health and safety for employees, contractors and sub-contractors.



3.2.3 Housing and Accommodation

The Project housing and accommodation strategy will be further developed in consultation with the NT Government and key regional stakeholders such as the Local Council.

3.2.4 Employment, education and training

- ▶ Develop and implement an Industry Participation Plan in accordance with the requirements of the Northern Territory Government for major projects;
- ▶ This plan will be based on preferentially sourcing people, goods and services from within the Katherine Region and the Northern Territory to build business, industry and community capability;
- ▶ Use local (Katherine Region) businesses to fill contract positions (e.g. catering, cleaning, fuel supply, light vehicle maintenance etc.) provided contractors are competitive and appropriately skilled; and
- ▶ Work with local training providers to ensure that local training programs will give unskilled people the skills and training necessary to gain employment in the Project.

3.2.5 Community and Stakeholder Engagement

The following strategies relating to community and stakeholder engagement should be undertaken:

- ▶ Develop a Community and Stakeholder Engagement Plan detailing mechanisms for ongoing consultation and feedback on the Project including establishing a community reference group;
- ▶ Continue to work with key Project stakeholders including the NT Government, Katherine Town Council, Victoria Daly Shire Council and Roper Gulf Shire Council, the Jawoyn Association and others as required to minimise social issues;
- ▶ Continue to develop and operate the Mt Todd Project Website and toll-free number to provide a point of contact for interested members of the community to obtain information on the Project;
- ▶ Establish an incident/action management system to provide a transparent and equitable mechanism for responding to any community suggestions or concerns; and
- ▶ Establish a Community and Stakeholder Relations Role for the Project prior to Project construction.

3.2.6 Vista Gold Sponsorship Program

- ▶ Establish a community sponsorship fund to contribute to community development initiatives. This should include the development of criteria for sponsorship and a clear and transparent selection process advertised through the Project web page.

3.2.7 Near Neighbour Program

- ▶ Develop a 'Near Neighbour' program to be implemented with adjacent and downstream landholders. This will be a regular system of contact with landholders to monitor any changes on properties and the road network and implement mitigation measures as agreed. Landholders will have a single point of contact with a structured communication system in place to ensure a quick and efficient response to any issues that may arise. Mitigation measures will be implemented within agreed timeframes; and
- ▶ The 'Near Neighbour' program will be developed in consultation with landholders, identifying the respective roles and responsibilities of the Proponent and landholders.



3.2.8 Industry Participation Plan

- ▶ Prepare an Industry Participation Plan for the Project. This plan will be prepared consistent with the template provided by the Northern Territory Government and guidance from the Northern Territory Industry Capability Network.
- ▶ The plan should include the following matters:-
 - How services, suppliers and labour will be utilised;
 - How the Project will enhance local business and industry capability;
 - What the regional economic benefits will be;
 - Opportunities for Indigenous participation;
 - Communication with local industry; and
 - How success will be reported on.

3.2.9 Jawoyn Partnership Agreement

- ▶ As part of the partnership agreement with the Jawoyn Association continue to work with the Jawoyn Traditional Owners towards the achievement of economic and employment aspirations of the Jawoyn people; and
- ▶ Establish clear mechanisms for ongoing collaboration, communication and reporting between Vista Gold and the Jawoyn Association including mechanisms for any dispute resolution.

3.3 Summary of Impacts and Key Mitigation Strategies

To understand the linkages between the various potential social impacts identified and the mitigation strategies developed to address those impacts, an ‘impact and mitigations matrix’ has been developed (Table 5). The purpose of this matrix is to illustrate how impacts will be addressed using a number of different mitigation strategies.



Table 5 Potential Impacts and Key Mitigations Matrix

Aspect	Potential impacts and opportunities	Mitigation and Management Strategies									
		Project Design	Community and Stakeholder Engagement	Workforce Management Strategy	Housing and Accommodation Strategy	Industry Participation Plan	Vista Gold Sponsorship	EIS Technical Environmental Management	Jawoyn Partnership Agreement	Monitoring Program	Near Neighbour Program
Workforce	Lack of social integration of workforce		√	√	√		√			√	
	Increased incidence of anti-social behaviour		√	√	√		√			√	
	Exacerbation of existing labour and skills shortages		√	√		√				√	
	Cross-over employment impacts	√					√			√	
	Decline in worker well-being	√		√	√					√	
	Fatigue-related impacts associated with worker travel			√				√		√	
Housing and accommodation	Increase in demand for short-term accommodation ²	√	√		√					√	
	Increase in demand for long-term accommodation	√		√	√					√	
	Reduction in affordability of rental housing	√		√	√					√	
Economic and Employment	Increase in business opportunities and local/regional spend	√			√	√				√	
	Potential for local inflationary impacts ³						√			√	
	Reduced focus on traditional customer base			√			√			√	
	Increased employment opportunities	√					√			√	
Community infrastructure and services	Increased demand for community infrastructure and utilities leading to local/regional shortfalls	√			√			√		√	
	Exacerbation of existing health shortfalls			√	√			√		√	

² Only negative elements assessed

³ Positive aspects of this impact are considered under increased regional/local spend



Aspect	Potential impacts and opportunities	Mitigation and Management Strategies									
		Project Design	Community and Stakeholder Engagement	Workforce Management Strategy	Housing and Accommodation Strategy	Industry Participation Plan	Vista Gold Sponsorship	EIS Technical Environmental Management	Jawoyn Partnership Agreement	Monitoring Program	Near Neighbour Program
Community health, safety and wellbeing	Benefits to local/region and national community from rehabilitation of existing mine site		✓					✓		✓	
	Decrease in community health, safety and wellbeing (whether real or perceived)	✓	✓		✓			✓		✓	
	Negative impacts on vulnerable groups within community		✓	✓	✓					✓	
	Increase in community concerns regarding water quality and risk of environmental contamination		✓	✓				✓		✓	
Property and land use impacts	Negative impacts arising from a decrease in use and enjoyment of land										✓
Indigenous resources, values and aspirations	Indigenous employment and business opportunities		✓						✓	✓	
	Potential for exacerbation of existing community conflicts		✓						✓	✓	
	Traditional Owner cultural heritage and resources									✓	
Traffic and Transport	Increased traffic and transport on Stuart Highway									✓	
	Increased risk of spill of hazardous substances									✓	



4. Action Plans

Based on the impact mitigations and commitments outlined in Chapter 3, specific action plans have been developed in this SIMP. The action plans include specific actions to be undertaken to manage the impacts, timing of actions, performance indicators and stakeholders involved in the management of the actions. The action plans have been prepared for the following social impact mitigation themes:

- ▶ Community Values and Change;
- ▶ Local Industry Participation, Employment and Training;
- ▶ Housing and Accommodation;
- ▶ EIS Management Plan (Roads, Traffic and Safety);
- ▶ Workforce Management Strategy;
- ▶ Near Neighbour Program; and
- ▶ Social Infrastructure and Services.

4.1.1 Community Values and Change

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Establish a community and stakeholder relations role for the Project or assign the responsibility for this task to an existing role	Current – Ongoing	Establishment of role	NT Government Key stakeholder groups Local Council
Establish 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	Current – Ongoing	Establishment of mechanism	NT Government Key Stakeholder groups Local Council
Develop a community and stakeholder engagement plan for keeping the community informed regarding the project and providing appropriate feedback and consultation	Current – Ongoing	Community and stakeholder engagement plan in place	NT Government Local Council Local and regional community
Establish an incident/action register for tracking and appropriately responding to any community issues raised	Ongoing	Number of valid contacts made	Local community



4.1.2 Local Industry Participation, Employment and Training Action Plan

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Prepare an industry participation plan for the Project consistent with the NT Government Template	Q4 2013	Local employment plan and training plan in place No. and type of employment opportunities available	NT Government Local employment agencies Indigenous organisations
Work with local training providers to ensure that local training programs will give unskilled people opportunity to gain employment in the Project	Ongoing	Local employment plan and training plan in place	Local employment agencies including Indigenous employment agencies

4.1.3 Housing and Accommodation

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Further develop the preferred housing and accommodation strategy with key stakeholders	Current – Ongoing	Final housing and accommodation strategy	NT Government Local Council

4.1.4 EIS Management Plans (Traffic, Emergency Response and Site Safety)

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Develop traffic management plans for construction and operation	Q4 2013	Traffic management plans in place prior to construction and operations	NT Government
Develop Site Safety Management Plan	Q4 2013	Site safety management plan in place	NT Government

4.1.5 Workforce Management Strategy

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Develop an overall workforce management strategy including workforce sources, management, health and wellbeing and appropriate behaviour	Q4 2013	Workforce Management Strategy and other workforce policies in place	NT Government



4.1.6 Near Neighbour Program

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Develop and implement a near neighbour program with adjacent and downstream landholders to maintain a regular system of contact with landholders to monitor any concerns or issues that might arise	Q4 2013	Near neighbour program developed and implemented Communications mechanism established with contact details for all near neighbours Complaints and responses	Landholders Contractors Local council

4.1.7 Indigenous resources, values and aspirations

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Continue to work in partnership with the Jawoyn Association under the partnership agreement	Ongoing	Implementation of Jawoyn Partnership Agreement	Jawoyn Association
Establish clear mechanisms for ongoing consultation and communication with Indigenous groups potentially affected by the Project	Current and ongoing	Indigenous consultation strategy developed as part of the broader public consultation and engagement strategy	Indigenous groups
Implement and monitor a Cultural Heritage Management Plan	Ongoing	Monitoring and implementation of Cultural Heritage Management Plan	Traditional Owners

4.1.8 Social Infrastructure and Services Management

Actions	Timeframe	Performance Indicators	Stakeholders/Partners
Emergency Response Plan developed which will include provision of onsite paramedic personnel's, ambulance, fire fighting systems and equipment, induction programs for all users of the site, security services and Police presence.	Current – ongoing through the life of this SIMP	Additional demands placed on the existing emergency response systems in the region	NT Government Emergency Services
Develop and implement a Vista Gold Sponsorship program	Current - ongoing	No. of community initiatives funded Value of the community development fund	Local community organisations



5. SIMP Implementation, Monitoring and Reporting

5.1 SIMP Implementation

To ensure that the Project is delivered in line with the commitments in the EIS, an overall Project Commitments Register will be developed and maintained, which will form the basis of monitoring for compliance with the EIS.

The various impact management initiatives detailed in the SIMP will be led by Vista Gold in partnership and collaboration with various partners as outlined in the management strategies.

The SIMP should be reviewed on an annual basis, with a rolling life of 10 years. The annual reviews should be based on stakeholder engagement and feedback enabled through the various stakeholder engagement and reporting processes.

5.2 Monitoring and Reporting

A monitoring and reporting mechanism is critical to ensuring that the social impacts are identified and measured and the mitigations are implemented. A Monitoring Program should be developed in consultation with the key stakeholders during the finalisation of the SIMP. The Action Plans outline preliminary performance and monitoring indicators for each of the mitigation strategies.

The key objectives of the monitoring program will be to demonstrate:

- ▶ Compliance with the EIS and SIMP commitments;
- ▶ Track the identified impacts and the delivery of their mitigation strategies;
- ▶ Identify new impacts arising from changing conditions and develop responses; and
- ▶ Enable regular stakeholder contact and feedback.

To facilitate the monitoring process various reporting mechanisms should be put in place. The reporting mechanisms include the following:

- ▶ As part of being open and transparent as well as accountable within the community, a quarterly community newsletter will be prepared and distributed to the community and stakeholders. In addition to reporting on activities at the mine and upcoming event it will also provide a snapshot of the key performance indicators as they relate to mine operations with the intention of providing up-to-date, realistic information on forecasts for mining operations, workforce (including contractors) and project changes;
- ▶ Internal reporting within Vista Gold's – Annual Corporate Reporting; and
- ▶ Internal reporting within Vista Gold – including monthly reporting on the grievance and dispute resolution mechanism.

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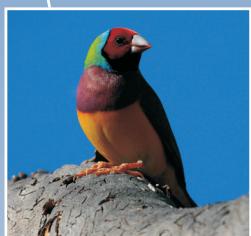
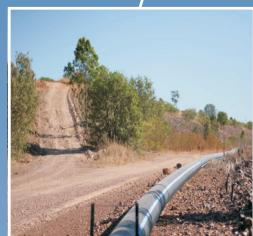
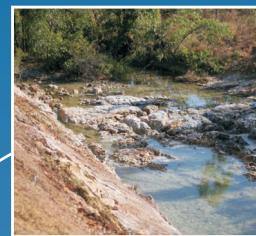
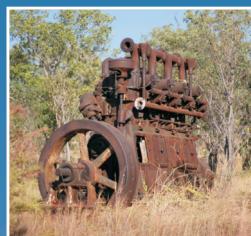
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1	N Dommissie S Beattie M Lander	K Fitzpatrick		I McCardle		05/06/13



APPENDIX G

Climate Change Assessment



CLIENTS | PEOPLE | PERFORMANCE

Vista Gold Australia Pty Ltd

**Mt Todd Gold Project
Climate Change Assessment**

May 2013





This Climate Change Assessment (“Report”):

1. *has been prepared by GHD Pty Ltd (“GHD”) for Vista Gold Australia Pty Ltd (“Vista Gold”);*
2. *may only be used and relied on by Vista Gold;*
3. *must not be copied to, used by, or relied on by any person other than Vista Gold without the prior written consent of GHD;*
4. *may only be used for the purpose of identifying potential climate change impacts in relation to the Mt Todd Gold Project (and must not be used for any other purpose).*

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Vista Gold arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- *were limited to those specifically detailed in section 1.0;*
- *did not include a site-specific climate modeling exercise, or consultation with the project design team.*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report (“Assumptions”), including (but not limited to) those detailed in Section 3.9.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation and may be relied on for 6 months, after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.



Contents

Summary and Recommendations	i
1. Introduction	1
1.1 Project Location	1
1.2 Project Overview	3
2. Legislative Framework	5
3. Methods	6
3.1 Weather Station Selection	6
3.2 Data Sources	7
3.3 Greenhouse Gas Emission Scenarios	7
3.4 Baseline Observational Data	8
3.5 Global Climate Models	8
3.6 Study Parameters	8
3.7 Potential Climate Related Impacts	8
4. Results	11
4.1 Temperature	11
4.2 Extreme Temperature	12
4.3 Rainfall	12
4.4 Potential Evaporation	13
4.5 Wind speed	13
4.6 Tropical Cyclones	13
4.7 Relative Humidity	13
4.8 Solar Radiation	14
4.9 Summary of Potential Climate Risks to the Project	14
4.10 Limitations and Uncertainty	15
5. References	17

Table Index

Table 1	Regional Variability, Darwin and Katherine	6
Table 2	Components of Mine Operations Influenced by Climatic Conditions and Relevance to Mt Todd System Components	9



Table 3	Projected Average Annual Mean Temperature Change (°C) (values in brackets correspond with the 10 th and 90 th percentile results)	11
Table 4	Projected Average Duration of Extreme Temperatures (values in brackets correspond with the 10 th and 90 th percentile results)	12
Table 5	Projected Average Annual Mean Rainfall Change (mm/yr) (values in brackets correspond with the 10 th and 90 th percentile results)	12
Table 6	Projected Average Change in Potential Evaporation % (values in brackets correspond with the 10 th and 90 th percentile results)	13
Table 7	Projected Annual Average Mean Wind Speed Change (km/h) (values in brackets correspond with the 10 th and 90 th percentile results)	13
Table 8	Projected Annual Average Relative Humidity (%) (values in brackets correspond with the 10 th and 90 th percentile results)	14
Table 9	Projected Average Change in Annual Solar Radiation % (values in brackets correspond with the 10 th and 90 th percentile results)	14
Table 10	Summary of Potential Climate Risks to the Mt Todd Project	14

Figure Index

Figure 1	Location of Project – regional context	2
Figure 2	Greenhouse Gas Emissions Scenarios from 2000 through 2100 in the Absence of Additional Climate Policies (IPCC 2000)	7



Summary and Recommendations

This climate change assessment was undertaken by GHD as part of the Environmental Impact Assessment for the proposed re-establishment and operation of the Mt Todd Gold Mine.

The study aims to assess changes in projected climate patterns for the region, asset vulnerabilities and typical control measures for adaptation over the proposed operating life of the mine.

A review of Commonwealth Scientific and Industrial Research Organisation's (CSIRO's) Climate Change in Australia Technical Report 2007 highlighted that the site will possibly be vulnerable to average temperature increases and extreme precipitation events. Other climate conditions such as total annual rainfall, wind speed, humidity and evaporation rates are projected to remain relatively constant over 20 and 50 year return periods.

Based on the results of the study, it is recommended that special consideration be given to the risks of flash flooding. In particular, the following aspects of the design should be reviewed:

- ▶ the design flood level criteria for the mine and design outcomes, especially with regard to roads, stockpiles, ponds, open pits, water treatment and storage facilities; and
- ▶ resilience of the overall site water balance to wet and dry periods.

It is recommended that a standard weather station be maintained at the Mt Todd site to enable systematic monitoring of conditions and to allow future comparisons with climate projections.



1. Introduction

Vista Gold Australia Pty Ltd (Vista Gold) proposes to re-establish and operate the Mt Todd Gold Mine. A climate change assessment has been prepared as part of the planning process for the Project. It addresses the requirements of Sections 6.4 (Climate) and 10.1 (Climate Change) of the *Guidelines for the Preparation of an Environmental Impact Statement, Mt Todd Gold Project, Katherine Region NT* (NT EPA (formerly NRETAS) 2011).

The assessment aims to assess changes in projected climate patterns for the region over the proposed operating life of the mine. This information will be used to select climate parameters for the final design.

This report includes projections for the following climatic features:

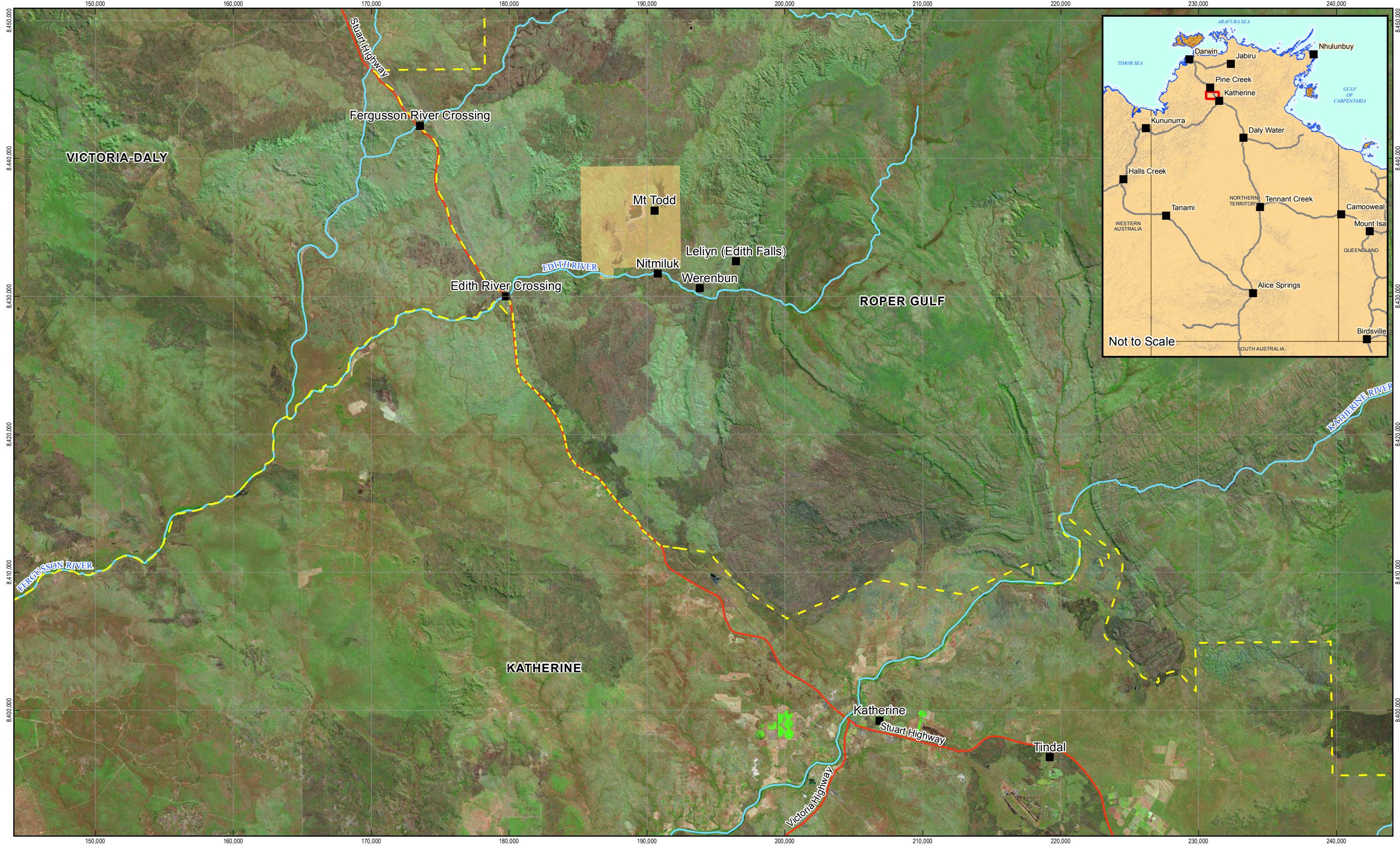
- ▶ temperature change ($^{\circ}\text{C}$);
- ▶ extreme heat – projected number of days above 35°C (days);
- ▶ rainfall change – Annual (%);
- ▶ windspeed (%);
- ▶ tropical Cyclones (frequency and intensity);
- ▶ relative humidity (%);
- ▶ solar radiation (%); and
- ▶ evaporation increase (%).

Projections were obtained from publicly available data published by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in its *Climate Change in Australia Technical Report 2007* (CSIRO 2007) for the years 2030 and 2070.

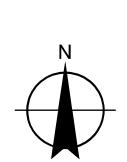
1.1 Project Location

The Mt Todd Gold Mine site is located approximately 55 km north-west of Katherine, and 250 km south of Darwin. Mining and associated operations will primarily occur primarily on mine leases MLN 1070, MLN 1071 and MLN 1127, covering approximately 5,365 hectares (ha).

Figure 1 shows the location of the mine site.



1:250,000 (at A3)
0 2.5 5 7.5 10 Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 53



LEGEND

- Place Names
- Major Roads
- Rivers
- LGA Boundaries
- Mt Todd Mineral Leases



Vista Gold Australia Pty Ltd
Mt Todd Gold Project

Job Number 43-21801
Revision 1
Date 27 May 2013

Location of Project - regional context

Figure 1



1.2 Project Overview

Mining will be an open-pit truck and shovel operation, using large haul trucks, hydraulic shovels and front end loaders to transport materials to the crusher, stockpiles, Run of Mine (ROM) pad and waste dump. Extracted ore, will be processed in an ore processing plant where it will be crushed, milled and then carbon in leach (CIL) leached followed by adsorption, desorption and recovery leading to gold dore (unrefined gold).

Approximately 17.8 million tonnes per annum (Mtpa) of ore will be processed. The CIL tailing will be detoxified and sent to an impoundment from which plant process water will be recycled. Gold dore will be transported for onward secure shipment to a refinery.

The Project, based on current known data, will have a life of around 19 years inclusive of construction, operations and closure. Construction is anticipated to commence in the first quarter of 2014 and take two years, including 6 months pre-production. The mine is scheduled to operate for a further 13 years. Closure and rehabilitation of the mine is expected to take four years.

The key elements of the Project include:

Mining and Mining Infrastructure

- ▶ extension of the existing Batman Pit from its current depth of 114m to approximately 588m (RL -400m) and surface area of 40 hectares (ha) to approximately 137ha;
- ▶ expansion of the existing waste rock dump (WRD) from a height of 24m above ground level to approximately 350m above ground level (RL 470m), and a footprint of 70ha to approximately 217ha. The dump currently contains 16Mt of waste rock and the expansion will provide total capacity of up to 510 Mt;
- ▶ construction of a Run of Mine (ROM) pad and ore stockpile;
- ▶ construction of an Ammonium Nitrate and Fuel Oil (ANFO) Facility;
- ▶ construction of heavy and light vehicle workshop and administration offices, and facilities comprising wash down area, tyre change facility, lube storage facility etc; and
- ▶ construction of haul roads and access roads.

Process Plant and Associated Facilities

- ▶ Ore Processing Plant capable of processing approximately 50,000 tonnes per day (tpd) of ore;
- ▶ processing and / or reclamation of the existing low grade ore (LGO) stockpile and scats stockpile, and construction and processing of new LGO stockpile with a footprint of approximately 47ha;
- ▶ raising the existing tailings storage facility (TSF1) from 16m to approximately 34m above ground level;
- ▶ construction of a new TSF2, approximately 300ha in area and up to 60m high (RL 175m);
- ▶ diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection;
- ▶ rehabilitation of the existing heap leach pad (HLP), if residual HLP material is not processed through the new plant;
- ▶ chemical and reagent storage and handling facility; and
- ▶ process plant workshops, administration offices, control room etc.



Other Infrastructure

- ▶ gas fired Power Station, including re-routing of the existing gas pipeline;
- ▶ anaerobic treatment wetlands, approximately 10ha in area;
- ▶ a 2m high raising of the raw water dam (RWD) and an increase in the area of inundation;
- ▶ construction of saddle dams at the RWD and TSF1;
- ▶ construction of three coffer dams at Retention Pond 1 (RP1) and deepening of RP1;
- ▶ water treatment plant;
- ▶ security gate house;
- ▶ potential re-alignment of access roads;
- ▶ site wide drainage, sediment traps; and
- ▶ modification to existing fuel storage and distribution facility.



2. Legislative Framework

This report is intended to fulfil Vista Gold's duty to provide a climate change assessment to the Northern Territory Environmental Protection Authority (NT EPA) under the Northern Territory *Environmental Assessment Act 1982*. The scope and methods for conducting the assessment are based on the following guidance documents:

- ▶ Northern Territory EPA (formerly NRETAS) 2011 Guidelines for the Preparation of an Environmental Impact Statement, Mt Todd Gold Project, Katherine Region NT.
- ▶ Northern Territory Government, Department of Natural Resources, Environment, the Arts and Sport, May 2010. *NT Environmental Impact Assessment Guide: Greenhouse Gas Emissions and Climate Change*.

The guidance documents cite recent publications published by CSIRO and the Bureau of Meteorology (BoM) as appropriate data sources for a climate change assessment.



3. Methods

This section outlines the types of data and information used in modelling possible global climate change. For the purposes of this report, the explanation is brief. Detailed information on the methodology employed by CSIRO for its climate projections can be found in the CSIRO Technical Report (CSIRO 2007).

3.1 Weather Station Selection

Climate Change projection data are sourced from those available in the CSIRO Australian Major Cities Summaries. The nearest major city to the site is Darwin. The climatic impacts in Darwin will differ slightly from those in the Mt Todd region and a review of historical meteorological data was undertaken to determine similarities or differences of significance.

An assessment of the regional variability of climate impacts was performed to identify a weather station meeting the following criteria:

1. Located near the Project site.
2. Projected climate changes for the weather station included in the CSIRO Technical Report (CSIRO 2007).
3. Representativeness of the selected weather station to the Project Site.

Katherine is the closest long-term weather station to Mt Todd and its climate data can be used for comparison and variability assessment. Katherine is located approximately 55 km south east of the project site. A summary of the variation between the climates of Darwin and the Katherine Aviation Museum weather station, which have similar lengths of records, is provided in Table 1. The variation identified between these two sites is considered acceptable for this level of climate risk assessment.

Table 1 Regional Variability, Darwin and Katherine

Climate Variable	Darwin Statistics	Katherine Statistics	Comments
Mean maximum temperature	32 °C	34 °C	Annual maximum temperatures and monthly maximum temperatures tend to be slightly higher for Katherine.
Mean minimum temperature	23.2 °C	20.3 °C	Mean minimum temperatures are lower at Katherine with cooler seasonal differences
Mean rainfall	1740.2 mm	1143.1 mm	The seasonal pattern of rainfall of the two centres is similar, with majority of rainfall during summer months (wet season). Katherine receives significantly less rainfall than Darwin.
Relative humidity (9am)	71%	66%	Relative humidity is lower at Katherine than at the coastal location of Darwin.
Relative Humidity (3pm)	56%	38%	
Wind speed (9am)	10.9 km/h	4.8 km/h	Wind speed is lower inland at Katherine compared to Darwin and more predominant during winter months (dry season) at Katherine.
Wind speed (3pm)	17.9 km/h	8.8 km/h	

3.2 Data Sources

Baseline climate conditions were obtained from publicly available data including:

- ▶ Bureau of Meteorology, Darwin Airport weather station (site number 014015) humidity record, based on the average at 9 am and 3 pm, years 1941-2012; and
- ▶ Bureau of Meteorology, Katherine Aviation Museum weather station (site number 014903) humidity record, based on the average at 9 am and 3 pm, years 1946-2011.

Projected climate conditions were obtained from CSIRO's Climate Change in Australia Technical Report 2007 (Appendix B City Summaries, Years 2030 and 2070, CSIRO 2007). This is considered the best current available data for this assessment.

3.3 Greenhouse Gas Emission Scenarios

In 2000, the Intergovernmental Panel on Climate Change (IPCC) published a Special Report on Emissions Scenarios (SRES) that described a family of six greenhouse gas emission scenarios to condition global climate models (IPCC 2000). Figure 2 presents the six global greenhouse gas emissions scenarios. The scenarios cover a wide range of the main driving forces of future emissions, from demographic to technological and economic developments. (Throughout this report, the terms 'emissions scenario' and 'sensitivity' are used interchangeably).

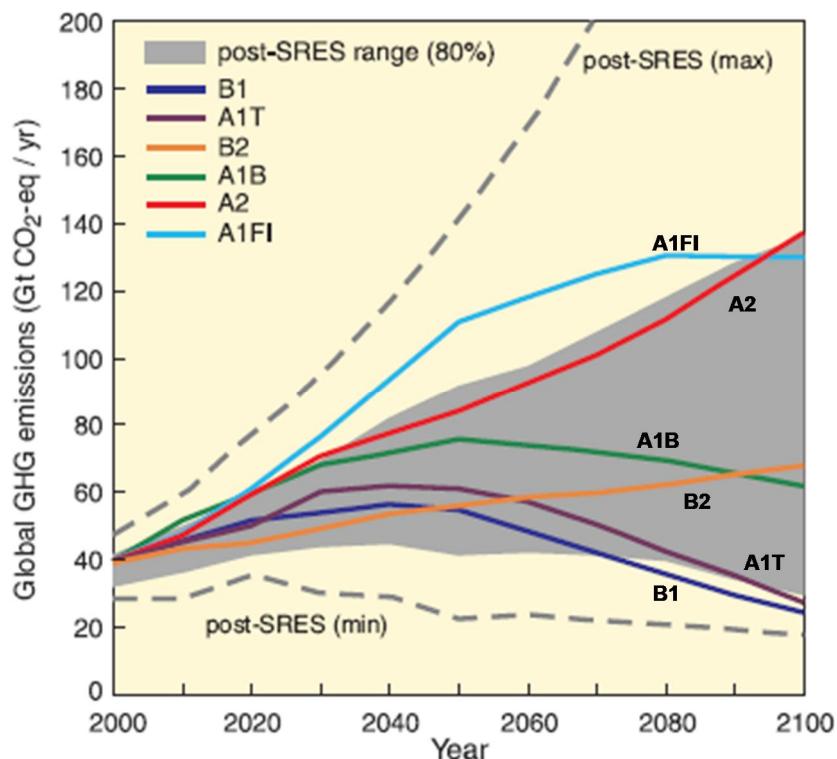


Figure 2 Greenhouse Gas Emissions Scenarios from 2000 through 2100 in the Absence of Additional Climate Policies (IPCC 2000)



The Mt Todd study used the A1B (medium) and A1FI (high) emissions scenarios for the target evaluation dates of 2030 and 2070. This provides a mid-point scenario on a shorter time horizon and a more extreme scenario on a longer-term time horizon to accommodate an upper level of risk.

3.4 Baseline Observational Data

Emissions projections and projected climatic changes are compared to a historical baseline. Baseline data for the Mt Todd study were obtained from the Bureau of Meteorology for Darwin Airport, as described in Section 3.2.

3.5 Global Climate Models

Mathematical simulations or computer models of the atmosphere and ocean are the principal tools for estimating the response of the climate to increases in greenhouse gases. The most sophisticated of these tools are Global Climate Models (GCMs), which express mathematically what is known of the processes that dictate the behaviour of the atmosphere and the ocean. GCMs include interaction of the atmosphere with the oceans and the surface of the Earth, including plants and other ground cover.

An ensemble of 23 models was used for the CSIRO study (Table 4.1, CSIRO 2007).

3.6 Study Parameters

Future scenarios were extracted from the CSIRO dataset. These scenarios include projected changes to precipitation, maximum temperature, minimum temperature, wind speed and solar radiation. Projected changes to temperatures, precipitation, wind speed and water balance are presented for 2030 and 2070. Projected changes under two SRES emission scenarios were selected:

- ▶ A1FI – high climate sensitivity (referred to as A1FI). A1FI previously represented a worst-case scenario emissions projection. Recent observations of emissions make the A1FI scenario the most plausible compared to other scenarios, making this the ‘business as usual’ case (US Department of Energy, Oak Ridge National Laboratory 2011); and
- ▶ A1B – mid climate sensitivity (referred to as A1B).

3.7 Potential Climate Related Impacts

Changes in climatic conditions and water availability over the design life may have the potential to impact the Project’s infrastructure, processes, supply chain logistics and lifecycle maintenance costs.

Elements of mine operations that may be influenced by changing climatic conditions and their relevance to the Mt Todd Gold Project are presented in Table 2. Structures and processes are influenced by ambient air temperatures, precipitation, wind speeds and water availability. In addition, maintaining water balance is essential for mining and ore processing activities; necessitating the provision of appropriate resources to cope with periodic drought and/or flood conditions.



Table 2 Components of Mine Operations Influenced by Climatic Conditions and Relevance to Mt Todd System Components

Component	Key Climate Parameters for Mt Todd	Possible Influence on Mt Todd System
Administration and Plant Site Buildings	Ambient air temperature Humidity Extreme wind storms	Possible increased expansion and contraction from increased temperature variability. Increased air conditioning loads. Extreme humidity may impact electronic equipment. Wind sensitive design elements may be impacted.
Anaerobic Treatment Wetlands	Potential Evaporation Extreme precipitation as indicator of flash floods	Efficiency of wetlands may be affected by high rates of evaporation and/or extreme flood events Flooding may result in contaminant transport if containment is insufficient
Clay Borrow Area	Strong winds Extreme precipitation as an indicator of flash floods	Increases in mean wind speed may affect airborne dust from clay borrow area Flooding may result in contaminant transport if containment is insufficient
Critical Structures (e.g. pipelines)	Extreme precipitation as indicator of flash floods Extreme wind and sand storms Ambient air temperature	Temperature, rainfall wind and flooding characteristics of the site are an important civil design parameter. Changes in the parameters over time need to be understood.
Decant and Polishing Ponds	Potential Evaporation Extreme precipitation as indicator of flash floods	Capacity and efficiency of ponds may be effected by high rates of evaporation and/or extreme flood events Flooding may result in contaminant transport if containment is insufficient
Heap Leach Pad	Extreme precipitation as an indicator of flash floods Evaporation	Rehabilitation and closure plans should consider extreme flood events and evaporation rates
Low Grade Ore Stockpiles	Extreme wind storms Extreme precipitation as an indicator of flash floods	Increase in wind speed may affect airborne dust from stockpiles Flooding may result in contaminant transport if containment is insufficient
Mine Pit	Extreme precipitation as indicator of flash floods	Potential increased risk of flooding or inundation of pits
Power and Gas Supply	Ambient air temperature Humidity	Capacity and efficiency of gas turbine will degrade at high temperatures and humid conditions
Raw Water Dam	Potential Evaporation Extreme precipitation as indicator of flash floods	Capacity and efficiency of dam may be effected by high rates of evaporation and/or extreme flood events
Retention Ponds	Potential Evaporation Extreme precipitation as indicator of flash floods	Capacity and efficiency of ponds may be effected by high rates of evaporation and/or extreme flood events Flooding may result in contaminant transport if containment is insufficient



Component	Key Climate Parameters for Mt Todd	Possible Influence on Mt Todd System
Roads	Extreme precipitation as indicator of flash floods Extreme wind storms	Extreme precipitation, flash floods, wind and sandstorms may impede transportation to and from the site
Services (Fire Protection, Drinking and Sanitary Water)	Potential Evaporation Average Precipitation	Raw water will be harvested from the raw water dam. This will be the primary supply for process and potable water and fire water reserve. Flash flood and drought conditions may negatively impact water availability for the site.
Tailings Storage	Extreme precipitation as an indicator of flash floods Potential Evaporation	Flooding may result in contaminant transport if containment is insufficient Excessive evaporation could interfere with water balance required for recycled water scheme
Waste Rock Dump	Extreme precipitation as an indicator of flash floods Extreme wind storms	Increase in wind speed may affect airborne dust from stockpiles Flooding may result in contaminant transport if containment is insufficient
Water Treatment Plant	Potential Evaporation Extreme precipitation as indicator of flash floods	Capacity and efficiency of water treatment plant may be effected by high rates of evaporation and/or extreme flood events



4. Results

CSIRO's projected climate changes for Darwin are summarised in the following sections, including:

- ▶ annual Mean Temperature (°C);
- ▶ number of days above 35 °C;
- ▶ annual Rainfall (%);
- ▶ annual Potential Evaporation (%);
- ▶ annual Wind-Speed (%);
- ▶ tropical Cyclones (frequency and intensity);
- ▶ annual Relative Humidity (%); and
- ▶ annual Solar Radiation (%).

Climate change assessments typically include projections for sea level rise, but this is not directly applicable for the Mt Todd site due to its elevated inland location. Sea level rise is unlikely to impact product exports over the expected lifetime of operations.

Projected future climate changes are provided relative to a global baseline period averaged between 1980 and 1999. For convenience, the baseline is often called 1990 as this is the intended reference time. Projections of future climate parameters are derived by adding the projected change to the observed baseline climate applicable at 1990. The long term data record of Katherine is used as the local climate baseline for Mt Todd.

4.1 Temperature

The CSIRO study provides projected changes in annual mean temperatures (°C) applicable to the years 2030 and 2070. The projected changes were applied to the historical average annual mean temperature, resulting in a series of projected degree change of mean temperature for Darwin.

Generally, the annual average mean temperature in Darwin is expected to increase by 0.7°C to 1.4°C, and by 2.3°C to 4.4°C in 2070. The modelling suggests a small annual mean temperature increase would also apply for the Mt Todd region. In applying the projected increase in temperature it is expected that the annual average mean temperature in the region will increase slightly by 2030. These results are summarised in Table 3.

Table 3 Projected Average Annual Mean Temperature Change (°C) (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Katherine Baseline (°C)	Change from Baseline Temperature (°C)	Katherine Max Projected Mean Temperature (°C)
A1B, 2030	34	1 (0.7-1.4)	35 (34.7-35.4)
A1FI, 2070	34	3.2 (2.3-4.4)	37.2 (36.3-38.4)



4.2 Extreme Temperature

The CSIRO study estimates that the incidence of extreme temperatures (often taken to be above 35°C) will increase under both A1B and A1F1 scenarios. Without a specific analysis of modelled data for the Mt Todd region however, we simply present the Darwin data as a reference because it would be inappropriate to view this statistic in any site-relative sense. Under the A1B scenario, the frequency of temperatures >35°C in Darwin is projected to exceed 28 days by 2030 and to exceed 141 days under the A1F1 scenario for 2070.

The baseline frequency of days exceeding 35°C in Katherine is significantly higher than in Darwin (151 days versus 11) and although an increased frequency in future climates is indicated, the percentage increase in this statistic will likely be less than Darwin's at the Mt Todd site and a higher temperature statistic would be more informative at Mt Todd (say 40°C). Nonetheless, Table 4 summaries the CSIRO projections for increases in the count of days exceeding 35°C in Darwin, plus the Katherine baseline count.

Table 4 Projected Average Duration of Extreme Temperatures (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Duration of T>35 °C (days/year)
Baseline	151
Baseline Darwin	11
A1B, 2030 (Darwin)	28 (28-69)
A1FI, 2070 (Darwin)	141 (141-308)

4.3 Rainfall

The CSIRO study provides projected changes in annual mean precipitation (mm/yr) for the years 2030 and 2070. The projected changes were applied to the historical daily-sampled precipitation record recorded at the Katherine Aviation Museum. Results are summarised in Table 5.

Table 5 Projected Average Annual Mean Rainfall Change (mm/yr) (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Katherine Baseline (mm/yr)	Change from Baseline Rainfall (%)	Katherine Projected Average Annual Mean Rainfall (mm/yr)
A1B, 2030	1,143	0 (-7.0 - -6.0)	1,143 (1,136 - 1,137)
A1FI, 2070	1,143	-1 (-21.0 - -20.0)	1,142 (1,122 - 1,123)

Although the average annual mean figures are relatively constant over the 20 and 50-year return periods, there is a wide degree of variability between the 10th and 90th percentile results. This is an indication that there may be a greater occurrence of extreme dry and wet periods.

Notwithstanding the above projection for little change in future climates, rainfall statistics for the region indicate a period of increased rainfall since 1988 relative to the longer-term baseline annual mean (1941-2012). The shift in the mean annual rainfall since 1988 at Darwin is of the order of 4% and at Katherine is of the order of 3%.



These shifts are representative of the range of variability on inter-decadal timescales that can occur in such statistics and, in association with consideration of extreme rainfall events, should form the basis of sensitivity analyses of the design for expanded mine operations.

4.4 Potential Evaporation

Annual potential evaporation changes were estimated by CSIRO for the years 2030 and 2070. Annual potential evaporation is projected to increase by 3% in 2030 and 10% in 2070 (Table 6).

Table 6 Projected Average Change in Potential Evaporation % (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Baseline Katherine (mm/yr)	% Change in Potential Evaporation	Katherine Projected Change in Potential Evaporation
A1B, 2030	2,400	3 (2-5)	2,472 mm/yr
A1FI, 2070	2,400	10 (7-15)	2,424 mm/yr

4.5 Wind speed

The CSIRO study projected changes in annual average mean wind speed (m/s) for the years 2030 and 2070. The projected changes were applied to the historical daily wind speed record at Katherine Aviation Museum. A forecast change in wind speed is unlikely to provide any major impact to the Mt Todd site. These results are presented in Table 7.

Table 7 Projected Annual Average Mean Wind Speed Change (km/h) (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Katherine Baseline (km/h)	Change from Baseline Wind Speed (%)	Projected Average Annual Mean Wind Speed (km/h)
A1B, 2030	6.8	1 (-1.0; 2.0)	7.8 (5.5; 8.8)
A1FI, 2070	6.8	2 (-4.0; 7.0)	8.8 (2.8;13.8)

4.6 Tropical Cyclones

The CSIRO study projected broad regional trends in tropical cyclone activity; it did not provide a projection for the Darwin area specifically. For the NT, the study indicates that there is likely to be an increase in ‘the proportion of the tropical cyclones in the more intense categories, but a possible decrease in the total number of cyclones.’ Additionally, the study found that the location of cyclones is not likely to change over time. This can be interpreted as being unlikely to significantly change the tropical cyclone threat at the Mt Todd site compared with the present climate.

4.7 Relative Humidity

Changes in annual relative humidity were projected by CSIRO for 2030 and 2070. The projected changes were applied to the historical daily humidity records for data recorded from the Katherine Aviation Museum. Average humidity is projected to decrease by 0.5% by 2030 and 1.5% by 2070 (Table 8).



Table 8 Projected Annual Average Relative Humidity (%) (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Katherine Baseline (%)	Change from Baseline Humidity (%)	Projected Average Annual Humidity (%)
A1B, 2030	52	-0.5 (-1.0; 0.0)	51.5 (53; 52)
A1FI, 2070	52	-1.5 (-3.2; 0.1)	50.5 (48.8; 52.1)

4.8 Solar Radiation

Changes in annual solar radiation were projected by CSIRO for 2030 and 2070. Average solar radiation is projected to stay the same by 2030 and increase by 0.1% by 2070 (Table 9).

Table 9 Projected Average Change in Annual Solar Radiation % (values in brackets correspond with the 10th and 90th percentile results)

Emissions Scenario, Year	Katherine Baseline (Kwh/m ²)	% Change in Annual Solar Radiation
A1B, 2030	6.3	0 (-1.1; 1.3)
A1FI, 2070	6.3	0.1 (-3.6; 4.3)

4.9 Summary of Potential Climate Risks to the Project

Based on the climate change analysis, some conclusions can be drawn, these are summarised in Table 10.

Table 10 Summary of Potential Climate Risks to the Mt Todd Project

Climate Parameter	Project Components Most Likely Affected	Implications for the Site	Potential Adaptation Options
Ambient air temperature	Administration and Plant Site Buildings Power and Gas Supply Critical Structures	Increases in the number of extreme heat days may have a minor impact on the Project.	Consider appropriate temperature ranges in selection of plant and equipment. Undertake adequate preventative maintenance of plant, pumps, 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.
Extreme precipitation / flash floods / tropical cyclones	Anaerobic Treatment Wetlands Clay Borrow Area Critical Structures Decant and Polishing Ponds	The mean annual rainfall is not projected to change significantly for the 2030 and 2070 scenarios. Precipitation extremes	Ensure site drainage is sufficient to manage potential extremes in rainfall events. Appropriate bunding of watercourse redirection and overflow collection areas should be provided as

Climate Parameter	Project Components Most Likely Affected	Implications for the Site	Potential Adaptation Options
	Low Grade Ore Stockpiles Mine Pit Raw Water Dam Retention Ponds Roads Services Tailings Storage Waste Rock Dump Water Treatment Plant	may increase, thus accentuating the risk of flash floods. The incidence of tropical cyclones will likely stay the same or decrease, however the intensity of extreme cyclonic events may increase. The Project catchment is characterised by perennial flows which recharge groundwater levels.	appropriate/necessary. For recycled plant process water, ensure design considers both dry and wet periods. Provisions should be considered for adequate supply reserves. For example, tailings thickening agents may be considered during dry periods. Ponds should be sized appropriately including overflow capacity Open pit slopes should be walled and designed to withstand appropriate flood volumes.
Evaporation	Anaerobic Treatment Wetlands Decant and Polishing Ponds Raw Water Dam Retention Ponds Services Tailings Storage Water Treatment Plant	Projected changes in evaporation rates are not considered significant for the water requirements for the site. Therefore this risk is not considered significant.	N/A
Wind speed	Administration and Plant Site Buildings Critical Structures Low Grade Ore Stockpiles Roads Waste Rock Dump	Projected increase in mean wind speed is relatively insignificant and is thus unlikely to have any considerable impact on the Project.	N/A
Humidity	Administration and plant site buildings Power and Gas Supply	Impacts of humidity changes are unlikely to have any significant impact on the site.	N/A

4.10 Limitations and Uncertainty

This assessment of the Mt Todd Gold Project is a high-level analysis of potential climate change impacts, and therefore its limitations need to be considered. These may include:

- ▶ assessment of risks and possible adaptation plans are qualitative, not quantitative;
- ▶ climate change scenarios are based on publicly available projections;
- ▶ these projections are regional rather than localised – therefore there is a level of uncertainty associated with these; and
- ▶ these projections consider the years 2030 and 2070 only, as compared to the 1990 baseline climate condition (as specified in the IPCC report (2000)).



The risk assessment component is the result of a desktop study, combining site-specific details provided by Vista Gold from their Pre-feasibility Study with publicly available climate information and in-house GHD knowledge related to generic mine operations. This risk assessment information is provided as general guidance, and as core information that may be used to guide further investigation of impacts and asset resilience. This does not constitute a full assessment. Therefore these projections, vulnerabilities and control measures are not exhaustive.

The projections chosen for this assessment are the medium and high emissions scenarios (A1B and A1F1: IPCC AR4 reports), which rely on the base assumptions of a homogenous world with an economic focus (which does not allow for major wars, trade embargos or a shift to an environmental focus). Upper limits of the model are used to ensure a conservative approach is produced by considering higher impacts, and therefore risk.

The methods employed in this study involve the following limitations and uncertainties.

- ▶ Uncertainty in projections: SRES A1B was selected as the mid-range scenario for future global mean temperature increase, while A1FI was selected as the highest end of global mean temperature increase.
- ▶ The uncertainty related to the projected temperature, precipitation and wind values generated by the various GCMs was represented by the 10th and 90th statistical percentiles. The uncertainty range presented in this report cannot cover the full range of uncertainties of future climate change. The CSIRO Report (CSIRO 2007) provides further details on the uncertainties associated with the projections summarised herein.
- ▶ The assumptions that projected changes available for Darwin can be directly applied to Katherine climate data and that these data are fully representative of conditions at Mt Todd.



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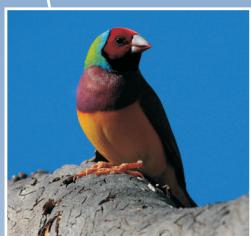
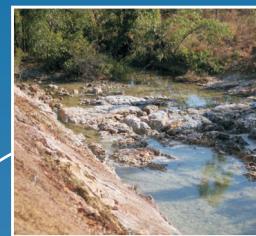
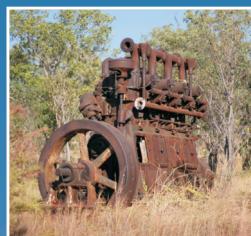
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APPENDIX H

Sustainability Assessment



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Vista Gold Australia Pty Ltd
Mt Todd Gold Project
Sustainability Assessment

May 2013





This Sustainability Assessment (“Report”):

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Contents

Summary and Conclusions	1
1. Introduction	2
1.1 Study Area	2
1.2 Objective of this Document	2
2. Methodology	3
3. Project Description	4
4. Project Sustainability	6
4.1 Principles of Sustainability	6
4.2 Outcomes of the Sustainability Framework	7
5. References	15

Table Index

Table 1	Mt Todd - Sustainability Matrix	8
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Summary and Conclusions

This sustainability assessment has been undertaken by GHD as part of the Environmental Impact Assessment (EIA) for the proposed re-establishment and operation of the Mt Todd Gold Mine.

A sustainability framework has been developed based on existing mining best practice standards and principles. This framework identifies sustainability initiatives which should be considered during specific phases of the Project, and associated targets or indicators which may be used to measure the performance against.

This framework identifies sustainability initiatives beyond business as usual to facilitate reduced operation costs, reduce costs associated with the environmental footprint and minimise potential adverse impacts associated with Project development, operation and closure.

Key sustainability initiatives to be considered for the Mt Todd Gold Project incorporate the following sustainability themes:

- ▷ Environmental management monitoring and reporting
- ▷ Procurement and materials
- ▷ Establishing sustainability objectives
- ▷ Project economic longevity
- ▷ Minimising and mitigating Project risks
- ▷ Minimising energy use and greenhouse gas emissions
- ▷ Water demand reduction and recycling
- ▷ Managing and control of hazardous materials
- ▷ Managing and minimising emissions and discharges to the environment
- ▷ Biodiversity considerations
- ▷ Planning for closure and rehabilitation
- ▷ Tailings and acid mine drainage management
- ▷ Natural and cultural heritage
- ▷ Safety and community



1. Introduction

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. This sustainability assessment has been undertaken as part of the Environmental Impact Assessment for the Project and addresses Section 2.1 of the EPA (formerly Department of Natural Resources, Environment, the Arts and Sport's) 2011 Guidelines for the Preparation of an Environmental Impact Statement, Mt Todd Gold Project, Katherine Region NT.

1.1 Study Area

The Mt Todd Gold Mine site is located approximately 55km north west of Katherine, and 250km south of Darwin. The topographical feature named Mt Todd is within the mine lease. The mine site is accessed via Jatbula Road, approximately 10 km east of the Stuart Highway off the Edith Falls Road.

Mining and associated operations will primarily occur on mine leases MLN 1070, MLN 1071 and MLN 1127, covering approximately 5,365 hectares (ha). A small portion of EL 29886 will be affected by the proposed increase in the area of inundation associated with raising the Raw Water Dam.

1.2 Objective of this Document

To effectively manage the Project's sustainability performance, sustainability objectives and targets should be set, reviewed and updated throughout each stage of the Project.

The main objectives of this assessment are to:

- ▶ Outline the approach to meeting any Project specific sustainability objectives and integrating principles of sustainable development into the delivery of the Project.
- ▶ Provide guidance for Vista Gold in establishing sustainability benchmarks for the Project.
- ▶ Develop an adequate sustainability matrix which incorporates social, economic and environmental risks and performance indicators. It is envisaged that this matrix will assist in defining Vista Gold's objectives to integrate the principles of sustainability into the Mt Todd development.
- ▶ Identify sustainability initiatives beyond current business practice to ultimately reduce operation costs, reduce costs associated with the environmental footprint and minimise potential adverse social impacts associated with the Project.



2. Methodology

The methodology applied to undertake the sustainability assessment has included a detailed review of:

- ▶ The Mt Todd April 2011 Notice of Intent (GHD 2011)
- ▶ Project documents and technical studies provided by Vista Gold including the Pre-feasibility Study.

Key sustainability issues identified during the review process were then benchmarked against the following sources:

- ▶ The Australian Green Infrastructure Council (AGIC) tool was utilised as a reference and basis to align the sustainability initiatives. The tool provides a relevant and quantifiable benchmark for a standardised assessment method. The preliminary initiatives identified were aligned against the infrastructure sustainability principles from AGIC, and a gap analysis highlighted areas where potential objectives may have been omitted in the preliminary review.
- ▶ A Guide to Leading Practice Sustainable Development in Mining (DRET 2011) was used as a reference source to identify key areas of risk and evaluate sustainability approaches. The Mt Todd site was referenced within the guide identifying failures of incorporating Project sustainability into the design and development phase.
- ▶ Existing sustainability criteria and objectives (Corporate, Territory, Industry or Local) were integrated into the Project sustainability framework.
- ▶ Technical specialists (mine engineers with extensive operational experience) were consulted to review risks and relevance of sustainability initiatives and indicators.
- ▶ Ecologically Sustainable Development in the Northern Territory.



3. Project Description

The Project will expand the Batman Pit, re-establish and refurbish existing facilities, expand the existing waste rock dump and develop new associated infrastructure such as a processing plant, power station, and a second Tailings Storage Facility (TSF2).

The proposed development will occur both within the existing disturbance footprint of the Batman Mine and in surrounding areas.

Mining will be an open-pit truck and shovel operation, using large haul trucks, hydraulic shovels and front end loaders to transport materials to the crusher, stockpiles, Run of Mine (ROM) pad and waste dump. Extracted ore, will be processed in an ore processing plant where it will be crushed, milled and then carbon in leach (CIL) leached followed by adsorption, desorption and recovery leading to gold dore (unrefined gold).

Approximately 17.8 million tonnes per annum (Mtpa) of ore will be processed. Gold dore will be transported for onward secure shipment to a refinery.

The Project, based on current known data, will have a life of around 19 years inclusive of construction, operations and closure. Construction is anticipated to commence in the first quarter of 2014 and take two years, including 6 months pre-production. The mine is scheduled to operate for a further 13 years. Closure and rehabilitation of the mine is expected to take four years.

The key elements of the Project include:

Mining and Mining Infrastructure

- ▶ Extension of the existing Batman Pit from its current depth of 114m to approximately 588m (RL -400m) and surface area of 40 hectares (ha) to approximately 137ha.
- ▶ Expansion of the existing waste rock dump (WRD) from a height of 24m above ground level to approximately 350m above ground level (RL 470m), and a footprint of 70ha to approximately 217ha. The dump currently contains 16Mt of waste rock and the expansion will provide total capacity of up to 510 Mt.
- ▶ Construction of a Run of Mine (ROM) pad and ore stockpile.
- ▶ Construction of an Ammonium Nitrate and Fuel Oil (ANFO) Facility.
- ▶ Construction of heavy and light vehicle workshop and administration offices, and facilities comprising wash down area, tyre change facility, lube storage facility etc.
- ▶ Construction of haul roads and access roads.



Process Plant and Associated Facilities

- ▶ Ore Processing Plant processing approximately 50,000 tonnes per day (tpd) of ore
- ▶ Processing and / or reclamation of the existing low grade ore (LGO) stockpile and scats stockpile, and construction and processing of new LGO stockpile with a footprint of approximately 47ha.
- ▶ Raising the existing tailings storage facility (TSF1) from 16m to approximately 34m above ground level.
- ▶ Construction of a new TSF2, approximately 300ha in area and up to 60m high (RL 175m).
- ▶ Diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection.
- ▶ Rehabilitation of the existing heap leach pad (HLP), if residual HLP material is not processed through the new plant.
- ▶ Chemical and reagent storage and handling facility
- ▶ Process plant workshops, administration offices, control room etc.

Other Infrastructure

- ▶ Gas fired Power Station, including re-routing of the existing gas pipeline.
- ▶ Anaerobic treatment wetlands, approximately 10ha in area.
- ▶ A 2m high raising of the raw water dam (RWD) and an increase in the area of inundation.
- ▶ Construction of saddle dams at the RWD and TSF1.
- ▶ Construction of three coffer dams at Retention Pond 1 (RP1) and deepening of RP1.
- ▶ Water treatment plant.
- ▶ Potential re-alignment of access roads.
- ▶ Site wide drainage, sediment traps.
- ▶ Modification to existing fuel storage and distribution facility.

Decommissioning and closure plans for each existing and proposed major facility at Mt Todd have been developed. Throughout the mine-life Vista Gold will plan, design for, and implement effective plans for:

- ▶ Identification of potentially acid forming (PAF) and non-PAF materials.
- ▶ Selective handling of PAF and non-PAF material and potentially directly treating PAF materials throughout the mine-life to prevent or reduce the generation of acid and metalliferous drainage (AMD).
- ▶ Separation of unimpacted surface and groundwater from PAF materials and AMD
- ▶ Short- and long-term hydrologic isolation of PAF and metalliferous materials from ground and surface water.
- ▶ Facility and site-wide closure.
- ▶ Control of stormwater to prevent excessive erosion and sedimentation.



4. Project Sustainability

Based on the objectives outlined in Section 1.2, and with consideration of Vista Gold's corporate sustainability values, one of the key steps in the development of the sustainability initiatives has been to review existing corporate practices and industry standards.

To facilitate the implementation of sustainability into the Project (design and construction), a sustainability hierarchy has been established. This includes identification of:

- ▶ Sustainability initiative/principles
- ▶ Objectives
- ▶ Indicators/targets
- ▶ Roles and responsibilities

4.1 Principles of Sustainability

The International Council of Mining and Minerals (ICMM), was established in 2001 to improve sustainable development performance in the mining and metals industry. It developed ten key principles of sustainability to measure performance. The principles generally align with the Themes outlined in the Australian Green Infrastructure Council (AGIC) rating tool, and are outlined below. The sustainability framework specific to the Project was prepared on this basis.

1. Implement and maintain ethical business practices and sound systems of corporate governance.
2. Integrate sustainable development considerations within the corporate decision-making process.
3. Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by the activities.
4. Implement risk management strategies based on valid data and sound science.
5. Seek continual improvement in health and safety performance.
6. Seek continual improvement of environmental performance.
7. Contribute to conservation and biodiversity and integrated approaches to land use planning.
8. Facilitate and encourage responsible product design, use, re-use, recycling and disposal of products.
9. Contribute to the social, economic and institutional development of the communities in which we operate.
10. Implement effective and transparent engagement, communication and independently verified reporting arrangements with stakeholders.



4.2 Outcomes of the Sustainability Framework

A sustainability framework is provided in Table 1. The framework outlines sustainability initiatives and associated indicators and targets to demonstrate objectives have been achieved. The recommended Project phases during which each respective initiative should be implemented has also been provided, as well as the party responsible for each initiative.



Table 1 Mt Todd - Sustainability Matrix

Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
Management	Environmental Management	To adopt a formal environmental management system based on established guidelines	<ul style="list-style-type: none">▶ Implement a system to effectively monitor, measure and report on environmental management. This may include:<ul style="list-style-type: none">- Key Result Areas;- Key Performance Indicators;- Environmental Management Systems.▶ 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 EMS procedures and work within the system.	Design, Construction and Operation	Design Team Vista Gold Principal Contractor
	Purchase and Procurement	To consider type, volume, sourcing and application of materials, services and resources to achieve sustainable outcomes	<ul style="list-style-type: none">▶ 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.	Design, Construction and Operation	Design Team Vista Gold Principal Contractor



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
	Project Sustainability	To adopt and improve identified sustainability initiatives throughout the Project life, including sustainability reporting and monitoring	<ul style="list-style-type: none">▶ Identify appropriate and achievable sustainability goals for the Project and reflect outcomes of subsequent monitoring and reporting annually.	Construction and Operation	Principal Contractor Vista Gold
Economic Performance	Economic Life	To consider ongoing operational, maintenance, closure and replacement costs in the Project design	<ul style="list-style-type: none">▶ 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.	Design	Design Team Vista Gold
	Due Diligence	To undertake a systematic approach to assessing risks and opportunities	<ul style="list-style-type: none">▶ Apply risk management systems to provide early identification and corrective action to avoid Project/mine failure.▶ Create a culture for site construction and operation of risk awareness and risk management.	Design, Construction and Operation	Principal Contractor Vista Gold



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
Resources	Energy & Greenhouse Gas	To minimise energy use and reduce greenhouse gas emissions.	<ul style="list-style-type: none">▶ Consider energy use reduction opportunities noted and assessed during Project design.▶ Undertake greenhouse gas assessment for construction and operation phases of the Project; consider appropriate recommendations for carbon reduction opportunities.▶ Design buildings and structures to reduce heating ventilation and air conditioning load (HVAC), install HVAC efficient systems.▶ Evaluate turbine efficiency, cogeneration and heat recovery options to improve energy efficiency.▶ Evaluate process optimisation to reduce energy requirements and options for heat recovery/ use of waste heat in process.▶ Assess potential sale of excess power to grid.▶ Evaluate use of biofuels where feasible in plant and equipment.	Design, Construction and Operation	Design Team Principal Contractor Vista Gold



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
	Water Management	To reduce water consumption during all phases of the Project through efficient design and alternative means for non-potable water usage To avoid environmental impact through water discharge	<ul style="list-style-type: none">▶ Design efficient water management systems to reduce pump requirements and optimise pump efficiency.▶ Measure water consumption during construction and operation.▶ Design measures (bunds, location to water courses, allowance for peak flow) to comply with applicable Waste Discharge Licences.▶ Incorporate water recycling or closed loop systems where feasible.▶ Implement mitigation plans for pipeline, WTP or pump failure.▶ Consider climate change impacts (drought/flood events).▶ Identify measures to optimise the system water balance.	Design, Construction and Operation	Design Team Principal Contractor Vista Gold
	Hazardous Materials	To encourage safe and effective management of hazardous materials on site to avoid damage to the environment and human health	<ul style="list-style-type: none">▶ Design, construct, operate and decommission in accordance with international Cyanide Management Code.▶ Develop effective Transport Management Plans for hazardous goods delivered to and from site.▶ Reduce risk of wildlife mortalities - specifically birds in relation to access to contaminated water bodies.▶ Build storage to avoid groundwater contamination or spill to waterways.▶ Develop effective OHS systems to avoid worker and contractor health risk from hazardous materials.	Design, Construction, Operation	Design Team Principal Contractor Vista Gold



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
Environmental Management	Emissions, pollution and waste	To minimise pollution and degradation of emissions to air, water and land	<ul style="list-style-type: none">▶ Develop effective dust management strategies during construction and operation.▶ Implement procedures to manage non-mineral wastes to avoid contamination and attraction of pests and vermin.	Design, Construction and Operation	Design Team Principal Contractor Vista Gold
	Discharges to air, water and land	To seek to avoid discharges / emissions through process design, treatment and reuse / recycling	<ul style="list-style-type: none">▶ Comply with monitoring and reporting requirements as per the site-specific Waste Discharge Licence and other applicable regulator instruments.	Construction and Operation	Principal Contractor
Biodiversity	Ecological Management	To minimise impact to the natural environment over the full project lifecycle	<ul style="list-style-type: none">▶ Consider initiatives to maintain or enhance the ecological value of the site at each major stage of the Project and document where appropriate.▶ Categorise high risk zones and develop management plans for life of the mine.▶ Rehabilitate and/or expand areas to promote and improve biodiversity.▶ Develop short term and long term weed eradication plans.▶ Consider options to offset any unavoidable loss of ecological features as a result of the Project.	Design, Construction, Operation and Decommissioning	Design Team Principal Contractor Vista Gold



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
	Mine Closure & Rehabilitation	To integrate measures to reduce the need for subsequent mine rehabilitation	<ul style="list-style-type: none">▶ Characterise ore and waste material to assist with mine closure planning.▶ Take into consideration during design eventual demolition and removal of structures.▶ Reduce double handling of waste material and topsoil by integrating closure & rehabilitation planning into mine operations.▶ Save significant future costs by cumulative closure and rehabilitation whilst staff and machinery are already on-site.▶ Develop anaerobic wetland treatment systems.▶ Re-use materials for capping and site management.	Design, Construction, Operation and Decommissioning	Design Team Vista Gold Principal Contractor
	Tailings and acid and metalliferous drainage	To minimise efforts associated with site closure and mine rehabilitation	<ul style="list-style-type: none">▶ Perform preliminary testing of waste rock to plan for waste containment systems.▶ Undertake ongoing monitoring to identify acid and metalliferous drainage problems.▶ Construct containment structures to allow for variability in volumes and climatic influences including flooding and drought.▶ Restore nutrients back into soil.▶ Select optimal species to revegetate areas and minimise drainage impacts.	Design, Construction, Operation and Decommissioning	Design Team Vista Gold Principal Contractor



Theme	Sustainability Initiative	Objective	Suggested Actions / Targets	Project Phase to be Implemented	Responsibility
People and Place	Natural and cultural heritage values	To ensure indigenous communities or sites of cultural significance are identified and appropriately protected during all phases of the Project	<ul style="list-style-type: none">▶ Develop and implement a Cultural Heritage Management Plan (CHMP) to manage potential disturbance of indigenous areas of cultural significance during Project construction and operation.▶ Include in the (CHMP) actions to manage potential discovery or unearthing of artefacts of cultural significance.	Construction and Operation	Principal Contractor Vista Gold
	Safety & Community	To ensure all phases of the Project consider community development and the health and safety of all workers and personnel	<ul style="list-style-type: none">▶ Maintain records of induction training and other briefings.▶ Complete audits of health and safety procedures during construction, operation and decommissioning phases of the Project.▶ Implement systems to promote health and safety aspects during construction, operation and decommissioning phases of the Project.▶ Provide briefings to contractors and subcontractors on local conditions and risks.▶ Provide net positive impacts to the community through support or funding of facilities and/or programs.▶ Develop employment and training options and programs for the local community.▶ Develop and maintain avenues for community consultation.▶ Minimise potential adverse impacts of mine development and operation on the local community.	Construction, Operation and Decommissioning	Principal Contractor Vista Gold



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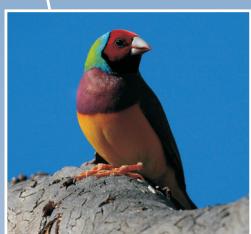
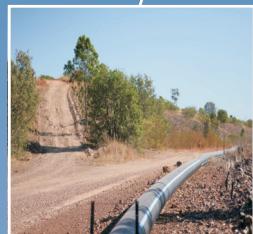
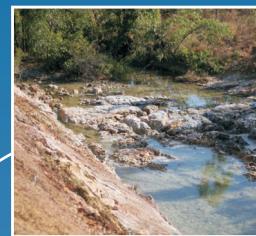
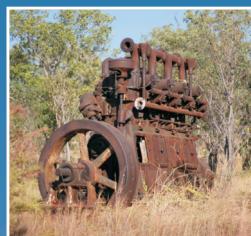
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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
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APPENDIX I

Surface Water Assessment - Hydrology



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Vista Gold Australia Pty Ltd

Mt Todd Gold Project

Surface Water Assessment - Hydrology

May 2013





This Mine Site Surface Water Assessment - Hydrology Study ("Report"):

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The services undertaken by GHD in connection with preparing this Report:

- *were limited to those specifically detailed in this Report;*
- *did not include GHD undertaking any site visits.*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

- *GoldSim Water Balance model provided by Tetra Tech.*

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

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Contents

Executive Summary	i
1. Introduction	1
1.1 Overview	1
1.2 Key Elements of the Project	2
2. Water Containment	4
2.1 Infrastructure	4
2.2 Climate	9
2.3 Surface Runoff	10
2.4 Seepage	11
2.5 Tailings Reclaim Water	12
2.6 Water Demands	13
2.7 Water Balance Modelling	14
2.8 Summary of Water Balance Results	19
2.9 Summary	26
3. Stormwater Management	28
3.1 Introduction	28
3.2 Existing infrastructure	28
3.3 Previous Flood Studies	28
3.4 New Design Flood Modelling	31
3.5 Hydraulic Flood Routing	35
3.6 Potential Stormwater Drainage Impacts	37
4. Flood Management Measures	41
4.1 Flooding	41
4.2 Diversion Channels and Levees	41
4.3 Cross Drainage Structures and Haul Roads	43
4.4 Channel Protection	45
4.5 Prevention of Surface Water Contamination	45
4.6 Mine Pit Water	45
4.7 Material Storage Dump Areas	45
4.8 Processing Plant Areas	46
4.9 Undisturbed Areas	46
4.10 Extreme Rainfall Event Management	46



4.11	Surface Water Monitoring	46
5.	References	49

Table Index

Table 1	Development Footprints	5
Table 2	Water Storage Characteristics	5
Table 3	Pump Capacity	6
Table 4	Creek Catchment Diversions	8
Table 5	Water Management Operating Rules	8
Table 6	Stochastic Rainfall Model Parameters	9
Table 7	Mean Monthly Evaporation	9
Table 8	Catchment Areas for Retention Ponds	11
Table 9	Seepage Parameters	12
Table 10	Tailings Reclaim Water	13
Table 11	Simulated Rates of Water Supply to Processing Plant and Percentage Days Failure	22
Table 12	Simulated Rates of Water Supply for Dust Suppression and Percentage Days Failure	23
Table 13	Simulated Rates of Transfer to Equalisation Pond	24
Table 14	Simulated Percentage Days when Untreated Water Overflows to Creeks	25
Table 15	Knight Piesold Study Flood Peaks	30
Table 16	Knight Piesold Study Flood Levels	30
Table 17	GHD Flood Discharge	31
Table 18	IFD Rainfall Data for Mt Todd Mine	33
Table 19	Rational Method Inputs for Flood Peak Estimation	34
Table 20	Design Flood Peak Estimates	35
Table 21	Existing Surface Water Level Monitoring	47

Figure Index

Figure 1	Mine Footprint	4
Figure 2	Batman Pit Void Space	7
Figure 3	Simulated Post Closure Water Levels in Batman Pit (Tetra Tech May 2013, Figure 6.5)	21
Figure 4	Schematic of Mine Water Supply System	22
Figure 5	AGC Woodward-Clyde Study Modelled Flood Extents	29



Figure 6	Diversions at the WRD	31
Figure 7	Modelled Catchments	32
Figure 8	Extent of Hydraulic Flood Routing Models	36
Figure 9	Modelled 100-year ARI Flood Extent	39
Figure 10	Simulated Channel Flow Velocities for the 100-year ARI event	40
Figure 11	Modelled 10-year ARI Flood Extent	42
Figure 12	Stow Creek Diversion	44
Figure 13	Horseshoe Creek Diversion	44



Executive Summary

This report considers the water management issues relating to the re-establishment and renewed operation of the Mt Todd Gold Project. Its scope includes an assessment of existing water containment infrastructure through water balance modelling and an appraisal of flood risk and existing stormwater management. Issues relating to water quality are addressed in a separate report.

Vista Gold Australia Pty Ltd proposes to re-establish and operate the Mt Todd Gold Mine, located 55km north of Katherine and 250km south of Darwin.

The Mt Todd Gold Mine was most recently mined for gold in the 1990s. Mining operations ceased in the 2000s and have been in a care and maintenance phase since then. Existing mine site infrastructure comprises an open cut pit, tailings dam, waste rock dump (WRD), heap leach pad (HLP) and the remains of processing facilities. Water retention ponds are located downstream of the WRD, HLP and processing plant to capture surface runoff and seepage. The operation of this infrastructure to contain runoff from disturbed and undisturbed areas of the mine has been investigated by means of water balance models.

It has been suggested that storm rainfall during the last two wet seasons has been in excess of a 100-year ARI and is therefore likely to exceed the design criteria of water management infrastructure on the site. An examination of rainfall records at Katherine shows that the total wet season rainfall between Nov 2010 and May 2011 was only the 5th highest of the 139 years on record and the following wet season was only the 63rd highest. In terms of monthly rainfall, December 2010 has a total that is equivalent to about a 5-year ARI and the December 2011 is more frequent than this ARI. It is possible that shorter duration rainfall events were more extreme in terms of the expected frequency of occurrence.

Significant hazard water storage infrastructure is likely to be designed for the containment of at least monthly and preferably extreme wet season rainfall and should therefore be able to contain rainfall such as that falling in 2010 and 2011, which records at Katherine suggest was not as extreme as suggested. Shorter duration rainfall is of more consequence to water conveyance infrastructure and it is possible that channel capacities and less significant storages may have been exceeded by short duration high intensity rainfall during 2010 and 2011.

Water Balance

Production phase water balance modelling is based on a 12-year sequence of daily rainfall and pan evaporation compiled from on-site records (1993 to 2010). Statistics from the rainfall record have been used in conjunction with a stochastic model to prepare 100 x 12 year daily sequences of rainfall for input to the water balance model. The use of stochastic sequences provides a robust assessment of the performance of water containment infrastructure. A separate post closure phase water balance model contains mean monthly values of rainfall and evaporation which are recursively applied to a 600 year period of simulation.

Water balance models simulate runoff from undisturbed areas of the mine and local upstream catchments by means of the USDA Curve Number method. The AWBM method has been implemented for the Edith River catchment. Seepage from the WRD and HLP is modelled as a proportion of daily rainfall lagged by a specified number of days. The HLP includes a decay function to represent the reduction in seepage after rehabilitation. Estimates of seepage from the tailings storage facility (TSF) have been obtained from an external finite element analysis. Groundwater flows in to or out of storage



facilities and the pit have not been represented in water balance models. Recent studies have shown that groundwater inflows will range from a few litres per second at the start of mining to approximately 31 L/s during the final months of mining and values are likely to be in excess of 13 L/s for most of the production period.

The mine site currently has nine storage facilities which hold water as their primary or secondary function and many are linked by a network of pipes. The water management strategy during mine operation is to eliminate overflows to the downstream environment in all but extreme storm rainfall events by transferring stored water to the WTP for treatment and subsequent re-use or discharge to the downstream environment under discharge licence conditions.

Water balance models have been created by previous studies:

1. GoldSim Model, December 2010 - MtToddWB 10.6Mtpy Pre-&Production&Closure JAN2011.gsm – simulates the performance of water containment infrastructure during pre-production, production and closure phases of the mine's life cycle.
2. Goldsim Model, January 2012 - MtToddWB_LOM2011Update_Phase1&2_120118b_FLOW – is an update of the Goldsim model in (1) and simulates the production phase, only.
3. Spreadsheet Models - Water Balance_12-08-10_100MT.xls and Water Balance_12-08-10_BIG.xls – both models are restricted to an assessment of the performance of tailings storage facilities during the production phase of the mine's life cycle i.e. dam crest level requirements and plant make-up water.
4. Goldsim Model, December, 2010 - MtToddWB 10.6Mtpy Post-Closure 12Dec2010.gsm – focuses on quantifying the treatment stream during the post closure phase of the mine's life cycle.
5. A recent water balance has been carried out by Tetra Tech and is summarised in 'Mt Todd Gold Project, Hydrogeology', May 2013. The water balance covers a 500-year period representative of the post closure phase of the mine and focuses on inflows and outflows to Batman Pit including groundwater.

The performance of water management infrastructure during the production phase was assessed from output generated by the latest Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 and MtToddWB_LOM2011Update_Post-Closure_PPT_Chooser, May 2012, 2010.

The capacity of the equalisation pond (30,000m³, source 2013 Goldsim model) in conjunction with a WTP capacity of 300 m³/h (years 1 to 3) and 500 m³/h (years 4 to 12) is sufficient to receive transfers from Batman Pit (RP3), WRD retention pond (RP1), heap leach pad (HLP) and the low grade ore retention pond (RP2) to prevent overflows from these facilities during normal operating conditions. However, the model results show instances of overflow at RP1, RP2, HLP and RP5 which are likely to be the result of insufficient pump capacity on pipelines to the equalisation pond during high intensity rainfall events. Overflows from the stormwater sediment pond (RP5) are to be expected given its function as a sediment trap rather than a water retention pond. Simulations indicate no overflow from Batman Pit.

It should be noted that the water management procedure leading up to and during extreme peak rainfall is likely to invoke different operating rules to those represented in the Goldsim water balance which are representative of normal operating conditions. This could involve measures such as the temporary transfer of excess water to the TSF. Furthermore, because simulated overflows from retention ponds to the downstream environment occur as a consequence of extreme rainfall, it is likely that such events will



involve widespread rainfall and therefore flow within receiving waters will also be elevated. In this situation high dilution ratios will help reduce the impact of mine water discharge to the Edith River.

The results of the water balance also show that estimates of reclaim water and seepage from the TSF together with a similar magnitude of contribution from the RWD and WTP will be sufficient in meeting mine water demands over the life of mine (LOM). However, this assessment assumes the RWD is an unlimited water resource. The risk of shortfall in water supply is considered to be an economic risk rather than an environmental impact

The simulated annual average output of water treatment plant varies from 2.6 to 4.4 GL/yr over the LOM and assumes transfers from RP1, RP2, RP5 and RP3 occur whenever there is spare storage capacity within the equalisation pond. The model shows that a relatively small amount of excess water may be discharged from the WTP to the Edith River during the first three years of operation. This is most probably caused by the adoption of a fixed water transfer operating rule regardless of mine production and is not expected to occur during actual operations when rates of transfer will be dynamically controlled.

The water balance during production years makes a number of assumptions. No net groundwater inflow to Batman Pit and the pit is assumed to contain 1799 ML of water at the commencement of the production phase. The rates of reclaim water and seepage outflow from the TSF have been determined independently of the Goldsim water balance. Diversion drains around the WRD are assumed to have been constructed and will divert 29% of catchment runoff away from the retention pond.

Some discrepancies exist between modelled and reported areas of development footprints for the Low Grade Ore Stockpiles, Batman Pit, to a lesser extent the Waste Rock Dump, and the proposed period of mine production. Underestimation of the development footprint of the pit will have a significant impact on expected inflow and this may affect assumptions regarding transfer rates to the WTP from the pit which may then impact transfers from other areas of the mine.

The results of a Goldsim post closure water balance indicate that water levels in Batman Pit are expected to reach equilibrium at a level of between 975 m and 977 m (169 m and 167 m below the 1144 m top of pit level). However, this assumes no groundwater inflow which recent investigations indicate could be up to 31L/s.

The results of a more recent water balance for the post closure period includes groundwater inflows (Tetra Tech, May 2013) and suggests that the pit lake water level will rise relatively rapidly following cessation of pit dewatering and reach equilibrium after 345 years at an elevation of approximately -15 mAHD. At this elevation the surface area of ponded water is expected have evaporation rates which balance inflows from rainfall and groundwater.

Stormwater Management

The Mt Todd Mine is traversed by four creeks which drain into the Edith River to the south of the mine. Horseshoe and Batman Creeks feed Stow Creek which borders the proposed TSF and then flows into the Edith River. Horseshoe Creek flows along the eastern boundary of the mine, Batman Creek flows through the centre of the mine and Burrell Creek flows along the south western corner of the mine.

Flooding along these creeks has the potential to encroach on storage embankments, plant, pit and other infrastructure. Hydrologic modelling in conjunction with 1-D hydraulic models has been used to extend the existing flood outlines from previous studies and to assess flood immunity and impacts on existing and proposed mine infrastructure, particularly storage embankments.



Flood modelling has shown that most of the existing mine infrastructure is located outside the 100-year ARI design flood extent of creeks passing through the mine area. The notable exceptions are the future TSF2 which encroaches on the area of flooding along Horseshoe Creek and Stow Creek, also the area of proposed Low Grade Ore Stockpiles and ROM which encroach on the flood extent of Batman Creek.

The design of the new TSF2 includes diversion channels and levees along Horseshoe Creek and Stow Creek to protect the embankment from flooding and erosion. Diversion channels have been designed for 100-year ARI flood events and comprise lined rip-rap channels with a width and length on Stow Creek of approximately 60m and 850m, respectively, and a nominal depth of 4.2m. The width and length of the diversion channel on Horseshoe Creek will be approximately 40m and 550m, respectively, with a nominal depth of 2.5m.

The existing TSF1 is protected from flooding along Horseshoe Creek by means of a creek diversion channel which modelling shows has sufficient capacity to accommodate the 100-year ARI design flood event.

Upgrade or re-design of existing drains and levees to protect areas of the processing plant against the 100-year ARI flood event along Batman Creek is required. Drainage across the processing plant site will be limited by the installation of cut-off drains to divert uncontaminated runoff from around the site and into Batman Creek via a settling pond. All stormwater runoff from within the site will be directed toward the existing drainage channel on the east side of the proposed process plant.

Run-of-Mine and additional Low Grade Ore Stockpiles will require collection ditches to capture runoff and seepage from stockpiles for conveyance to retention ponds. The location and quantity of runoff is not yet known and will need to be assessed during the design phase to determine the required channel and storage embankment height.

Mitigation includes diversion structures to limit the runoff from undisturbed areas of the mine and upstream catchments from reaching water containment and plant infrastructure. Diversions are also present upstream of the low grade ore stockpiles and around the HLP with the purpose of collecting runoff from these disturbed areas of the mine and directing it into storage ponds for transfer to the waste water treatment plant. Diversion drains have been constructed around the western and eastern margins of the WRD retention pond (GHD, Nov 2010) to divert uncontaminated runoff away from the pond and thereby reduce the risk of overtopping. Diverted water will report to local creeks downstream of the pond.

Overtopping of cross drainage structures and haul roads is likely to be an infrequent occurrence but upgrades to existing stormwater drainage, erosion and sediment controls, including the vegetation of verges, will be necessary to minimise damage during less extreme but more frequent storm events.

Locations where flood peak velocities are expected to exceed 2m/s and thus have the potential to cause scouring of unlined channels have been identified. Whilst the majority of these locations are sufficiently distant from mine infrastructure to be of no immediate risk, the section of Batman Creek adjacent to the processing plant is likely to experience high velocity flows during extreme flood events. Rip-rap protection to earthwork embankments adjacent to the existing drainage channel on the east side of the proposed process plant will be installed for channel protection. Sections of Stow Creek in the vicinity of the proposed embankment of TSF2 are also expected to experience high flow velocity during extreme flood events. Scour protection measures will include placement of rip-rap in association with proposed channel diversion works.

The following additional mitigation measures are proposed for the management of storm water runoff:



- ▶ Ensure flood immunity by siting mine infrastructure outside the 100-year ARI flood extent;
- ▶ The potential for contamination of receiving waters has been reduced by segregation of “clean” stormwater runoff from “dirty” stormwater runoff and the collection and treatment of “dirty” stormwater runoff from areas within the mine site;
- ▶ The amount of pit water needing treatment has been reduced by minimising the stormwater runoff entering the pit by construction of bunds around the pit perimeter;
- ▶ The amount of stormwater runoff from material stores has been minimised through appropriate design of batter slopes and drainage collection systems;
- ▶ During rainfall events that exceed the design capacity of water containment infrastructure, excess inflow may need to be redirected back into the active TSF up to the height of beached tailings or allowed to overflow to the environment. It is assumed that retention ponds have been designed to overflow whilst maintaining the safety of embankment structures.

Monitoring

Water monitoring stations are required to obtain the rate of surface water runoff entering and exiting the mine site to assist with the efficient operation of water management infrastructure and to demonstrate compliance with discharge licence conditions. In addition, it would be advantageous to obtain data that could be used to validate parameters used in water balance models; this would comprise storage levels, runoff from disturbed areas of the mine and pumping rates between storage infrastructure.

Monitoring has been carried out at a number of locations throughout the mine site. Whilst this provides valuable information for the operation of infrastructure its value to the long-term management and planning of water containment is often impaired by a lack of information on the duration and rate of flow. Recommended improvements to monitoring during operation of the mine include:

- ▶ Monitoring of water levels at locations on Batman Creek and Horseshoe Creek just upstream of mine infrastructure together with the derivation of stage – discharge relationships for existing monitoring sites just downstream of the mine site;
- ▶ Installation of hourly or continuous monitoring of water levels at the weirs downstream of the WRD would assist with the estimation of seepage rates from the waste rock dump. However, this information could also be obtained from existing monitoring of water levels in the retention pond so long as monitoring of transfers and any other outflows is carried out in tandem.



1. Introduction

1.1 Overview

Vista Gold Australia Pty Ltd (Vista Gold) proposes to re-establish and operate the Mt Todd Gold Mine, located 55km north of Katherine and 250km south of Darwin. The mine site is accessed via Jatbula Road (restricted mine access road), approximately 10km west of the Stuart Highway (the main highway between Darwin and Adelaide).

The Mt Todd Gold Mine site was most recently previously mined for gold in the 1990s. Mining operations ceased in the 2000s and have been in a care and maintenance phase since that time. Mining infrastructure such as tailings dams, WRDs, mine pit and remains of processing facilities remain on site.

The new mining operation will be by conventional open-pit truck and shovel methods, using large haul trucks, hydraulic shovels and front-end loaders to transport material to the crusher, ore stockpiles and waste dump facilities. Approximately 17.8 million tonnes per annum (Mtpa) of ore will be carbon in leach (CIL) leached leading to recovery of gold dore (unrefined gold). The CIL tailings will be detoxified and sent to an impoundment from which plant process water will be recycled.

A number of previous studies have investigated the design and operation of water management infrastructure, the most recent being Envirotech Monitoring's Mt Todd Water Management Plan 2011/12.

This report provides information in support of the Mt Todd Gold Project Environmental Impact Statement and addresses the Guidelines for the Preparation of a Draft Environmental Impact Statement, Mt Todd Gold Project Katherine Region, NRETAS (2011) i.e.

- ▶ Description of catchments, their boundaries, area and topography. Indicate location of infrastructure footprints;
- ▶ An estimate of the effects from current and future pits, water stores and operational processes on surface water distribution;
- ▶ Areas of inundation, drainage lines, surface-water flow directions, creeks and receiving waterways. Existing surface drainage patterns, flows (including flood level contours) and discharge rates;
- ▶ Size of drainage lines, creeks and waterways, and frequency of extreme rainfall events; and
- ▶ Describe the current surface water monitoring program, any proposed modifications to the program.

The report is based on the descriptions of the mine footprint as provided by Vista Gold Australia Pty Ltd and contained within the models:

- ▶ GoldSim Pro (Version 10.5) simulation software MtToddWB_Production_PFS_45K.gsm; and
- ▶ MtToddWB_LOM2011Update_Post-Closure_PPT_Chooser.

This report considers water management issues relating to the re-establishment and renewed operation of the mine. The report is divided into two main sections which:

- ▶ Assess the performance of water containment infrastructure; and
- ▶ Appraise stormwater management.



The operation of infrastructure to contain runoff from disturbed and undisturbed areas of the mine has been investigated by means of water balance models

Previous flood mapping studies are available and have been used to assist with the appraisal of stormwater management.

1.2 Key Elements of the Project

The key elements of the Project include:

Mining and Mining Infrastructure

- ▶ Extension of the existing Batman Pit from its current depth of 114m to approximately 588m and surface area of 40 hectares (ha) to approximately 137ha;
- ▶ Expansion of the existing waste rock dump (WRD) from a height of 24m to approximately 350m, and a footprint of 70ha to approximately 217ha. The dump currently contains 16Mt of waste rock and the expansion will provide total capacity of up to 510 Mt;
- ▶ Construction of a Run of Mine (ROM) pad and ore stockpile;
- ▶ Construction of an ANFO (Ammonium Nitrate and Fuel Oil (ANFO) Facility;
- ▶ Construction of heavy and light vehicle workshop and administration offices, and facilities comprising wash down area, tyre change facility, lube storage facility etc.; and
- ▶ Construction of haul roads and access roads.

Process Plant and Associated Facilities

- ▶ Ore Processing Plant capable of processing approximately 50,000 tonnes per day (tpd) of ore;
- ▶ Processing and / or reclamation of the existing low grade ore (LGO) stockpile and scats stockpile, and construction and processing of new LGO stockpile with a footprint of 25ha;
- ▶ Raising the existing tailings storage facility (TSF1) from 16m to approximately 34m;
- ▶ Construction of a new TSF2, approximately 300ha in area and up to 60m high;
- ▶ Diversion of Horseshoe Creek and Stow Creek adjacent to TSF2 to provide flood protection;
- ▶ Rehabilitation of the existing heap leach pad (HLP) if residual HLP material is not processed through the new plant;
- ▶ Chemical and reagent storage and handling facility; and
- ▶ Process plant workshops, administration offices, control room etc.

Other Infrastructure

- ▶ Gas fired Power Station, including re-routing of the existing gas pipe line;
- ▶ Anaerobic treatment wetlands, approximately 10ha in area;
- ▶ A 2m high raising of the raw water dam (RWD) and an increase in the area of inundation;
- ▶ Construction of saddle dams at the RWD and TSF1;
- ▶ Construction of three coffer dams at Retention Pond 1 (RP1) and deepening of RP1;



- ▶ 500 m³/h capacity water treatment plant;
- ▶ Security gate house;
- ▶ Potential re-alignment of access roads;
- ▶ Site wide drainage; and
- ▶ Modification to existing fuel storage and distribution facility.

The construction and operations workforces are expected to peak at approximately 450 and 350 personnel, respectively.

The Project, based on current known data, will have a life of around 19 years inclusive of construction, operations and closure. Construction is anticipated to commence in the first quarter of 2014 and take two years, including 6 months pre-production. The mine is scheduled to operate for a further 13 years. Closure and rehabilitation of the mine is expected to take four years.

2. Water Containment

2.1 Infrastructure

The mine site contains infrastructure including a mine pit, tailings dam, WRD and the remains of processing facilities together with a number of water storage retention ponds. A map showing the layout of existing and proposed infrastructure is shown in Figure 1.

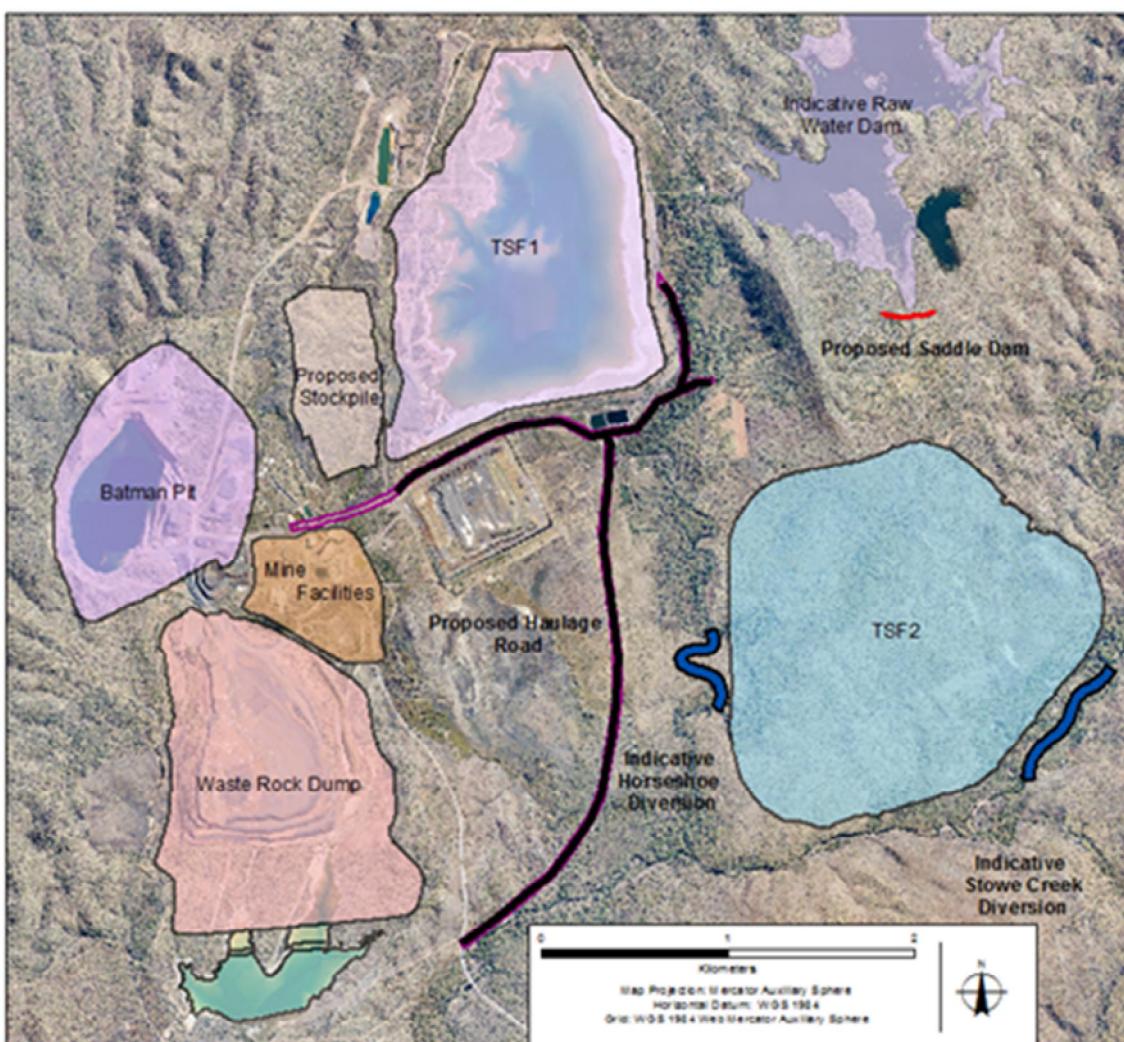


Figure 1 Mine Footprint

Source: Vista Gold Australia Pty Ltd, 2012.

The area of each development footprint is available from a number of sources and the values which have been used in the Goldsim model (MtToddWB_Production_PFS_45K) are listed in Table 1. Given the dynamic nature of mine planning a number of discrepancies exist between the parameters describing the latest known development and values contained within the water balance model. Its impact on the water balance has been highlighted where necessary.



Table 1 Development Footprints

Facility	Area (ha)
Waste Rock Dump	61 to 202.5 ^a
Low Grade Ore Stockpile	11.3 ^{a b}
Batman Pit	32.5 ^a
Heap Leach Pad	37
Plant, WTP, Operations and administration	22
Tailings Storage Facility TSF1 (RP7)	156.0
Tailings Storage Facility TSF2 (RP8)	300.0

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

Notes: ^a proposed maximum development footprints WRD = 217ha LGOS = 47ha Batman Pit = 137ha ^b excludes LGOS pad

The mine site consists of nine storage facilities which will store water as their primary or secondary function (Table 2) and a pipe/pumping network (Table 3) that aims to eliminate overflows from retention ponds to the downstream environment during all but extreme storm rainfall events. Whilst the pit is not strictly speaking a storage facility it has been included in the table.

Pit dimensions will change during the life of mine from a current depth of 114m (RL 74 m) to a final depth of 588m (RL -400m). The storage characteristics of the expanded pit during future development phases are shown in Figure 2. The results of Goldsim Model water balance modelling are available for the existing pit storage characteristics (pit area 32.5 ha), only.

Table 2 Water Storage Characteristics

Retention Pond	Storage Capacity (ML)	Maximum Storage Level (m)	Initial Storage Volume (ML)
WRD RP1	1226	1119.00	926.8
Low Grade Ore Pad RP2	10.4	1130.00	2.5
Batman Pit RP3	11970	1144.00	1799.1 ^b
HLP	67.5	1135.50	31.8
Stormwater Sediment Pond RP5	13.7	1128.00	3.1
TSF1 RP7	4680	1136.50	0
TSF2	unknown	unknown	unknown
Raw Water Dam	Infinite ^a	infinite	infinite
Equalisation pond	30 ^c	1128.00	0

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 Notes: ^a Goldsim Model assumes infinite storage source due to lack of reliable data to establish storage curve ^b based on output from Pre-production model which in turn relies on observed water elevations and dewatering rules based on current discharge permit (ref Tetra Tech memo 21/2/2013)

^c storage is reported to be equivalent to 5 days water treatment capacity (36 ML) but in fact is only 30 ML within the Goldsim model



Table 3 Pump Capacity

Source	Destination	Capacity (m³/h)	Time Scaling Factor applied to Pump capacity
WRD RP1	WTP	443	1
Raw Water Dam	Dust suppression	50	1
Low Grade Ore Pad RP2	WTP	266	0.3
Stormwater Runoff RP5	WTP	70	0.5
HLP Facility	WTP	194	1
Batman Pit RP3	WTP	443	1
Tailings Storage Facility TSF1	WTP	360	1
WTP	Dust suppression	50	1

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

Discrepancies exist between modelled and reported areas of development footprints for the Low Grade Ore Stockpile, Batman Pit and to a lesser extent the Waste Rock Dump. Inflow to their respective retention ponds comprises external catchment runoff, seepage from material stores (or pit wall runoff in the case of Batman Pit) and direct rainfall over ponds each of which involves a different method of calculation and magnitude of unit runoff depth. The greatest unit runoff is generated by direct rainfall over ponds and pit walls. These two sources exhibit 5 times the runoff depth per unit area than is generated by rainfall over catchment areas (surface runoff) or material stores (seepage).

The underestimation of pit area by the Goldsim model may result in an underestimate of the pit wall area and ponded water area whilst overestimating the area of catchment runoff. This will result in a significant underestimate of pit inflow due to the differences in unit runoff depth. Therefore a water balance on an expanded pit is likely to change the assumptions regarding required transfer rates to the WTP from the pit and possibly transfers from other areas of the mine.

The underestimation of the Low Grade Stockpile footprint is not expected to cause a significant impact on the water balance. As mentioned above seepage and catchment runoff have a similar unit runoff depth and therefore changes to the areas will not significantly affect the water balance.

Discrepancies in the final footprint of the Waste Rock Dump are of less significance to the overall water balance.

Diversion channels isolate runoff from undisturbed areas, such as the upper reaches of Horseshoe Creek and Burrell Creek, and thereby reduce the amount of water entering the mine site water management system (Table 4). Diversions are used to divert runoff from disturbed areas of the mine and direct it into water retention ponds. Other diversion structures are used to protect infrastructure by re-aligning the course of creeks and do not alter the water balance of the mine site e.g. proposed diversions along Horseshoe and Stow Creeks.

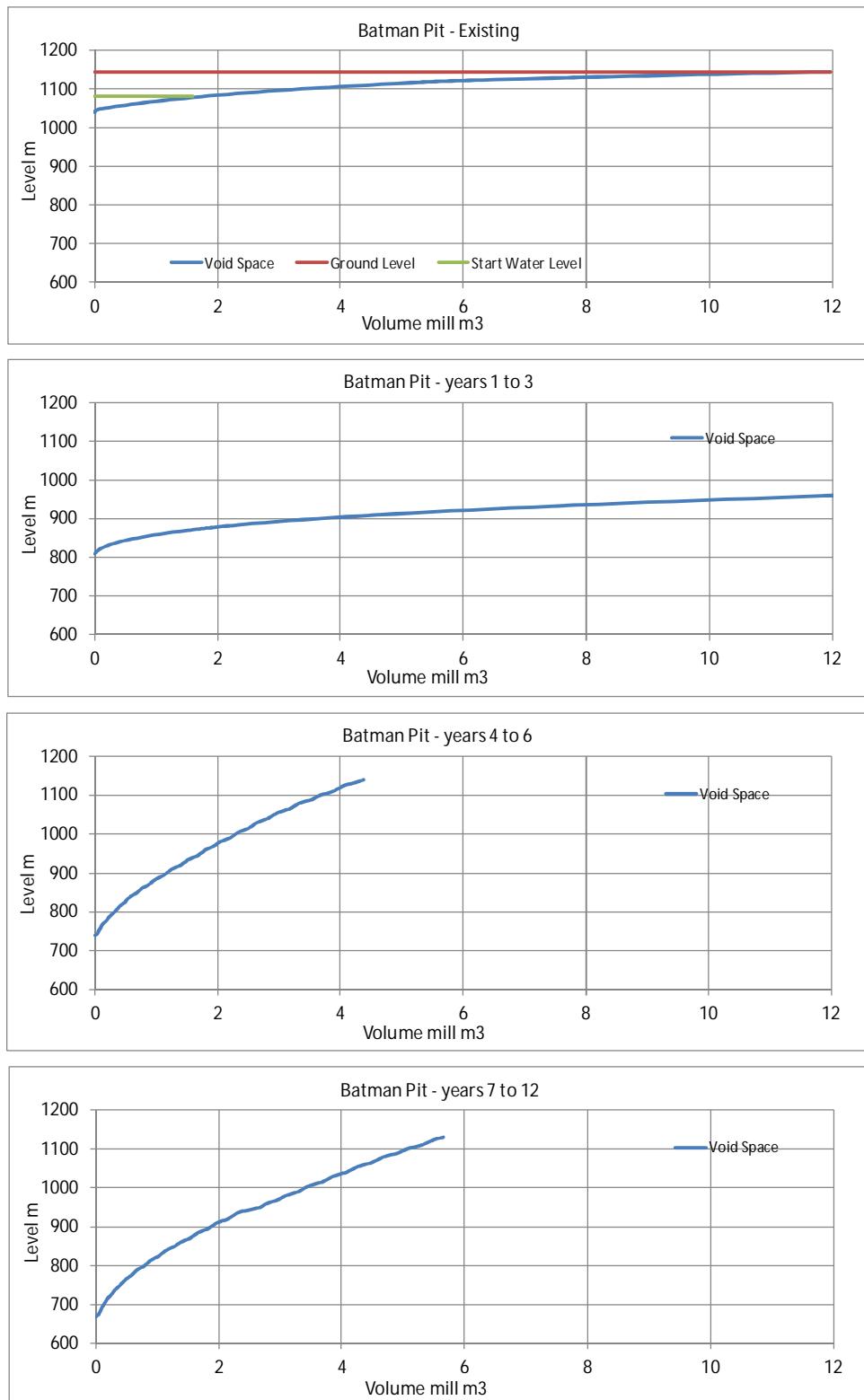


Figure 2 Batman Pit Void Space



Table 4 Creek Catchment Diversions

Creek	Location	Status	Capacity (m ³ /h)
Burrell Creek catchment	Western margin of WRD	Existing	Unknown
Burrell Creek catchment	West drain - WRD retention pond	Existing	29,160
Burrell Creek catchment	East drain - WRD retention pond	Existing	15,120
Batman Creek	Between Low Grade Ore Stockpile and its pond	Existing	Unknown

Notes: these diversions are limited to those that change the quantity of runoff in the downstream channel

Schematics of the layout of pipelines can be found in Figures 2-1 to 2-5 of 'Mt Todd Gold Project Water Management Update – Appendix I-M' (Jan 2011, Vista Gold). A summary of the water containment management system is given in Table 5 and aims to transfer excess water from all retention ponds to the equalisation pond at the WTP, so long as the equalisation pond is not in danger of overflowing. Treated water in excess of processing plant and dust suppression requirements is discharged to the Edith River. This means that retention ponds are allowed to overflow in exceptional circumstances.

Table 5 Water Management Operating Rules

Source	Destination	Rule
Burrell Creek	West Creek	WRD will progressively fill to occupy its own catchment thereby replacing catchment runoff with rainfall seepage.
Burrell Creek	West Creek	Runoff from 29 % of catchment and up to 10-year 24-hour storm volume will be diverted in drains around WRD retention pond.
WRD Pond (RP1)	WTP	Pump to WTP if Equalisation Pond freeboard is less than 0.5m threshold.
Low Grade Ore Stockpile Pond (RP2)	WTP	Pump to WTP if Equalisation Pond freeboard is less than 0.5m threshold.
Stormwater Sediment Pond (RP5)	WTP	Pump to WTP if Equalisation Pond freeboard is less than 0.5m threshold.
Heap Leach Pad (HLP)	WTP	Pump to WTP if Equalisation Pond freeboard is less than 0.75m threshold.
Batman Pit (RP3)	WTP	Pump to WTP if Equalisation Pond freeboard is less than 0.5m threshold.
WTP	Batman Creek/Edith River	Discharge water in excess of processing plant and dust suppression requirements via monitoring pond (pond not modelled in Goldsim).

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013



It is understood that in exceptional circumstances water can be temporarily transferred to the TSF should retention ponds be in danger of overflowing and there is insufficient capacity in the WTP. This option was not included in the Goldsim water balance.

2.2 Climate

The production phase water balance model has been set up to run with a stochastic precipitation model which is able to generate multiple sequences of daily rainfall covering the life of mine production (12 years). This provides an envelope of expected conditions representative of overly dry years ranging to overly wet years.

The stochastic model uses a Weibull distribution with a slope parameter value of 1 that causes it to collapse to an exponential distribution. The distribution is defined by a minimum daily rainfall of 0 mm; a mean daily rainfall based on defined mean monthly rainfall totals for the wet season (Table 6) factored upwards by 1.2 (dry season rainfall is 0 mm); and, a maximum daily rainfall of 257 mm which is the 100-year 24-hour design storm rainfall (source published Bureau of Meteorology IDF database). Rainfall is generated for randomly determined durations with a target mean length of 3 days and a defined target probability of occurrence (Table 6). The source of mean monthly rainfall values and target probabilities is not stated but it is assumed to have been extracted from historical on site rainfall records. It has been stated by Tetra Tech that on-site records (1993 to 2010) have been in-filled and extended using adjusted records from Katherine (rainfall increased by 19%).

Table 6 Stochastic Rainfall Model Parameters

Parameter	October	November	December	January	February	March	April
Mean Monthly Rainfall ^a (mm)	35	111	239	292	259	193	38
Expected Probability	0.12	0.26	0.44	0.49	0.52	0.36	0.13

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013. Notes: ^a rainfall is multiplied by 1.2 in model

The relatively low variability in evaporation permits the use of mean monthly pan evaporation adjusted by a pan factor of 0.9, which delivers a slightly conservative estimate. The Goldsim model contains data representing three alternative climatic conditions termed; dry, average and wet (Table 7). However, the model has been run using an average climatic condition where annual evaporation is 2574 mm. The source of evaporation data is not stated but it is believed to be based on mine site records.

Table 7 Mean Monthly Evaporation

Scenario	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Dry (mm/day)	7.3	8.5	8.7	9.0	8.5	8.2	8.2	7.5	6.3	4.9	5.5	5.7
Ave. (mm/day)	7.0	8.1	8.6	8.5	8.2	7.7	7.6	6.9	5.9	5.1	5.3	5.8
Wet (mm/day)	6.6	7.8	8.7	8.6	7.6	7.6	7.8	6.6	5.5	4.8	4.7	5.5

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 Notes: ¹ rainfall is multiplied by 1.2 in model



A post closure phase water balance model (Goldsim model - MtToddWB_LOM2011Update_Post-Closure_PPT_Chooser) contains the following two options for representing future rainfall conditions both of which are based on a rainfall sequence developed from the record at Katherine and updated with recent site records:

- ▶ Sampled over the entire 137-year record (1873 to 2012) and repeated approximately 4 times to achieve a 600 year period; and
- ▶ Sampled over the most recent 20-year subset of the 137-year sequence and repeated 30 times to achieve a 600 year period.

Rainfall data does not include any adjustment for climate change as there is no official means of adjusting long term sequences of daily rainfall.

A daily sequence of evaporation has been compiled from monthly evaporation which is believed to be based on mine site records. A pan factor of 0.78 has been used to adjust the data to rates of evaporation from an open water surface.

The mean annual rainfall for the period 2010-2030 at the mine site is 1280 mm and the mean annual potential evaporation is 2470 mm (excluding pan factor of 0.78). Including the pan factor of 0.78, adjusted evaporation becomes 1926.6 mm annually.

It has been suggested that storm rainfall during recent wet seasons has been in excess of a 100-year ARI and is therefore likely to exceed the design criteria of most water management infrastructure on the site. Examination of rainfall records show that the total wet season rainfall between Nov 2010 and May 2011 was only the 5th highest at Katherine (available record 1873 to 2012 at gauge number 14902) which equates to about a 30-year ARI (using Log Pearson distribution), whilst the following wet season was only the 63rd highest out of the 139 year record at Katherine and has a more frequent 2-year ARI. In terms of monthly rainfall, December 2010 has a total that is equivalent to about a 5-year ARI and December 2011 is more frequent than this ARI. It is possible that shorter duration rainfall events were more extreme in terms of frequency of occurrence. However, major water storage infrastructure is likely to be designed for the containment of at least monthly and preferably wet season rainfall which records at Katherine suggest was not as extreme as suggested for these longer durations in 2010 and 2011. Shorter duration rainfall is of more consequence to water conveyance infrastructure and it is possible that channel capacities and smaller storages (RP2 and RP5) may have been exceeded by short duration high intensity rainfall events in the 2010 and 2011 wet seasons.

2.3 Surface Runoff

Runoff is captured in retention ponds from a significant area within the mine lease boundary (Table 8) and has been represented within the water balance model by means of the USDA Curve Number method. Land use and the characteristics of soil texture are used to select a 'curve number' which is input to empirical formulae to calculate the depth of runoff from daily rainfall and evaporation. Curve numbers for the mine site vary between 80 and 95 and were calibrated by previous studies using rainfall and runoff records for the period October 2008 to September 2010 (Tetra Tech memorandum Dec, 2010). Curve numbers have recently been checked using site conditions and processes as they occurred in real time from 2008 to present and synthetically extended to October 2012 (Goldsim Model MtToddWB_Calibration Model_20120518_FINAL - Vista Gold Australia Pty Ltd, 2012).



Table 8 Catchment Areas for Retention Ponds

Retention Pond	Catchment area [ha]
Waste Rock Dump RP1 – Production start to end	177 to 35
Low Grade Ore Pad RP2	32
Stormwater Sediment Pond RP5	33
Batman Pit RP3 – including pit and pit walls	24
Raw Water Dam ^a	-
Total	266 to 124

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

Notes ^a RWD is modelled as an infinite resource

The calibration of curve numbers relies on water balance calculations using detailed records of inflows, outflows and changes in pond storage. The absence of continuous records of flow rates through pipelines and the coarse time resolution of water level records at weirs prevent an accurate appraisal of curve numbers.

Whilst it is reported that flows within the Edith River have been modelled by the Australian Water Balance method (AWBM) this information is not used by the model as controlled discharges only occur from the water treatment plant and are therefore not controlled by the dilution capacity of the Edith River.

The AWBM model rainfall – runoff parameters (Soil storage capacity = 50, BFI = 0.1, Ks = 0.25 and Kb = 0) were obtained by calibration using an unspecified set of observed Edith River flows, rainfall and evaporation records. The performance of the calibrated model has been reported to be generally conservative (lower than observed flow) in terms of simulated flow especially for baseflows. It is also reported that the "...the ratio of annual totals between observed and modelled results equal to 1.2" (Tetra Tech memo 14/1/2013).

The capacity of water storage facilities to contain runoff from mine affected areas has been investigated by water balance modelling and the results summarised in Section 2.8. The combined mean annual inflow to retention ponds has been estimated from the 100 x 12 year stochastic simulations to be 2.6 GL/year.

2.4 Seepage

Seepage occurs from the WRD, HLP and Low Grade Ore Stockpiles and is modelled in the water balance as a proportion of daily rainfall lagged by a specified number of days (Table 9). No description of the method to obtain these parameters by previous studies has been found.

Estimates of seepage from the WRD can be derived from the water level records at v-notch weirs located downstream of the dump. However, a relationship between seepage and rainfall requires the comparison of flow at the v-notch weir with coincident records of rainfall over the WRD. A comparison has not been made due to the difference in time resolution between the two records. Water levels at the v-notch weirs are recorded once daily whereas rainfall is monitored continuously.



Table 9 Seepage Parameters

Facility	Parameters		
	Proportion of rainfall	Lag time (days)	
Waste Rock Dump	uncovered	0.25	30
	covered	0	0
Heap Leach Pad	uncovered wet season	0.8	25 – 65
	uncovered dry season	0.5	25 – 65
Tailings Storage Facility 1	uncovered	^a -	^a -
Low Grade Ore Stockpiles	uncovered	0.25	0

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

Notes: ^aestimated as 10% of reclaim water

The HLP may be decommissioned in the first year (if ore is not re-processed), and a decay function attempts to simulate the achievement of a steady-state infiltration. After a period of time the amount of water seeping into the pile reaches equilibrium as the pad dries out. An estimate of the time it takes to reach this equilibrium is obtained from a decay function using a factor of -0.46, and achieves an infiltration rate equal to 10% of the initial rate after 10 years.

Seepage from the tailings storage facilities (existing and future) will be transferred to the water treatment plant. A SeepW finite element analysis was carried out by a previous study (Tetra Tech memorandum, Sep 2010) to determine seepage rates from the existing TSF. Seepage rates from the future TSF have been scaled from those determined for the existing TSF. The water balance assumes a seepage rate equal to 10% of reclaimed water is sent to the WTP and values are given in Table 10. The remaining volume of reclaimed water is sent to the processing plant.

Groundwater seepage in to, or out of, the pit has not been included in the water balance of the mine. A recent study indicates that "Predicted groundwater inflows ranged from a few litres per second at the start of mining to approximately 31 L/s during the final months of mining" (Section 6.2.1 'Mount Todd Gold Project, Hydrogeology'. Tetra Tech. May 2013). The exclusion of groundwater inflows to the pit may alter the assumptions regarding required transfers to the WTP.

The ability of water storage facilities to contain seepage inflow from mine dumps and stockpiles has been investigated by water balance modelling and results are summarised in Section 2.8. The combined mean annual seepage has been estimated from 100 x 12 year stochastic rainfall simulations to be 0.8 GL/year.

2.5 Tailings Reclaim Water

Table 10 lists the estimated quantity of water that is expected to be reclaimed from the TSF for use in the plant. Any residual plant water requirement will be made up by transfers from the Raw Water Dam.



Table 10 Tailings Reclaim Water

Year	Estimated Reclaim Water from Tailings during Dry and Wet Seasons (m ³ /day)
1	0
2	0
3	9600 - 19200
4	9600 - 19200
5	9600 - 19200
6	9600 - 19200
7	9600 - 19200
8	10200 - 19200
9	10200 - 19200
10	10200 - 19200
11	10200 - 19200
12	10200 - 19200
13	10200 - 19200
14	10200 - 19200
15	10200 - 19200

Source: Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

The TSF will comprise two dams. The existing dam (TSF1) will be raised in six stages to a level approximately 34m above ground level. A second dam (TSF2) will be constructed to the south east and will have a height of about 60m above ground level.

The projected heights of the TSFs as they are raised to accommodate the volume of tailings over the life span of the mine production phase were previously investigated by water balance models (HydroGeoLogica, December 2010). No description of the water balance models is known to exist and it is assumed that one model (Water Balance_12-08-10_BIG.xls, HydroGeoLogica 2010) represents TSF1 up to production year 7 and the second model (Water Balance_12-08-10_100MT.xls HydroGeoLogica 2010) represents TSF2 for production years 7 to 17. It is assumed that the TSF water balance models have been updated with the latest mine development information.

2.6 Water Demands

2.6.1 Construction Phase

Water will be sprayed onto unsealed roads to suppress dust by means of water carts. It is assumed that this will be treated water of an acceptable quality or failing this supplied directly or indirectly from the Raw



Water Dam. Also, potable water will be required for an expected workforce of up to 450 people (estimated rate of 45 m³/day based on assumed consumption of 100 L/person/day).

The capacity of the raw water dam should be more than sufficient to meet water demands during the construction phase.

2.6.2 Operational Phase

A new ore processing plant will be constructed and its water requirements are estimated to be 24,230 m³/day (30,000 tpd production) for the first three years and thereafter 36,409 m³/day (45,000 tpd production) (source Tetra Tech memo, 14/1/2013 and Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013) (The actual water demand for the processing plant based on a production of 50,000tpd is 30,000m³/day). 16% of this amount is assumed to be needed for elution/potable (Tetra Tech Memo 14/1/2013). Raw water will be utilised for crusher sprays, reagent make-up, potable water production, process water make-up, gland water, filter plant seal water make-up, and fire water reserve. The processing plant demand is scheduled to be supplied from one or more of the following sources whilst elution/potable would be supplied from the Raw Water Dam:

- ▶ TSF reclaim water
- ▶ Water Treatment Plant
- ▶ Raw Water Dam.

A small quantity of water will be required for fire-fighting purposes and for use by on-site personnel in the plant and control area (35 m³/day and 1.7 m³/h, respectively). Water will be obtained from the Raw Water Dam and treated via filtration, chlorination and ultra violet sterilisation at an on-site facility.

Water is also required for cooling purposes in the electrical power generation plant and its quantity is estimated to be about 20 m³/h.

The demand for water for the purpose of dust suppression is estimated to vary between 220 m³/day and 1153 m³/day (Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013) depending on the season and is supplied from the WTP in the first instance and thereafter from the RWD.

The capacity of water storage facilities to meet water demands for the abovementioned purposes has been investigated by water balance modelling and its results are summarised in Section 2.8.

2.7 Water Balance Modelling

2.7.1 Available Models

The operation of infrastructure to contain runoff from disturbed and undisturbed areas of the mine has been investigated by means of water balance models.

Previous studies have created a number of water balance models which are largely independent and focus on different phases of the mine's life cycle. The exception is the use of outputs from the spreadsheet models of the TSF, which calculate the demand for plant make-up water, and its input to the production phase Goldsim model. Available models consist of:



1. Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 – this updated version of a previous Goldsim Model - MtToddWB_LOM2011Update_Phase1&2_120118b_FLOW simulates the performance of water containment infrastructure during the production phase of the mine's life cycle (the model outputs results for a 12 year period).
2. Spreadsheet Models - Water Balance_12-08-10_100MT.xls and Water Balance_12-08-10_BIG.xls – both models are restricted to an assessment of the performance of tailings storage facilities during the production phase of the mine's life cycle i.e. dam crest level requirements and plant make-up water.
3. Goldsim Model - MtToddWB_LOM2011Update_Post-Closure_PPT_Chooser.gsm is an update of a previous model MtToddWB 10.6Mtpy Post-Closure 12Dec2010.gsm and focuses on quantifying the treatment stream during the post closure phase of the mine's life cycle.
4. A further model is available for the pre-production phase (previously defined as October 1, 2012 to August 1, 2014) - MtToddWB_PreProduction_20120523_Final. The model is used to assess the dewatering time for RP3, water treatment for ponds RP3, RP7 and RP1 and the frequency of overtopping events during the pre-production phase. The model uses wet, dry and average climate scenarios. The wet scenario is based on rainfall for the year 2011/12 and Edith River flows from the year 2008/09 with the data repeated for each of the two years of simulation. Years with the driest and average rainfall were determined from a synthetic rainfall record (length 2000-10). The chosen scenarios are largely synthetic due to the mixture of data source time lines and the repetition of data in successive years and this makes an assessment of the severity of the scenarios by statistical frequency analysis, problematic.

The updated production phase water balance model (Goldsim Model MtToddWB_Production_PFS_45K) is described in Tetra Tech memo 14/1/2013 and by comments within the code of the model. A previous Goldsim model of the production phase was documented in the following reports:

- ▶ 'Mt Todd Water Balance - Care and Maintenance Model Calibration and Forward Modeling Predictions', Hydrogeologica and Tetra Tech, December 2010; and
- ▶ 'Mt Todd Mine Life Water Balance, 10.6 Mtonnes/year Mine Plan', Hydrogeologica, December 2010.

A more recent water balance has been carried out by Tetra Tech and is summarised in Mt Todd Gold Project, Hydrogeology, May 2013. The water balance covers a 500-year period representative of the post closure phase of the mine and focuses on inflows and outflows to Batman Pit including groundwater inflow.

A brief description of available water balance models is given in the following sections and the simulation results from the models are summarised in Section 2.8.

2.7.2 Production Phase Goldsim Model

The Goldsim model represents the daily containment and transfer of rainfall, seepage and runoff from catchment areas during the production phase of the mine (12 years) using stochastically generated daily rainfall sequences. The assumed mine production period differs from the latest proposal which is for a 13-year production period. Given the use of a probabilistic approach to rainfall it is considered unlikely that the extension of the simulation would significantly alter the study outcome.

The stochastic model differs from those proposed for use in Australia by eWater (Stochastic Climate Library) but it is beyond the scope of this report to assess the significance of any differences resulting



from the application of the selected stochastic model. The following is a brief description of the main components of the model:

- ▶ The model assumes that the water treatment plant is implemented within the first year of mine production. Transfers to the water treatment plant equalisation pond from the TSF (reclaimed water and seepage), WRD retention pond, low grade ore pond, stormwater retention pond, Batman Pit and the HLP retention pond (seepage) are determined by the model using inputs of daily climate data, rainfall-runoff coefficients and required freeboard criteria. Transfers to the equalisation pond proceed so long as water level remains below the prescribed freeboard within the equalisation pond otherwise uncontrolled discharges from retention ponds throughout the mine are permitted. The size of the water treatment plant equalisation pond has been determined by model simulation to reduce the risk of overflows.
- ▶ The model relies on an external calculation of available reclaim water from the TSF. Outflows of seepage and reclaimed water from the TSF are obtained from a SeepW analysis which was carried out by previous studies and the output from a spreadsheet water balance model described in Section 2.7.3. It is assumed that the spreadsheet models have been updated in tandem with the Goldsim model to be representative of the latest mine development plan.
- ▶ Water supply from the RWD is assumed to be infinite due to the problems encountered in calculating a storage curve because of uncertainties in topographic data for the storage basin.
- ▶ The HLP may be closed at the beginning of the production phase and seepage flows which are transferred to the water treatment plant are reduced accordingly.
- ▶ Modelling of Batman Pit assumes that groundwater inflows and outflows are negligible and are not included in the water balance. Recent work by hydrogeologists indicates that average groundwater inflow could vary between a few litres per second and 31 L/s over the production period of the mine. Model simulations for the production period commence with a pit water level equivalent to about 1.8 million m³ (1081 m) which is about 15% of the reported maximum volume of 12 million m³ (1144 m). The selected start level is reported to have been obtained from the results of the Pre-production Goldsim model.
- ▶ Water in excess of processing plant and dust suppression requirements is pumped from the WTP via a monitoring pond to Batman Creek/Edith River throughout the year.

Validation of the water balance model has involved comparison of the date, layout and operation of water containment infrastructure with reported information. The absence of continuous records of transfers between water management facilities, together with periodic rather than continuous recording of runoff from disturbed areas (e.g. v-notch weirs downstream of WRD) have prevented a meaningful validation of rainfall-runoff coefficients or seepage rates.

2.7.3 Production Phase Spreadsheet Model of TSFs

Spreadsheet models represent a monthly water balance of inflows to the existing and future tailings storage facilities comprising dry tailings, entrained water and rainfall, and outflows comprising evaporation and reclaim water. Models representative of simulations carried out in the past were available for review and represent the period of mine production.

The primary output of the model is a time series of the dam crest levels that will be required to contain projected inflows of dry tailings and entrained water, together with output of the quantity of accumulated



free water during each month of the production period. Also available are time series of simulated monthly volumes of dry tailings and entrained water within both tailings storage facilities (TSF1 and TSF2), together with the surface area of free water and its distance from the dam.

Outputs which are available for use in Goldsim model water balances comprise free water volume at the time of closure of both tailings storage facilities, also the plant water requirement for the calculation of make-up water demand on the equalisation pond during times when the raw water dam is empty.

Two spreadsheets are available (Water Balance_12-08-10_100MT.xls and Water Balance_12-08-10_BIG.xls) and represent the staged construction of storage capacity (embankment lifts) during the following periods:

- ▶ Oct 2012 to Jul 2018 – representing six 'lifts' (2012, 2014, 2015, 2016, 2017, 2018); and
- ▶ Aug 2018 to Jan 2028 – representing four 'lifts' (2018, 2019, 2022, 2025).

There appears to be no formal documentation for the spreadsheet models.

The model contains mean monthly values of rainfall and evaporation (adjusted by a constant pan factor of 0.72) which are recursively applied in each year of the simulation to calculate the volume of free water. A Probable Maximum Precipitation (PMP) 24-hour storm volume has been included in the water balance to assess dam crest elevation requirements. No seepage into or out of the tailings storage facilities has been included. The model appears to assume that seepage inflows and outflows are balanced.

A catchment and impoundment area of 75.318 ha is assumed for the existing TSF which excludes the proportion (~70%) of the Horseshoe Creek catchment that is diverted around the eastern side of the facility. An area of 1.65ha has been used for the future facility.

Tailings production is defined within the model for the purposes of calculating the volume of dry tailings and entrained water. Monthly production has been pro-rated from an annual value of 10,650,000 tonnes (Tom Dyer, MDA, Oct 2010). The slurry solids by weight is assumed to be 50%.

Water use by the plant is assumed to be 1,536m³/h (Tom DeMull, Nov 2010) less reclaim water which varies between 500m³/h and 1,000m³/h. The tailings water facility does not include inflows from the water treatment plant.

The model contains storage curves for various levels of tailings deposits ranging between 133.5m to 158.0m in the first TSF1 (RP7) and 118.0m to 183.6m in the second TSF2 (RP8). No details are available regarding the source of this data and it is therefore assumed to be correct.

The lack of formal documentation regarding the source of model contents hampered a thorough validation of the models.

Model assumptions regarding the balance of seepage inflows and outflows along with the source of information used to compile storage curves, tailings production and water use data have not been reviewed. Given the changes to mine development it is assumed that the reviewed spreadsheet models have been superseded and that the required data for input to the Goldsim water balance model relating to TSF reclaim water has been obtained from an alternative source.



2.7.4 Post Closure Phase Goldsim Model

This Goldsim model estimates the annual treatment stream during the post closure phase of the mine's life cycle determined over a period of 600 years. It is unclear why this particular length of simulation was chosen. The treatment stream comprises:

- ▶ Seepage flows from the WRD;
- ▶ Seepage flows from the HLP; and
- ▶ Seepage flows from TSF.

Runoff from the low grade ore stockpiles and the plant area are not included, presumably because these areas will be decommissioned and allowed to drain untreated into Batman Creek.

The model has been implemented within Goldsim and uses a monthly time step. Some model details are given in 'Mt Todd Mine Life Water Balance – 10.6 Mtpy Mine Plan', Hydrogeologica, December 2010.

The model contains daily values of rainfall and evaporation (adjusted by a constant pan factor of 0.78) for two alternative periods of 137 years and 20 years. The user can recursively apply either period of daily values to achieve a simulation of 600 years. It is unclear why these periods are applied recursively as other model inputs are fixed and thus the response of the system does not change after the first period of simulated rainfall.

Climate change is an emerging issue and the effects are, at this stage, complex to quantify. The absence of a representation of the year on year variability in rainfall or the effects of climate change prevent a robust assessment of water management performance or an assessment of specific drivers to mitigate climate change.

The water balance of Batman Pit includes runoff from the pit walls and is modelled as a percentage (75%) of rainfall. This is a conservatively high runoff factor commensurate with the purposes of the water balance in determining potential overflows from the pit. The calculation of the exposed area of pit wall takes into account the changing water level in the pit.

Surface runoff and seepage flow from the WRD are modelled by means of a combined runoff factor which specifies that during the wet season (November to April) outflows amount to 5% of rainfall and will take 30 days to reach the WRD outlet. It is assumed that seepage during the dry period is insignificant.

Surface runoff and seepage from the HLP is also modelled as a combined percentage of rainfall. It is assumed that 5% of rainfall would drain from the pad during all months and take between 25 and 65 days to reach the outlet. It is understood that these values were obtained by model calibration (Tetra Tech memo, Dec 2010).

A SeepW finite element seepage analysis has been carried out (Tetra Tech memo, Sep 2010) to determine rates of seepage from the first TSF1 (RP7). Seepage rates from the second TSF2 (RP8) have been scaled from these rates. Given the changes to the design of the second TSF2 estimates of seepage may need to be revised.

The potential for overflows from Batman Pit are assessed by means of a daily water balance of inflows (rainfall over water surface and runoff from pit walls) and outflows (evaporation from water surface). Groundwater inflows and outflows are assumed to be negligible and have not been included. Recent work by hydrogeologists indicates that average groundwater inflow could vary between a few litres per second and 31L/s.



The simulation makes the assumption that 5.09 million m³ of water will be present within the pit at the beginning of the simulation. The model shows the pit as having a maximum storage capacity of just over 222 million m³ and a maximum footprint of 117.4ha. This differs from the latest proposed footprint of 137ha and will therefore cause an underestimation of pit inflow. However, it is unlikely to significantly alter the outcome of the water balance.

The lack of records for transfers from the HLP pond make further checks on the validity of seepage rates and response times problematic.

2.7.5 Post Closure Phase Tetra Tech Groundwater Model

A recent water balance involving the simulation of groundwater inflows to Batman Pit during a post closure period of 500 years has been carried out by Tetra Tech, May 2013.

Modelling has represented inflows to the pit from groundwater seepage, direct rainfall and runoff from pit walls. Evaporation from the ponded surface represents the only pit outflow. Details of the extent of pit excavation and areas of external catchment, pit wall and ponded surface are not provided. Groundwater inflows were obtained from the results of a MODFLOW groundwater model.

The lack of details regarding the extent of excavated pit makes a comparison with the results of Goldsim modelling problematic. Given that this modelling was carried out more recently it is assumed its results will be more representative of the latest mine development plan.

2.8 Summary of Water Balance Results

It has been assumed that the proposed system will consist of infrastructure and operations in line with those described in Table 5 of this report as represented by the contents of available water balance models. Some discrepancies exist between modelled and reported areas of development footprints for the Low Grade Ore Stockpile, Batman Pit, to a lesser extent the Waste Rock Dump, and in the expected period of mine production. Differences in the development footprint of the pit will have a significant impact on expected inflow and may alter the assumptions regarding transfer rates to the WTP from the pit which may then impact transfers from other areas of the mine.

The following summary of water management performance during the production phase is extracted from the Goldsim Model - MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 and is based on probabilistic output (100 x 12-year daily sequences). No assessment regarding the validity of the stochastic rainfall generation model has been made.

The performance during post closure is obtained from the Goldsim model – ‘MtToddWB_LOM2011 Update_Post-Closure_PPT_Chooser, July 2012.

2.8.1 TSF Production Phase

Available water reclaim rates during the dry season increase slightly from 9,600 m³/day to 10,200 m³/day after seven years and is assumed to reflect the change from TSF1 to TSF2. Wet season water reclaim rates remain constant throughout the production period (19,200 m³/day). Ninety percent of this total is transferred to the equalisation pond and 10 percent is sent directly to the WTP (Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013).



2.8.2 TSF Post-closure Phase

Water reclaim rates from the future TSF1 are estimated to vary between 6.5 m³/day and 52.5 m³/day whilst those of TSF2 will vary between 25 m³/day and 176 m³/day. This water will need to be transferred to the water treatment plant until a passive treatment cell has been constructed.

2.8.3 Water Containment Facilities - Production Phase

An equalisation pond with a capacity of 30,000 m³ in association with a WTP rate of 300 m³/h (years 1 to 3) and 500 m³/h (years 4 to 12) is sufficient to receive transfers from the WRD retention pond (RP1), low grade ore retention pond (RP2), stormwater sediment pond (RP5), TSF1/2, HLP and Batman Pit (RP3) to prevent uncontrolled overflows from these facilities and the equalisation pond during normal operation. However, the model results show instances of overflow at the WRD retention pond (RP1), low grade ore retention pond (RP2) and stormwater sediment pond (RP5) (Table 14). This is most likely the result of insufficient pump capacity on pipelines to the equalisation pond during high intensity rainfall events. The water management strategy leading up to and during extreme peak rainfall is likely to invoke different operating rules to those that are represented in the Goldsim water balance which are representative of normal operating conditions. This could involve measures such as the temporary transfer of excess water to the TSFs.

Overflows from the stormwater sediment pond (RP5) are to be expected given its function as a sediment trap rather than a water retention pond.

Overflows from the WRD retention pond (RP1) are less likely during later years of production because the WRD progressively fills the catchment and surface runoff is replaced by less intense seepage flow.

A maximum storage capacity in the HLP of 67,545 m³ is assumed by the water balance model and the model indicates a number of spills during the first three years. After year 3 the model estimates a maximum storage of only 7,615 m³ is utilised on any one day which reflects the decommissioning and the consequent reduction in seepage inflow.

2.8.4 Water Containment Facilities - Post-Closure

Seepage rates from the WRD are estimated to range between 0 and 2304 m³/day and will be treated at the water treatment plant until a passive treatment cell has been constructed.

Water levels in Batman Pit are estimated to rise over a long period of time before reaching equilibrium (Figure 3) at which point evaporation balances inflow from groundwater, surface runoff and rainfall.

The results of a Goldsim water balance indicate that water levels in Batman Pit are expected to reach equilibrium at a level of between 975 m and 977 m (169 m and 167 m below the 1144 m top of pit level). However, this assumes no groundwater inflow which recent investigations indicate could be up to 31L/s.

The results of a more recent water balance for a 500 year post closure period which included groundwater inflows of between a few litres per second and 31 L/s show that "...pit lake water level rose relatively rapidly following cessation of pit dewatering and after 345 years had reached approximate steady-state at an elevation of approximately -15 mAHD and with the water surface covering an area of approximately 656,250 m² (65.625 ha). Starting at that time, the modelled water surface elevation fluctuated between approximately -15.054 and -14.941 mAHD" (Section 6.2. Tetra Tech. May 2013).

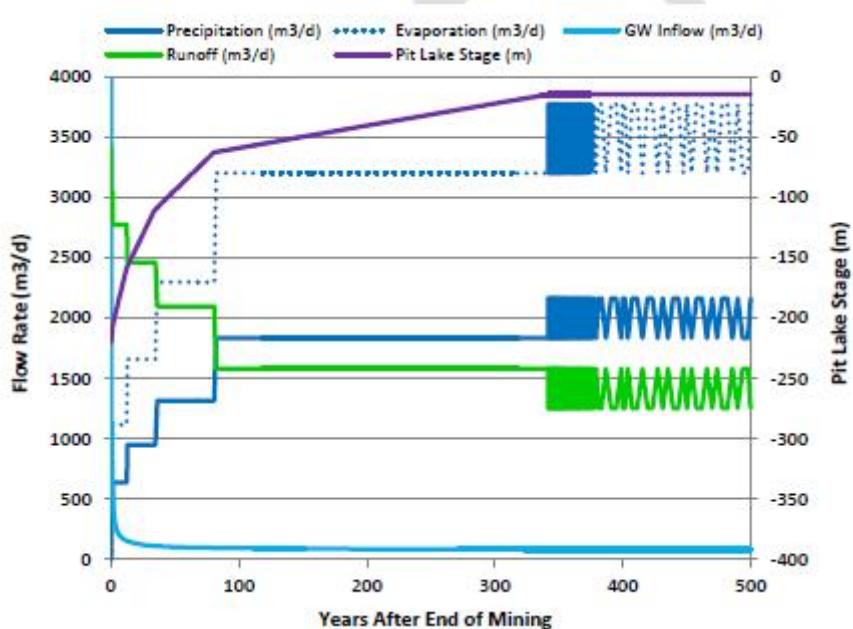


Figure 3 Simulated Post Closure Water Levels in Batman Pit (Tetra Tech May 2013, Figure 6.5)

2.8.5 Water Supply - Construction Phase

No details have been found but water demands are expected to be relatively small and given the relatively large size of the raw water dam are expected to be met without difficulty.

2.8.6 Water Supply - Production Phase

Water demands comprise mainly of the requirements for:

- ▶ processing - 24,230 m³/day for years 1 to 3 and 36,409 m³/day for years 4 to 12; and
- ▶ dust suppression – average daily demand of 562 m³/day where the monthly demand has a maximum of 1153 m³/day in July/August and a minimum of 220 m³/day between November and March.

A schematic of the mine infrastructure and transfers associated with the supply of these demands is shown in Figure 4.

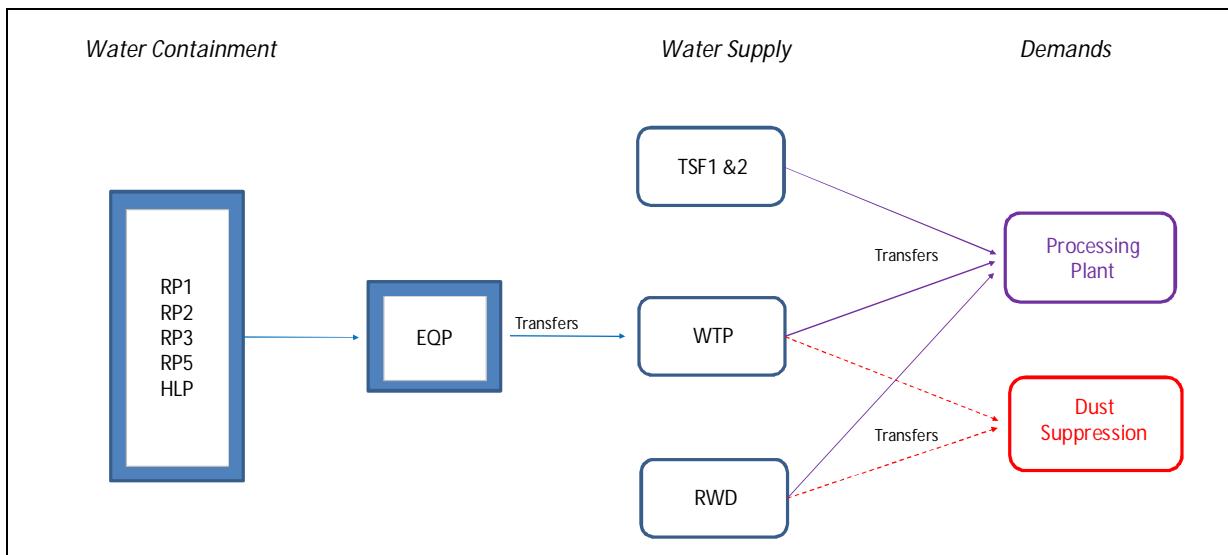


Figure 4 Schematic of Mine Water Supply System

The simulated minimum and maximum daily rates of supply to meet processing plant and dust suppression demands are summarised in Table 11 and Table 12. The results have been extracted from 100 simulations of stochastically generated 12 year sequences of daily rainfall input. Therefore, maximum or minimum values for each water source do not necessarily occur on the same day and thus the values from individual resources do not necessarily add up to the reported combined inflow total.

The simulation results confirm that processing plant water demands can be supplied without failure by a combination of supply from the WTP, RWD (assuming an infinite resource) and reclaim water from the TSF. The WTP contributes a minimum daily flow of 6,950 m³/day during years 1 to 3 and 12,000 m³/day during years 4 to 12. Shortfalls in the processing plant demand are made up by transfers from the RWD and/or TSF at maximum rates of 17,030 m³/day and 17,280 m³/day, respectively.

Table 11 Simulated Rates of Water Supply to Processing Plant and Percentage Days Failure

Component	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Maximum from WTP (m ³ /day)	7200	7200	7200	12000	12000	12000	12000	12000	12000	12000	12000	12000
Minimum from WTP (m ³ /day)	6950	6950	6950	6950	12000	12000	12000	12000	12000	12000	12000	12000
Maximum from RWD (m ³ /day)	17030	8390	8390	8390	15769	15229	15229	15229	15229	15229	15229	15229
Minimum from RWD (m ³ /day)	0	0	0	0	7129	7129	7129	7129	7129	7129	7129	7129
Maximum from TSF (m ³ /day)	17280	17280	17280	17280	17280	17280	17280	17280	17280	17280	17280	17280



Component	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Minimum from TSF (m ³ /day)	0	8640	8640	8640	8640	9180	9180	9180	9180	9180	9180	9180
Maximum combined inflow (m ³ /day)	24230	24230	24230	36409	36409	36409	36409	36409	36409	36409	36409	36409
Minimum combined inflow (m ³ /day)	24230	24230	24230	24230	36409	36409	36409	36409	36409	36409	36409	36409
% No days with failure in supplying demand	0	0	0	0	0	0	0	0	0	0	0	0

Source: 100 x 12 year sequences generated by Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 Note: maximum values do not necessarily occur on the same day and therefore rows are not additive.

Water supply for dust suppression is obtained from the WTP and RWD. Transfers will be made to a storage tank with a capacity equivalent to two days maximum dust suppression (2 days x 1153 m³/day x 0.95 = 2191 m³). The simulation results in Table 12 include both the requirement for tank top-up water and dust suppression. The simulation shows that the majority of water requirements are sourced from the RWD and that after year 3 a failure in supply can be expected in approximately 4 percent of days in each year and is most probably the consequence of limitations in the assumed transfer infrastructure.

Table 12 Simulated Rates of Water Supply for Dust Suppression and Percentage Days Failure

Type	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Maximum supplied from RWD (m ³ /day) ^b	2651	2651	2609	2647	2645	2631	2644	2637	2622	2649	2638	2651
Maximum from WTP (m ³ /day)	250	250	250	250	0	0	0	0	0	0	0	0
Maximum combined from RWD+WTP (m ³ /day) ^{a,b}	2651	2651	2609	2647	2645	2631	2644	2637	2622	2649	2638	2650
% No days with failure in supplying demand ^b	0.3	0.0	0.0	2.9	3.6	3.5	3.6	3.7	3.5	3.6	3.6	3.7

source: 100 x 12 year sequences generated by Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013 Note: ^a maximum values do not necessarily occur on the same day and therefore rows are not additive ^b includes top up water for dust tank

2.8.7 Water Supply - Post-closure Phase

No details were reported and it is assumed that there will be no on-going demand for water.



2.8.8 Overflows to the environment - Production Phase

Model simulations have assumed a WTP with a capacity of 300 m³/h for years 1 to 3 and 500 m³/h for years 4 to 12, in association with an equalisation pond capacity of 30,000 m³ and a combined pump capacity for transfers from retention ponds (including TSF) to the equalisation pond of 37,315 m³/day (Table 3).

The simulated maximum rate of inflow to the equalisation pond (Table 13) is constant (30,595 m³/day) during production years and is controlled by a combination of equalisation pond capacity and its net rate of evaporation together with available treatment capacity. A relatively small amount of excess water is discharged from the WTP during the first three years of operation (maximum 250 m³/day). This is most probably caused by the adoption of a fixed water transfer operating rule regardless of mine production and is not expected to occur during actual operations when rates of transfer will be dynamically controlled.

Simulations show that the EQP and WTP are able to prevent overflows from retention ponds during normal operating conditions. However, the results also show that overflow from the WRD retention pond (RP1), low grade ore retention pond (RP2), HLP and stormwater sediment pond (RP5) can occur during high intensity storms and is possibly the result of insufficient pump capacity on pipelines to the equalisation pond. The simulated frequency and maximum rate of overflow during the production period is reported in Table 14.

The water management strategy leading up to and during extreme peak rainfall is likely to invoke different operating rules to those represented in the Goldsim water balance which are representative of normal operating conditions. This could involve measures such as the temporary transfer of excess water to the TSFs. Also, given the occurrence of overflows during periods of extreme rainfall it is likely that flows within the Edith River will also be higher than normal and the dilution criteria for discharge may not be contravened.

No overflows from Batman Pit were predicted by the water balance simulation during production or post closure phases as evaporation is expected to balance inflows. Any net groundwater inflows have not been included in the water balance during production years.

Table 13 Simulated Rates of Transfer to Equalisation Pond

Type	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Maximum combined inflow (m ³ /day)	30595	30595	30595	30595	30595	30595	30595	30595	30595	30595	30595	30595
Minimum combined inflow (m ³ /day)	0	960	960	960	960	1020	1020	1020	1020	1020	1020	1020
Maximum discharge to Edith River (m ³ /day)	250	250	250	250	0	0	0	0	0	0	0	0
Minimum discharge	0	0	0	0	0	0	0	0	0	0	0	0



Type	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
to Edith River (m ³ /day)												

Source: 100 x 12 year sequences generated by Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

Table 14 Simulated Percentage Days when Untreated Water Overflows to Creeks

Pond	Year												Max. Spill (m ³ /day)
	1	2	3	4	5	6	7	8	9	10	11	12	
RP1	5.2	8.3	9.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	329,400
RP2	1.5	2.5	1.9	1.5	0.7	0.6	0.7	0.5	0.7	0.6	0.7	0.7	48,018
RP3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
RP5	2.3	3.2	2.8	2.4	1.2	1.1	1.2	1.0	1.1	1.1	1.2	1.2	52,036
HLP	6.1	14.6	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9,226

Source: 100 x 12 year sequences generated by Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013

2.8.9 Over Flows to the Environment - Post-closure Phase

Daily treatment rates are estimated to vary from 180 m³/day during early times after pit closure to rates approaching 39 m³/day at much later times.

2.8.10 Model Assumptions

The water present in Batman Pit at the commencement of the production phase is 1.8 million m³ (1081 m) which is about 15% of the reported maximum volume of about 12 million m³ (1144 m).

Simulations have not considered groundwater inflows or outflows and recent investigations indicate that groundwater inflows could occur up to 31L/s.

The west catchment diversions at the WRD are constructed and will capture and divert runoff away from the pond from 22% of the catchment and up to a 10-year, 24-hour storm event (12.3m³/s) (GHD, 2010).

The WRD will reach a maximum footprint of 202.5 ha after two years of production.

Discharge into the Edith River of excess water from the WTP can occur at any time of the year.

The RWD has been modelled as an infinite resource due to uncertainties in topographic data preventing the calculation of a storage curve.

Reclaim water from the TSF (TSF1 and TSF2) is estimated to be 19,200m³/day during the wet season and between 9,600m³/day and 10,200m³/day in the dry season. Bleed water from the TSF is estimated to be 1,920m³/day in the wet season and 960m³/day during the dry season.



2.9 Summary

2.9.1 Production Phase

The performance of water containment infrastructure has been assessed by means of a Goldsim water balance model (Goldsim Model MtToddWB_Production_PFS_45K - Vista Gold Australia Pty Ltd, 2013). A water balance representing the 12-year production phase of the mine has been simulated using stochastic methods to generate rainfall input. The assumed mine production period differs from the latest proposal which is for a 13-year production period. With the exception of the discrepancies in the development footprint of the Low Grade Ore Stockpiles and Batman Pit (Table 1) the model appears to have represented the physical extent of proposed mine development albeit in a shorter than expected time schedule. This broadly faithful representation in partnership with a probabilistic approach represents a reasonably robust assessment of water containment capacity. It is unlikely that the extension of the simulation by three years would significantly alter the study outcome in terms of WTP capacity or annual frequency of retention pond overflow.

The water balance demonstrates that a WTP with capacity of 300 m³/h in years 1 to 3 and 500 m³/h is able to limit the incidence of overflows from retention ponds to periods of high intensity rainfall which are likely to have a relatively low frequency of occurrence during the life of mine. Simulated overflows to the downstream environment will occur as a consequence of extreme rainfall that exceeds the design criteria of infrastructure and it is likely that such events will involve widespread rainfall. Therefore, it is also likely that at the same time flows within receiving waters and the Edith River will also be elevated due to high rainfall over their own catchments. As a result the dilution criteria to allow mine water discharge may not be contravened.

The water balance has also shown that process water demands can be met without failure from combined transfers from the WTP, RWD and TSF. However, this assessment has not investigated any limits to the available supply from the RWD.

The following summary is limited to the reporting of averages calculated from the output of all 100 stochastic simulations:

- ▶ Catchment draining into mine affected areas (RP1, RP2, RP5) – 266ha decreasing to 124ha over LOM;
- ▶ Combined surface runoff entering retention ponds (RP1, RP2, RP5, excluding the TSF where runoff is not modelled explicitly in the water balance and is assumed to be represented by tailings reclaim water) – 2.6 GL/yr;
- ▶ Estimated reclaim water from tailings – 5.2 GL/yr;
- ▶ Combined seepage from material stores entering retention ponds (RP1, HLP, TSF) – 0.8 GL/yr;
- ▶ Combined water retention and sediment pond storage (RP1, RP2, HLP, RP5, TSF) – 18 GL;
- ▶ Total water demand (process plant) – 8.8 increasing to 13.2 GL/yr during LOM and supplied from:
 - Average supply from WTP – 2.6 to 4.4 GL/yr
 - Average supply from TSF – 4.7 to 4.8 GL/yr
 - Average supply from RWD – 1.5 to 4.0 GL/yr
- ▶ Total water demand (dust suppression) – 0.2 GL/yr and supplied mainly from RWD:



- Average supply from WTP – <0.01 GL/yr
- Average supply from RWD – 0.2 GL/yr
- Average excess discharge from WTP to the downstream environment – 0.02 GL/yr during first 3 years and thereafter 0 GL/yr;
- ▶ Combined average uncontrolled overflow from retention ponds to the downstream environment – between 0.02 and 0.06 GL/yr.

The Goldsim water balance makes a number of assumptions which include no net groundwater inflow to Batman Pit. Also, the quantity of reclaim water available from the TSF for use in water supply has been determined externally to the Goldsim model and has not involved a water balance of the TSF within the model. Furthermore, the simulation of water supply assumes an unlimited water supply from the RWD. The risk of shortfall in water supply is considered to be an economic risk rather than an environmental impact.

It is unclear what design storm rainfall event was used in the original design of the water management system, however, it is unlikely that design criteria exceeded a 100-year ARI as this is a generally accepted upper limit for the design of water containment storage. The severity of long duration storm rainfall during recent wet seasons is unlikely to have been in excess of a 100-year ARI (see Section 2.2) and it can be expected that the performance of larger storage infrastructure would not have been compromised. However, it is possible that shorter duration storm events were more extreme and smaller storage together with conveyance infrastructure might have been compromised.

2.9.2 Post-Production Phase

The following results of a water balance for the post closure phase were obtained from the Goldsim model - MtToddWB_LOM2011Update_Post-Closure_PPT_Chooser, July 2012:

- ▶ Seepage rates from the TSF are estimated to decrease to 39m³/day;
- ▶ Seepage rates from the WRD are estimated to be up to 2304m³/day; and
- ▶ Water levels in Batman Pit are expected to reach equilibrium level of between 975 m and 977 m (relative to 1144 m top of pit) where evaporation equals inflow from rainfall. However, this assumes no groundwater inflow which recent investigations indicate could be up to 31L/s.

A more recent water balance carried out by Tetra Tech (May 2013) has included groundwater inflow to Batman Pit and suggests that water levels will reach equilibrium after 345 years at an elevation of approximately -15mAHD.

The water balance simulation for the post closure phase does not include adjustments to rainfall that represent the effects of climate change, natural or otherwise.



3. Stormwater Management

3.1 Introduction

The Mt Todd Mine is traversed by four creeks which drain into the Edith River to the south. Horseshoe Creek and Batman Creek flow through the centre of the mine whilst West Creek passes close to the western boundary and Stow Creek flows along the southern edge of the mine.

Storm rainfall during recent wet seasons has reportedly been in excess of a 100-year Average Recurrence Interval (ARI) which likely exceeds the design criteria of most water management infrastructure on site. It is therefore to be expected that the performance of existing stormwater conveyance infrastructure has been compromised (Section 3.2).

An assessment of the potential impacts of flooding from Horseshoe Creek, Batman Creek, West Creek and Stow Creek was undertaken to confirm the adequacy of existing/proposed stormwater management measures from an environmental perspective. This assessment included:

- ▶ Extending the description of flood peak and flood levels provided by previous studies through new modelling;
- ▶ Delineating catchment areas and identifying key catchment properties;
- ▶ Evaluating the hydraulic performance of creeks flowing through the site;
- ▶ Indicating critical regions for flood management based on inundation and scour risk; and
- ▶ Recommending flood management strategies.

A number of studies have previously been carried out for the mine site and details are summarised in Section 3.3. Where existing information was inadequate new modelling was carried out consisting of a hydrological assessment to determine flood peak discharge and hydraulic flood routing to derive an indication of flood immunity and the potential for scour (Section 3.4).

3.2 Existing infrastructure

Diversion structures exist along Horseshoe Creek, Batman Creek and Burrell Creek and are used to limit the runoff from undisturbed areas of the mine and their upstream catchments from reaching existing water containment and plant infrastructure.

Diversions are also present upstream of the low grade ore (LGO) stockpile and around the heap leach pad (HLP) but with the purpose of collecting runoff from disturbed areas of the mine and directing it into storage ponds for transfer to the water treatment plant.

Diversion drains have been constructed around the western margins of the existing waste rock dam (WRD) retention pond (GHD, Nov 2010). The drains reduce the volume of uncontaminated runoff entering the pond and thereby reduce the risk of overtopping. Diverted water will report to local creeks downstream of the pond.

3.3 Previous Flood Studies

Three hydrological studies of the mine area are known to have been carried out and a summary of their purpose and significant results are given below. Previous studies have limited their assessment of flood

inundation to reaches in the lower half of the mine area. In order to extend an understanding of flooding extent, levels and velocities additional hydrological and hydraulic flood modelling has been undertaken for the 10 and 100 year ARI design events.

AGC Woodward-Clyde (Oct 1992) – This study estimated the extent of flood inundation along the lower sections of Batman Creek and Horseshoe Creek during a 100-year ARI storm event. Flood peak discharge was estimated by means of the Rational Method and flood extents derived from water levels modelled by HEC2 and interpolation within 2m contour maps. Whilst a map of flood extents (Figure 5) was produced values of flood peak discharge and flood level were not reported.

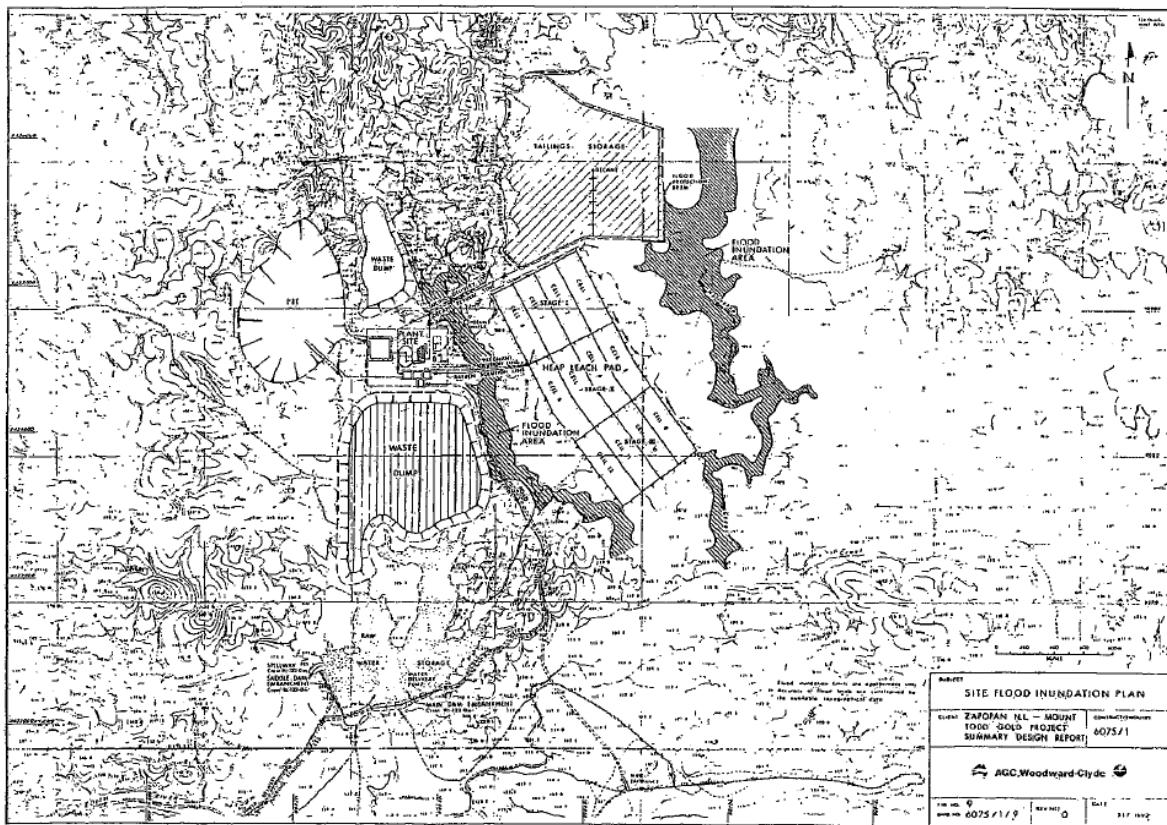


Figure 5 AGC Woodward-Clyde Study Modelled Flood Extents

Knight Piesold (July 1995) – This study estimated flood levels along Horseshoe Creek adjacent to the site of the TSF to assist with the design of engineering works to protect the tailings embankment. Flood discharges for 10-year, 20-year and 100-year ARI storm events were calculated by means of RORB modelling software and flood levels determined with a HEC-2 water surface profile model. Flood discharges were calculated for both the north-west tributary upstream of the TSF and the north-east tributary which is now occupied by the Raw Water Dam. Modelling took into consideration the attenuating effects of the dam in deriving flood peaks in Horseshoe Creek downstream of the confluence. The flood peak discharges determined by the study are reported in Table 15 and flood levels determined by the study are reproduced in Table 16.



Table 15 Knight Piesold Study Flood Peaks

ARI (yrs)	North-west tributary (m ³ /s)	North-east tributary (m ³ /s)	Downstream of confluence (m ³ /s)
10	75	52	127
20	90	64	154
100	135	92	227

Source: Knight Piesold, July 1995 and includes attenuating effect of RWD

Table 16 Knight Piesold Study Flood Levels

ARI (yrs)	Northern end of TSF	Confluence of tributaries	Southern end of TSF
10	131.3	125.5	122.3
20	131.3	125.7	122.4
100	131.7	126.1	122.8

Source: Knight Piesold, July 1995

The report indicated that flood depths next to the tailings embankment would be 1 to 1.9 m during a 100-year ARI event with velocities in the channel of between 2 and 3 m/s reducing to 1 m/s over the floodplain. The study proposed the diversion of the north western creek by means of a 420 m long channel along the northern end of the TSF. It also recommended the re-alignment of the creek to further protect the embankment but no maps illustrating this alignment have been found.

GHD (Nov 2010) – This study calculated the capacity of drains to reduce the volume of runoff entering the WRD retention pond from undisturbed areas to the east and west (Figure 6). Flood discharges from surrounding catchments during 10-year ARI storm event were calculated by means of the Rational Method (Table 17). Drains were sized using standard open channel flow calculations. The drains have been designed with a capacity to divert flows up to a 10-year ARI storm event as the volume of overflow during more severe events is considered to be insignificant relative to the pond capacity due to the infrequency and shortness of such extreme events. The drains are considered to be effective in reducing the catchment area contributing runoff to the pond by 20% during storm events with a magnitude of less than a 10-year ARI.

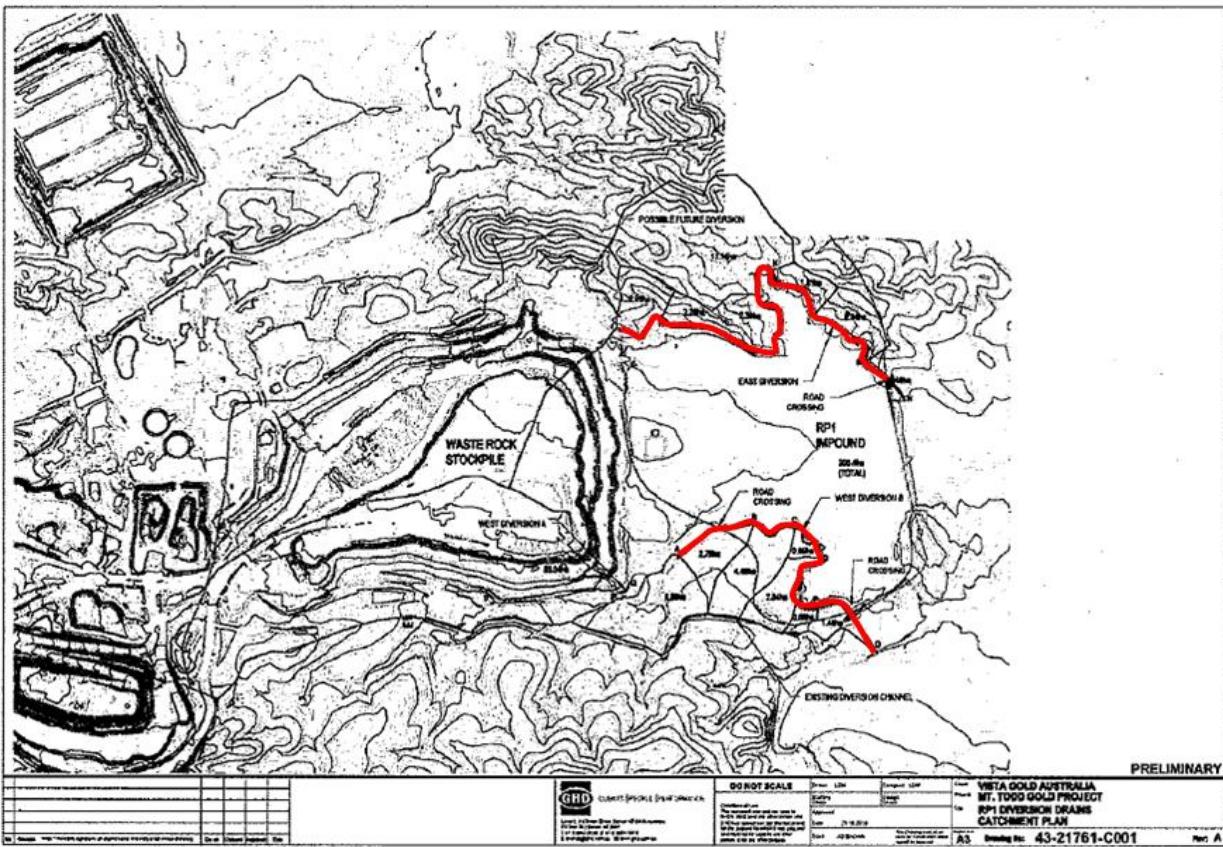


Figure 6 Diversions at the WRD

Table 17 GHD Flood Discharge

ARI (yrs)	Western Drain m ³ /s	Eastern Drain m ³ /s
10	8.1	4.2

Source: GHD, November 2010

3.4 New Design Flood Modelling

3.4.1 Approach

Hydrologic modelling of the catchments has been undertaken to augment previous study findings by generating flood peak discharges at significant locations within the mine area for 10-year and 100-year ARI design storm events.

Design criteria based on these two ARI is compatible with generally accepted guidelines. A 10-year ARI event will help assess the adequacy of cross drainage and diversion structure capacities where an exceedance of capacity is not expected to cause major or sustained impacts, whilst the 100-year ARI event provides a more robust assessment of the mine site's flood immunity.

Where possible design flood peak information has been taken from previous studies and augmented by new analyses. A summary of the source of flood peak information is as follows:

- ▶ Horseshoe Creek, with flood peaks at locations downstream of the confluence of the north-western and north-eastern (including Raw Water Dam) tributaries, also along the north-western tributary at the northern end of the TSF, extracted from the previous study by Knight Piesold (July 1995).
- ▶ Batman Creek at a location just upstream of Batman Pit was calculated by the Rational Method.
- ▶ Catchments draining into Burrell Creek were also calculated with the Rational Method.
- ▶ Catchments draining into Stow Creek calculated by the Rational Method.

In the absence of flood peak estimates for most of the catchments, recourse to new modelling involving the application of the Rational Method was required. The Australian Rainfall and Runoff (ARR) from Engineers Australia (1987) provides slightly different methodologies for the application of the Rational Method in different areas of Australia. Due to the sparseness of recorded flood frequency information, runoff coefficients have only been defined for flood events up to and including the 10-year ARI. The calculation of design flood peaks for more extreme events relies on frequency factors to scale up the 10-year ARI event.

Figure 7 shows the catchments for which flood peaks have been determined and the following sections provide a description of model input data and results.

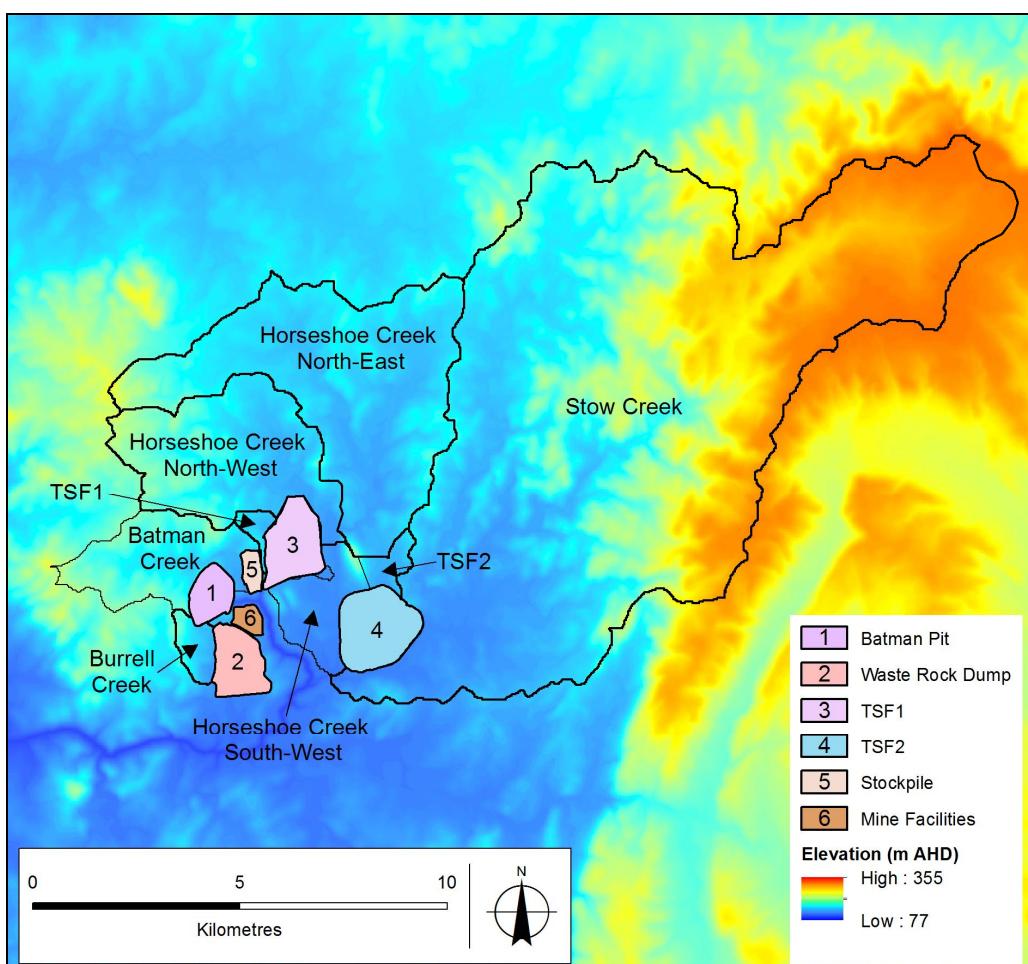


Figure 7 Modelled Catchments



3.4.2 Input Data

Design storm rainfall for 10-year and 100-year ARIs was obtained for the mine site from the Bureau of Meteorology website for standard design storm durations ranging from 15 minutes to 72 hours (Table 18). The Intensity-Frequency-Duration (IFD) values are determined from the bureau's rainfall database which includes interpolated data for areas which have not benefited from continuously recording rain gauges such as the mine site.

Storm durations have been determined on the basis of the concept of catchment 'Time of Concentration'. The Bransby-Williams formula was used to determine the time of concentration at each location and values are reported in Table 19.

Table 18 IFD Rainfall Data for Mt Todd Mine

Storm Duration	Average Recurrence Interval						
	1-year	2-years	5-years	10-years	20-years	50-years	100-years
5 minutes	116	149	186	209	241	283	317
6 minutes	108	139	174	195	225	265	296
10 minutes	89.9	115	144	161	186	218	244
20 minutes	68.9	88	109	122	140	163	182
30 minutes	57.3	73	90.3	101	115	134	150
1 hour	38.7	49.3	60.8	67.7	77.4	90.4	101
2 hours	23.7	30.3	37.4	41.7	47.7	55.7	62
3 hours	17.3	22.1	27.3	30.5	34.9	40.8	45.4
6 hours	9.89	12.6	15.7	17.6	20.2	23.6	26.4
12 hours	5.84	7.49	9.4	10.6	12.2	14.3	16
24 hours	3.68	4.75	6.07	6.88	7.99	9.5	10.7
48 hours	2.37	3.09	4.04	4.64	5.45	6.57	7.47
72 hours	1.72	2.26	3	3.47	4.11	4.99	5.71



Table 19 Rational Method Inputs for Flood Peak Estimation

Parameter	Batman Creek	West/ Burrell Creek	Stow Creek	Horseshoe Creek {north west tributary}	Horseshoe Creek {north east tributary} ¹
Area (km ²)	6.58	1.16	101.27	13.06	24.70
Flow Path Length (km)	5.59	1.34	24.68	8.25	12.01
Flow Path Slope (m/km)	11.56	13.56	6.45	5.72	2.68
Time of Concentration (hrs)	2.74	0.76	10.35	4.35	6.92
100-year ARI Runoff Coefficient	0.99	0.99	0.99	0.99	0.99
100-year ARI Rainfall Intensity (mm/h)	44.6	98.4	19.6	- ²	- ²
10-year ARI Rainfall Intensity (mm/h)	67.6	67.6	-	- ²	- ²

Notes:¹ includes RWD basin ² flood peaks sourced from Knight Piesold report (1995)

The extent of upstream catchments for creeks intersecting the site was delineated with Arc-Hydro® using the 30 m Shuttle Radar Topography Mission (SRTM) digital elevation model acquired from Geoscience Australia (2011). Local sub-catchment areas within the mine site have not been included; this will not affect design flood peak estimates due to relatively small extent of these sub-catchments compared to upstream areas and their shorter response times. The lengths of the main channels and the equal area slopes as required for application of the Rational Method were calculated using the same SRTM elevation data set.

The catchment areas surrounding the mine comprise low lying hills with rural land use and land cover consisting of scrub and long grass. Runoff coefficients for the Rational Method calculations were determined using the Department of Main Roads Road Drainage and Design Manual (2007), assuming 100% rural catchments and are listed in Table 19.

3.4.3 Design Flood Peak Results

Design flood peak discharges are available for Horseshoe Creek from a previous study by Knight Piesold (1995) and are considered to be adequate for the purposes of this assessment. New design flood peak modelling based on the Rational Method was required for the catchments of Batman Creek, Burrell/West Creek and Stow Creek (see catchments shown in Figure 7).

A summary of the adopted design flood peaks for each of the creeks is given in Table 20. The results for Horseshoe Creek as derived from the Knight Piesold (1995) study do not include the likely additional attenuating effects created by the proposed 2m increase in dam height and are therefore slightly conservative in terms of downstream flood magnitude.



Table 20 Design Flood Peak Estimates

Parameter	Batman Creek	West / Burrell Creek	Stow Creek	Horseshoe Creek {north west tributary} ¹	Horseshoe Creek {north east tributary} ¹	Horseshoe Creek {downstream of confluence} ¹
10-year Peak (m ³ /s)	58	20	-	75	52	127
100-year Peak (m ³ /s)	103	34	691	135	92	227

¹ source Knight Piesold report (1995)

3.5 Hydraulic Flood Routing

3.5.1 Approach

Maps showing the outline of the 100-year design flood event are available from the previous study of AGC Woodward-Clyde (1992) but are limited in geographical extent (Figure 5). Therefore the results of new hydraulic flood routing using inputs from hydrologic modelling (Table 20) have been used to extend existing flood outlines and to assess likely velocities. This information will be used to assess flood immunity and impacts on existing and proposed mine infrastructure and the potential for scour.

A steady state 1-D hydraulic model was constructed for each creek using HEC-RAS vers 4.1 (United States Army Corps of Engineers, 2013). A 1-D steady state model has been selected because flows occur in well-defined channels and the inter-change of flows between channel and floodplain is not expected to be significant.

3.5.2 Hydraulic Model Data

The geometry of channels and floodplains for Batman, West/Burrell and Horseshoe Creeks was defined at cross sections along each watercourse from a 1 m digital elevation map of the mine area (Figure 8). This was augmented by 5 m digital elevation data to define the geometry of channels and floodplains along Stow Creek.

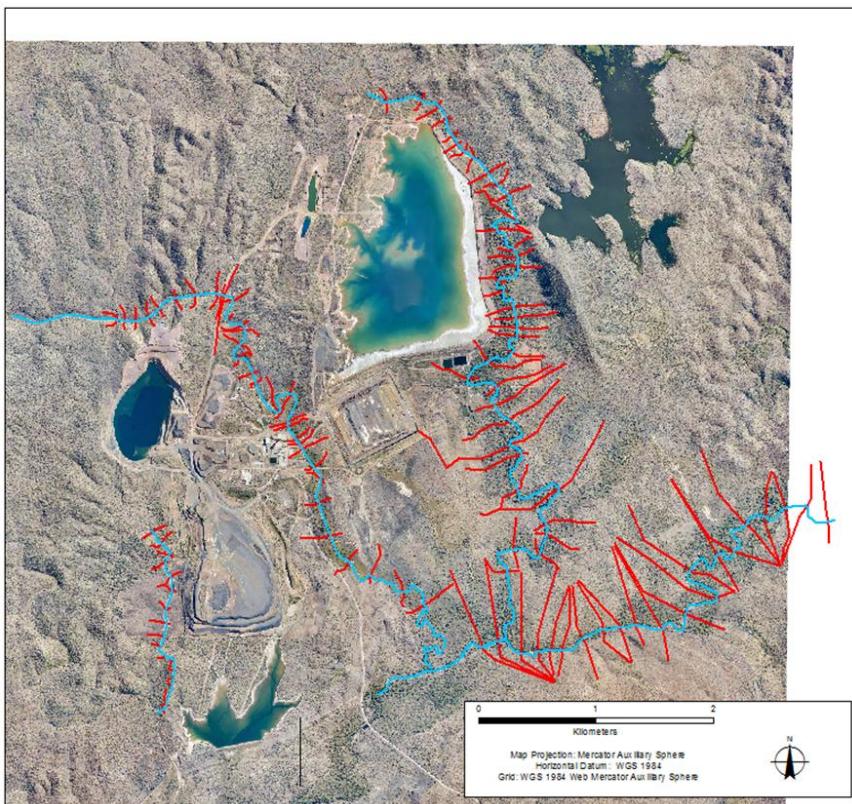


Figure 8 Extent of Hydraulic Flood Routing Models

The Manning's 'n' roughness coefficient has been used to represent the effects of surface friction on the conveyance flood peak flows through channels and over floodplains. Estimates for roughness coefficients were determined by analysis of aerial photography and with reference to industry standard tables (Chow, 1959). A value of 0.04 was applied to the main channel and a value of 0.08 was used for the floodplain.

Within the mine area two road crossings exist on Batman Creek and they comprise circular culverts of 2 x 1.6m diameter for the northern crossing and circular culverts of 8 x 1.1m diameter for the southern crossing.

The upstream boundary condition in hydraulic models is obtained from the design flood peaks estimated by hydrologic modelling (Table 20).

The downstream boundary representative of tailwater conditions in the lower reaches of Batman Creek, Horseshoe Creek and Stow Creek has been represented by a water level of 120.5m. This level corresponds to a level extrapolated from Stow Creek during what was calculated to be a 100-year event (Knight Piesold, 1995). A normal flow depth specified by the stream bed slope was used in Burrell Creek since the lower end of the model is not expected to have significant backwater effects from West Creek or the Edith River due to the relatively steep terrain.

Any errors due to the assumptions regarding downstream boundary conditions are not expected to significantly impact water levels in the vicinity of mine infrastructure due to the distance involved. Details of the channel alignments and the extents of the cross-sections of the simulated channels and floodplains are provided in Figure 8 and Figure 9.



3.5.3 Hydraulic Model Results

Flood Immunity

The results of hydraulic flood routing have been used to create an outline defining the extent of flooding during a 100-year ARI design event. Overlaying this outline onto the footprint of mine infrastructure allows an assessment of flood immunity (Figure 9). This indicates:

- ▶ Significant encroachment of flood waters into the proposed TSF2, to a lesser extent into the LGO Stockpile and to a minor extent into the mine facilities;
- ▶ The capacity of the diversion channel which collects uncontaminated runoff from catchments of Burrell Creek to the west of the WRD is exceeded at some locations along its length;
- ▶ Inundation of significant reaches of the realigned site access road; and
- ▶ The culverts on Batman Creek create a significant flow obstruction and backwater effect.

Given the absence of surveyed spot heights of infrastructure together with the approximation of flood outlines between the locations of model cross sections this analysis is not suitable for design of structures associated with flood mitigation.

Flood Velocity

Channel scour and degradation is dependent on the channel flow velocities. Commonly accepted guidelines indicate that flows with a velocity in excess of 2 m/sec have the potential to cause scouring in unlined channels. The locations where flow velocities are simulated to exceed this threshold are depicted in Figure 10. Whilst this includes reaches on Batman Creek adjacent to mine facilities and along Horseshoe Creek adjacent to site access and haul roads areas of potential significance are along Stow Creek next to the proposed location of the embankment for the TSF2.

3.6 Potential Stormwater Drainage Impacts

Construction and operation of the mine has the potential to create the following hydrologic impacts:

- ▶ Inundation of mine infrastructure due to flooding from local runoff;
- ▶ Change in local flow regime due to creek diversions; and
- ▶ Change in local flow regime due to construction of haulage roads across waterways.

Flood hazards within the mine site comprise:

- ▶ Accumulation of direct rainfall in Batman Pit and the Heap Leach Pad creating a pond of potentially contaminated water requiring disposal;
- ▶ Inundation of Batman Pit and the Heap Leach Pad should the flood levees be breached;
- ▶ Accumulation of direct rainfall in the Tailings Storage Facilities and Equalisation Pond resulting in a breach of embankments and discharge of contaminated water;
- ▶ Excessive runoff from the WRD and LGO Stockpile and accumulation of direct rainfall in the respective Retention Ponds resulting in uncontrolled discharges of potentially contaminated water;
- ▶ Erosion of the embankments and batters of the WRD, LGO Stockpile and Tailings Storage Facilities possibly resulting in increased sediment loads and a deterioration of downstream water quality; and



- ▶ Erosion of flood levees and increased sediment loads in runoff.

Construction of cross drainage structures such as culverts and causeways may result in:

- ▶ Obstruction of natural waterways due to the build-up of sediment and/or debris resulting in an increase in upstream water levels due to a reduction of existing flow area;
- ▶ Increase in outlet velocities and therefore scouring; and
- ▶ Changes in waterway sediment load.

Scour protection will be required at:

- ▶ Locations where a narrowing of flow paths or an abrupt change in flow path direction or steep gradients occur, either within channels due to cross drainage structures and natural features or on floodplains due to obstacles or prominent landforms; however
- ▶ Potential future flood management interventions such as culverts, channel diversions and flood levees have not been assessed but may alter existing flow paths and could result in other areas requiring erosion protection.

It should be noted that some storm rainfall events during recent wet seasons have reportedly been in excess of a 100-year ARI design storm event, and likely exceed the design criteria of most water management infrastructure on site. Therefore, it is to be expected that the performance of existing storage and conveyance infrastructure has been compromised.

3.6.1 Potential Surface Water Contamination

Material Storage Dump Areas

Spoil dump areas may contain contaminated soil particles that can reduce surface water quality if allowed to discharge into the natural environment.

Excess water accumulation around the outside of the spoil dump areas could potentially erode the inert spoil banks, causing sediment-laden runoff into natural channels.

Process Plant Areas

Surface water runoff from the plant areas may contain traces of heavy metals and soil particles that can reduce surface water quality if allowed into natural watercourses.

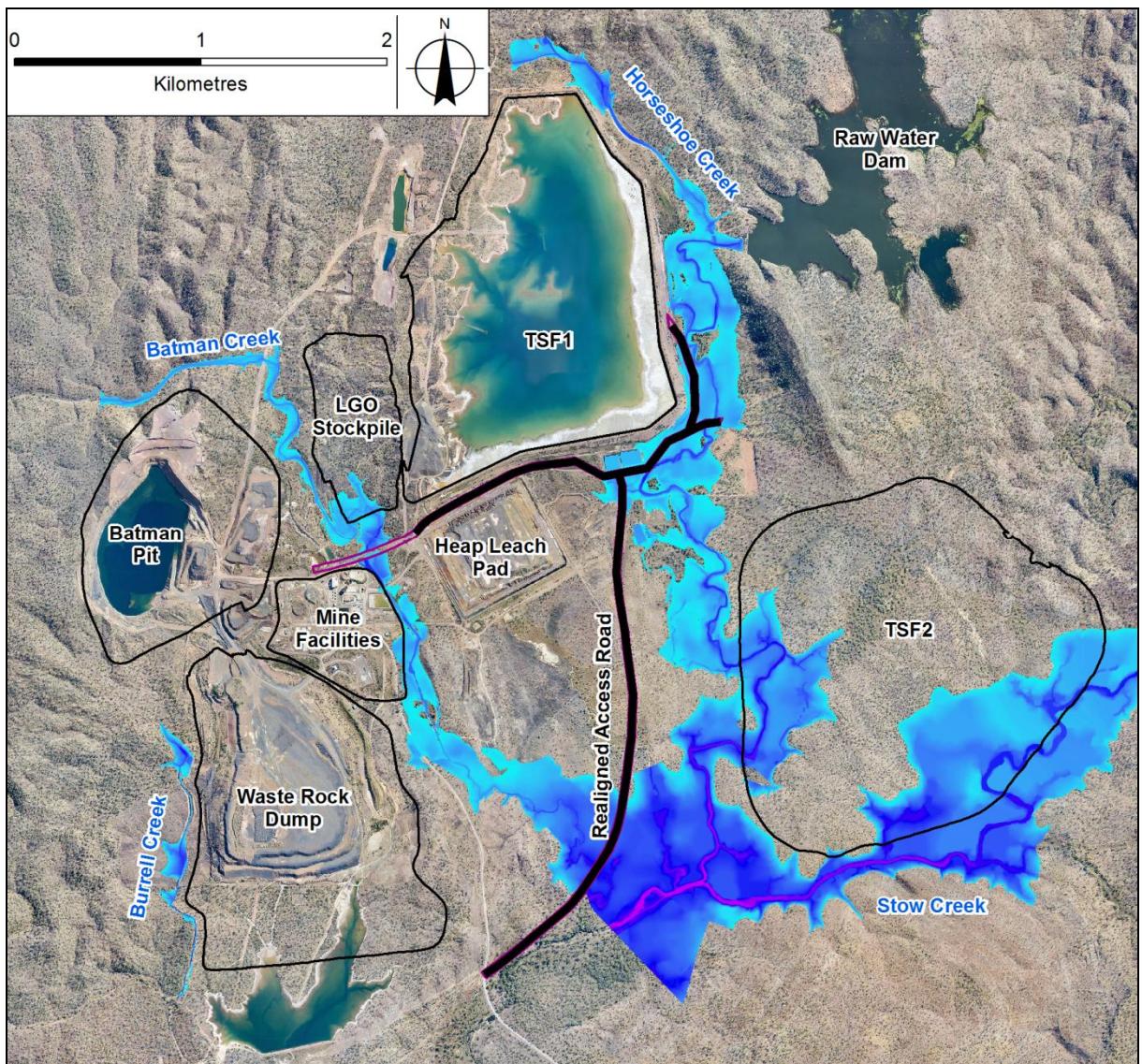


Figure 9 Modelled 100-year ARI Flood Extent

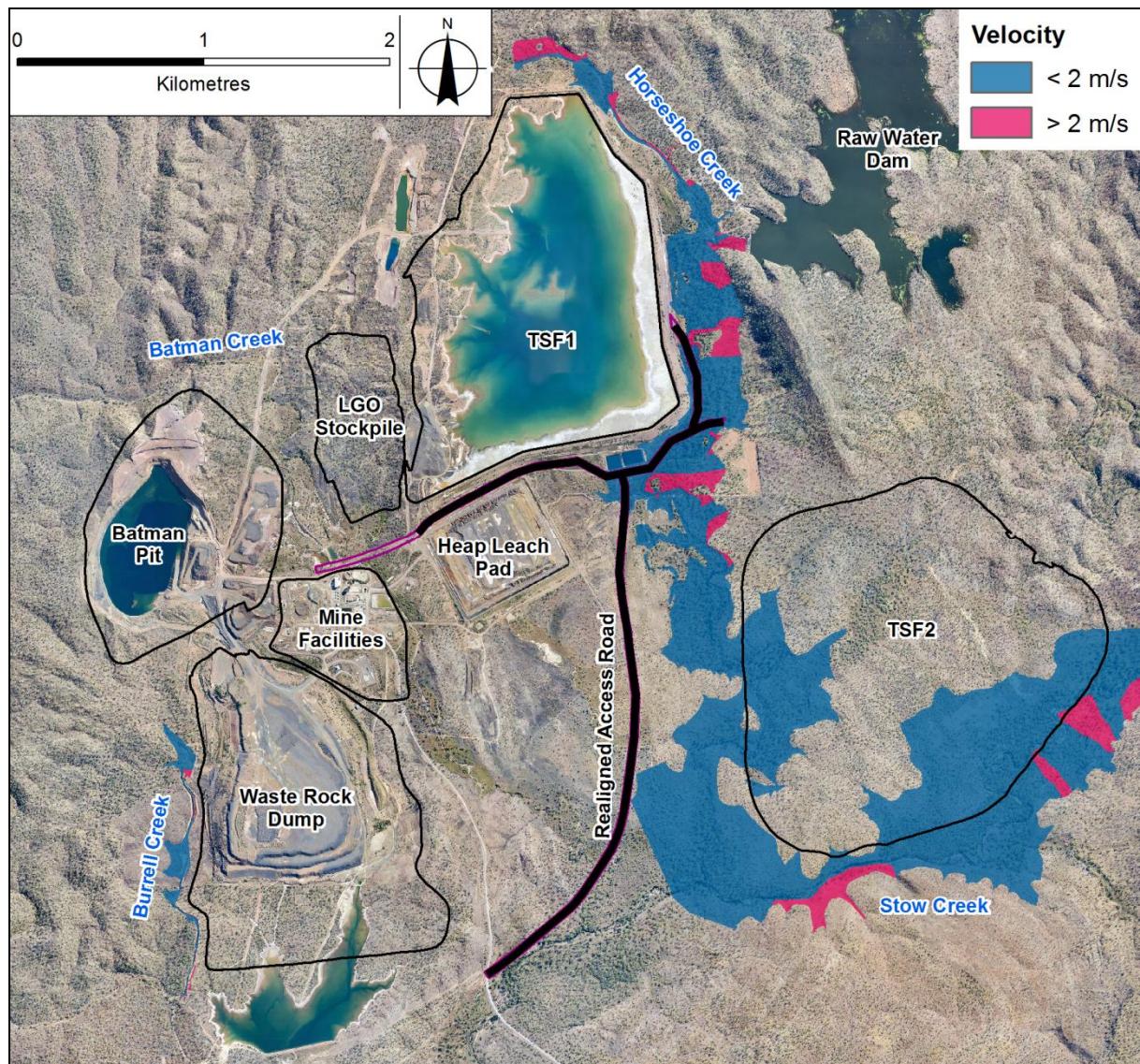


Figure 10 Simulated Channel Flow Velocities for the 100-year ARI event



4. Flood Management Measures

The following mitigation measures are proposed to minimise potential impacts during the production phase.

4.1 Flooding

Batman Creek, Horseshoe Creek, Burrell Creek and Stow Creek flow through or next to the mine area and therefore have the potential to encroach on storage embankments and to inundate plant, pit and other mine infrastructure. Potential flooding of the pit, process plant area and material storage dumps has been minimised during their design by siting these facilities away from flood inundation areas or through the construction of flood protection barriers/levees around each mine area. No further mitigation measures are required.

Whilst it is recommended that proposed infrastructure is located outside the 100-year ARI flood extent to minimise flood risk it is recognised that this is not always practical. For example, the proposed footprint of the TSF2 and LGO Stockpiles will encroach on the 100-year ARI design flood extent. Construction of diversion channels or flood protection levees will be required around these areas and other proposed infrastructure at risk.

4.2 Diversion Channels and Levees

Diversion channels already exist at the following locations:

- ▶ LGO Stockpile has a diversion structure that diverts water from the stockpile and conveys it to a retention pond and away from Batman Creek. Erosion of this channel has occurred during storm events although it is reported that the quality of the embankment has been improved following the 2008-09 wet season;
- ▶ HLP generates runoff and seepage which is collected by a moat. The pad will either be reprocessed or decommissioned and the site rehabilitated after the return to operations;
- ▶ WRD has a diversion channel which collects uncontaminated runoff from catchments of Burrell Creek to the west. The design capacity of this channel is not known but flood modelling shows that the channel capacity may be less than the 10-year ARI flood event at some locations along its length (Figure 11);
- ▶ TSF1 embankment is protected against flood flows in Horseshoe Creek by means of a diversion channel which flood modelling shows has a capacity equivalent to the 100-year design flood event. Diversion channels are also located to the west of TSF1 and divert runoff northwards towards Horseshoe Creek; and
- ▶ In addition to diversion channels at the WRD, diversion channels have recently been constructed at WRD retention pond to collect uncontaminated water from surrounding catchments. The WRD retention pond has diversion channels for the collection of uncontaminated runoff to its west and east (Figure 6). The channels have a capacity equivalent to 10-year ARI catchment runoff and thereby reduce the catchment area contributing runoff to the pond by 20% during storm events with a magnitude of less than a 10-year ARI.

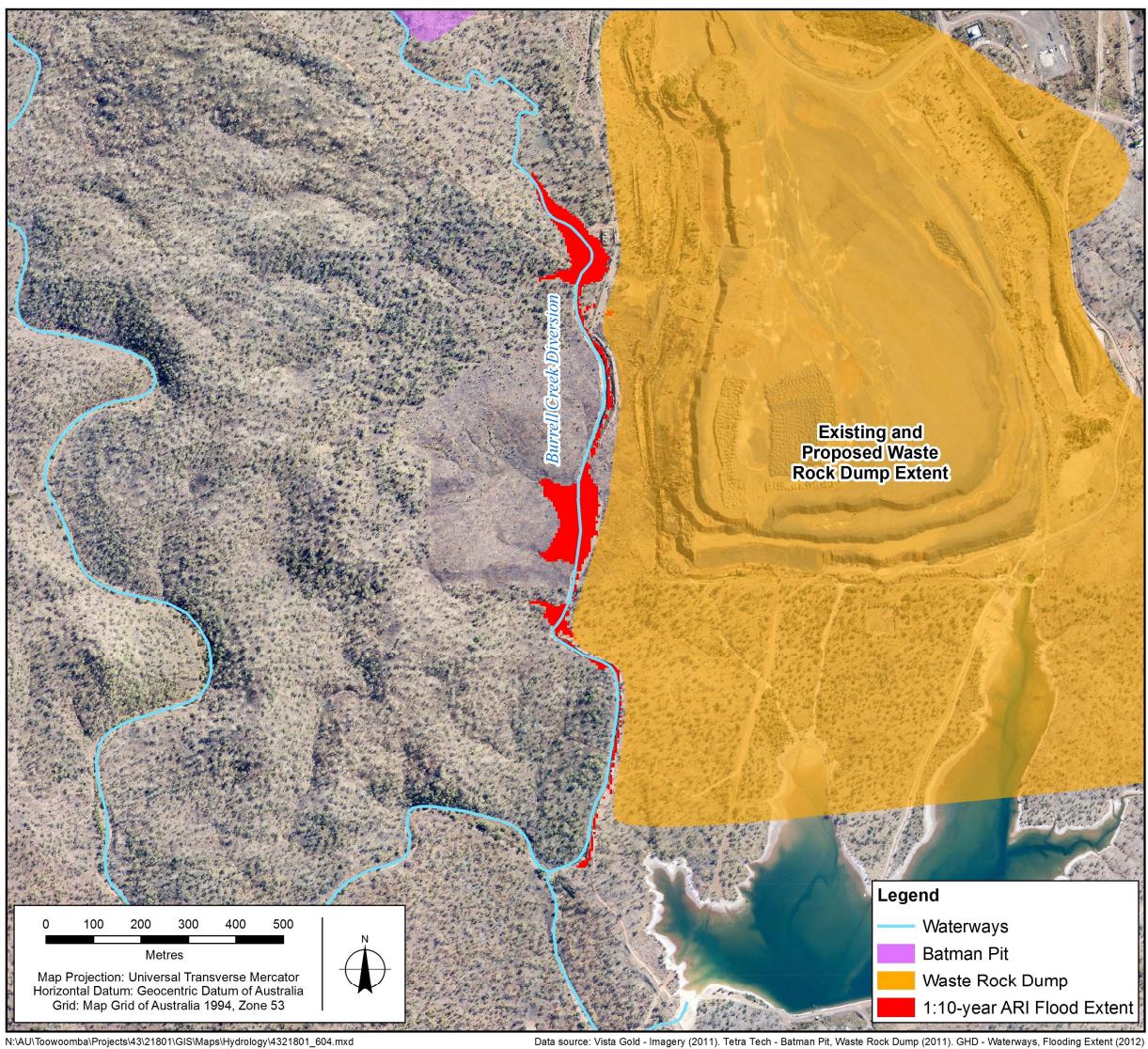


Figure 11 Modelled 10-year ARI Flood Extent

Diversion channels are proposed at the following facilities and will be designed to minimise channel side slopes, to keep maximum velocities below 2.0m/s and channel depths below 2.5m:

- ▶ Run-of-Mine and additional LGO Stockpile will require collection ditches to capture runoff and seepage from stockpiles for conveyance to retention ponds. The location and quantity of runoff is not yet known and will need to be assessed during the design phase to determine the required channel and storage embankment height:
 - Cut-off perimeter drains with a capacity equivalent to the 10-year design storm event will be required for the diversion of uncontaminated runoff around stockpiles and into Batman Creek.
 - Hydraulic modelling has demonstrated that small areas of the proposed stockpiles will encroach on the 100-year flood extent of Batman Creek and will require mitigation measures to reduce flood risk. The backing-up of flood water behind culverts on Batman Creek is likely to be a contributing factor and therefore re-design of culverts may assist in reducing flood risk.

Alternatively, construction of a levee with a height equivalent to the 100-year flood peak level plus freeboard or construction of a stream diversion to bypass the portion of Batman Creek which loops back toward the stockpile;

- ▶ Clay borrow area will require erosion protection and sediment control structures to manage runoff from the low permeability area.
- ▶ New diversion channels and levees along Horseshoe Creek and Stow Creek have been designed to protect the embankment of TSF 2 from flooding and erosion. Diversion channels have been designed for the following 100-year ARI flood events:
 - Stow Creek (Figure 12) designed for a peak flow of approximately $656\text{m}^3/\text{s}$. The channel will be lined with rip-rap to reduce potential scour and erosion. The channel will have a width and length of approximately 60m and 850m, respectively, and a nominal depth of 4.2m.
 - Horseshoe Creek (Figure 13) designed to accommodate a peak flow of approximately $182\text{m}^3/\text{s}$ comprising $100\text{m}^3/\text{s}$ of runoff from the Horseshoe Creek catchment and $82\text{m}^3/\text{s}$ of overflow from the existing raw water supply dam. The channel will be lined with rip-rap to reduce scour and erosion and have a width and length of approximately 40m and 550m, respectively, and a nominal depth of 2.5m.
- ▶ Upgrade or re-design of existing drains and levees in limited areas of the processing plant to cope with a 100-year ARI flood event plus freeboard from Batman Creek.
 - Drainage across the processing plant site will be limited by the installation of cut-off drains to divert uncontaminated runoff from around the site and into Batman Creek via a settling pond.
 - Stormwater vee-drains will be designed to collect water alongside plant roads and with drainage conveyed beneath the roads via corrugated steel culverts to prevent scouring of plant roads. All stormwater runoff will be directed toward the existing drainage channel on the east side of the proposed process plant.

4.3 Cross Drainage Structures and Haul Roads

Flood modelling shows that these existing cross drainage structures on Batman Creek and Horseshoe Creek will be overtopped during the 10-year and 100-year ARI flood events, also a significant length of the road adjacent to the TSF1 will be inundated. The model results also show that these culverts cause backwater effects upstream but this does not appear to cause inundation of mine infrastructure. Furthermore, this backwater effect only occurs during extreme flood events and is therefore unlikely to be a frequent occurrence.

Overtopping of cross drainage structures and haul roads is likely to be an infrequent occurrence but upgrades to existing stormwater drainage, erosion and sediment controls, including the vegetation of verges, will be necessary to minimise damage during less extreme but more frequent storm events. Similar protection measures will be required for new roads with suitable cross drainage structures to convey drainage beneath roads to prevent scour.

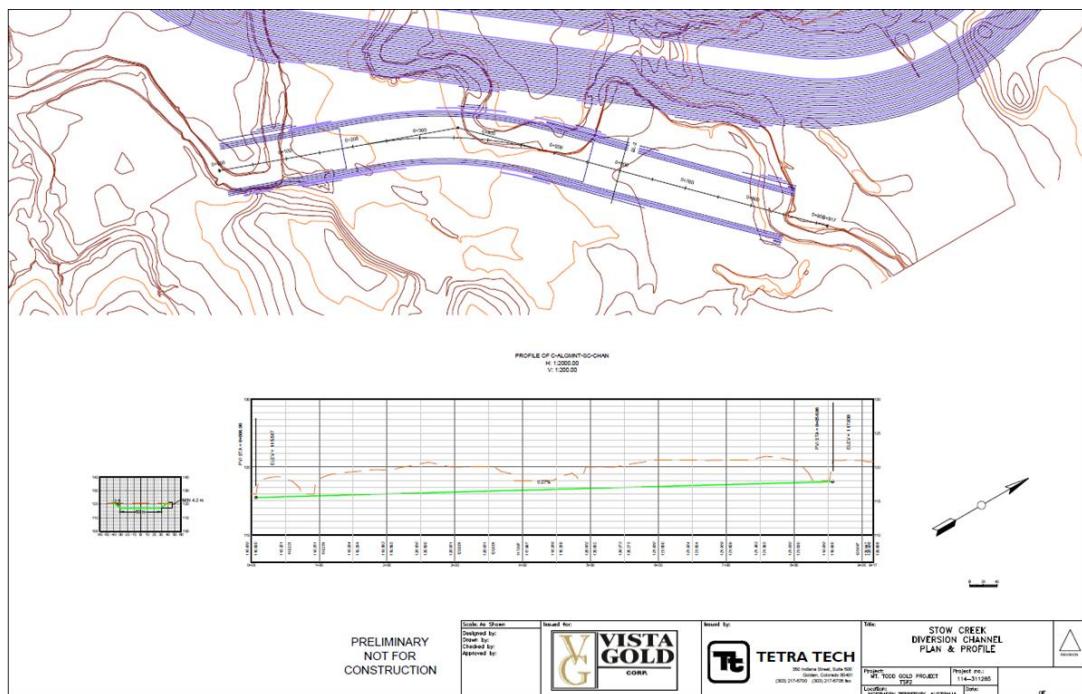


Figure 12 Stow Creek Diversion

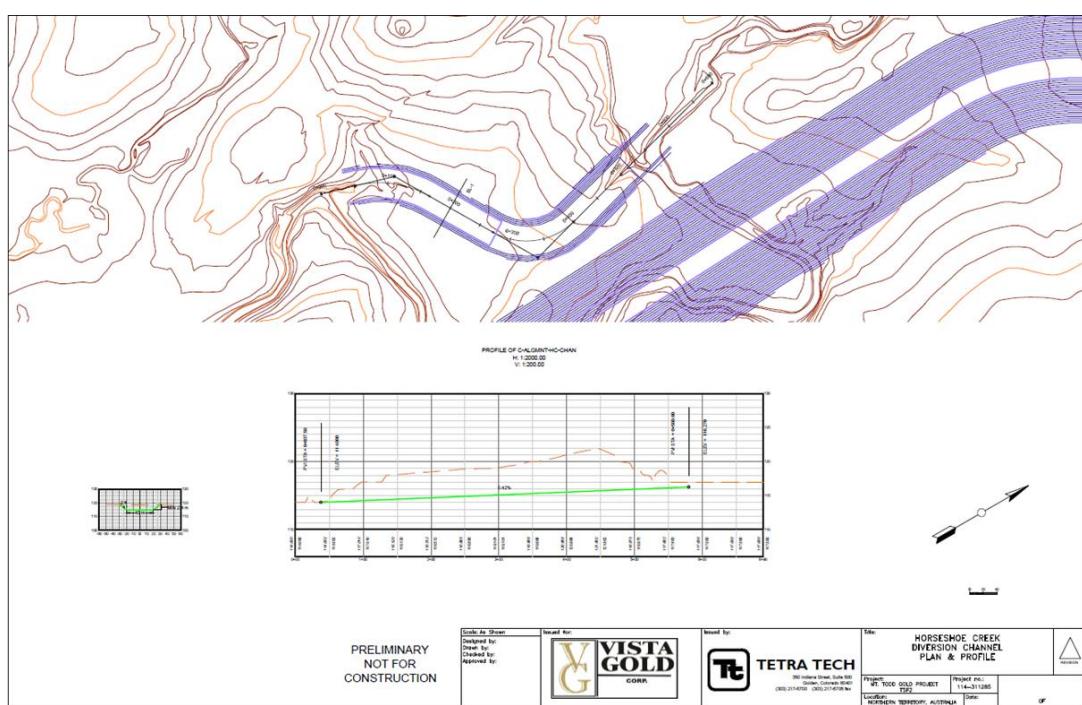


Figure 13 Horseshoe Creek Diversion



4.4 Channel Protection

An indication of the erosion potential of 100-year ARI flood flows has been obtained from the velocity results of hydraulic flood routing. This shows a number of locations along creeks may experience flow velocities of greater than 2m/s (Figure 10).

Whilst the majority of these locations are sufficiently distant from mine infrastructure to be of no immediate risk, the section of Batman Creek adjacent to the processing plant is likely to experience high velocity flows during extreme flood events. Rip-rap protection to earthwork embankments adjacent to the existing drainage channel on the east side of the proposed process plant will be installed for channel protection.

Sections of Stow Creek in the vicinity of the proposed embankment of TSF2 are also expected to experience high flow velocity during extreme flood events. Scour protection measures will include the placement of rip-rap along the proposed channel diversion works.

4.5 Prevention of Surface Water Contamination

The potential for contamination of receiving waters has been reduced by segregation of “clean” stormwater runoff from “dirty” stormwater runoff and the collection and treatment of “dirty” stormwater runoff from areas within the mine site.

“Dirty” stormwater runoff emanates from disturbed mining areas including mine pits (pit water) and material storage dumps. “Clean” stormwater runoff results from rainfall on undisturbed areas.

The method by which surface water contamination is to be minimised is provided below for each of the land use areas.

4.6 Mine Pit Water

Mine pit water will evaporate or be pumped to the water treatment plant where it will re-used in mining operations. The amount of pit water needing treatment has been reduced by minimising the stormwater runoff into the pit by construction of runoff barriers (e.g. engineered mounds/levees) around the mine pit.

4.7 Material Storage Dump Areas

WRD construction will include 8m wide benches at 30m vertical intervals on the face of the WRD and each lift will be constructed at 34°. These benches will function as stormwater drainages and as access for closure cover installation, reclamation activities and maintenance. In general stormwater runoff from material storage dumps has been minimised or will be minimised by:

- ▶ Constructing dumps in a manner that dissipates runoff through seepage and evaporation;
- ▶ Constructing the outer batter slopes of dumps with inert overburden material;
- ▶ Construction of perimeter drains that collect runoff from the outer batter slopes and perimeter areas;
- ▶ Construction of drainage lines that convey runoff from dump perimeter drains to water retention ponds; and
- ▶ Construction of water retention ponds that are sized to capture an ARI wet season rainfall appropriate to their hazard category plus an appropriate freeboard allowance for sedimentation.



4.8 Processing Plant Areas

Surface water runoff from the plant area may contain traces of heavy metals, dust and soil particles that can reduce surface water quality if allowed into natural watercourses. The plant area will be surrounded by a bund forming a controlled drainage area.

4.9 Undisturbed Areas

Runoff from undisturbed land within and upstream of the mine site will be kept separate from “dirty” runoff from undisturbed areas within the mine site. “Clean” runoff will be diverted downstream of the mine site with no further treatment.

4.10 Extreme Rainfall Event Management

During extreme rainfall events in excess of the water management system design, the following procedures are proposed:

- ▶ Regular comparison of storage levels with prescribed Mandatory Reporting Levels will provide advance warning of potential containment issues and the early implementation of measures to help maintain storage levels within design guidelines during higher than normal rainfall periods;
- ▶ If all water storages are at or near capacity, excess water will be redirected to the TSF up to the height of beached tailings for temporary storage;
- ▶ Additional stand-by pumps will be used to increase the transfer capacity between affected ponds and the TSF or pit; and
- ▶ Water retention ponds have been designed to overflow and discharge to the natural environment.

4.11 Surface Water Monitoring

Water monitoring stations will be positioned to obtain the rate of surface water runoff entering and exiting the mine site to assist with the efficient operation of water management and to demonstrate compliance with discharge licence conditions.

In addition, it would be advantageous to obtain data that can be used to validate parameters used in water balance models; this would comprise storage levels, runoff from disturbed areas of the mine and pumping rates between storage infrastructures.

Monitoring of various parameters has been carried out at a number of locations throughout the mine site (Table 21). Whilst this provides valuable information for the operation of infrastructure its value to the long-term management and planning of water containment is often impaired by a lack of information on the duration and rate of flow.

For example, water level during outflow from the WRD into the downstream retention pond is recorded at three weirs on a daily basis. Without information on the duration of outflow it must be assumed that the recorded water level at the weirs is representative of the flow throughout that day, which can lead to gross under or overestimation of flow rates. Also, unless rating curves are established for gauges that record water levels in creeks the rate of runoff from disturbed areas of the mine site cannot be established. An assessment of storage inflow from undisturbed areas by means of water balance calculation is problematic due to the absence of accurate data on the rate of transfer through pumping.

Table 21 Existing Surface Water Level Monitoring

Parameter	Location	Frequency
Rainfall	Yard, Tailings Dam and Security Gate	Daily
Evaporation	Yard	Daily
Syphon flow	WRD retention pond	Continuous during operation
Spillage	WRD retention pond	Continuous during operation
Spillage	Low Grade Ore Pad retention pond	Continuous during operation
Spillage	Stormwater retention pond	Continuous during operation
River stage	Edith River SW2, SW4	Daily
River stage	Horseshoe Creek SW1, SW11	Daily
River stage	Batman Creek SW5	Daily
River stage	Stow Creek SW3, SW12	Daily
Pumping	WRD	Continuous during operation
Runoff	WRD weirs 1, 2 and 3	Weekly
Water level	WRD retention pond	Daily
Water level	Low Grade Ore Pad retention pond	Daily
Water level	Stormwater retention pond	Daily
Water level	Batman Pit	Daily
Water level	TSF	Daily
Water level	HLP	Daily

Recommended improvements to monitoring include:

- ▶ Monitoring of water levels at locations on Batman Creek and Horseshoe Creek just upstream of mine infrastructure (low grade ore stockpile on Batman Creek and tailings storage facility on Horseshoe Creek), together with the derivation of stage – discharge relationships for existing monitoring sites just downstream of the mine site, would provide a means of quantifying the runoff from the disturbed areas of the mine. This would also provide information on flows from incremental areas along both creeks and thus a way of calibrating the runoff coefficients used in water balance models. Given the size of catchments it is likely that flows within the creeks are quite variable and therefore a meaningful assessment of runoff requires hourly or continuous monitoring during storm events;
- ▶ Installation of hourly or continuous monitoring of water levels at the weirs downstream of the WRD during times of flow would provide a direct assessment of seepage rates from the dump. However, it is recognised that the same information can be obtained from records of water levels in the retention pond so long as records of other inflows and outflows are maintained in tandem; and



- ▶ Similarly, continuation of the measurement of transfers between water containment facilities will assist in determining the quantity of runoff entering ponds from disturbed areas and thus provide a means of verifying the required capacity of storage and pumps, and assist with decision making during operation.



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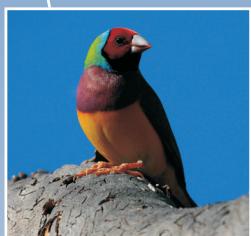
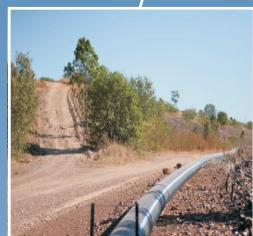
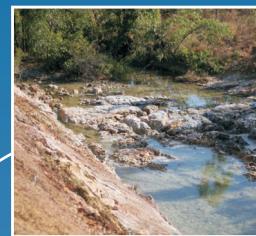
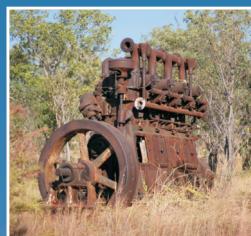
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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	Peter Dunn	Ian McCardle	<i>I. McCardle</i>	Ian McCardle	<i>I. McCardle</i>	16/05/2013



APPENDIX J

Surface Water Assessment and Monitoring



CLIENTS | PEOPLE | PERFORMANCE

Vista Gold Australia Pty Ltd

Mt Todd Gold Project - Mine Site Surface Water Assessment and Monitoring Program

May 2013





This Surface Water Assessment and Monitoring Program Report (“Report”):

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To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- *were limited to those specifically detailed in Section 1; and*
- *did not include GHD undertaking any site visits.*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report (“Assumptions”), including (but not limited to):

- *Water quality data provided by Vista Gold Australia Pty Ltd had been checked for quality*
- *Treated water discharged from RP3 will in the future replace the discharge from RP1 into Edith River.*
- *During mining operations all water leaving the site will be treated.*

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation [August 2012], after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.



Contents

Executive Summary	ii
1. Introduction	1
1.1 Previous Disturbance and Mining History	1
1.2 Project Description	2
2. Legislative and Licence Requirements	3
2.1 Commonwealth Legislation	3
2.2 Northern Territory Legislation	3
2.3 Guidelines	4
2.4 Waste Discharge Licence	5
3. Existing Environment	6
3.1 Surrounding Land Uses	6
3.2 Surface Hydrology	6
3.3 Surface Water / Groundwater Interactions	10
3.4 Discharge Currently Entering the Edith River	10
3.5 Sources of Impact and Sensitive Receptors	12
3.6 Current Surface Water Quality	14
3.7 Fate and Effects of Contaminants	18
4. Mine Discharge Plan	22
4.1 Introduction	22
4.2 Dilution Factors	22
5. Future Water Quality	24
5.1 Mine Site	24
5.2 Impacts of Future Surface Water Discharges	24
5.3 Tailings Storage Facility (TSF2)	25
5.4 Passive / Semi-Passive Water Treatment	27
5.5 Chemical, Fuel and Oil Storage	28
6. Surface Water Monitoring Program	30
6.1 WDL 178-2 Surface Water Monitoring	30
6.2 Surface Water Monitoring for EIA	33
6.3 Review of Monitoring Programs	38
7. References	39



Table Index

Table 1	Summary of River Flow Information	6
Table 2	On-site Water Storage Facilities (Vista Gold 2010)	8
Table 3	Sediment Quality Data (Metals – Weak Acid Digest)	19
Table 4	Chemistry of RP3 Treated Water (Trial 2011)	25
Table 5	Authorised Monitoring Points	30
Table 6	Parameters to Measure at Sample Locations (WDL 178-2Daily when discharging)	31
Table 7	Timing of Sampling Events for Sample Types (WDL 178-1)	32
Table 8	Summary of Water Sampling Sites for Mt Todd Mine	37
Table 9	Parameters to be Monitored Monthly	38
Table 10	Statistics for RP1 Weir 1	42
Table 11	Statistics for RP1 Weir 2	42
Table 12	Statistics for RP1 Weir 3	42
Table 13	Statistics for RP1 Siphon A	43
Table 14	Statistics for RP1 Siphon B	43
Table 15	Statistics for RP2	43
Table 16	Statistics for RO2 Spillway	44
Table 17	Statistics for RP3	44
Table 18	Statistics for RP5	44
Table 19	Statistics for RP5 Spillway	45
Table 20	Statistics for RP7	45
Table 21	Heap Leach Pad	45
Table 22	Statistics for SW1 (Raw Water Supply Reservoir)	46
Table 23	Edith River Average 2008 – 2011	47
Table 24	Stow Creek	48
Table 25	Stow Creek	48
Table 26	Batman Creek	48

Figure Index

Figure 1	Surface Water Locations	7
Figure 2	Site Conceptual Model	11
Figure 3	Summary of Mt Todd Surface Water Data	15
Figure 4	Location of Surface Water Sampling Sites	36

Appendices

- A Surface Water Quality Summary



Glossary	
%ile	Percentile
μg	Microgram
$\mu\text{S}/\text{cm}$	Microsiemens/centimetre
ANFO	Ammonium Nitrate Fuel Oil
ANZECC & ARMCANZ	Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand
AMD	Acid and Metalliferous Drainage
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DME	Department of Mines and Energy
EL	Exploration Lease
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPHC	Environment Protection and Heritage Council
ERDS	Edith River Downstream
ERISS	Environmental Research Institute of the Supervising Scientist
ERSW4	Edith River SW4
ERUS	Edith River Upstream
FRDS	Fergusson River Downstream
FRUS	Fergusson River Upstream
HLP	Heap Leach Pad
ITV	Interim trigger value
kg	Kilogram
km^2	Square Kilometre
L	Litre
LGO	Low Grade Ore
m	Metre
m^3	Cubic Metres (1000L)
ML	Megalitres
mg	Milligram
NEPC	National Environmental Protection Council
NEPM	National Environment Protection Measures
NES	National Environmental Significance
NRETAS	The Department of Natural Resources, Environment, the Arts and Sport
NT	Northern Territory
NTEPA	Northern Territory Environment Protection Authority
RP	Retention Pond
t	Tonnes
TOC	Total Organic Carbon
TSF	Tailing Storage Facility
TV	Trigger Value
WDL	Waste Discharge Licence



Executive Summary

This report discusses the current and future water quality on-site, identifies any potential impacts from discharging mine water to the Edith River as permitted in Waste Discharge Licence (WDL) 178-2 and documents necessary measures to manage identified potential impacts. Issues relating to surface water hydrology, flood risk and mine water management are addressed in GHD (2013b).

Surface water quality has been monitored at several locations in the Edith River and on the Mt Todd mine site for many years. These data show that the water quality of the retention ponds (RPs) on-site has improved dramatically since 2005. However, pH, sulphate and the metals copper, cadmium and zinc remain at levels that have the potential to cause adverse effects on receiving ecosystems downstream of the mine site. The Northern Territory Department of Natural Resource Environment the Arts and Sport (NRETAS) issued a Waste Discharge Licence (WDL) 178 to Vista Gold Australia in January 2011 requiring that any discharge from RP1 is to be diluted to 20,000:1 and discharges to the Edith River are only to occur when river depth is 0.81m or more. This level of dilution was derived to maintain downstream ecosystem health based on ecotoxicity testing performed by the Environment Research Institute of Supervising Scientist (ERISS) (2005).

Investigations into the flow of Edith River at the SW4 sampling site show that the dilution attained at the 0.81m River level can be as low as 50:1, depending on the siphon release at RP1. These investigations showed that the WDL's dilution of 20,000:1 from RP1 has never been met. The NT EPA (formerly NRETAS) addressed this issue in WDL 178-1 in March 2012. WDL 178-1 required Vista Gold to determine site specific trigger values (SSTVs). These were based on background water quality and the Australian and New Zealand Environment Conservation Council (ANZECC) and Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) default 95% species protection trigger values. The site specific trigger values were to be met at the edge of the mixing zone.

A macroinvertebrate sampling program has been undertaken for many years to assess downstream impacts of the mine's discharge. The results of the program indicate that macroinvertebrate populations at site SW4, downstream of the confluence of Burrell Creek (receptor of the RP1 discharge) and Edith River to date show no adverse impacts from low pH and high metal, electrical conductivity and sulphate levels at this site. The discharges from the Mt Todd mine site, in particular from RP1, have not adversely impacted macroinvertebrate populations downstream of the mine site. However, habitats sampled for macroinvertebrates were shallow gravel river edges, and did not take into account the ecosystems in large pools where there is potential for metals from the discharge to settle in benthic sediments. The sediments in the deep pools were sampled and tested for metal accumulation in the 2012 sampling program. The sediments downstream of SW4 contained elevated metals compared to reference and upstream sites, however, all metal concentrations were below the ANZECC & ARMCANZ (2000) guidelines for ecosystem protection.

Vista Gold has received a WDL 178-2 to discharge treated mine water from RP3 into Edith River. To date untreated water has been discharged from RP1. Metal levels of the treated water are substantially reduced compared to levels in untreated RP1 water. Dilution factors have been calculated for RP1, RP7 and treated RP3 mine waters from a suite of bioassays representative of species living in the Edith River to obtain an 80% species protection level at SW4.

A sampling program has been developed for the mine site. The proposed analytes will detect anthropogenic chemicals such as hydrocarbons from fuel sources, nitrous oxides from the use of ANFO (Ammonium Nitrate Fuel Oil), and elevated metals and sulphate from the mine site. An increase in



sampling sites at the Mt Todd mine site has been included and will help to differentiate between potential contaminant point sources. The selection of the proposed additional sites has been based on the locations of potential point source influences from the mine to the Edith River. Results from all sampling will be assessed against the Monitoring Values determined following the methodology in Vista Gold's Discharge Plan (GHD 2013) to ensure ecosystem health.

During operations, Vista Gold proposes to discharge water only after treatment by the water treatment plant. The treated water quality discharged will be of higher quality than that discharged during the dewatering process. Vista Gold proposes to meet the water quality for ecosystem protection to meet the requirements of any future WDL.



1. Introduction

Vista Gold Australia Pty Ltd (Vista Gold) proposes to re-establish and operate the Mt Todd Gold Mine, located 55km north of Katherine and 250km south of Darwin. The mine site is accessed via Jatbula Road (restricted mine access road), approximately 10km east of the Stuart Highway (the main highway between Darwin and Adelaide).

Mining and associated operations will occur on mineral leases MLN 1070, MLN 1071 and MLN 1127 covering 5,365ha. Vista Gold also controls exploration leases EL 25668, EL 25669, EL 25670 covering 117,632ha.

The Project area is in an historical mining district. The Mt Todd Gold Mine site is a brownfield/disturbed site. The site was most recently mined for gold in the 1990s. Mining operations ceased in the early 2000s. Mining infrastructure such as tailings dams, waste rock dumps and remains of processing facilities remain on-site. The site has many surface water bodies. Some of these contain water with high metal and low pH levels and have the potential to overflow during the wet season.

The primary concerns regarding water quality from the Mt Todd mining area are related to acid and metalliferous drainage (AMD) in several of the retention pond areas. Exposure of the mine's waste rock to air and water results in sulphide minerals liberating heavy metal ions such as zinc and copper, as well as sulphates, into the retention ponds. The liberated sulphate ions can mix with free hydrogen ions in solution leading to the formation of sulphuric acid, which in turn is responsible for lowering the overall pH of the ponds. Excesses of heavy metal ions and low pH may have deleterious effects on the aquatic ecosystems of the Edith River.

This report discusses the current and future water quality on-site, identifies any potential impacts from discharging mine water to the Edith River as permitted in Waste Discharge Licence (WDL) 178-2 and documents necessary measures to manage identified potential impacts. Issues relating to surface water hydrology, flood risk and mine water management are addressed in GHD (2013b).

1.1 Previous Disturbance and Mining History

The Mt Todd area is the location of numerous Aboriginal archaeological sites, including a large (at least 2 by 2.5km) quarry site occupying the *Eucalyptus tintinnans* woodland habitat to the west and south of the Batman Pit. The Overland Telegraph Line traversed the site in 1872, and was soon followed by mining for gold. From then until the 1980s the study area was the site for intermittent mining for gold, tin and wolfram. Much of this early disturbance was overgrown by the early 1990s.

The Project area was again mined for gold in the 1990s, but underperformance and higher than anticipated operating costs led to the mine being closed and placed in care and maintenance in 1997. Design capacity was never achieved because inadequacies in the crushing circuit reduced recoveries of gold. Cyanide soluble copper minerals resulted in high reagent consumption, further hindering efforts to reach designed production levels.

General Gold formed a joint venture with Multiplex Resources and Pegasus Gold to own, operate and explore the mine in 1999. Operations ceased in July 2000, with administrators appointed. Mining infrastructure such as tailing dams, waste rock dumps and remains of processing facilities remain on site. The mine has been in care and maintenance for the past 10 years.



This Project takes the opportunity to renew mining of the gold resource whilst simultaneously securing rehabilitation for the site.

1.2 Project Description

The current mine development and operation plans involve an open pit mine with conventional open pit mining methods. Ore will be processed on site prior to disposal of the tailings in one of two tailings storage facilities. The current plans are to process approximately 17.8 million tonnes of ore per annum for a design mine life of 13 years. Approximately 62 million tonnes of thickened process tailings will be stored within the proposed expansion of the existing TSF1 during production years one through four. An additional 161 million tonnes of thickened tailings will be stored in the proposed new Tailings Storage Facility (TSF2), commencing during production years four (Tetra Tech 2012).



2. Legislative and Licence Requirements

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), any development requires assessment if it has the potential to affect one or more of eight matters of National Environmental Significance (NES). The matters of NES that may be of relevance to surface water at Mt Todd include:

- ▶ wetlands of international importance (listed under the Ramsar Convention);
- ▶ listed threatened species and ecological communities; and
- ▶ migratory species protected under international agreements.

The EPBC Protected Matters Search Tool indicates that at Kakadu Stages 1 & 3 (a Ramsar listed wetland), ten threatened species and fourteen migratory species are likely to, may or are known to occur in the search area (Project area plus a 10km buffer). Sightings have been made in the water storage of one migratory species, the freshwater crocodile (*Crocodylus johnstoni*). This species was not recorded by Lane *et al.*, (1990), however there are seven records from the Yinberrie Hills in the NT Fauna Atlas. The other species identified are upstream of the mine and will not be impacted by mining activities.

2.1.2 National Environment Protection Measures (Implementation) Act 1998

Under the *National Environment Protection Measures (Implementation) Act 1998*, the National Environmental Protection Council (NEPC) was established to set national environmental goals and standards for Australia through the development of National Environment Protection Measures (NEPMs). The NEPC is part of the Environment Protection and Heritage Council (EPHC).

Section 14(1) of the NEPC Act prescribes that NEPMs may relate to any one or more of the following:

- ▶ ambient marine, estuarine and fresh water quality;
- ▶ general guidelines for the assessment of site contamination; and
- ▶ environmental impacts associated with hazardous wastes.

2.2 Northern Territory Legislation

2.2.1 Mining Management Act 2001

The *Mining Management Act 2001* ensures the development of the Territory's mineral resources in accordance with environmental standards consistent with best practice in the mining industry. The Act is administered by Department of Mines and Energy (DME). The objectives of the act that relate to surface water at Mt Todd are:

- ▶ Protect the environment by:
 - the authorisation and monitoring of mining activities;
 - requiring appropriate management of mining sites;



- facilitating consultation and cooperation between management and workers in implementing environment protection management systems;
 - implementing audits, inspections, investigations, monitoring and reporting to ensure compliance with agreed standards and criteria; and
 - specifying the obligations of all persons on mining sites with respect to protection of the environment.
- Assist the mining industry to introduce programs of continuous improvement to achieve best practice environmental management.

2.2.2 Water Act 1992

The *Water Act 1992* covers allocation, use, control, protection and management of Northern Territory water resources.

Pollution under the Act includes directly or indirectly altering the physical, thermal, chemical, biological or radioactive properties of the water so as to render it less fit for a prescribed beneficial use for which it is or may reasonably be used, or to cause a condition which is hazardous or potentially hazardous to:

- public health, safety or welfare;
- animals, birds, fish or aquatic life or other organisms; and
- plants.

The Waste Discharge Licence (WDL 178-2) for the Mt Todd site is applicable under this Act (See Section 2.4 below).

2.2.3 Waste Management and Pollution Control Act 2009

The purpose of the *Waste Management and Pollution Control Act 2009* is to protect the environment through objectives and approvals, encouraging effective and responsible waste management and reduction and response to pollution. This Act facilitates the implementation of national environment protection measures made under the *National Environment Protection Council (Northern Territory) Act 1999*, and incorporates environmental compliance plans and audits.

Section 14 of the Act establishes a process for notifying the Environmental Protection Agency (the administrating agency for the Act) about incidents causing, or threatening to cause pollution. Schedule 2 of the Act requires environment protection/licensing for certain activities.

2.3 Guidelines

The following Guidelines may be applicable to surface water quality in the NT:

- Australian and New Zealand guidelines for Fresh and Marine Water Quality ANZECC & ARMCANZ (2000);
- Erosion and Sediment Control Plan Content, NRETAS, 2006; and
- NT Health and Families: Requirements for Mining, Construction and Bush Camps (Environmental Health Information Fact Sheet No. 700).



2.4 Waste Discharge Licence

The Northern Territory Government has provided Vista Gold Australia with a Waste Discharge License (WDL) under Section 74 of the *Water Act 1992*. The WDL permits the discharge of waste water into the Edith River from the Mt Todd mine site for a period of two years (until 30 September 2014). The requirements of the license are:

"The Licensee must, for each wastewater source or each combination of wastewater sources, determine the Dilution Factor and Monitoring Value(s) required to achieve an 80% species level of protection at monitoring point SW4"

The Dilution Factor and Monitoring Value(s) must be:

- 14.1. determined in accordance with the Discharge Plan using Direct Toxicity Assessment;*
- 14.2. determined prior to the first discharge for each Wet season covered by this Licence;*
- 14.3. provided to the NT EPA prior to the first discharge for each Wet season of this Licence; and*
- 14.4. made available on the Licensee's Australian website within 10 Business days of being provided to the NT EPA under condition 14.3*

The Licensee must apply, in accordance with the Discharge Plan, the Dilution Factor and Monitoring Value(s) provided to the NT EPA under condition 14 at monitoring point SW4"



3. Existing Environment

3.1 Surrounding Land Uses

The mine is surrounded by Exploration Lease 25576 and 25670, controlled by Vista Gold. Land uses immediately adjacent to the mine site include:

- ▶ north – Horseshoe Tin Field;
- ▶ east – Nitmiluk National Park;
- ▶ south – Edith River and Edith Falls Road; and
- ▶ west – Yinberrie Hills (supporting a population of Gouldian finches (*Erythrura gouldiae*)).

3.2 Surface Hydrology

The Mt Todd mine is located in the Daly River Catchment (NRETAS, 2011) to the north of the Edith River. The Edith River flows from the east to the west into the Fergusson River, which enters the Daly River. Catchment areas and flows are shown in Table 1.

Table 1 Summary of River Flow Information

Gauging Station Number	Tributary	Catchment Area (km ²)	Mean Annual Flow Volume (m ³)	Mean Annual Discharge (m ³ /sec)
G8140040	Daly River	47,100	5,750,000,000	213.90
G8140001	Katherine River	8,640	1,922,000,000	87.17
G8140044	Flora River	5,900	762,300,000	30.80
G8140008	Fergusson River	1,490	415,600,000	23.49
G8140068	King River	11,000	207,800,000	7.64
G8140063	Douglas River	842	148,800,000	6.07

Several surface water bodies including retention ponds are present on-site (Figure 1), being the:

- ▶ Raw Water Dam;
- ▶ Waste Rock Dump Pond (RP1);
- ▶ Low-Grade Ore Dump Pond (RP2);
- ▶ Batman Pit Lake (RP3);
- ▶ Plant Runoff Pond (RP5);
- ▶ Tailings Storage Facility Pond (RP7);
- ▶ Heap Leach Pond (HLP); and
- ▶ Decant/Polishing Pond.

On-site water storage facilities and the capacity of each facility are listed in Table 2.

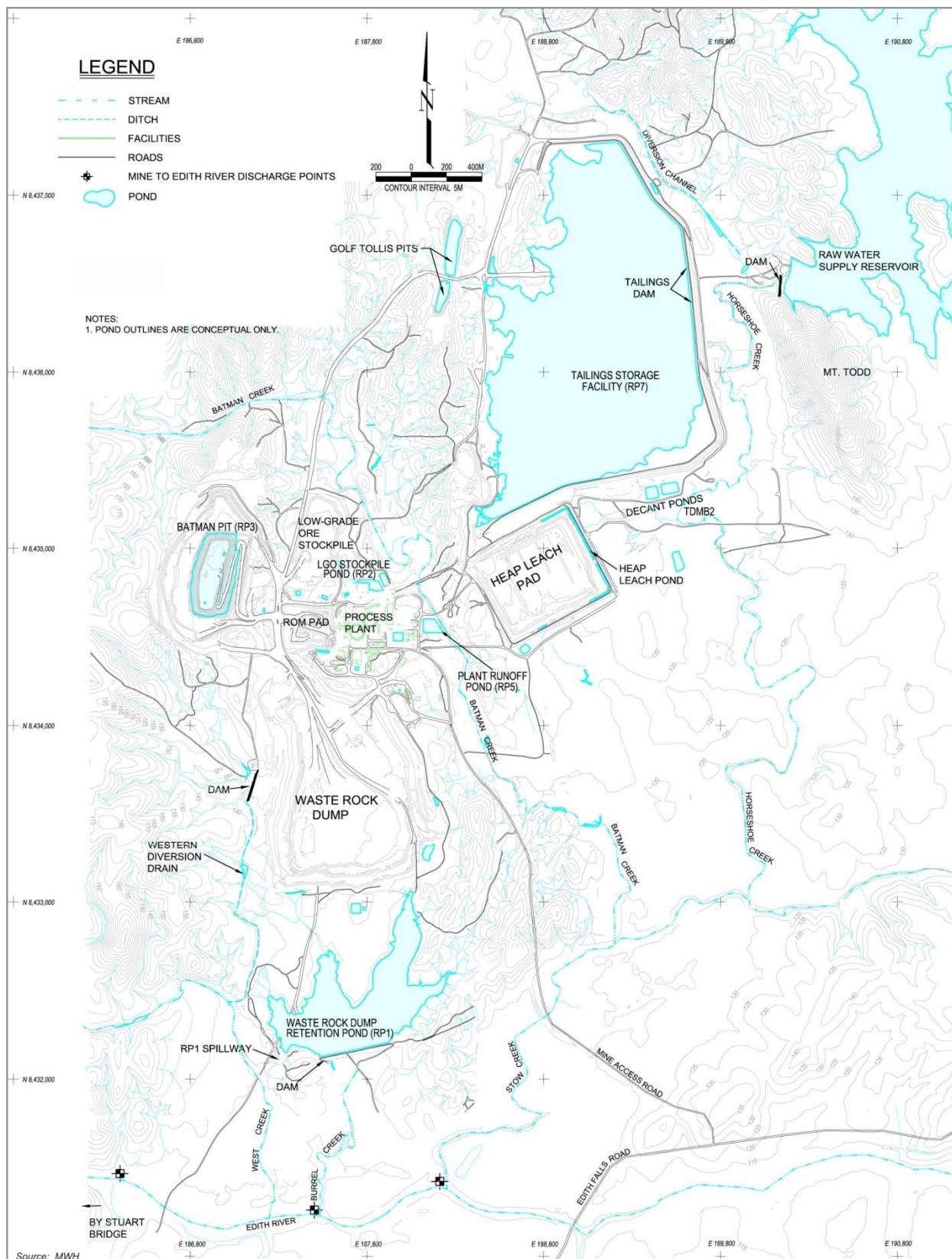


Figure 1 Surface Water Locations



Table 2 On-site Water Storage Facilities (Vista Gold 2010)

Retention Pond Number	Details	Current Storage Capacity (m ³)	Current Storage Capacity (ML)
Raw Water Supply Reservoir	Water Supply	4,500,000	4,500
RP1	Waste Rock Dump Retention Pond	1,040,000*	1,040*
RP2	Low-grade Ore Stockpile Pond	5,000	5
RP3	Batman Pit	10,600,000	10,600
RP5	Plant Run-off Pond	20,000	20
RP7	Tailing Impoundment Facility	5,070,000	5,070
n/a	Decant / Polishing Ponds	30,000	30
n/a	Barren Solution Pond	6,600	6.6
n/a	Heap Leach Pad Moat	17,000	17

*The actual volume of RP1 has since changed due to remodeling and earthworks. Vista Gold proposes to further modify RP1 as the waste rock dump increases in size during operations.

A gauging station is located on the Edith River downstream of the mine. The catchment area for the gauge is 671km². The maximum recorded river height at this station is 6.44m (NRETAS 2011a). This height was exceeded on the 27th December 2011 when a height of approximately 9.4m was recorded.

A description of the individual tributary catchments of the Edith River from the Mt Todd Water Management Plan 2010/2011 (Vista Gold 2010) is summarised below:

- ▶ Horseshoe Creek is fed naturally by its catchment area, including the raw water supply reservoir and a drainage diversion channel around the tailings storage facility. Horseshoe Creek may receive any potential seepage from RP7. It flows into Stow Creek, which in turn discharges into the Edith River. The Horseshoe Creek riparian zone east of RP7 contains wetland species and may be classified as a seasonal wetland as it is ephemeral (Vista Gold 2010);
- ▶ Batman Creek is fed naturally by its catchment area upstream of the mine site during the wet season. It captures discharges and runoff from RP5, RP2 and the Heap Leach Pad during the wet season and discharges to Stow Creek;
- ▶ Stow Creek is fed by Batman Creek and Horseshoe Creek and discharges to the Edith River;
- ▶ a large majority of Burrell Creek is essentially covered by the waste rock dump. It receives water from the RP1 siphons during planned discharges. Burrell Creek contains wetland-type vegetation species and during the wet season would be classified as a seasonal wetland (Vista Gold 2010); and
- ▶ West Creek is located to the west of the waste rock dump and discharges directly to the Edith River. It is constantly fed by the western diversion drain. It also receives water from the waste rock dump retention pond (RP1) spillway during periods of uncontrolled discharge.



3.2.1 Environmental Values and Beneficial Uses

The Edith River is not listed as a wetland of international importance (Ramsar Wetland). Nor is it listed as one of Australia's Nationally Important Wetlands.

The Edith River and its catchment (including the mine site) have a declared Beneficial Use under the *Water Act 1992* (NRETAS 2011d). Beneficial Use is a legislated process that assists in the protection and management of water. The community decides how a particular water body should be used by choosing on one or more Beneficial Use categories. Specific categories of uses have been defined in the *Water Act* to provide the context in which decisions relating to water management, planning and the issuance of licences and approvals are made.

The Edith River declared beneficial use is the protection of aquatic ecosystems. (NRETAS 2011d) Groundwater in the region is referred to as the Katherine Area groundwater and also has declared beneficial uses under the *Water Act 1992*. These are for use of raw water for drinking, for agricultural or industrial purposes (NRETAS 2011a).

Edith River

The Edith River is a 69km tributary of the Fergusson River. The nearest sensitive receptor (in this case a residential area) is the Werenbun Community, approximately 8km east (upstream of the Edith River and to the immediate south of the mine site).

Edith Falls

Leliy/Edith Falls is located on the western side of Nitmiluk National Park (Katherine Gorge), 42 kilometres north of Katherine along the Stuart Highway. The site is a popular tourist attraction and important sacred site for the Werenbun Community. Tourist visitation is controlled in a limited area around and above the plunge pool, leaving the downstream sections of the river available for free access by members of Werenbun community and other Aboriginal people visiting the area. It is a favoured area for turtles and is regarded as a safe place for children due to the relative absence of saltwater crocodiles (CSIRO 2009).

The environmental values at this site include:

- ▶ water quality for swimming;
- ▶ water quality for ecosystem protection; and
- ▶ flora and fauna for bushwalking.

Impacts on these values may arise from camping and bushwalking activities.

Downstream Users

Cropping occurs downstream of the mine site, close to the confluence of the Edith River with the Fergusson River. Edith River water may be used for irrigation. Surface water (which is potentially dependent, in part, on locally discharging groundwater) from the Edith River is used in the Edith Farms area for stock and domestic purposes as well as for irrigation (surface water extraction licences, 360ML and 110ML on portions 4725 and 2351 respectively).



3.3 Surface Water / Groundwater Interactions

3.3.1 Mt Todd Mine Site

Regional groundwater flow at the Mt Todd mine site is generally westwards, mimicking the surface water flow of the Edith River. The regional flow is likely to be interrupted by local groundwater highs and lows associated with groundwater sources and sinks. Local topography is likely to provide localised groundwater high points beneath elevated features such as the Yinberrie Hills and Mt Todd, or low points where groundwater may discharge as springs in surface water courses.

Groundwater is likely to be recharged from infiltration of direct rainfall, leakage from the ephemeral surface water courses that flow after wet season rainfall events, and leakage from the perennial Edith River where river levels are above the surrounding groundwater level. High rainfall in the wet season, combined with thin alluvial cover and extensive areas of outcrop in surface drainages, are likely to result in high rates of aquifer recharge.

The key potential anthropogenic sources of groundwater infiltration are the raw water dam, the tailing storage facility (TSF), heap leach pad, low grade ore (LGO) stockpile, process plant, unlined earthen surface water diversion drains, pits, waste rock dumps, the waste rock dump retention pond and the proposed new TSF.

3.3.2 Anthropogenic Groundwater Sinks at Mt Todd

The currently flooded Batman Pit (RP3) is an example of a groundwater sink when evaporation during the dry season (or pumping) exceeds inflow, resulting in a regional (or local) groundwater low point. During this scenario groundwater flows into the pit and makes contact with the mine workings. Batman Pit is also expected to act as a groundwater sink during mining. During future non-operational periods, the source/sink scenario will be a function of rainfall, evaporation, pumping and infiltration (in or out).

3.4 Discharge Currently Entering the Edith River

A conceptual water model for the site is provided in Figure 2.

Water discharged from the mine site currently enters the Edith River during the Wet season from:

- ▶ treated RP3 water via Batman Creek;
- ▶ RP7 via Horseshoe Creek;
- ▶ Stow Creek into the Edith River;
- ▶ controlled siphon discharge from RP1 via Burrell Creek; and
- ▶ overflow from RP1 via a spillway to West Creek.

No surface flow of mine water currently enters the Edith River during the dry season from May to December (MHW 2006), because Horseshoe, Batman, Burrell and West Creeks are ephemeral. Groundwater has the potential to discharge to surface water throughout the year (Tetra Tech 2013).

Stow Creek receives water intermittently during the wet season from two ephemeral creeks that run through the mine site: Batman Creek and Horseshoe Creek. These creeks have received overflow and seepage during heavy rainfall. Flows come from several mine site sources, including the mine's tailings dam (RP7), retention ponds and a heap leach pad (HLP).

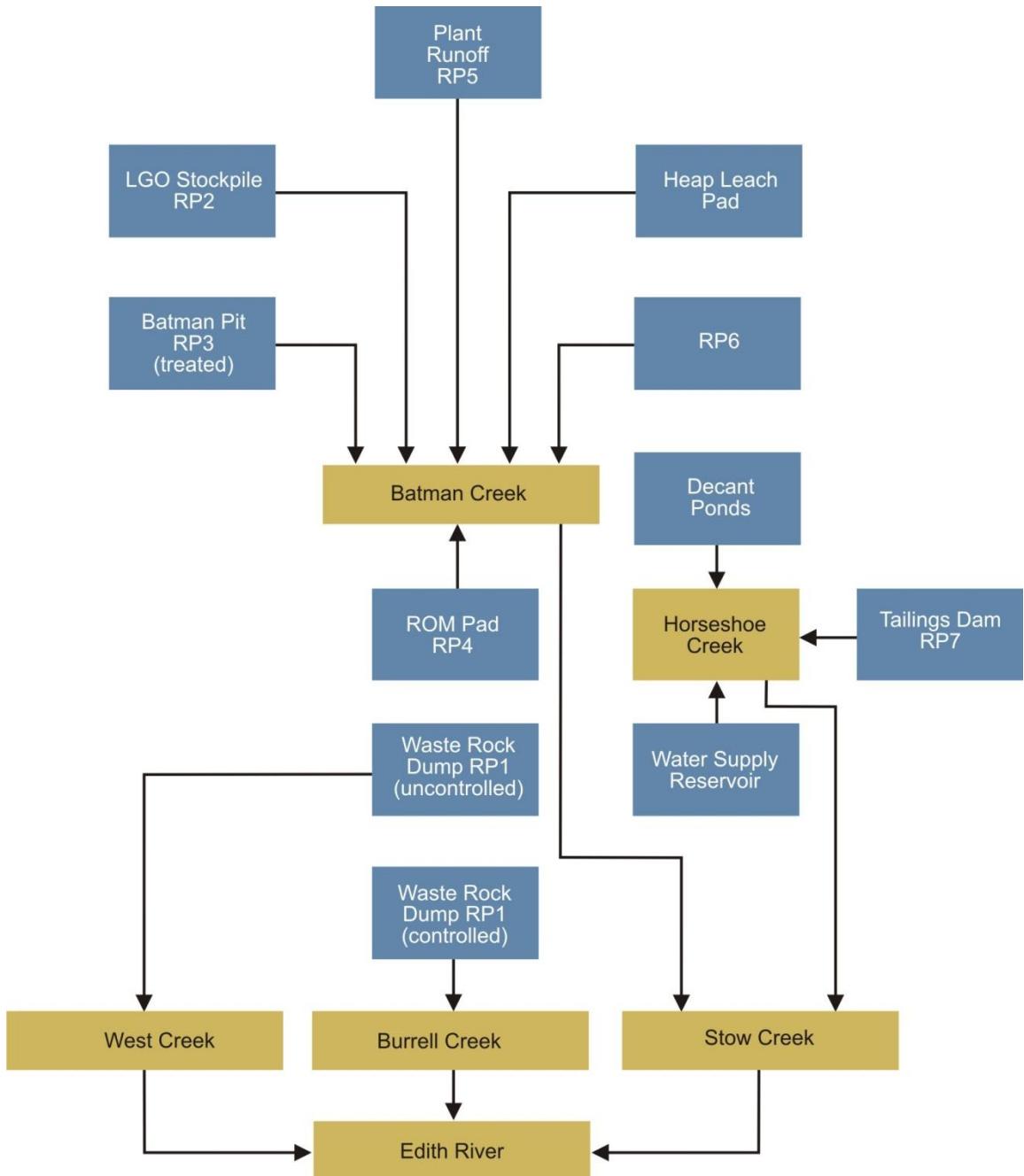


Figure 2 Site Conceptual Model



Controlled discharge from RP1 has been the largest contributor of mine water to Edith River to date. Water has been released to the Edith River in order to increase the holding capacity of RP1 during the wet season. Uncontrolled discharge from RP1 (via the spillway) to West Creek has occurred during heavy rainfall events, the most recent being 27th December 2011.

Uncontrolled discharge from Stow Creek into the Edith River may occur during periods of wet season base flow (approximately January to May). Mine water may make up part of this discharge and potentially originates from a number of sources on-site. Seepage from the low grade ore (LGO) stockpile, the Process Plant and the HLP is flushed to Batman Creek and then Stow Creek. Tailings Dam seepage and underflow as well as some seepage from the HLP are flushed into Horseshoe Creek and then Stow Creek. Some seepage from the Tailings Dam (RP7) may also occur directly into Horseshoe Creek along the eastern Tailings Dam wall.

The other locations of mine water discharge to the Edith River are the RP1 discharge point and a minor drainage, West Creek. The RP1 discharge point is where controlled siphon pumping from RP1 enters the Edith River. West Creek delivers diverted water from the western side of the Waste Rock Dump via the Western Diversion Drain, and overflow from the RP1 spillway. It is reported that West Creek only delivers mine water to the Edith River when substantial rainfall events cause RP1 to overflow, as was the case in December 2011.

Treated RP3 mine water will be discharged during mine dewatering 2012/2013 and 2013/2014 wet seasons only via Batman Creek into Stow Creek where it then enters Edith River. The volumes discharged from RP3 will be determined by the requirements of WDL 178-2.

3.5 Sources of Impact and Sensitive Receptors

3.5.1 Sources of Impact

Water quality may cause impacts associated with:

- ▶ leachate containing metals and acids from ore and waste rock pile contaminating surface water runoff and/or discharges;
- ▶ enhanced loads of suspended sediment; and
- ▶ hydrocarbon and other chemical spills, leaks or disposals contaminating surface water runoff and/or discharges.

Mine Water Contamination

The retention ponds at the Mt Todd mine site contain waters of varying quality. Some contain elevated levels of metals such as copper and zinc as a result of oxidation of the native rock (e.g. waste rock) in the area. Periodically, water from the waste rock dump retention pond (site RP1) reaches a level where discharge to the nearby Edith River is necessary to maintain control of the water levels throughout the mine site.

RP3 is currently being treated in order to reduce the concentrations of metals. Discharge from RP3 is regulated by WDL 178-2 and the Vista Gold Discharge Plan (GHD 2013).



Chemicals to be Stored on Site

An assessment of chemicals to be stored on-site has been undertaken to provide a list of potential contaminants that may enter surface waters in the case of an accidental spill or from routine mine operations.

All chemicals, fuels and oils will be or are currently stored and contained according to Australian Standards and Regulations for the protection of surface water from impacts of spills. Lubricating oil will be stored in bulk containers inside a bunded area with spill protection and recovery.

Waste oil will be stored in a tank within a bunded area and held for collection by a contractor for reprocessing and recycling.

To prevent adverse environmental impacts from exposure to flocculants Vista Gold proposes to use non-hazardous, low toxicity non-ionic or anionic flocculants.

To assess if any chemicals stored on-site (current and future) are entering the surface waters additional analytes have been included into the current surface water monitoring program. Nitrate and nitrite have been included on the list of analytes to assess if ANFO is entering the waterways from blasting. Total petroleum hydrocarbons have also been included on the list of analytes to assess if diesel is entering the surface waters. Weak Acid Dissociable (WAD) cyanide has been included in the proposed monitoring program to identify if this contaminant is entering the waterways.

3.5.2 Sensitive Receptors

Sensitive receptors that may be impacted by the mine's activities include:

- ▶ the morphology of streams and land surfaces;
- ▶ aquatic and terrestrial biodiversity including:
 - aquatic phytoplankton;
 - aquatic macrophytes;
 - terrestrial plants;
 - zooplankton;
 - benthic and other aquatic macroinvertebrates including biting insects;
 - terrestrial invertebrates;
 - fish;
 - frogs;
 - reptiles;
 - birds and;
 - mammals; and
- ▶ downstream users of water.

Contaminated surface water from the mine may have the following impacts on sensitive receptors:

- ▶ direct effects of metals contaminating the gills of fish and other aquatic animals;
- ▶ bioaccumulation of heavy metals up the food chain;
- ▶ direct effects of low pH on plants and animals and prokaryotes;
- ▶ mortality of macroinvertebrates leading to disruption of food sources and food webs;

- ▶ mortality from drinking contaminated water;
- ▶ indirect and direct toxicity;
- ▶ settling of precipitates on stream substrates, which can clog interstitial spaces in river bed sediments and restrict availability of habitat to aquatic organisms; and
- ▶ loss of potable, irrigation and stock water supplies.

Risks to biodiversity are assessed in Chapter 13, Flora and Vegetation and Chapter 14, Fauna.

3.6 Current Surface Water Quality

3.6.1 Water Quality Data – Mt Todd Mine Site

Acid and metalliferous drainage (AMD) in several of the retention pond areas are the main water quality concerns from the Mt Todd site. Exposure of sulphide minerals associated with the mine's waste rock to air and water results in the liberation of heavy metal ions such as zinc and copper as well as sulphates into the retention ponds. The liberated sulphate ions can mix with free hydrogen ions in solution leading to the formation of sulphuric acid, lowering the overall pH of the pond. Excesses of heavy metal ions and low pH can have deleterious effects on the aquatic ecosystems of receiving environments, in this case, the Edith River.

A monitoring program is in place to assess the quality of surface waters upstream and downstream of the mine site. In the past, surface water had been analysed for pH, EC, SO₄, Al, Cd, Cu and Zn. The current sampling program has increased the number of analytes to capture any anthropogenic chemicals used on-site (Section 6).

The surface waters at Mt Todd mine are sampled on a daily basis during mine discharge from the start of the wet season through to April or May at the end of the wet season at the locations specified in the WDL. This sampling period is intended to capture metal levels that will indicate if any discharges (controlled or uncontrolled) from the mine site occur. Surface waters are also sampled year round on a monthly basis to obtain annual variations in water quality.

The surface water chemistry data provided by Vista Gold in Appendix A covers sampling periods in wet seasons from 2008 to 2011 for the retention ponds and surface waters. Summaries of each sampling location are provided in Appendix A. To provide an indication of the decrease in metal concentration through the wet season the maximum and minimum results are also shown in Appendix A. Summaries of the median results for major analytes for each surface water site are shown in Figure 3.

The samples from the start of the wet season show high metal concentrations for the first week of sampling due to evaporation of the RPs during the dry season increasing the concentrations of metals in the ponds. The metal concentrations in the RPs continually decrease during the wet season and at the end of the wet season are approximately half that observed at the start of the season.

Mean monthly water quality parameters from the three Edith River sites (SW2, SW4 and SW10) and single Stow Creek (SW3) monitoring site over the 2011-2012 wet season is provided to demonstrate the general temporal patterns of variation among the sites (Figure 3). Data are presented as the mean with 95% confidence intervals indicated by the error bars. Patterns for 2010-2011 were analysed and are referred to where results differ from what happened in 2011-2012. As would be anticipated, the monitoring site above the influence of discharges from the mine site (SW2) had relatively stable close to neutral pH, and low levels of sulphate, copper and zinc over both wet seasons.

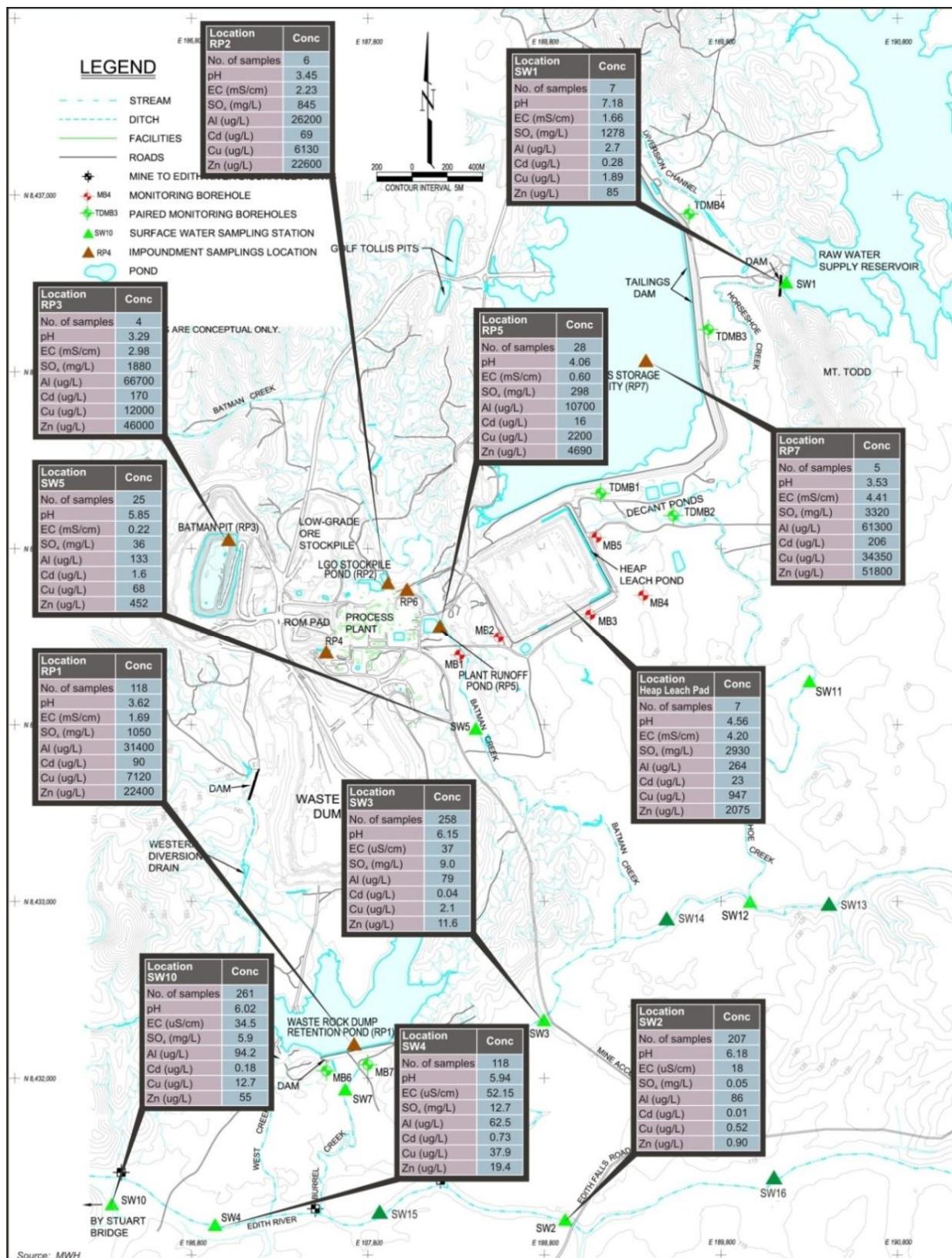


Figure 3 Summary of Mt Todd Surface Water Data



3.6.2 Retention Ponds – RP7

RP7 in the past and currently contains water with high EC, low pH and high metal levels (Figure 4). RP7 currently contains the poorest water quality on site. The water displays the distinct chemical signature of acidic drainage from sulfidic scat stockpiled in the south-western part of the RP7 catchment (Earth Systems 2012).

There is evidence that water is migrating from RP7 via the previous alignment of Horseshoe Creek where backfilling occurred. There are two key seepages observed in the field where the RP7 embankment crosses the original creek line. This surface seepage is the main source of water migration from RP7. Water from the seeps has been observed to pond for several hundred meters both upstream and downstream in Horseshoe Creek (Earth Systems 2012). Seepage rates from the north-eastern embankment were estimated to be up to 5 – 10 L/s and 1 L/s from the eastern embankment (Earth Systems 2012).

Earth Systems (2012) also suggest that RP7 water is present in groundwater down gradient of the embankment. This indicates that another key mechanism for water migration from RP7 is direct percolation of the RP water from the ponded water to the groundwater system via fractured bedrock, along the western margin of the RP. However Earth Systems (2012) state that the seepage of acidic water from the tailings material is not expected to be a significant risk to water quality, provided current management practices are maintained (ie. maintaining saturation of tailings to minimise acid generation).

Vista Gold is proposing to raise RP7 to accommodate an additional 62Mt of tailings via a 16m tailings lift. Provided the tailings remain saturated the additional material will not increase sulfide oxidation and acid generation. Further, Earth Systems (2012) state that the rate of seepage from the uplifted TSF is expected to be comparable, if not lower, than the seepage rates currently observed. This is due to the deposition of tailings material with relatively low hydraulic conductivity across the entire footprint of the existing TFS, which will limit the rate of seepage via the backfilled Horseshoe Creek line, as well as seepage from the ponds into the groundwater via fractured bedrock pathways.

To prevent waste rock from generating acid in the future, following mine closure and TFS rehabilitation; Vista Gold proposes to cap any waste rock with acid generating potential with a clay liner then cover with non-acid generating rock from the mining process. This proposed process will prevent water movement through the TSF and consequent leaching of acid water.

3.6.3 Retention Ponds – RP1

Retention Pond (RP) 1 collects run-off water from the waste rock dump, which in the past had the potential for significant acid generation. Water quality in RP1 has improved significantly since the ERISS (2005) direct toxicity assessment (DTA) conducted on a water sample from the RP. Metal levels in the RP have reduced by approximately 3 – 5 times those measured by ERISS in 2005, with the toxicity reducing by approximately 20 times (Dilution factor 2005: 1:20,000, Dilution factor 2013: 1:1,000). Prior to the 2012/2013 wet season RP1 was the main source of mine water into the Edith River. RP1 discharged untreated mine water to meet 95% species protection site specific trigger values at SW10.

The DME undertook significant earthworks to divert stormwater runoff from the retention pond prior to the 2012/2013 wet season. Together with additional pumping from RP1 to RP3, the free board in RP1 has reduced and the likelihood of an uncontrolled discharge from RP1 due to a storm event is now less likely.

Prior to the commencement of mining operations Vista Gold propose to only discharge untreated water from RP1 if it is required to lower the freeboard to eliminate the chance of an uncontrolled discharge.



Upon commencement of operations all water to be discharged from RP1 will be treated through the water treatment plant.

3.6.4 Batman Pit – RP3

Batman Pit is the mine void remaining from the previous mining operations. Since 2005 the pit has filled with water which has become acidic with high EC and metal concentrations. Before the mine can commence operations the pit must be dewatered. Currently, Vista Gold are treating the water in-situ in order to raise the pH and remove metals. This treated water will be discharged into the Edith River, via Batman Creek and Stow Creek at a dilution determined by a DTA to meet an 80% species protection level at SW4 to meet WDL 178-2. This is discussed in detail Section 4.

3.6.5 Stow Creek SW3

Results from the Stow Creek site (SW3) were clearly influenced by intermittent flows of contaminants from the tailings dam (RP7), retention ponds and the heap leach pad (HLP), and likely variation in the pattern of rainfall between years. There was little decrease in pH during December to February in 2011-2012, although there was significant decrease during December to February 2010-2011. Sulphate levels in 2011-2012 were high in December, and declined in January although remaining higher than at the other sites. Sulphate levels in 2010-2011 were lower than those observed in 2011-2012 with a pattern of gradual increase during the wet season. Copper and zinc levels remained statistically similar to levels at SW2 throughout the 2011-2012 wet season. Levels of copper and zinc peaked above SW2 levels during January 2010-2011.

3.6.6 Edith River SW4

Water quality at the site immediately downstream from the mine (SW4) was strongly influenced by discharges from the RP1 discharge point, and to a lesser extent from Stow Creek discharge . pH was significantly lower relative to the upstream site (SW2) through December to February, with recovery in March. The pH was even lower in December 2010-2011, although the general pattern, including recovery in March and April, was similar to 2011-2012. Sulphate levels relative to upstream values were elevated in all months except March. Levels were also elevated in 2010-2011, with recovery delayed until April. Levels were consistently lower than those recorded at SW3 during December to February 2011-2012 with the reverse occurring during December to March 2010-2011. These patterns seem to reflect the intermittent flow from Stow Creek. Copper and zinc levels were very significantly elevated above upstream levels during all months other than March. The patterns in 2010-2011 were similar to those in 2011-2012, other than recovery to upstream levels not occurring until April 2011.

3.6.7 Edith River SW10

Water at the downstream site (SW10) could be expected to be of higher quality than occur at SW4 near the discharge point. Any improvement is likely to have resulted from dilution caused by rainfall, surface runoff, and inflow from creeks between SW4 and SW10. pH was lower relative to upstream (SW2) of the mine during December to January, and did not differ significantly from that near the discharge point (SW4). During 2010-2011 the pH was higher than at SW4 during December to February and similar to SW4 in March to April when the pH at SW4 increased. Levels of sulphate were elevated relative to upstream of the mine during December to March, with levels less than SW4 only during December. Levels of sulphate during 2010-2011 were elevated and significantly lower than at SW4 during December to March. The elevation in sulphate continued through to April. Levels of copper and zinc remained lower



or the same as at SW4 during all months. Elevated copper levels upstream of the mine site were highest during January and February, with high zinc levels persisting to March. Levels of copper and zinc during 2010-2011 were consistently much lower than at SW4 in all months other than April when levels of elevation at both site decline to that of SW2.

3.6.8 Patterns of Contamination

The patterns of contamination described above are based on a consistent annual cycle of rainfall in the wet season. These patterns are determined by elevated levels occurring in Stow Creek (at times that are difficult to predict due to rainfall and upstream impacts) entering the Edith River. The elevated levels of contamination in the early wet season months at sites downstream of the mine are considerably lower as the wet season continues, and the dilution of contamination between SW4 and SW10 plays an important part in returning metal levels to background at SW10. This cycle varies between years according to patterns and levels of rainfall and river flows. The levels of contamination in the controlled discharges and the volumes of discharge released also act on the patterns of contamination within the Edith River at SW4 and SW10.

3.7 Fate and Effects of Contaminants

3.7.1 Fate and Effects of Discharge Entering the Edith River

Sites on the Edith River that receive discharges of mine water with elevated metals and depressed pH still retain significant benthic macroinvertebrate community. Any potential impacts that have been observed in the past have been very short-term or transient, and the results do not indicate a long-term adverse effect. This is supported by the sediment chemistry sampled in May 2011 (Table 3).

Sediments in the Edith River (SW15 and SW4) below SW2 and in Stow Creek (USSC, SW13, SW12, SW14 and SW3) have large particle sizes and minimal clay content (fines <63 μ m). This configuration of particle sizes and low total organic carbon (TOC) provides limited binding sites (usually organic particles such as humic acids) for metals to adsorb to the sediments. Metals are therefore unlikely to remain in the system (Simpson et al., 2005). There is some influence of mine discharge on zinc, copper and manganese levels in the sediments. Sediments at SW4 have higher levels than at SW2. These differences are not large, with all metal concentrations at all sites tested coming in below the interim sediment quality guideline low trigger values (ANZECC & ARMCANZ 2000). Sample sites are shown in Figure 3.

The sediments sampled at the macroinvertebrate sampling sites are representative of shallow river habitat and show a slight increase in copper, manganese and zinc levels downstream of the mine discharge (Table 3). These sediment samples may not be representative of the sediments found in the large pools. Deposition of fine particles may increase as water flow decreases on entering large pools. Deposition of fine particles has the potential to increase the TOC of the sediment and increase the ability of the sediments to bind metals from the mine discharge. High levels of metals in benthic sediments can enter food chains and ultimately increase metal levels in recreational fish (Welch 2009).

Sediments sampled in 2012 from deep pools (Envirotech Monitoring 2012) showed that metals were elevated compared to those sampled at SW2; however all metals were below ANZECC & ARMCANZ (2000) sediment quality guidelines for environmental protection.

Table 3 Sediment Quality Data (Metals – Weak Acid Digest)

	USSC	SW13	SW12	SW14	SW3	SW4	SW15	SW2	ANZECC ISOG - low
% Moisture	20	19	19	15	18	22	22	24	
pH	5.9	6.3	6.2	6.3	6.1	6.7	6.8	5.9	
%TOC	0.19	0.094	0.28	0.046	0.043	0.12	0.16	< 0.005	
Metals mg/kg									
Aluminium	2200	1500	1000	760	1000	1200	940	990	25519*
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5
Chromium	< 5	< 5	< 5	8.7	< 5	< 5	5.4	< 5	80
Cobalt	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	-
Copper	< 5	< 5	< 5	< 5	< 5	26	< 5	< 5	65
Iron	14000	9000	6100	9700	6400	7200	8500	12000	-
Lead	6.7	< 5	< 5	< 5	13	< 5	< 5	< 5	50
Manganese	41	36	18	44	18	79	130	20	460**
Mercury	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.15
Nickel	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	21
Silver	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	1
Zinc	6.4	< 5	< 5	6.9	9.8	24	9.2	< 5	200
Particle Size %									
>2000µm	2.7	2.1	0.1	30	13	0.3	1.1	0.3	
1000-2000µm	2	4	0.7	12	3.6	2.1	8.8	0.8	
500-1000µm	9.8	14	38	33	30	8.3	38	21	
250-500µm	32	30	39	14	23	37	20	28	
125-250µm	38	42	16	8.3	24	24	5.8	14	
63-125µm	6.5	2.5	3.7	2.7	1.5	2.3	3	4.9	
<63µm	9.3	6.2	2.4	< 0.1	5.7	26	24	31	

*Ingersoll et al. 1996 **Persaud et al 1992

Welch (2009) stated that metal levels in recreational fish species sampled downstream of the mine discharge were elevated when compared to upstream fish samples. This was attributed to an increase in metals uptake from contaminated sediments. Different species of fish were sampled at each site. The metal levels cannot be compared between sites because differences in species, age, stage of maturation and sex of fish influence metal uptake and deposition.

3.7.2 Macroinvertebrate Data

Aquatic macroinvertebrate communities were sampled to assess the impact of the mine discharge on populations downstream from the RP1 discharge site. The populations downstream are compared with populations from reference sites. Macroinvertebrate sampling commenced in 2003 at the following locations (Figure 3):

- ▶ Edith River Upstream of Stow Creek Confluence (ERUS);
- ▶ Edith River Downstream of Stow Creek Confluence (ERDS);
- ▶ Edith River Downstream of Site SW4 (ERSW4);
- ▶ Fergusson River Upstream (FRUS); and
- ▶ Fergusson River Downstream (FRDS).

The five sites were sampled using standard NT AUSRIVAS survey methodology. The macroinvertebrates were generally identified to family level and the actual macroinvertebrate abundances were extrapolated from the percentage identified. A Bray-Curtis similarity matrix was generated after transforming the data using a 4th root transformation for the 2003–2008 data (Vista Gold 2008). The matrices compared percentage similarity pair-wise between the three Edith River sites and the two Fergusson River sites. The reference site was subsequently compared with the Edith River similarities and a decision made as to whether an impact was detectable.

The mine site discharge had no detectable impact on macroinvertebrate populations in the Edith River during the years 2003, 2005, 2006, 2007 or 2008 (Vista Gold 2008). This was based on the reference sites being less similar to one another than were the Edith River sites to each other. Based on the statistical methodology of the historical sampling program, an impact was detected only once, in 2004 (GHD 2011a).

Based on these historical data, the mine discharge does not have an adverse impact on macroinvertebrate populations in the Edith River. Sampling undertaken in 2011 and 2012 supports these findings. The water quality at sites SW3, SW4 and SW10 is not creating an adverse impact on the macroinvertebrate populations sampled. The major reason for the lack of impact would be the lack of TOC in the sediments and the large particle size, both of which limit the ability of the sediment to retain metals.

3.7.3 Edith River Flow and RP1 Dilutions

Water quality data from the beginning of several wet seasons shows that there are high metal concentrations entering Edith River during the first week of discharge which decrease as the season progresses. The increased concentrations have not caused any long-term impacts on aquatic populations in the Edith River as evidenced by several years of macroinvertebrate sampling demonstrating that the Edith River populations at SW4 are similar to those from the reference sites.

The sample site SW4, below the RP1 discharge site at Burrell Creek, shows the highest concentrations of metals of any site on the Edith River (excluding aluminium which has naturally high background levels in the Edith River). These results show that the discharge from RP1 is being diluted with Edith River water, although not to the level required to meet the interim trigger values of WDL 178-1.

The previous WDLs required a 20,000:1 dilution of the RP1 mine water to Edith Creek for 95% species protection WDL 178 stated that the dilution rate of 20,000:1 is achieved when the Edith River height at the SW4 gauge station is at an estimated minimum of 0.81m. Investigations into the flow of the Edith



River have shown that NRETAS may have overestimated the flow of the Edith River at SW4. This may be related to extrapolation of data obtained by NRETAS in 1999 and 2000 (Envirotech Monitoring 2011). Envirotech Monitoring (2011) calculated that the 20,000:1 dilution rate will be attained when there are flows of 4,800m³/s in the Edith River with the siphons fully open at 0.24m³/s. This flow rate has never been reached in the Edith River. A maximum flow rate in the Edith River of 1,503m³/s was recorded at the gauge station G8140152 in 2000 (Envirotech Monitoring 2011). This would have been exceeded during December 2011 when the height at the gauging station was above 9 metres.

NRETAS calculated a flow rate of 12m³/s at SW4 when the river height was 0.81m (Envirotech Monitoring 2011). The minimum dilution rate obtained for the discharge of RP1 based on this flow rate would be 50:1. The maximum dilution for RP1 discharge to the Edith River as measured at gauge station G8140152 in 2000 would be 6,262:1. Therefore the previous WDL's required dilution rate for RP1 was never met. Even so, the elevated metal levels at SW4 from the RP1 discharge did not have adverse impacts on macroinvertebrate populations.

The failure to achieve a 20,000:1 dilution factor caused NRETAS to issue a revised licence, WDL 178-1 requiring development of site specific trigger values (SSTVs) to be met at the downstream edge of a yet to be identified mixing zone. The SSTVs will be based on ANZECC & ARMCANZ (2000) 95% species protection default trigger values and assessment of the mixing zone, ecotoxicity of RP1 and macroinvertebrate studies.

Sample site SW10, further downstream on the Edith River, shows lower EC, SO₄ and metal concentrations than SW4 (with the exception of aluminium which is returning to levels similar to the reference site). This indicates that complete mixing of mine water and Edith River water is occurring with additional inflows from creeks entering Edith River downstream of SW4. The decrease in metals between SW4 and SW10 may involve metals settling out in the deep pools of Edith River. Further investigation to determine the sediment composition in the deep pools showed that metals were elevated when compared to concentrations at SW2, however all concentrations were below ANZECC & ARMCANZ (2000) sediment quality guidelines.

The elevated metal levels and SO₄ observed at sample sites SW3, SW4 and SW10 during the wet season can be attributed to source rock from mine activities and discharges from the retention ponds on the mine site.

3.7.4 Impacts of Current Surface Water Discharges to Edith River

Macroinvertebrate populations at SW4 site show no adverse impacts from exposure to elevated metal, sulphate and EC from the mine water even though water quality does not meet previous WDL requirements. Metal deposition in deep pool sediments do not have the potential to adversely impact resident fish populations and related ecosystems (Envirotech Monitoring 2012).



4. Mine Discharge Plan

4.1 Introduction

Vista Gold received an updated Waste Discharge Licence (WDL 178-2) from the NT EPA in February 2013. The licence outlined environmental requirements for the discharge of treated wastewater from RP3 into the Edith River, and discharge from the RP7 and RP1 siphons. RP1 by volume has been the largest contributor of mine water to the receiving environment to date with no adverse impacts detected.

4.2 Dilution Factors

A Discharge Plan (GHD 2013) has been developed by Vista Gold to address the requirements of Waste Discharge Licence (WDL) 178-2. The Discharge Plan describes the investigations that have been, and are proposed to be, conducted in a weight of evidence approach (using multiple lines of evidence) to derive dilution factors for mine waste water discharge from site. The dilution factors were calculated for ecosystem protection in the Edith River at the 80% species protection level near the point of discharge (SW4) and were derived from ecotoxicity testing using appropriate species following ANZECC & ARMCANZ (2000) guidelines. Investigations used to derive the 2012/2013 dilution factors and provide additional information on the health of the Edith River downstream from the discharge point include:

- ▶ Investigations into the toxicity of Retention Pond (RP) 7 mine water;
- ▶ Investigations into the toxicity of treated RP3 mine water (pilot trial and in-situ samples);
- ▶ Investigations into the toxicity of RP1 mine water;
- ▶ Risk assessment for the discharge of treated RP3 mine water at SW4;
- ▶ Risk assessment for the discharge of untreated RP1 and RP7 mine waters at SW10 and SW4;
- ▶ Investigations into the determination of a mixing zone for the Mt Todd discharge;
- ▶ Macroinvertebrate and sediment studies to assess downstream impacts from the mine discharge;
- ▶ Investigations into the speciation of metals due to water chemistry at the site.

This Discharge Plan provides results to date for the investigations listed above to address the requirements of WDL178-2.

The Discharge Plan provides information that will be used by Vista Gold for guidance on ecosystem protection within the Edith River including:

- ▶ An 80% species protection dilution factor obtained from a suite of site specific bioassays for treated RP3; and
- ▶ Untreated RP1 and RP7 mine water discharges to be met at SW4 for the following discharge scenarios using:
 - Controlled discharge of treated mine water from RP3 at a dilution factor to meet requirements for 80% species protection at SW4;
 - Controlled discharge of untreated mine water from RP1 at a dilution factor of 1:1,000 for 2012/2013 wet season;
 - Controlled discharge of untreated mine water from RP7 at a dilution factor of 1:4,545 for 2012/2013 wet season.



The Discharge Plan provides the outcomes of three risk assessments on water quality of untreated discharges on the Edith River. A risk assessment conducted on the water quality for discharges from RP1 and RP7 using the interim site specific trigger values (ISSTVs) (GHD 2012) (based on 95% species protection trigger values) showed that a medium risk was calculated for copper and zinc, with a low risk calculated for aluminium, cadmium and pH to the indigenous aquatic populations at SW10. The risk assessments conducted on untreated water from RP1 and RP7 at SW4 using the 80% species protection dilution factor resulted in a low risk for copper, zinc and pH for populations living in the Edith River at SW4 and no risk for aluminium and cadmium.



5. Future Water Quality

5.1 Mine Site

In addition to care and maintenance for the Mt Todd Mine Site, Vista Gold has been conducting studies towards resumption of mining operations including pit development, processing plant and operational facility design and construction. Virtually all operational facilities on-site used to store contaminated water are close to their maximum capacity following an unprecedented wet season in 2010/11. Of particular interest are the Tailing Storage Facility (RP7), the Batman Pit (RP3) and RP1. Vista Gold initiated a number of investigations for the treatment of contaminated water on-site as a proactive approach to ensure the protection of the offsite receiving environments in the event of an uncontrolled discharge occur during future wet seasons. The updated GoldSIM water balance model for the site indicates that if a significant volume (in excess of multiple Gigalitres) of water are not removed from the system, whether through evaporation or discharge during the dry seasons, there is a high probability of uncontrolled discharges in future wet seasons.

To minimise this risk Vista Gold is currently treating the water *in-situ* prior to discharge from RP3 into the Edith River upstream of the SW4 sampling point. The two stage process includes use of very finely ground calcium carbonate (CaCO_3) and quick lime (CaO). Laboratory results in trials and to date *in-situ* have shown that the treatment results in considerable reduction in metal concentrations and increases in pH. The chemical analytical results of the treated water are shown in Table 4.

Vista Gold is proposing to build a water treatment plant before the commencement of mining in order to treat future mine waste water. All water to be discharged off site will be treated once the water treatment plant is constructed and commissioned. In the interim, the Department of Mines and Energy and Vista Gold have conducted earthworks designed to prevent uncontrolled discharges by diverting stormwater away from retention ponds.

Following treatment, discharged water will be of a better quality than that discharged to date. Further, discharge volumes will decrease compared to those discharge during the pit dewatering process as treated water will be used on site during plant operations.

5.2 Impacts of Future Surface Water Discharges

The treatment process will alter the chemistry of future discharges of water from the Mt Todd mine site. As mentioned in section 3.7.2 the previous discharge regime (from RP1) has not adversely impacted the macroinvertebrate population downstream of the mine's discharge point, even though the 20,000:1 dilution factor required by the initial WDL was never met. Due to the increase in pH and reduction in metal concentration, the quality of the water discharged from RP3 after treatment will not adversely impact on the macroinvertebrate populations of Edith River.

Vista Gold intends to dewater over a period of two wet seasons (2012/2013 and 2013/2014), NT EPA has permitted the 80% species protection level of dilution to be applied at SW4 to allow this to occur.

Wastewater treatment prior to discharge will significantly reduce the metal load entering the Edith River. Aluminium, cadmium, cobalt, copper, nickel and zinc will be reduced between 70 – 99%. Water quality entering the Edith River will be significantly improved compared to that previously discharged. This will benefit the receiving aquatic ecosystems by reducing the metal content of the river water and reducing the size of the mine's mixing zone.



Upon commencement of operations Vista Gold propose to treat all water in the water treatment plant. All treated water will be used in plant process. Any water leaving site will be treated and Vista Gold will apply for an appropriate water discharge license prior to operations commencing. As future discharge water quality will be of a high standard it is unlikely that any adverse impacts will be detected in downstream populations in the Edith River.

Table 4 Chemistry of RP3 Treated Water (Trial 2011)

Analytes (metals 0.45 µm)	RP3 Untreated Water	RP3 Treated Water 18/08/11
pH		
DO (mg/L)		
Conductivity (µS/cm)	2,800	2,600
Mg (mg/L)	220	200
SO ₄ (mg/L)	1,800	1,400
Al (µg/L)	62,000	10
Cd (µg/L)	160	48
Co (µg/L)	1,600	460
Cr (µg/L)	2	<1
Cu (µg/L)	11,000	13
Mn (µg/L)	21,000	17,000
Ni (µg/L)	1,600	290
Pb (µg/L)	1	<1
Fe (µg/L)	<50	<10
Hg (µg/L)	<1	<0.1
Zn (µg/L)	46,000	3,400

5.3 Tailings Storage Facility (TSF2)

A new tailings storage facility (TSF2) is proposed for the Mt Todd site as the current TSF1 will be insufficient to contain future tailings from the mine. The site chosen for TSF2 is located southeast of the existing TSF and south of the existing raw water supply reservoir. The site is bounded to the west by Horseshoe Creek, to the south by Stow Creek, to the east by a small mountain range, and to the northwest by Mt. Todd. In general, the ground slopes from north to south. (Vista Gold 2011).

The TSF2 impoundment is designed to operate as a zero-discharge facility with a linear low-density polyethylene (LLDPE) textured (double sided) geomembrane bottom liner for tailings containment.

5.3.1 Dewatering

Supernatant process water from the tailings impoundment will be dewatered and returned to the process plant using a pair of skid mounted electric pumps. The tailings delivery pipelines and the return water pipelines shall be installed within specially excavated HDPE lined ditches to provide effective containment of process fluids in case of accidental spills resulting from a breach in the pipelines (Tetra Tech 2012).



5.3.2 Seepage Control

The seepage collection system for the TSF2 tailings impoundment will consist of a network of underdrains and overdrains for collecting subsurface seepage in the TSF footprint and tailings pore water drain down respectively (Tetra Tech 2012). Additionally, toe drains will be installed at the upstream and downstream toes of the stage 1 embankment.

5.3.3 Surface Water Management

A surface water diversion channel will be constructed to the southwest of the facility during Stage 1 construction to divert the existing Horseshoe Creek away from the toe of the embankment to prevent erosion of the facility. Rip-rap will be used to line the diversion channel to prevent erosion (Tetra Tech 2012). The channel has been designed to accommodate a peak flow of approximately $182\text{m}^3/\text{s}$ comprising $100\text{m}^3/\text{s}$ of runoff from a 100 year, 24h storm event in the Horseshoe Creek catchment and $82\text{m}^3/\text{s}$ of overflow from the existing raw water supply dam.

A surface water diversion along the south-eastern edge of TSF2 will direct Stow Creek away from the TSF2 footprint. The channel will have a width and length of approximately 60m and 850m respectively and a nominal depth of 4.2m. Rip-rap will be used to line the channel. The channel has been designed to accommodate a peak flow of approximately $656 \text{ m}^3/\text{sec}$ from a 100 year, 24h storm event in the Stow Creek catchment.

5.3.4 Impacts of the Proposed TSF2 on Surface Water Quality

The proposed TSF2 will operate as a zero discharge facility with many contingency management techniques incorporated into the design in case of mechanical failure and other causes of system overflows or excess drainage. The Horseshoe Creek and Stow Creek diversion channels have been designed to minimise erosion during flows with the use of a liner and an “S” shaped channel.

Construction of the TSF2 is proposed to occur in stages. It is recommended that construction be conducted during the dry season to minimise erosion due to construction activities. Horseshoe Creek is ephemeral, and does not have a resident aquatic life year round. Upstream of the proposed Horseshoe Creek diversion is a modified rocky base with minimal aquatic life that dries out completely during the dry season. Similarly, Stow Creek recedes during the dry season and water quality deteriorates until pools dry out. The proposed diversions will not adversely impact on aquatic populations in Horseshoe Creek or Stow Creek during construction in the dry season and the diversion drains will be integrated with Horseshoe Creek and Stow Creek during the next wet season.

5.3.5 Impact Mitigation for TSF2

To provide protection from potential erosion from construction of the TSF2, Horseshoe Creek and Stow Creek diversion drains, a sediment and erosion minimisation plan is required following the Erosion and Sediment Control Plan Content (NRETA 2006).

It is recommended that construction of the diversion channels be conducted in the dry season when the ephemeral creeks do not contain water. To avoid adverse impacts on aquatic populations that may be resident in Horseshoe Creek and Stow Creek during the wet season.

5.4 Passive / Semi-Passive Water Treatment

Vista Gold intends to install passive or semi-passive water treatment on the site. This will treat seepage and runoff from facilities that generate AMD (e.g. RP1) or alkaline but metal laden water (TSF1 and TSF2). It will become operational after closure of the mine and once flow rates are reduced to levels that make passive treatment viable.

The goals of the passive / semi-passive water treatment are to:

- ▶ eliminate or drastically curtail the costs and continual inputs (e.g. reagents, power, staff) required to operate and maintain the new WTP;
- ▶ eliminate sludge disposal cell operations and maintenance;
- ▶ enable year-round collection, containment and treatment of all AMD prior to release; and
- ▶ ensure that treated AMD complies with the WDL water quality standards.

Passive and semi-passive water treatment systems typically include one or more of constructed anaerobic and aerobic wetlands, successive alkalinity producing systems (SAPS), oxic limestone drains (OLD), anaerobic limestone drains (ALD), sulphate-reducing bacteria bioreactors, aeration and settling basins, waterfalls, permeable reactive barriers as well as other passive treatment methods.

Passive and semi-passive water treatment systems are generally appropriate for AMD with a discharge of between approximately 24m³/h and 48m³/h and low levels of mineral acidity. Passive water treatment systems have successfully treated AMD flows of up to 120m³/h. It is estimated that three passive treatment systems (most likely anaerobic wetlands or SAPS) will be required covering a total area of approximately 11ha. During the operations, AMD flow from the reclaimed TSF1 and HLP will be treated in Passive Treatment System 1. Immediately following closure, AMD flow from the reclaimed WRD will be treated in Passive Treatment System 2. In the post-closure phase, AMD flows from TSF2 will be treated in Passive Treatment System 3. The location and final form of these systems is yet to be determined.

5.4.1 Conceptual Anaerobic Wetland Treatment System

As mentioned above, the most likely passive treatment system is an anaerobic wetland system as these are commonly used for treatment of mining impacted waters. Subsurface wetlands, when properly constructed, create an oxygen deficient environment which enables the growth of sulphate-reducing bacteria (SRB). Growth of the SRB is encouraged by the presence of the desired electron acceptor (sulphate) and electron donors (organic carbon substrates), while minimising the population of other bacteria that would compete for the electron donors. Maintaining an oxygen deficient system is critical in minimising the population of bacteria that may scavenge the electron donors from the SRB and thereby minimise the growth of the SRB populations.

The presence of the electron acceptor, sulphate, is provided in the source water. The electron donors in the form of organic carbon substrates must be supplied in the constructed wetland. Common electron donors used in subsurface constructed wetlands include manure (e.g. horse, cow, or sheep), woodchips, straw, or other organic matter. Substrate selection is often based on the availability of materials near the project site, and a wide variety of combinations of substrates have proven effective for treatment.

The key mechanisms for treatment within a subsurface constructed wetland include:

- ▶ sulphate reducing bacteria respire sulphate and transform the sulphate to soluble sulphides (H₂S, HS⁻ and S²⁻); and



- ▶ the soluble sulphides react with cationic metal ions (i.e. Me^{2+} such as Fe, Ni, Cu, Zn) to form highly insoluble metal sulphides.

The reaction can be simplified as follows:



In addition, sorption of dissolved metals to negatively charged substrates may result in short-term or long-term immobilisation (Halverson, 2004).

5.4.2 Impacts of Proposed Passive Water Treatment on Surface Water Quality

As the location and final form of the passive / semi-passive treatment has not yet been determined it is difficult to assess the impacts of the treated water on discharge to surface water in detail. It is anticipated that the treatment systems will be designed to substantially reduce contaminants in the AMD (sulphate in particular), and allow the discharge to meet the site specific trigger values prescribed in the WDL.

Further, the use of the passive / semi-passive systems will minimise any adverse impacts caused by AMD entering the Edith River by removing contaminants and raising pH.

5.5 Chemical, Fuel and Oil Storage

Chemicals stored and used on site have the potential to enter waterways in the event of accidents or spills. Chemicals stored and used on site are listed below:

- ▶ Diesel will be stored on-site for mining equipment and owners' vehicles. It is planned to have a single diesel storage area close to the heavy equipment workshop. Refuelling facilities will be provided in the heavy vehicle workshop area for the vehicles belonging to the operation. It is anticipated that approximately 60,000 – 70,000L of diesel will be used daily. Storage capacity of up to 600,000L will be maintained on-site; and
- ▶ The drillers' storage yard also contains 260L of waste oil in 20L drums and 16 x 25L of EP Bit drilling fluid.

The Ore Processing Plant will use various reagents including:

- ▶ sodium cyanide will be delivered as a solid in a vendor bulk sparging unit in 22t packages. Cyanide will be recovered by dissolving it in water for storage in a 494m³ tank. There will be storage for up to seven days consumption - 16,153 tonnes per annum (tpa);
- ▶ caustic soda will be delivered in 1t bags with a 50% solution stored in a 43m³ tank – 710 tpa;
- ▶ flocculent will be delivered as a powder in 1t bulk bags and stored in a 15t dry storage silo. A flocculent solution will be made by dissolving the powder in raw water and stored in two 1027m³ tanks – 266 tpa;
- ▶ sodium metabisulfite will be delivered as a powder in 1.2t bulk bags with a 20% solution stored in a 73m³ tank - 12,958 tpa;
- ▶ hydrochloric acid will be delivered as a liquid by 20t road tankers. Storage tank capacity will be 14 days – 1,441 tpa;
- ▶ activated carbon will be delivered to site in 500kg bulk bags - 355 tpa;
- ▶ fluxes will be delivered to site as bagged solids via bulk truck delivery (borax, silica, soda ash, potassium nitrate and litharge) – 3.6 tpa;



- ▶ lead nitrate will be delivered as a powder in 1t bulk bags with a 20% solution stored in a 102m³ tank – 1,775 tpa; and
- ▶ quicklime will be delivered to site in 1.25t bulk bags - 16,153 tpa.

5.5.1 Explosives Magazines/Depot

Packaged explosives will be stored in Ammonium Nitrate Fuel Oil (ANFO) Emulsion storage bins, powder magazines and a cap magazine to be built and operated in accordance with the Dangerous Goods regulations.



6. Surface Water Monitoring Program

6.1 WDL 178-2 Surface Water Monitoring

The surface water monitoring program is a requirement of WDL 178-2 (commencing 05/02/2013 and expiring 30/09/2014). The requirement is outlined in Sections 19, 20, 21 and Appendix 1 of the licence.

The following sections 6.1.1, 6.1.2 and 6.3 outline the requirements of the water monitoring program as described in WDL 178-2.

Vista Gold have developed a Standard Operating Procedure (SOP) for daily surface water monitoring required by the WDL and the monthly surface water monitoring program for extended sample locations.

6.1.1 Monitoring Sites

The authorised monitoring points for the Surface Water Monitoring Program are listed in Table 5. The points are illustrated in the map presented in Figure 4. The source of the discharge must also be sampled on a daily basis during discharge.

Table 5 Authorised Monitoring Points

Authorised Monitoring Point	Description	Location
SW 2	Edith River at Bridge on Edith Falls Road	Easting: 0189088 Northing: 8431347
SW 4	Gauge station on Edith River downstream of RP1 siphons (Burrell Creek) and RP1 Spillway (West Creek), near boundary of mine property	Easting: 0186745 Northing: 8431490
SW 10	Edith River at old Stuart Highway Causeway	Easting: 0179781 Northing: 8430015
RP1	Waste rock wastewater source	Easting: 0187843 Northing: 8432432
RP3	Batman Pit	Easting: 0187055 Northing: 8434993
RP7	Tailings storage area	Easting: 0189211 Northing: 8436326

6.1.2 Parameters

Parameters to be monitored from WDL 178-2 are listed in Table 6.



Table 6 Parameters to Measure at Sample Locations (WDL 178-2Daily when discharging)

Parameter	Units	Methodology
River Height at SW4	m	Gauging Station
River Flow	L/s	
Pumping Rate	L/s	Rating table or flow meter if available
Dissolved Oxygen	ppm	In-situ field measurement
Temperature	°C	In-situ field measurement
Electrical Conductivity	µS/cm	In-situ field measurement
pH		In-situ field measurement
Aluminium ^{1,2}	µg/L	Lab
Cadmium ^{1,2}	µg/L	Lab
Cobalt ^{1,2}	µg/L	Lab
Copper ^{1,2}	µg/L	Lab
Chromium III ^{1,2}	µg/L	Lab
Chromium VI ^{1,2}	µg/L	Lab
Iron ^{1,2}	µg/L	Lab
Lead ^{1,2}	µg/L	Lab
Magnesium ^{1,2}	mg/L	Lab
Manganese ^{1,2}	µg/L	Lab
Mercury ^{1,2}	µg/L	Lab
Nickel ^{1,2}	µg/L	Lab
Zinc ^{1,2}	µg/L	Lab
Sulfate	mg/L	Lab
Bicarbonate	mg/L	Lab
Unfiltered Alkalinity	mg/L	Lab
Hardness	mg/L	Lab
Total Dissolved Solids	mg/L	Lab
Total Suspended Solids	mg/L	Lab
Total Solids	mg/L	Lab
Sodium	mg/L	Lab
Chloride	mg/L	Lab
Calcium	mg/L	Lab
WAD Cyanide	mg/L	Lab

¹Total specific metal analysis ²Dissolved metal analysis filtered through a 0.45 micrometre (µm) filter



6.1.3 Methods

All samples will be analysed using a National Association of Testing Authorities (NATA) accredited laboratory.

Surface water samples will be collected in accordance with the Australian Standard Surface Water Sampling Guidelines by trained environmental scientists. The Australian Standards used include:

- ▶ Australian/New Zealand Standard, Water Quality – Sampling Part 4: Guidance on sampling from lakes, natural and man-made AS/NZ 5667.4, 1998; and
- ▶ Australian/New Zealand Standard, Water Quality – Sampling Part 6: Guidance on sampling from rivers and streams AS/NZ 5667.6, 1998.

6.1.4 Quality Assurance / Quality Control

Sample Quality Assurance / Quality Control applied during sample collection and analysis include:

- ▶ field notes including *in situ* water quality parameters;
- ▶ field duplicates;
- ▶ sample holding times;
- ▶ NATA accredited laboratory; and
- ▶ Chain of Custody (CoC) documentation. A CoC form includes label data (customer and Project, location, operator, and sample date). The completed form must accompany the samples from the field to the laboratory.

6.1.5 Reporting

As specified in Section 30 of WDL 178-2, surface water monitoring reports are to be submitted to the Executive Director on a monthly basis during discharge. These monthly submissions will present tabulated data from the surface water monitoring program, including river heights at time and point of discharge and results from *in situ* and laboratory water quality parameters.

6.1.6 Timing

The frequency and timing of sample events required by site and by parameter are presented in Table 7.

Table 7 Timing of Sampling Events for Sample Types (WDL 178-1)

Sampling Point	Field Parameters (pH, EC, Temp, Flow, DO)	Total, filtered metals and metalloids	Other major cations/anions	WAD CN
SW 2	A	A	A	B
SW 4	A	A	A	B
SW 10	A	A	A	B

A Daily (when discharging); and 1 week after the cessation of discharge; and once during the period of first flush
B Monthly



6.2 Surface Water Monitoring for EIA

Vista Gold has developed a Surface Water Monitoring Plan for assessing water quality of water bodies with the potential to be impacted by discharges from the mine site. The water quality data will be used in addition to the results from the macroinvertebrate and sediment monitoring programs and ecotoxicological assessments conducted routinely to provide a weight of evidence approach for assessing the impacts of the Mt Todd mine discharge on aquatic populations in the Edith River.

One of the lines of evidence suggested to be incorporated is the use of physical and chemical assessments of surface waters. Presented below is the surface water monitoring program to feed into the multiple lines of evidence required for environmental assessment.

In the past the main concerns regarding water quality from the Mt Todd mining area are related to acid and metalliferous drainage in several of the retention pond areas. Exposure of sulphide minerals associated with the mine's waste rock to air and water results in the liberation of heavy metal ions such as zinc and copper as well as sulphates into the retention ponds. The liberated sulphate ions can mix with free hydrogen ions in solution leading to the formation of sulphuric acid, lowering the overall pH of the pond. Excesses of heavy metal ions and low pH can have deleterious effects on the aquatic ecosystems of receiving environments, in this case, the Edith River. Aquatic ecosystem effects have not been observed in the Edith River but can include:

- ▶ direct effects to fish through gill exposure to heavy metals, including copper and bioaccumulation through the food chain;
- ▶ direct effects to macroinvertebrate populations, which could result in the loss of available prey items for fish species; and
- ▶ settling of precipitates on stream substrates, which can clog interstitial spaces in river bed sediments and restrict availability of habitat to aquatic organisms.

Treating the mine water by raising the pH and lowering the metal concentrations will reduce the potential impacts listed above.

Measuring the effects of mine water on populations in the receiving environment requires sufficient data to interpret the chemical processes in the catchment area. This includes testing for several parameters that interact physico-chemically.

The following water quality monitoring program has been developed with the above mentioned in mind, with a suite of parameters chosen to detect the presence and potential effects of AMD and mine associated contaminants on the aquatic ecosystem of Edith River. The data from this monitoring program will be analysed in conjunction with biological and ecotoxicological studies concurrently performed. This analysis will aid in ecosystem protection in the Edith River, and will take the historical background of the site into consideration.

6.2.1 Site Selection

Rationale

The specific authorised monitoring points mentioned in Appendix 1 of WDL 178-2 will be incorporated into this monitoring program. Several additional sampling points are proposed throughout the catchment area. These sites will help to differentiate between potential contaminant point sources. Selection of the proposed additional sites was based on the locations of potential point source influences from the mine to the Edith River.



The three main discharge sites reporting to the Edith River and the potential surface water sources contributing to the discharges are characterised below.

Source of Contamination

Differentiation of the contributions of pollutants from the three potential input sources is an essential aid in management decisions regarding the integrity and capacity of the upstream sources (ponds). There are several sources of possible contamination on-site:

- ▶ RP1, RP2 and RP5;
- ▶ RP3 treated mine water;
- ▶ Tailings Dam (RP7); and
- ▶ Heap Leach Pad Moat.

Several additional sites along Horseshoe Creek, West Creek and Stow Creek have been integrated into this sampling program; and are identified in Section 6.2.2.

Critical Waterways Sections

Confluence of Stow Creek and Edith River (CSE)

This waterway is a tributary of the Edith River receiving water sporadically from the ephemeral Batman and Horseshoe Creeks, which run through the Mt Todd mine area. According to the 2010/11 Water Management Plan (WMP) (Vista Gold Australia 2010), overflow is possible during large rainfall events from the RP2 and RP5 catchments into Batman Creek, and also from the mine's RP7 tailings dam into Horseshoe Creek. A third potential input source outlined in the WMP is from the Heap Leach Pad (HLP) moat. This spills during heavy rainfall and eventually drains into Stow Creek via Batman Creek. However, due to earthworks completed at the site in 2011 and 2012 to divert stormwater runoff overflowing of these sites is unlikely.

Confluence of RP1 and Edith River (RP1E)

This is the discharge location for the controlled release of mine water from the waste rock retention pond (RP1). According to the WDL 178-2 requirements, water from this pond can only be released at the dilution factor to meet the 80% species protection level calculated by DTA prior to discharging.

Confluence of West Creek and Edith River (WCER)

This creek discharges directly into the Edith River. It is the direct receiving environment for the RP1 site spillway, which can spill in an uncontrolled manner during the heavy wet season rainfall events. However, earthworks conducted by Vista Gold and DME should reduce the likelihood of this occurring.

6.2.2 Current Sampling Sites

The authorised surface water monitoring points listed in Appendix 1 of WDL 178-2 are outlined below.

The sites are monitoring requirements of WDL 178-2:

- ▶ SW2 (Edith River at bridge on Edith Falls Road);
- ▶ SW4 (Gauge station on Edith River downstream of RP1 siphons (Burrell Creek) and RP1 Spillway (West Creek), near boundary of mine property); and
- ▶ SW10 (Edith River at old Stuart Highway causeway).



With the potential for inputs of mine influenced water from Section 6.2.1 in mind, the following sample sites have been identified to provide additional data for WDL 178-2, with the following provisions:

- ▶ permission can be obtained from the landowners;
- ▶ determination of a requirement to establish roadways to the sampling sites; and
- ▶ the sites are safely accessible in wet weather.

The following sites have been selected in addition to the SW2, SW4 and SW10:

- ▶ one site on Horseshoe Creek (SW11): This site will be used to indicate ambient water quality in Horseshoe Creek prior to its confluence with Stow Creek;
- ▶ one site on Batman Creek (SW5): This site will be used to indicate ambient water quality in Batman Creek prior to its confluence with Stow Creek;
- ▶ one site upstream of SW14 and the confluence of Stow Creek and Horseshoe Creek (SW13): This site will be used as an upstream reference for the two sites further downstream;
- ▶ one site downstream of the confluence of Stow Creek and Horseshoe Creek (SW14): This site will be used to indicate the degree of change to the ambient chemistry of the Stow Creek upstream water following influx from Horseshoe Creek; and
- ▶ one site downstream of the Stow Creek confluence on the Edith River (SW15): This site will be used in conjunction with the upstream Edith River site to detect change as a result of discharge from Stow Creek.

The following storage ponds will be sampled to identify additional source concentrations:

- ▶ Tailings Storage Facility (RP7);
- ▶ Waste Rock Dump Retention Pond (RP1); and
- ▶ Batman Pit (RP3).

The proposed monitoring sites are illustrated in Figure 4 and summarised in Table 8.

6.2.3 Methods

Surface water samples will be collected by trained environmental scientists in accordance with the Australian Standard Surface Water Sampling Guidelines. The Australian Standards used include:

- ▶ Australian/New Zealand Standard, Water Quality – Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples. AS/NZ 5667.1:1998;
- ▶ Australian/New Zealand Standard, Water Quality – Sampling Part 4: Guidance on sampling from lakes, natural and man-made AS/NZ 5667.4, 1998; and
- ▶ Australian/New Zealand Standard, Water Quality – Sampling Part 6: Guidance on sampling from rivers and streams AS/NZ 5667.6, 1998.

All laboratory samples other will be analysed at a NATA accredited laboratory.

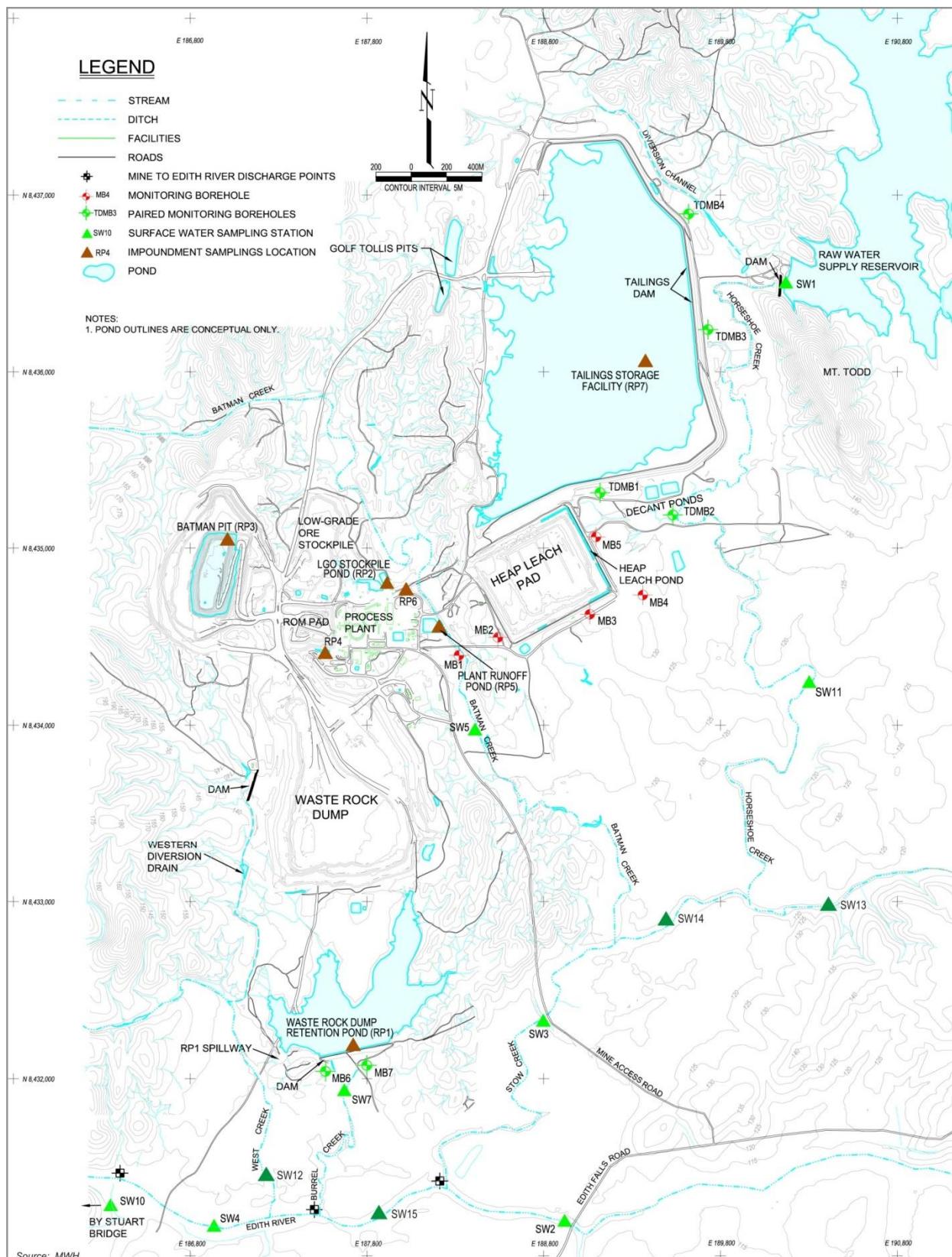


Figure 4 Location of Surface Water Sampling Sites



Table 8 Summary of Water Sampling Sites for Mt Todd Mine

Site	Water body
SW1	Raw Water Supply
SW11	Horseshoe Creek
SW5	Batman Creek
SW3	
SW13	Stow Creek
SW14	
SW7	Burrell Creek
SW2	
SW15	Edith River
SW 4	
SW 10	
SW12	West Creek
RP 7	Tailings storage area
RP3	Batman Pit
RP 1	Waste rock retention pond
Heap Leach Pad Moat	Heap leach pad

6.2.4 Quality Assurance / Quality Control

Sample quality assurance / quality control practices applied during sample collection and analysis include:

- ▶ field notes including *in situ* water quality parameters;
- ▶ field duplicates;
- ▶ sample holding times;
- ▶ NATA accredited laboratory; and
- ▶ CoC documentation.

6.2.5 Reporting

As specified in WDL 178-2, an annual report including interpretation of all monitoring data is required as a condition of the license. The report will include all surface water, biological and sediment monitoring results and interpretation.

6.2.6 Water Quality Parameters and Sampling Regime

Table 9 outlines the parameters to be monitored for each site mentioned above.

Sampling will be undertaken prior to the start of the wet season and during the wet season. The limited time available to sample surface water each year requires a higher frequency of sampling than is usual for monitoring programs of this type (mines). A monthly sampling event is proposed. Previous data show that water quality improves over the wet season. The large volumes of diesel proposed to be stored and used on-site necessitate the inclusion TPH in the monitoring suite. NO_x has been included in the sampling program to assess if ANFO has the ability to enter waterways. This program will run in conjunction with sampling for the WDL. Many of the sampling sites are the same.

Table 9 Parameters to be Monitored Monthly

Parameter	
In situ	Flow
	Dissolved Oxygen
	Temperature
	Electrical Conductivity
	pH
Laboratory	Total Suspended Solids
	Total Dissolved Solids at 180° C
	Total Dissolved Salts
	Unfiltered Alkalinity, bicarbonate, carbonate
	Major cations: Na, K, Ca, Mg
	Major anions: Cl, SO ₄
	Nitrate and Nitrite
	Hardness
	Cyanide-WAD
	TPH
	Dissolved Metals (45µm) (Al, As (III & V), Cd, Co, Cu, Cr (III & VI), Iron (II&III), Pb, Mg, Mn, Hg, Ni, U, Zn)
	Total Metals (Al, As, Cd, Co, Cu, Cr, Iron, Pb, Mg, Mn, Hg, Ni, U, Zn)

6.3 Review of Monitoring Programs

Data from the monitoring program will be reviewed on a monthly basis and the requirements for modification of the sampling program assessed. There is potential to reduce the number of sampling sites if monitoring demonstrates that the mine is not increasing levels of analytes. There is also potential to reduce the number of analytes if analytes are consistently below detection limits. Results may allow for a reduced sampling intensity.



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Appendix A

Surface Water Quality Summary

Mine Surface Water



Retention Ponds

Table 10 Statistics for RP1 Weir 1

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	AI (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP1 Wier 1							
Average	3.46	3.05	2165	66823	181	13883	45454
20th%	3.34						
50th %	3.44	3.06	2250	70050	194	14400	47850
80th%	3.60	3.51	2560	80160	226	16640	56520
St Deviation	0.15	0.53	451	19375	57	3906	13959
Minimum	3.13	1.30	716	4800	36	3880	8780
Maximum	3.97	4.01	2980	123000	296	23900	70300
Count	101	101	97	98	98	98	98

Table 11 Statistics for RP1 Weir 2

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	AI (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP1 Wier 2							
Average	3.49	2.81	1975	65859	175	14754	41120
20th%	3.35						
50th %	3.45	2.86	1955	66600	175	14900	41500
80th%	3.65	3.47	2606	91160	236	18840	55620
St Deviation	0.17	0.73	600	25417	57	4187	13987
Minimum	3.19	1.43	687	39	58	3130	14500
Maximum	4.10	4.39	3110	120000	296	23600	67000
Count	99	99	96	97	97	97	96

Table 12 Statistics for RP1 Weir 3

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	AI (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP1 Wier 3							
Average	3.60	2.35	1466	24841	100	4809	30463
20th%	3.47						
50th %	3.59	2.26	1275	23100	91	4500	28200
80th%	3.71	3.03	2016	31360	126	5942	39000
St Deviation	0.15	0.78	671	10377	40	1712	11902
Minimum	3.24	0.90	432	10	32	1640	9910
Maximum	4.14	4.66	3390	53900	219	11700	61800
Count	86	86	82	83	83	83	83



Table 13 Statistics for RP1 Siphon A

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP1 Siphon A							
Average	3.60	1.73	1023	30978	89	6831	21328
20th%	3.53						
50th %	3.60	1.68	954	29100	84	6410	20400
80th%	3.73	2.11	1312	40520	112	8454	27460
St Deviation	0.14	0.30	243	7911	22	1535	5128
Minimum	3.05	1.30	668	20400	63	4890	14600
Maximum	3.90	2.26	1490	47600	139	10100	31000
Count	82	82	83	83	83	83	83

Table 14 Statistics for RP1 Siphon B

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP1 Siphon B							
Average	3.61	1.73	1086	33026	94	7348	22709
20th%	3.54						
50th %	3.62	1.69	1050	31400	90	7120	22400
80th%	3.70	2.10	1340	41420	116	8920	28500
St Deviation	0.12	0.30	276	9208	25	1870	6196
Minimum	3.05	1.30	669	20200	62	4840	1690
Maximum	3.90	2.25	1970	62000	193	15000	41100
Count	118	81	119	118	119	119	119

Table 15 Statistics for RP2

2008 - 2009	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP2							
Average	3.50	2.22	896	28333	69	6133	22086
20th%	3.43						
50th %	3.45	2.23	845	26200	69	6130	22600
80th%	3.61	2.81	1019	32600	78	6674	25560
St Deviation	0.09	0.53	170	3305	11	677	4348
Minimum	3.41	1.72	805	26200	58	5460	17100
Maximum	3.61	3.19	1280	32600	92	7490	30000
Count	6	6	7	6	7	7	7



Table 16 Statistics for RO2 Spillway

2008 - 2009	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP2							
Average	3.50	0.81	622	26825	55	5285	15233
20th%	3.40		500	18400	41	4224	
50th %	3.50	0.81	634	28000	54	5595	16900
80th%	3.60		718	32900	69	5946	
St Deviation	0.08		104	6433	13	835	3602
Minimum	3.40	0.81	436	18400	35	3780	11100
Maximum	3.60	0.81	726	32900	75	6030	17700
Count	4	1	6	4	6	6	3

Table 17 Statistics for RP3

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP3							
Average	3.27	3.12	1925	69800	165	11925	46167
20th%							
50th %	3.29	2.98	1880	66700	170	12000	46000
80th%							
St Deviation	0.07	0.42	150	9728	14	772	2954
Minimum	3.19	2.80	1800	62000	150	11000	43300
Maximum	3.32	3.73	2140	80700	176	12700	49200
Count	3	4	4	3	3	4	3

Table 18 Statistics for RP5

2008 - 2009	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP5							
Average	3.87	1.82	611	17500	38	4527	10633
20th%							
50th %	3.80	1.29	619	15800	38	4160	10700
80th%							
St Deviation	0.17	0.94	17	3477	4	1068	1701
Minimum	3.75	1.27	592	15200	34	3690	8900
Maximum	4.07	2.90	623	21500	42	5730	12300
Count	3	3	3	3	3	3	3



Table 19 Statistics for RP5 Spillway

2008 - 2009	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP5 Spillway							
Average	4.07	0.60	297	10457	17	2166	4775
20th%	3.98						
50th %	4.06	0.60	298	10700	16	2200	4690
80th%	4.14	0.72	351	13020	20	2530	5580
St Deviation	0.10	0.12	58	2871	4	512	1179
Minimum	3.91	0.41	186	5960	10	1370	2730
Maximum	4.37	0.73	428	16700	28	3540	8090
Count	28	8	29	23	29	29	29

Table 20 Statistics for RP7

2008 - 2009	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
RP7							
Average	3.49	4.85	3270	65100	199	33150	50200
20th%	3.07						
50th %	3.53	4.41	3320	61300	206	34350	51800
80th%	3.73	6.48	3980		232	40000	59400
St Deviation	0.31	1.19	629	9771	34	6783	9023
Minimum	2.97	4.11	2460	57800	151	23900	37800
Maximum	3.74	6.96	3980	76200	232	40000	59400
Count	5	5	4	3	4	4	4

Table 21 Heap Leach Pad

2008 - 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
Heap Leach							
Average	5.10	2.98	2645	272	32	917	1995
20th%	3.50						
50th %	4.56	4.20	2930	264	23	947	2075
80th%	6.95	4.93	3330	418	60	1360	2630
St Deviation	1.70	2.08	868	131	19	488	596
Minimum	3.50	0.78	1390	142	21	415	1200
Maximum	7.92	5.45	3330	418	60	1360	2630
Count	7	7	4	4	4	4	4



Table 22 Statistics for SW1 (Raw Water Supply Reservoir)

1999 -2008	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW 1							
Average	7.02	1.36	1161	33.4	0.28	2.27	85.2
20th%	6.48		765				
50th %	7.18	1.66	1278	2.7	0.28	1.89	85.2
80th%	7.45	2.55	1321	91.4		4.37	
St Deviation	0.46	1.23	266	47.8	0.34	1.56	
Minimum	6.18	0.03	765	2.0	0.04	0.97	85.2
Maximum	7.52	2.64	1321	126.3	0.52	4.82	85.2
Count	7	7	4	7	2	7	1



Surface Waters

Table 23 Edith River Average 2008 – 2011

2008 -2011	pH (pH Units)	EC (µS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW2							
Average	6.20	18.4	0.11	108	0.01	0.57	1.49
20th%	6.07						
50th %	6.18	18.0	0.05	86	0.01	0.52	0.90
80th%	6.36	21.1	0.20	149	0.02	0.68	1.60
St Deviation	0.17	4.8	0.13	90	0.01	0.36	3.24
Minimum	5.71	8.4	0.05	10	0.01	0.13	0.20
Maximum	6.70	50.5	1.20	528	0.10	2.78	39.30
Count	207	206	194	194	220	193	193
2008 -2011	pH (pH Units)	EC (µS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW4							
Average	5.83	60.8	18.1	130.5	1.02	57.6	254.5
20th%	5.61	41.6					
50th %	5.94	52.2	12.7	62.5	0.73	37.9	194
80th%	6.12	72.6	21.4	118	1.28	61.5	328.8
St Dev	0.45	42.9	21.7	189.9	1.00	67.2	239.7
Minimum	4.22	13.6	0.7	11.9	0.02	1.1	6.7
Maximum	6.73	423.8	196	1110	5.36	386	1400
Count	118	118	101	101	100	100	100
2008 -2011	pH (pH Units)	EC (µS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW10							
Average	6.06	34.95	6.4	118.2	0.23	11.7	64
20th%	5.86						
50th %	6.02	34.50	5.9	94.2	0.18	12.7	55
80th%	6.28	44.16	9.7	178.0	0.38	18.2	108
St Dev	0.26	11.47	4.0	89.3	0.20	7.2	55
Minimum	5.08	11.20	0.5	1.4	0.01	1.5	3
Maximum	6.85	66.00	25.3	552.0	0.98	37.6	260
Count	261	243	246	246	242	247	246



Table 24 Stow Creek

2008 -2011	pH (pH Units)	EC (µS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW3							
Average	6.34	47	12.2	110	0.41	5.7	26.6
20th%	5.92						
50th %	6.15	37	9.0	79	0.04	2.1	11.6
80th%	6.43	64	17.0	153	0.18	4.6	28.0
St Dev	2.81	43	15.5	99	3.97	14.5	42.3
Minimum	4.75	11	0.1	9	0.01	0.3	0.3
Maximum	51.00	418	141	650	53.00	187.0	233.0
Count	258	241	207	219	178	227	230

Table 25 Stow Creek

15 April 2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW13	6.68	No Data	2.61*	4.2	<0.2	1.19	12.8
SW14	6.65	No Data	2.57*	5.8	<0.2	2.48	14.2

Assumption that data has been incorrectly entered into spread sheet supplied by Vista (data entered as mg/L instead of µg/L)

Table 26 Batman Creek

2008 -2011	pH (pH Units)	EC (mS/cm)	SO ₄ (mg/L)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Zn (µg/L)
SW5							
Average	5.62	0.27	69	208	3.33	326	729
20th%	4.84						
50th %	5.85	0.22	36	133	1.64	68	452
80th%	6.31	0.41	132	389	6.45	290	1460
St Dev	0.70	0.18	64	209	3.79	641	632
Minimum	4.33	0.07	13	18	0.36	26	123
Maximum	6.41	0.71	218	844	14.80	2450	2080
Count	25	24	21	20	21	21	21

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