GOULDIAN FINCH MANAGEMENT PLAN

Mt Todd Gold Project
EPBC 2011/5967

Prepared for:

Vista Gold Australia Pty Ltd
PO Box 1467
DOUBLE BAY NSW
2028

SLR Ref: 680.10533-R02
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Vista Gold Australia Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised	Vista Gold Authorisation
680.10533-R02-v1.1	Approved by Vista Gold	16 November 2018	Paul McHugh, Sarah Perkins, Sarah Smith, Paul Tett, Loren Yallop	S Smith	P Turyn	B Murdoch
680.10533-R02-v1.0	Revised as per final Approval Conditions	31 October 2018	Paul McHugh, Sarah Perkins, Sarah Smith, Paul Tett, Loren Yallop	S Smith	P Turyn	B Murdoch
680.10150.00400	Revision 3.0	6 February 2017	M Proos	P Turyn	P Turyn	B Murdoch
680.10150.00400	Revision 2.2 (reviewed by Stephen Garnett)	31 January 2017	M Proos	P Turyn	P Turyn	B Murdoch
680.10150.00400	Revision 2.1	31 January 2017	M Proos	P Turyn	-	-
680.10150.00400	Revision 2 (submitted)	8 August 2016	M Proos, K. Lawrence	P Turyn	P Turyn	B Murdoch
680.10150.00400	Revision 1 (submitted)	11 January 2016	M Proos	P Turyn	P Turyn	B Murdoch
680.10150.00400	Draft 5 (reviewed by Stephen Garnett)	1 December 2015	M Proos	P Turyn	P Turyn	B Murdoch
680.10150.00400	Draft 4	10 November 2015	M Proos	P Turyn	P Turyn	B Murdoch
680.10150.00400	Draft 3	23 October 2015	J Pepper, M Consterdine	M Proos	P Turyn	B Murdoch
680.10150.00400	Draft 2	7 October 2015	G Leonard, P Fagan, R Bullman, M Consterdine	J Pepper, M Proos	P Turyn	B Murdoch
680.10150.00400	Draft 1	17 August 2015	M Proos, J Kankkunen	P Turyn	P Turyn	B Murdoch

DECLARATION OF ACCURACY

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this *Gouldian Finch Management Plan v 1.1* is complete, current and correct.

2. I am duly authorised to sign this declaration on behalf of the approval holder.

3. I am aware that:

   a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

   b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.

   c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed _____

Full Name (please print) _____

Organisation (please print) _____

Date _____/ _____/ _____

EXECUTIVE SUMMARY

This Gouldian Finch Management Plan has been prepared to address the management of the Gouldian Finch population in the Yinberrie Hills, as related to the re-opening, operation and closure of the Mt Todd Gold Mine, approved under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (reference number 2011/5967). The plan has been prepared with reference to the Approval, the guidance document provided by the Department of Environment and Energy and the Commonwealths Environmental Management Plan Guidelines (Department of Environment 2014).

The Plan describes the project and the relevant biology of the Gouldian Finch and identifies potential impacts of the project. The objectives for management of the species that form part of the Approval are described, and their baseline condition is documented. To facilitate effective management of the project's risks, performance targets are identified, detailed monitoring methodology is provided and scaled responses to monitoring outcomes, based on their significance have been determined.

Reporting, audit and review commitments, consistent with the Approval are documented.

DOCUMENT REFERENCES

TABLES

FIGURES

ABBREVIATIONS

ANZECC	Australian and New Zealand Environment Conservation Council
dBA	A-weighted decibels
DENR	NT Department of Environment and Natural Resources
DoEE	Australian Government Department of the Environment and Energy
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GFMM	Gouldian Finch Monitoring Methodology
GFMP	Gouldian Finch Management Plan
LA_{eq}	The sound level in decibels equivalent to the total A-weighted sound energy measured over a stated period of time
PM_{10}	Particulate Matter up to 10 micrometres in size
SLR	SLR Consulting Australia Pty Ltd
SOCS	Site of Conservation Significance
SOCS30	The Yinberrie Hills Site of Conservation Significance
TAC	Technical Advisory Committee
TARP	Trigger Action Response Plan
The Project	The Mt Todd Gold Mine
TPWC Act	NT *Territory Parks and Wildlife Act 2006*
Vista Gold	Vista Gold Australia Pty Ltd

GLOSSARY OF TERMS

Approval is the Approval for the Mt Todd Gold Mine Project issued under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) (EPBC Act reference number 2011/5967)

Breeding habitat is woodland or forest containing *Eucalyptus tintinnans* identified as 'Breeding Habitat' in Map 2 of the Approval (EPBC Act reference number 2011/5967) (see **Figure 5 Gouldian Finch breeding and foraging habitat within the Project area**)

Clear/clearing is the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of native vegetation.

Department is the Australian Government Department of the Environment and Energy or any other agency administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) from time to time.

Department's Environmental Management Plan Guidelines means the Environmental Management Plan Guidelines published on the Department's website.

Foraging habitat is habitat containing suitable wet season grass species identified as 'Wet Season Foraging Habitat in Map 2 of the approval (EPBC Act reference number 2011/5967) (see **Figure 5 Gouldian Finch breeding and foraging habitat within the Project area**).

Gouldian Finch *Erythrura gouldiae*.

Minister is the Minister administering the EPBC Act and includes a delegate of the Minister.

Mt Todd Mineral Lease Area is the area shown in Map 1 of the approval (EPBC Act reference number 2011/5967) (see **Figure 1 Mt Todd Project location**)

New or increased impact a new or increased impact on any matter protected by the controlling provisions for the action, when compared to the plan that has been approved by the Minister.

Northern Territory Department of Environment and Natural Resources (DENR) as the current government department responsible to protect the environment and natural resources in the Northern Territory and including any government department that assumes that role for the Northern Territory Government in the future.

Project footprint is the footprint of the Mt Todd Project as shown in Map 2 of the approval (EPBC Act reference number 2011/5967) (see **Figure 5 Gouldian Finch breeding and foraging habitat within the Project area**).

Quality or extent include environmental and ecological characteristics as measured during baseline surveys required to be undertaken to inform the preparation of plans or strategies outlined in the approval decision.

Suitably qualified expert(s) means a person with relevant tertiary qualifications and a minimum of ten (10) years demonstrated experience relevant to the requirements of the condition of approval.

Yinberrie Hills Site of Conservation Significance is as shown in Map 1 of the approval (EPBC Act reference number 2011/5967) (see **Figure 2 Yinberrie Hills Site of Conservation Significance**).

1 Introduction

On 19 January 2018, Vista Gold Australia Pty Ltd (Vista Gold) received approval under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to re-open, operate, close and rehabilitate the Mt Todd Gold Mine (the Project) (EPBC Act reference number 2011/5967). The Project is located approximately 55km north of Katherine, Northern Territory (NT) (**Figure 1 Mt Todd Project location**).

The Approval nominates the Controlling Provisions as:

- Listed threatened species and communities (Sections 18 and 18A of the EPBC Act); and
- Listed migratory species (sections 20 & 20A of the EPBC Act).

The principal species subject to the Controlling Provisions is the Gouldian Finch (*Erythrura gouldiae*) which is known to breed and forage in the Project area and surrounds. This species is listed as Endangered under the EPBC Act and Vulnerable under the NT *Territory Parks and Wildlife Conservation Act* (TPWC Act). The area to be disturbed by the Project lies within the Yinberrie Hills, an area which is recognised as an important bird site at Territory, National and International levels based on the Gouldian Finch population (Ward and Harrison, 2009; Dutson, Garnett, and Gole, 2009; Birdlife International, 2018). The Yinberrie Hills Site of Conservation Significance (SOCS30) (recognised by the Northern Territory Government) (Ward and Harrison, 2009) comprises approximately 90,000 ha of Gouldian Finch habitat (**Figure 2 Yinberrie Hills Site of Conservation Significance**).

1.1 Preparation of the Gouldian Finch Management Plan

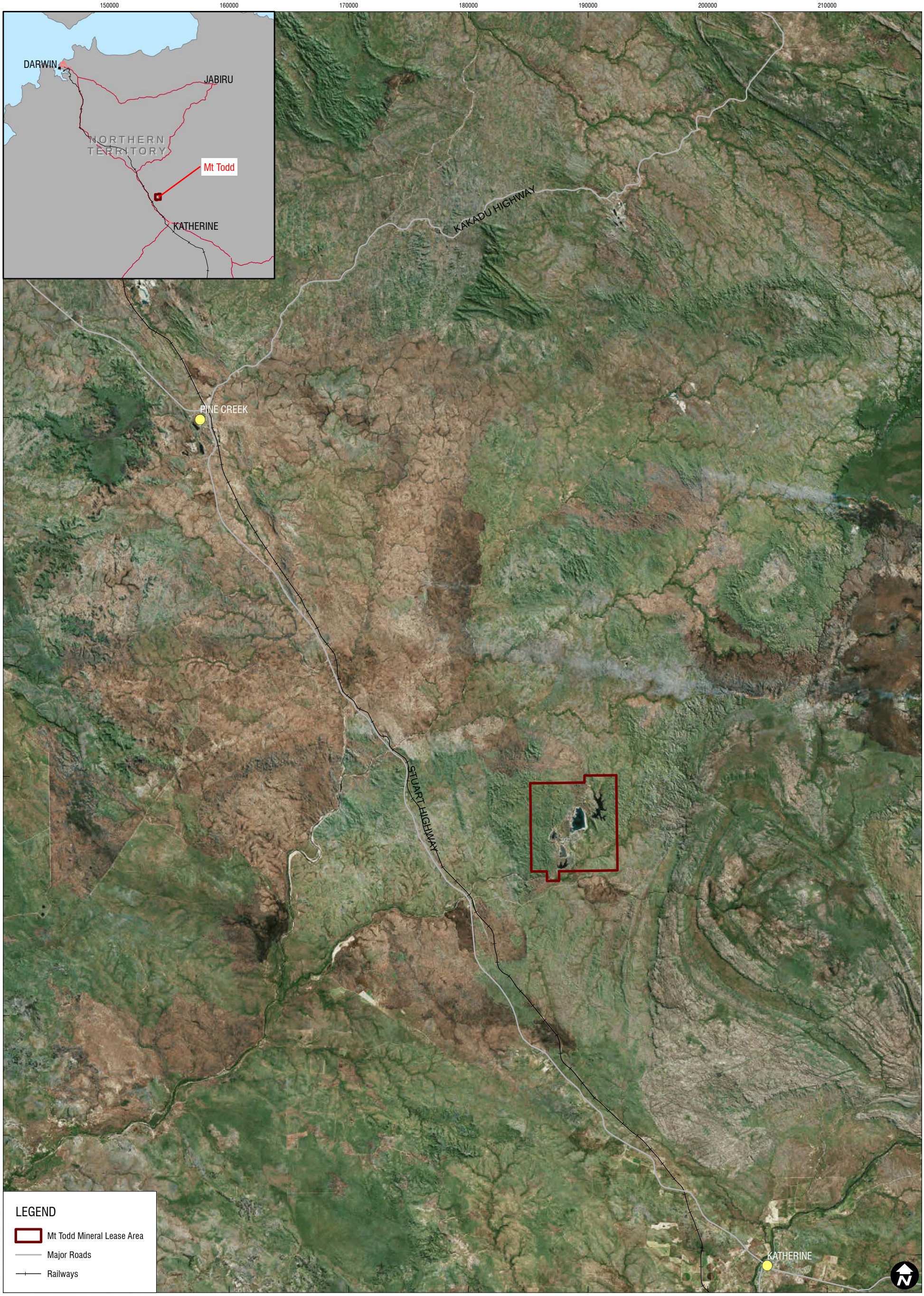
This Gouldian Finch Management Plan (GFMP) has been developed by SLR Consulting Australia Pty Ltd (SLR) on behalf of the Project Proponent Vista Gold. This GFMP has been prepared with reference to the Approval for the Project under the EPBC Act (EPBC 2011/5967), the guidance document provided by the Department of Environment and Energy (DoEE) and the Commonwealth *Environmental Management Plan Guidelines* (Department of Environment 2014).

The GFMP has been prepared by a team of suitably qualified persons, outlined in **Appendix A**.

1.2 Purpose

The purpose of this GFMP is to document the management tasks to be implemented by Vista Gold to meet the requirements of the Project Approval, and to limit the impacts of the Project on the Gouldian Finch population in the Yinberrie Hills. This GFMP discusses Gouldian Finch management requirements including:

- The relevant Approval Conditions,
- Key threats and potential impacts to the Gouldian Finch,
- Management actions to be implemented,
- Residual significant impacts to the Gouldian Finch population,
- Monitoring,
- Triggers and corrective actions.



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Mt Todd Project Location

Mt Todd Mine Project EPBC 2011/5967

FIGURE 1

160000 170000 180000 190000 200000 210000 220000

8490000 8480000 8470000 8460000 8450000 8440000 8430000 8420000 8410000 8400000 8390000

KAKADU HIGHWAY

PINE CREEK

STUART HIGHWAY

KATHERINE

VICTORIA HIGHWAY

LEGEND

- Yinberrie Hills 'Site of Conservation Significance'
- Mt Todd Mineral Lease Area
- Major Roads
- Railways

0 2 4 6 8 Kilometers

Scale: 1:300,000
GDA 1994 MGA Zone 53

31-Oct-2018
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H:\Projects-SLR\61 0-SrvSYD\680-DRW\680.10533 Vista Gold GFMP\SLR680.10533 F01 Yinberrie Hills Site of Significance.mxd

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Yinberrie Hills
Site of Conservation Significance

Mt Todd Mine Project EPBC 2011/5967

FIGURE 2

1.3 Relevant Conditions of Approval

The Approval conditions relevant to impacts to the Gouldian Finch are provided in **Table 1 Relevant Approval conditions**. The reference table provided as **Appendix A Conditions of approval reference table** identifies where the components of Condition 3 (which specifically relates to this plan) are addressed in this report.

Table 1 Relevant Approval conditions

Approval condition 1
1. The Approval holder must not **clear** more than: a. 158 ha of **breeding habitat** for the **Gouldian Finch** within the **Mt Todd Mineral Lease Area** b. 458 ha of **foraging habitat** for the **Gouldian Finch** within and outside the **Mt Todd Mineral Lease Area**
Approval condition 2
2. The Approval holder must undertake the action in accordance with the following objectives for the **Gouldian Finch** for the life of the action. The action must not result in: a. significant reduction in the **quality or extent** of **breeding habitat** outside of the project footprint, or b. significant reduction in the **quality or extent** of **foraging habitat** outside the project footprint, or c. significant decrease in the short, medium or long-term abundance or distribution of the **Gouldian Finch** within the **Yinberrie Hills Site of Conservation Significance**, or d. significant decrease in the short, medium or long-term health of the **Gouldian Finch** population within the **Yinberrie Hills Site of Conservation Significance.**
Approval condition 3
3. The Approval holder must prepare and submit to the **Department** a Gouldian Finch Management Plan (the Plan) detailing how the objectives outlined in Condition 2 of this approval will be achieved. The Plan must be prepared by a **suitably qualified expert(s).** The Approval holder must not **commence** the action unless the **Minister** has approved the Plan. The approved Plan must be implemented. The Plan must be prepared in accordance with the **Department's Environmental Management Plan Guidelines** and include, but not be limited to: a. objectives to be achieved for the **Gouldian Finch,** including by defining significant reduction or decrease as it applies to each objective specified in condition 2, based on baseline data b. components of the action that may impact on the **Gouldian Finch,** and commencement and completion dates for those components c. performance targets to achieve or maintain the objectives. d. identify and manage risks of failure to achieve performance targets. e. include baseline information from which performance targets are derived. f. detailed monitoring methodology including: i. the purpose of monitoring and its functional relationship to operational decisions. ii. monitoring objectives including provisions for early warning, early control and for improved predictive capacity. iii. variables to be measured which are appropriate to detect changes in a manner which allows for timely implementation of corrective actions. iv. frequency of monitoring. v. interpretation and analysis of monitoring data to inform the contingency response and corrective actions. g. management triggers that will enable actual or potential adverse impacts to the Gouldian Finch to be avoided,

mitigated or minimised in a timely manner.

h. detailed management measures to be implemented to achieve performance targets, management triggers for implementing a contingency response(s), and corrective actions that may be implemented.

i. mechanisms to review performance targets and triggers based on monitoring data including processes for validation of predictive models used in determining performance targets and management triggers

j. responsibilities and accountabilities including data handling, technical review, self-auditing and reporting requirements.

Approval condition 9

9. The Technical Advisory Committee (TAC) (Condition 8) must review and endorse in writing annual reporting related to the plans and strategies required in Condition 3 and 5 of this approval. All changes to monitoring activities conducted as part of the above plans must be endorsed in writing by the TAC prior to implementation (see also Condition 11 on revised management plans). All breaches must be reported to the Department within 30 days.

All breaches of the conditions of this approval must be reported to the TAC within 10 days of the breach occurring. All such reports must detail corrective action taken or proposed and include a re-assessment of impact after the corrective action has been implemented.

Approval condition 12

12. The Approval holder may choose to revise the management plan approved by the Minister under Condition 3 of this approval without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan would not be likely to have a **new or increased impact**. If the Approval holder makes this choice they must notify the **Department** in writing that the approved plan has been revised and provide the **Department**, at least four weeks before implementing the revised plan with:

a. an electronic copy of the revised plan;

b. Written endorsement of the changes from the Technical Advisory Committee in accordance with Condition 8 of this approval; and

c. The reasons the Approval holder considers that taking of the action in accordance with the revised plan would not be likely to have a **new or increased impact**.

Approval condition 17

17. By 31 March each year following **commencement**, the Approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of all plans, strategies and proposals. Documentary evidence providing proof of the date of publication must be provided to the **Department** at the same time as the compliance report is published. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the compliance report is published. Reports must remain on the website and continue to be published until advised by the **Minister** in writing.

Approval condition 20

20. Unless otherwise agreed to in writing by the **Minister**, the Approval holder must publish all plans and strategies referred to in these conditions of approval on its website within one (1) month of being approved by the **Minister**.

1.4 Relationship with Other Reports

The GFMP is intended to be read in conjunction with the *Gouldian Finch Offset Strategy* (SLR, 2018), the Gouldian Finch Monitoring Methodology (GFMM) (**Appendix C Monitoring Methodology**). This GFMP will be reviewed and endorsed by the Gouldian Finch Technical Advisory Committee (TAC) who operate under the Terms of Reference required under the Approval.

2 Objectives and Context of the Project

2.1 Location and Nature of Project Activities

The project is located east of the Stuart Highway and north of the Edith Falls Road, approximately 50 km north of Katherine, NT. The project area lies in the south-western end of the Yinberrie Hills, an area which is recognised as an important bird site at Territory, National and International levels based on the Gouldian Finch population (Ward and Harrison, 2009; Dutson, Garnett, and Gole, 2009; Birdlife International, 2018). The site provides habitat for one of the largest known breeding population of the Gouldian Finch (O'Malley, 2006).

The Yinberrie Hills support grassy eucalypt woodlands with a mixed over storey of snappy or salmon gums (including *Eucalyptus tintinnans*), *E. tectifica*, *Corymbia confertiflora* and an understorey dominated by tall annual spear grasses. They provide habitat values for the Gouldian Finch that are scarce in the broader landscape including an understorey of perennial native grasses, retention of water in small rocky pools throughout the dry season and smooth-barked eucalypts with hollows.

The site is partly a brownfield site previously mined for gold, with a total mining lease area of 5,544 hectares. Remnant mine infrastructure includes the (currently flooded) Batman Pit, a heap leach pad, a 16 million tonne waste rock dump, a tailings dam, low grade ore stockpiles, a raw water dam and the remains of processing facilities. Mining and associated operations will occur on Mineral Leases MLN 1070, MLN 1071, ML31525 and MLN1127.

It is proposed to process approximately 17.8 million tonnes per annum of ore using the carbon in leach process. Tailings are to be detoxified and stored in an impoundment from which process water will be recycled to the process plant. Unrefined gold bars will be transported via secure shipment to a refinery.

2.2 Project Schedule

The project will have a life of 19 years inclusive of construction (two years), operations (thirteen years) and closure (four years). Construction will commence subject to a favourable Vista Gold financial investment decision. Although not required by the approval, pre-baseline studies of Gouldian Finch biology and habitat within the Yinberrie Hills SOCS are currently underway; the outcomes of these studies will inform the future refinement of this GFMP as appropriate (**Section 9**). Potential threats to the Gouldian Finch population in the Yinberrie Hills SOCS associated with each project stage are provided in **Table 2 Project schedule**.

Table 2 Project schedule

Project phase	Timing	Related threats
Pre-commencement (baseline and preparation) **Note**: this project stage is not subject to the Approval Conditions	Current to commencement of construction (to be determined, not prior to 2019)	• Fires • Feral animals and weeds • Reduction in access to water resources

Project phase	Timing	Related threats
Construction	Nominally 2020and 2021 calendar years	• Land clearing • Elevated dust • Elevated noise • Contaminated water • Increased vehicle traffic • Elevated lighting levels • Blasting and vibration • Fires • Feral animals and weeds.
Operation and Closure	Nominally 2022 to 2035	• Land clearing • Elevated dust • Elevated noise • Contaminated water • Increased vehicle traffic • Elevated lighting levels • Blasting and vibration • Fires • Feral animals and weeds.

2.3 Gouldian Finch Habitat to be Protected

This GFMP has been developed to ensure the protection of Gouldian Finch breeding and foraging habitat within the Yinberrie Hills SOCS (Ward and Harrison, 2009). The SOCS30 comprises approximately 90,000 ha; the extent of Gouldian Finch habitat in the area was determined using the digitised dataset of vegetation communities in the Mt Todd/Yinberrie Hills created by the NT Government (Wilson and Clark, 1990) (**Figure 3 Gouldian Finch habitat in the SOCS**). The site supports a large breeding population – although the actual population size is contentious and is likely to fluctuate both in size and in the proportion of juveniles in the population (Woinarski, 2013).

3 Gouldian Finch Profile

The Gouldian Finch is a brightly coloured granivorous bird endemic to the savannah woodlands of northern Australia. It measures approximately 12 to 15 cm in length and weighs approximately 14 to 15 g (Higgins *et al.*, 2006; Tidemann and Woinarski 1994). The adults exhibit three different facial colour-morphs: black-headed (most common), red-headed (**Figure 4 Red faced male Gouldian Finch, Edith Falls Road NT**) and yellow-headed (rare). Juveniles are easily distinguished from the adults by their drab and nondescript olive-brown-grey plumage (Higgins *et al*., 2006).

3.1 Gouldian Finch Habitat Characteristics and Habitat Utilisation Patterns

Gouldian Finches occupy different regions of the landscape on an annual cycle driven by the availability of native grass seed, water and suitable breeding tree hollows (Dostine *et al.*, 2001).

In the late part of the wet season, and during the dry season, between February and October, Gouldian Finches live in rocky wooded hills that contain snappy or salmon gums (*Eucalyptus tintinnans*). Hollows in these trees provide nesting sites. Seeds from native annual spear grass and sorghum species (*Sorghum intrans* and *S. stipoideum*), which have dropped to the ground, provide the staple diet for Gouldian Finches through the dry season while they are nesting and raising young (Lewis, 2007).

In the early wet season, Gouldian Finches move from the hills into lowland drainages to feed upon a more diverse assemblage of scattered perennial grasses (Dostine and Franklin, 2002). These, in approximately the order of seeding, are Cockatoo Grass (*Alloteropsis semialata*), Golden Beard Grass (*Chrysopogon fallax*), Curly Spinifex (*Triodia bitextura*) and Giant Speargrass (*Heteropogon triticeus*). There can be periods of low seed availability prior to the first heavy rains of the wet season (November to January). The low water and seed availability occurs just after the Gouldian Finch moults and develops a new complement of feathers, and at the same time as they are moving to the lowlands (O'Malley, 2006). The project is expected to require the clearing of both breeding and foraging habitat (133 ha and 476 ha respectively) (**Figure 5 Gouldian Finch breeding and foraging habitat within the Project area**).

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KAKADU HIGHWAY

PINE CREEK

STUART HIGHWAY

VICTORIA HIGHWAY

KATHERINE

N

LEGEND

- Yinberrie Hills 'Site of Conservation Significance'
- Mt Todd Mineral Lease Area
- Major Roads
- Railways
- Approved Clearing

Gouldian Finch Habitat

- Breeding Habitat
- Existing Disturbance
- Wet Season Foraging Habitat

0 5 10 15 20 Kilometers

Scale: 1:300,000
GDA 1994 MGA Zone 53

31-Oct-2018
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H:\Projects-SLR\610-Snr\SYD\680-DRM\680.10533 Vista Gold GP\MPI\SLR680.10533 F05 Breeding and Foraging Habitat within Yinberrie Hills Site of Significance.mxd

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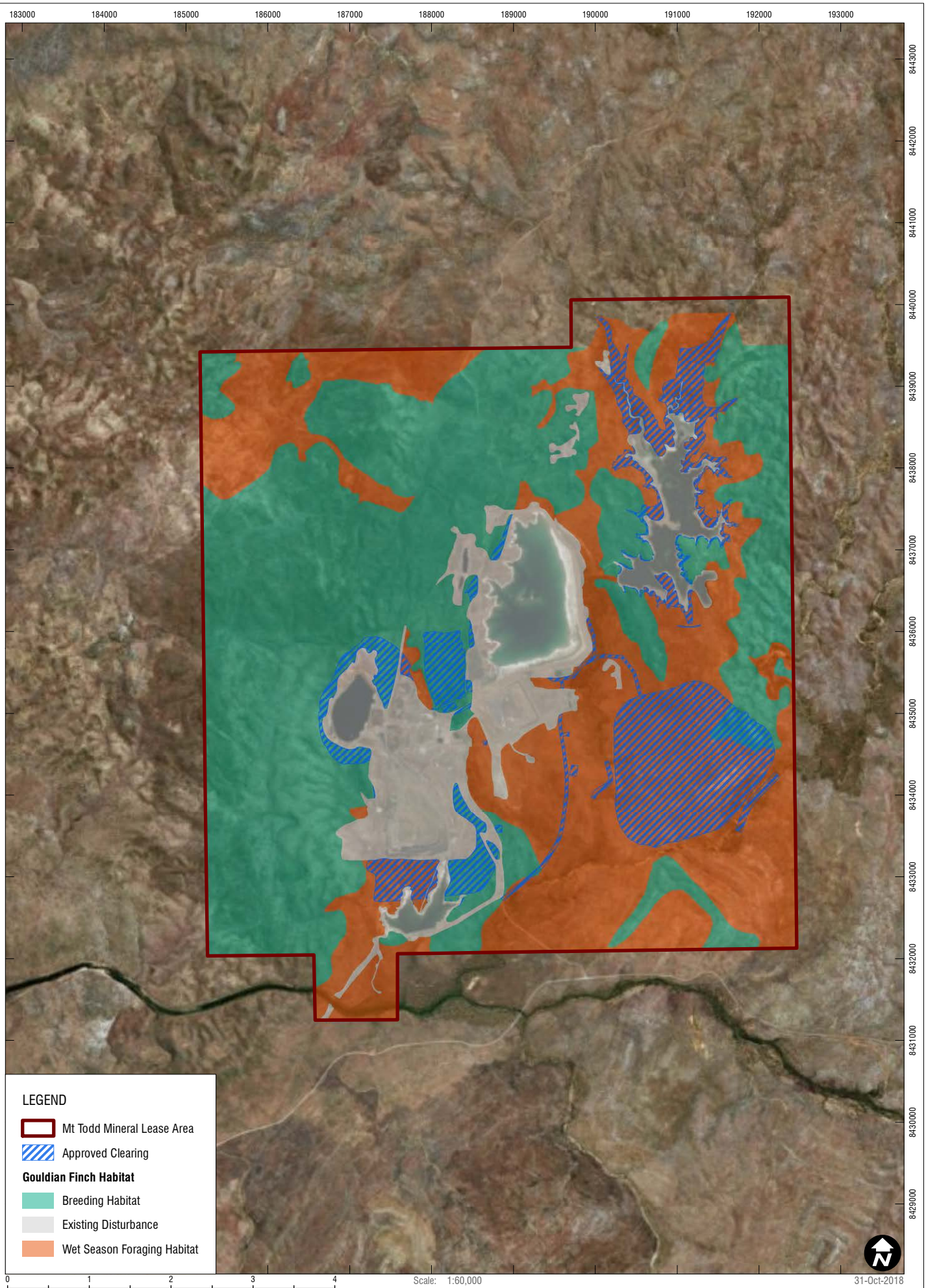
Breeding and Foraging Habitat within the Yinberrie Hills Site of Conservation Significance

Mt Todd Mine Project EPBC 2011/5967

FIGURE 3

Figure 4 Red faced male Gouldian Finch, Edith Falls Road NT



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Breeding and Foraging Habitat within the Project Area

Mt Todd Mine Project EPBC 2011/5967

FIGURE 5

4 Gouldian Finch Management Objectives

The management objectives for the Gouldian Finch in relation to the Project are provided in Approval Condition 2 (**Table 1 Relevant Approval conditions**) and include prevention of:

- significant reduction in the quality or extent of breeding habitat outside of the project footprint
- significant reduction in the quality or extent of foraging habitat outside of the project footprint
- significant decrease in the short, medium or long-term abundance or distribution of the Gouldian Finch within the Yinberrie Hills Site of Conservation Significance
- significant decrease in the short, medium or long-term health of the Gouldian Finch within the Yinberrie Hills Site of Conservation Significance.

Table 3 Pre-disturbance and significant reduction of objective parameters gives the pre-disturbance condition of the parameters addressed by the objectives and defines a significant decrease/reduction for each.

Table 3 Pre-disturbance and significant reduction of objective parameters

Parameter	Pre-disturbance condition	Significant decrease or reduction
Condition of Gouldian Finch breeding habitat outside of the Project area	The condition of Gouldian Finch habitat outside of the Project area has been assessed based on field studies using the 'Guide to determining terrestrial habitat quality' (Department of Environment and Heritage Protection 2017). The guide is designed to evaluate habitat quality specifically to feed into offset calculations using the EPBC Act offset calculator, and comprises assessment of site condition, site context and fauna habitat. The pre-disturbance condition of breeding habitat outside the Project footprint is 7/10.	A reduction by a score of 2 or more (i.e., reduction of the quality of breeding habitat from 7 to 5/10).
Extent of Gouldian Finch breeding habitat outside of the Project area	The extent of Gouldian Finch habitat outside the Project footprint was determined using the digitised dataset of vegetation communities in the Mt Todd/Yinberrie Hills created by the NT Government (Wilson and Clark, 1990). The pre-disturbance extent of breeding habitat outside the Project footprint (but within the Yinberrie Hills SOCS) is 70,629 ha.	Any reduction in the extent of breeding habitat outside of the Project area.
Condition of Gouldian Finch foraging habitat outside of the Project area	The pre-disturbance condition of foraging habitat outside the Project footprint is 7/10.	A reduction by a score of 2 or more (i.e., reduction of the quality of foraging habitat from 7 to 5/10).
Extent of Gouldian Finch foraging habitat outside of the Project area	The pre-disturbance extent of foraging habitat outside the Project footprint (but within the Yinberrie Hills SOCS) is 14,041 ha.	Any reduction in the extent of foraging habitat outside of the Project area.
Abundance of the Gouldian Finch with the Yinberrie Hills SOCS30	Mark recapture studies are currently being undertaken by Vista Gold in collaboration with Charles Darwin University. The results of these studies will provide an estimate of population size, with error estimates that will allow statistical definition of a significant reduction.	

Parameter	Pre-disturbance condition	Significant decrease or reduction
Distribution of the Gouldian Finch with the Yinberrie Hills SOCS30	Mark recapture studies and waterhole counts are currently being undertaken by Vista Gold in collaboration with Charles Darwin University. The results of these studies will provide baseline data on the current distribution of Gouldian Finches and will allow statistical definition of a significant reduction.	
Gouldian Finch health	Ongoing baseline surveys being carried out by Vista Gold in collaboration with Charles Darwin University will provide an estimate of population health (based on body condition and stress physiology), with error estimates that will allow statistical definition of a significant reduction.	

5 Potential Impacts of the Project

Potential impacts of the Project on the Gouldian Finch population identified in the Environmental Impact Statement (EIS) (GHD, 2013a) and revised in the EIS supplement (GHD, 2013b) taking into account NT Environment Protection Authority (EPA) and other feedback (e.g., NT EPA, 2014) are described and delineated into discreet stages of the Project in **Table 4 Potential impacts.**

Table 4 Potential impacts

Source of impact	Relevant period	Potential impact	Nature and extent of impact
Land clearing	Construction	Reduction in the availability of breeding and/or foraging habitat.	The development of the project will require the clearing of breeding and foraging habitat of the Gouldian Finch. This has been minimised through detailed project planning to the greatest extent possible.
Elevated dust	Construction Operation Closure	Deposition of dust on vegetation reducing productivity, or inhalation of dust.	Ground disturbing activities during construction of the project, as well as crushing, processing, and machinery movements during operations and closure activities have the potential to increase dust emissions.
Elevated noise	Construction Operation Closure	Modified habitat use.	Mobile machinery movements and stationary equipment usage will increase during the construction phase of the project and continue during operation with a corresponding increase in noise generation.
Elevated lighting levels	Construction Operation	Modified habitat use.	Artificial lighting will be used as required during construction and continuously in work areas during operation to improve safety.
Increased vehicle traffic	Construction Operation	Risk of fauna interactions and mortality.	Increased vehicle traffic within the project area during construction and throughout operation.

Source of impact	Relevant period	Potential impact	Nature and extent of impact
Fires	Construction Operation	Increased low intensity fires affecting habitat availability, or high intensity wild fires causing mortality or habitat loss.	Construction and operation activities will include the implementation of asset protection burns and the conduct of hot works.
Feral animals and weeds	Construction Operation	Increase in weeds, increase in feral animals.	Clearing of land and vehicle access increases the potential for introduction and spread of weed species. An increase in personnel throughout construction and operational activities may result in generated wastes attracting pests.
Access to contaminated water	Operation Closure	Fauna mortality through exposure and consumption.	Cyanide in tailings decant water during increases the risk of exposure.

6 Performance Targets to Achieve or Maintain the Objectives

Implementation of performance targets to measure effectiveness of management measures in achieving planed objectives will be as per **Table 5 Performance targets**.

Table 5 Performance targets

Performance target/s	Management measure/s	Related monitoring activity
There is no significant reduction in the quality or extent of Gouldian Finch breeding habitat outside of the project footprint.		
No late dry season fires	Training - inductions and communications	Fire management planning and implementation
No feral animals or weeds	Training - inductions and communications	Waste management plan and weed management programs
Habitat quality is not reduced by a score of 2 or more	Abundance and baseline monitoring program design	Annual Gouldian Finch monitoring program
No significant reduction in population size	Abundance and baseline monitoring program design	Annual Gouldian Finch monitoring program
Maximum of 158 hectares of breeding habitat cleared	Survey and schedule of vegetation clearing	Vegetation clearing plan
Water quality remains comparable to baseline values	Baseline monitoring program design	Annual Gouldian Finch monitoring program
Lighting is managed to within predicted levels	Controlled lighting	Data monitoring, reviews, and TARPs
Noise is managed within predicted levels (Nms 1: ≤85 dBA LAeq, Nms 2: ≤65 dBA LAeq and Nms 3: ≤50 dBA LAeq)	Controlled noise	Data monitoring, reviews, and TARPs

Performance target/s	Management measure/s	Related monitoring activity
Blasting is managed to within predicted levels (Bms 1: < 130 dBL, Bms 2: < 110 dBL)	Blasting design	Data monitoring, reviews, and TARPs
Manage release of airborne particulates to within maximum predicted levels (1-hour average PM_{10} ≤ 165 µg/m^3)	Dust deposition is measured and controlled	Dust deposition gauges
Manage release of airborne particulates to within maximum predicted levels (1-hour average PM_{10} ≤ 165 µg/m^3)	Control generation of fugitive dust	Particulate loggers
There is no significant reduction in the quality or extent of Gouldian Finch foraging habitat outside the project footprint.		
No late dry season fires	Training - inductions and communications	Fire management planning and implementation
No feral animals or weeds	Training - inductions and communications	Waste management plan and weed management programs
Habitat quality is not reduced by a score of 2 or more	Vegetation surveys	Annual Gouldian Finch monitoring program
No significant reduction in population size	Abundance and baseline monitoring program design	Annual Gouldian Finch monitoring program
Maximum of 458 hectares of breeding habitat cleared	Survey and schedule of vegetation clearing	Vegetation clearing plan
Water quality remains comparable to baseline values	Baseline monitoring program design	Annual Gouldian Finch monitoring program
Manage release of airborne particulates to within maximum predicted levels (1-hour average PM_{10} ≤ 165 µg/m^3)	Training - inductions and communications	Particulate loggers and dust deposition gauges
Manage release of airborne particulates to within maximum predicted levels (1-hour average PM_{10} ≤ 165 µg/m^3)	Control generation of fugitive dust	Particulate loggers and dust deposition gauges
Control of construction machinery	Training - inductions and communications	Auditing of vehicles as per weed management plan
There is no significant decrease in the short, medium or long-term abundance or distribution of the Gouldian Finch within the Yinberrie Hills Site of Conservation Significance.		
No late dry season fires	Training - inductions and communications	Fire management planning and implementation
No feral animals or weeds	Training - inductions and communications	Waste management plan and weed management programs
No significant reduction in population size	Abundance and baseline monitoring program design	Annual Gouldian Finch monitoring program

Performance target/s	Management measure/s	Related monitoring activity
There is no significant decrease in the short, medium or long-term health of the Gouldian Finch population within the Yinberrie Hills Site of Conservation Significance.		
No significant reduction in population health	Health monitoring	Annual Gouldian Finch monitoring program
Manage release of airborne particulates to within maximum predicted levels (1-hour average PM_{10} ≤ 165 µg/m^3)	Control generation of fugitive dust	Particulate loggers and dust deposition gauges

7 Management Actions

Management actions to mitigate potential impacts on the Gouldian Finch, and ensure that performance targets provided in **Section 8** are met, and the effectiveness of these actions, are described in Table 6 Gouldian Finch management measures. These actions will form part of the Mine Management Plan for the Project.

Table 6 Gouldian Finch management measures

Management objective	Management measures	Effectiveness of Measure
Inductions and access to habitat		
Site inductions and communications during construction, operation and closure	• All relevant staff and contractors are inducted as to the requirements of this Program. • Information on the Gouldian Finch relevant to the Project and employee / contractor / visitor responsibilities will be included as part of the site induction program. • All employees and contractors will also be informed of new Gouldian Finch management requirements as they emerge via email, signs, informal meetings, toolbox talks and staff meetings.	Highly effective – inductions and staff meetings provide an opportunity to discuss the effectiveness of the GFMP and any improvements that could be incorporated. Inductions and regular communication between staff and contractors has been shown in other projects to increase the effectiveness of mitigation measures (Sanchez and Gallardo, 2005). Inductions and staff meetings (of various kinds) are a proven way to convey and explore important information with staff.
Access restrictions to Gouldian Finch habitat during	• Access to water holes will be restricted. • Known locations and habitat areas of the Gouldian Finch have been mapped and access to these areas will be by authorisation only.	Highly effective - avoidance of sensitive habitat should be incorporated into all environmental management planning (University of California, 2002; van der Ree *et al*, 2008).
Land clearing		
Eliminate avoidable loss or damage to Gouldian Finch habitat during construction Prevent injury to Gouldian Finch individuals during construction	• The expansion of the open pit has been minimised as much as possible in order to avoid clearing of Gouldian Finch breeding habitat. • Clearing of known breeding habitat (including *Eucalyptus tintinnans* woodlands adjacent to the pit) can only occur outside of the breeding season, i.e. September through to February. Clearing of wet season foraging habitat will occur during the breeding season, i.e. undertaken from March to August. • All vehicle parking, laydown areas and temporary materials	Highly effective - avoidance of sensitive habitat should be incorporated into all environmental management planning (van der Ree *et al*, 2008). This has been done where feasible. Appropriate timing of vegetation disturbance has been shown to be effective elsewhere (Natural England, 2013).

Management objective	Management measures	Effectiveness of Measure
	stockpiles and other temporary facilities are located within existing hardstand areas or previously cleared sites and that environmental discharges from these areas are contained, controlled and monitored. • Ensure areas to be cleared are clearly marked. No works of any kind will occur outside marked areas. • Clearing of vegetation will be monitored daily during clearing activities to ensure no disturbance occur. • Clearing of vegetation will occur according to a Vegetation Clearing Plan to ensure, as much as possible, that areas of bare ground are minimised. • Any areas outside those required that are inadvertently cleared or disturbed will be rehabilitated (in addition to reporting breaches in accordance with the notification of breach procedures) • Adhere to buffer widths recommended by the NT Land Clearing Guidelines.	
	• Clearing of vegetation will be undertaken in conjunction with the requirements of an Erosion and Sediment Control Plan. • The Erosion and Sediment Control Plan will be developed by determining the soil type and structure, vegetative cover, topography, climate (rainfall and wind), and the nature of the land-clearing.	Erosion is most effectively prevented by covering the ground (NSW Department of Primary Industries, 2005; Queensland Government, 2015). Subsequently, controls will primarily revolve around retaining existing vegetation or revegetating and mulching disturbed areas as soon as possible.
Limit the reduction in breeding sites available to the Gouldian Finch during construction	• Replace removed hollows with artificial nests	A study undertaken in the eastern Kimberley region of WA (Brazill-Boast *et al*, 2013) suggests that nest-boxes could be used to enhance reproduction in recovering populations. Whilst GHD (2014) indicates that hollows are generally not a limiting factor for Gouldian Finches in the Yinberrie Hills, the enhancement of breeding habitat through a provision of

Management objective	Management measures	Effectiveness of Measure
		high quality artificial nests could improve the quality of breeding habitat in the Yinberrie Hills.
Rehabilitate Gouldian Finch habitat	• Design and construct final landforms such that the surface is stable and not prone to erosion. • Progressive rehabilitation will be undertaken when cleared areas are no longer required.	Rehabilitation plans will be created that ensure relevant measures of effectiveness are identified.
Air quality		
Reduce dust emissions during construction	• Use of water sprays and water carts to reduce dust productions on roads and during clearing activities • Cross-referencing dust suppression activities with real-time weather monitoring to assist with dust control • Undertake chemical treatment of roads to reduce ongoing dust generation • Cover construction materials and stockpiled materials if they are a source of fugitive dust • Install a continuous dust / meteorological monitor at site boundary to gather data during construction. This data may help refine the dust model and monitoring program. • Additional measures as listed in the Dust Monitoring and Mitigation Program (see **Appendix C Monitoring Methodology**) • Proper maintenance of dust-control equipment is essential and ensures that related elements of any dust-producing activities are avoided or minimised.	Highly effective - Department of Environment and Climate Change and Water (2010) has identified a series of measures for competent dust control, all of which have been incorporated into this Program, where relevant. Proper maintenance of dust-control equipment is essential and ensures that related elements of any dust-producing activities are avoided or minimised. The use of meteorological data for timing and design of dust-emitting activities has also proven to be effective in numerous other mining operations (Department of Environment and Climate Change and Water, 2010; BHP Billiton, 2011).

Management objective	Management measures	Effectiveness of Measure
Reduce dust emissions from roads / transportation during operation of the mine	• Use water sprays on haul roads, and loads • Post and enforce speed limits to reduce airborne fugitive dust from vehicular traffic • All dump trucks must have covered loads before travelling on public roads • Covering areas of disturbed soil, stockpiles and temporary spoil stockpiles with mulch, cover crop[1] or other material as best practicable • Restrict or halt (whichever is relevant) mining, hauling and vehicle travel in the dry season when prevailing winds and strength of winds reach trigger level that would results in spatially extensive and heavy dust deposition in the Gouldian Finch habitat area. • Install a continuous dust / meteorological monitors to gather data during operation. This data may help refine the dust model and monitoring program.	
Minimise offsite air quality/dust impacts during operation	• Revegetate disturbed areas as soon as possible after disturbance • Covering areas of disturbed soil, stockpiles and temporary spoil stockpiles with mulch, cover crop[1] or other material as best practicable • Avoid conducting dust generating activities during high wind speeds, where practical • Burning of waste and materials will not be allowed on site at any time	

[1] Note that a cover crop would need careful consideration to ensure that no increased risk from weed incursion into Gouldian Finch habitat occurs.

Management objective	Management measures	Effectiveness of Measure
	• Spraying of paint will not be undertaken during unstable or unpredictable weather, or periods of winds above 15 km/hr blowing towards the core breeding habitat.	
Reduce dust emissions from plant during operation of the mine	• Install a spray on primary crusher dump pocket • Ore will be wet prior to crushing and the crusher will be hooded • Maintenance program for crushing equipment will ensure that it is operating at peak efficiency • Enclosed high-pressure grinding role • Dust suppression sprays on conveyors to minimise dust.	
Noise		
Minimise noise emitted from the site during construction and operation	• Stationary equipment (i.e. crushers, compressors, generators etc.) will be located as far as practicable from sensitive Gouldian Finch breeding habitat • Blasting events to be timed, where possible, to be outside of Finch breeding times • Operation of more recent and silenced equipment where possible and maintenance will be regularly undertaken to ensure for good working condition • All new equipment to have sound control devices no less effective than those provided on the original equipment • Whenever feasible, schedule different noisy activities (e.g. blasting and earthmoving) to occur at the same time, since additional sources of noise generally do not add a significant amount of noise (i.e. less frequent noisy activities would be less disruptive than frequent less-noisy activities).	Very effective - the control of noise with these measures is considered generally effective and is common among noise management programs.

Management objective	Management measures	Effectiveness of Measure
Contaminated water sources		
Exclude birds from contaminated water sources during construction, operation and closure	• Ponds containing cyanide in the process plant area will be netted to exclude wildlife • The heap leach facility will have internal storage of cyanide solution.	Very effective - these measures have been developed in accordance with relevant industry standards, including the Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia 2016).
Deter birds from these water sources during construction, operation and closure	• Maintain vegetation cover surrounding water sources to a minimum, i.e. no vegetation on dam walls • Tailings dam and decant pond will be made unattractive to Gouldian Finches. Design options include but are not limited to, the reduction of the dam surface area, removing dam bank vegetation, creating steep dam walls, providing alternative adjacent Gouldian Finch friendly water sources, and avoiding the creation of islands in the dam. • Installation of devices to scare birds (cannons, waving steamers etc.) if necessary.	
Reduce contamination in TSF during operation and closure	• Follow best practice guidelines currently recommended for the NT for reducing the impacts of tailings storage facilities on wildlife. • Weak-acid-dissociable cyanide will be kept to a minimum via the standard elimination and reduction control methods (oxidation, biological, electrochemical treatment) • Trigger levels of weak-acid-dissociable cyanide where remediation action regarding water quality will be developed.	

Management objective	Management measures	Effectiveness of Measure
Vehicle traffic		
Minimise risk of Gouldian Finch and traffic interactions during construction, operation and closure	• Vehicle driving policies will be implemented (including speed restrictions) to minimise risk to fauna • Prepare and implement a Traffic and Road Safety Management Plan • Use of pooled vehicles such as buses and work vehicles (to minimise exposure) • Permits will be allocated for vehicle access to known breeding habitat during the critical breeding season.	Highly effective - avoidance of risks to the Gouldian Finch is the most effective approach possible.
Visual and lighting		
Control light emissions from site during construction and operation	• Limit artificial light to areas actively required and turn off lights when not required so as to avoid flooding natural habitats with light • Ensure that artificial lighting does not point upwards or laterally i.e. should point towards the ground. Otherwise, lighting guards/shutters should be installed to direct light to road/working surfaces and away from adjacent vegetation. • Preference should be given to lower rather than higher lighting installations so as to reduce the spread of the light cast • Use lower wavelengths of light wherever possible i.e. red/yellow lights and low light intensities that are as low as possible without reducing safety or efficiency • Avoid adverse offsite lighting impacts by implementing work procedures related to the use of mobile lighting plants • Where possible, conduct operations behind light barriers,	Light modelling for the project indicates very limited light spill to the area of concern, and this will be tested as part of the light monitoring program, including the effectiveness of the mitigation measures implemented. The measures listed have been proven to be effective in controlling lighting effects, according to the modelled data.

Management objective	Management measures	Effectiveness of Measure
	especially at night to avoid adverse offsite lighting impacts • Consider including reinforcement of screen plantings around areas where lighting plant are used extensively at night in offsite treatments • Conduct a lighting survey. Ensure optimal placement of all lighting plants.	
Blasting and vibration		
Control vibration at the source during construction and operation	• Confined or deck charging blasting techniques (where inert material such as crushed stone is used to seal off or 'stem' the blast holes and contain the energy released by the detonation of the explosives in the blast hole inside the rock) will be used in preference to unconfined methods. • Adhere to criteria for blast vibration in ANZECC 1990. • Identify alternative, lower-impact equipment of methods wherever possible. • Where practical, limit blasting to one per day and after dawn and before dusk (to avoid disturbing roosting and brooding birds). • Route, operate or locate high vibration sources as far away from sensitive breeding habitat areas as possible. • Sequence operations so that vibration-causing activities do not occur simultaneously. • Isolate vibration causing equipment on resilient mounts. • Keep equipment well maintained. • Ensure the initial blasts are as small as practical.	The measures listed are generally considered effective in controlling vibration effects, particularly as the blast program will be undertaken in accordance with relevant guidelines. This ensures that as much as possible is being undertaken to reduce any potential impacts.

Management objective	Management measures	Effectiveness of Measure
Control the transmission of vibration during construction, operation and closure	• Increase the distance to sensitive breeding habitat as far as possible • Be aware of the geological make-up and terrain separating source with receiver and how this will impact transmission.	
Control airblast and vibration at the receiver during construction and operation	• Investigate vibration trigger levels at the known breeding habitat and incorporate into the site Environmental Plan and Mine Management Plan • Develop blasting program to limit potential impact on Gouldian Finches, including incorporating deck charging (a method of loading blastholes in which the explosive charges in the same blasthole are separated by an inert material) and initiating the blast in the direction away from the closest point to the Gouldian Finch population receiver location, emissions from blasting, using an MIC in accordance with the airblast site law established for the mine, will assist in controlling airblast to acceptable levels. • Avoid blasting during 'sensitive' periods (e.g. breeding season).	
Fire		

Manage the timing, extent and duration of fires on site and within the wider Yinberrie Hills	• Preparation of a Project Fire Management Plan including (as key features):
	  ◦ Strict fire prevention protocols to prevent wildfire into Gouldian Finch habitat during clearing activities, i.e. fire unit/spotter is present with any road crew
	  ◦ Suppression where practicable of all wildfires occurring in Gouldian Finch habitat as quickly as possible with the aim of limiting the spread of high intensity fires.
	  ◦ Controlled asset protection burns will only be carried
		A cooperative approach with the Jawoyn should provide greater control of threats to, and better outcomes for, the Yinberrie Hills Gouldian Finch population. A cooperative effort towards effective fire management is a well-established principle in fire management agencies throughout Australia.

Management objective	Management measures	Effectiveness of Measure
	out over a four week period in the late wet/early dry season, with any required approvals and/or permits. • Vista Gold will contribute to the Jawoyn's fire management of the Yinberrie Hills. • Preparedness will be a key component of Vista's fire management approach to ensure that essential arrangements are readily available to respond to fire incidents.	
Feral animals and weeds		
Prevent and/or control the spread of weed infestations in Gouldian Finch foraging habitat	• All machinery, vehicles and plant arriving on site will required to be free of vegetative matter and soil/mulch. • Strict vehicle hygiene protocols to prevent new weed incursion and spread, including installation of a vehicle wash down facility on site • Weed Management Plan prepared and implemented • Environmental inductions for workforce.	Highly effective - feral animal and weed management will concentrate on those animals and plants considered most likely to threaten the Yinberrie Hills Gouldian Finch population. This will maximise the effectiveness of the approach.
Control the numbers of feral animals	• Feral Animal Management Plan prepared and implemented to control pigs, feral horses and cattle within the mining lease. • Management and removal of putrescible waste to limit the potential for colonisation by black rats.	Highly effective when developed and managed properly.

8 Residual Risk Assessment

An assessment of residual risk (the risk that exists following the application of the avoidance and mitigation measures described in **Section 9** Monitoring) was conducted using methodology consistent with consistent with the requirements of the Approval and AS/NZS 31000-2009 - Risk Management Principles and Guidelines, and using the likelihood and consequence descriptions and risk matrix provided in the DoEE guidance notes (provided in **Tables 5 to 7**). The residual risks of each of the potential impacts described in **Section 6 Performance Targets to Achieve or Maintain the Objectives are** shown in **Table 10 Risk assessment**.

Table 7 Quantitative measure of likelihood

Likelihood	Definition
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 8 Quantitative measure of consequence

Consequence	Definition
Minor	Minor risk of failure to achieve the GFMP's objectives. Results in short term delays to achieving GFMP objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the GFMP's objectives. Results in short term delays to achieving GFMP objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the GFMP's objectives. Results in medium-long term delays to achieving GFMP objectives, implementing uncertain, high cost/effort corrective actions.
Major	The GFMP's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The GFMP's objectives are unable to be achieved, with no evidenced mitigation measures.

Table 9 Risk assessment matrix

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 10 Risk assessment

Impact	Description	Possible Consequences	Likelihood	Consequence	Residual Risk Rating
Loss of potential breeding habitat outside the Project footprint	• Clearing outside of the approved area	• Reduced area available to breed • Reduced population viability • Bird mortality (at the time of vegetation removal).	Unlikely	High	Medium
Loss of potential foraging habitat outside the Project footprint	• Clearing outside of the approved area	• Reduced ability to forage • Reduced population viability • Bird mortality (at the time of vegetation removal).	Unlikely	High	Medium
Dust	• Increased dust generation during construction and operation	• Health impacts from inhalation and ingestion • Reduction in foraging efficiency on dry season food resource from dust deposition.	Likely	Moderate	Medium
Contaminated water	• The mine site provides sources of contaminated water, e.g. tailings dam • Gouldian Finches are not likely to use tailings dams as a source of water on a regular basis • The impact is likely to occur once every 2-10 years • Newly installed water treatment plant for the treatment of Acid Mine Drainage and release of water downstream.	• Susceptibility and limits of tolerance resulting in poisoning (specifically cyanide) • Gouldian Finches drink in large groups, if contaminated water is lethal, it is likely to affect a large number of birds in a single incident • Use is most likely during the late dry, when alternative water sources are scarce).	Likely	Moderate	Low
Traffic	• Vehicle strike: very occasional instances may lead to multiple deaths	• Mortality • Noise effects on breeding behaviour	Possible	Minor	Low

Impact	Description	Possible Consequences	Likelihood	Consequence	Residual Risk Rating
	• Noise effects on breeding and foraging behaviour (the Gouldian Finches will forage on the road verges early in the dry season, when the sorghum seed at the road verge is more accessible than elsewhere) • Dispersal of chemical pollutants in road dust. Note: the majority of generated traffic is expected to be concentrated on Stuart Highway south of Edith Falls Road and on Edith Falls Road east of Stuart Highway (i.e. outside the core breeding area for the Gouldian Finch but within potential wet season foraging habitat).	• Chemical pollutants in road dust.			
High intensity uncontrolled fire	• The creation and maintenance of tracks, and the increased traffic has the potential to lead to unintended ignitions.	• Reduced habitat quality • Reduced availability of food resources.	Unlikely	High	Medium
Frequent low intensity fires	• Annual asset protection zone burns: the asset protection zone is a small well defined area that primarily protects the poly-pipes.	• Reduced habitat quality • Change plant species composition • Change in food distribution.	Unlikely	Moderate	Low
Noise	• Fixed plant equipment such as conveyor belts, transfer stations and crushers • Mobile equipment such as dozers, scrapers, trucks and excavators Note: Heavy rainfall and thunderstorms can generate noise levels in excess of those likely	• 40-50 dBA: potential for acoustic masking of communication but most birds are expected to adapt given the ambient noise levels (38-45 dBA) (SLR, 2015) • 50-65 dBA: occasional alert responses,	Likely	Moderate	Medium

Impact	Description	Possible Consequences	Likelihood	Consequence	Residual Risk Rating
	from the Project, and the birds present in the locality are clearly adapted to those circumstances. However, the Project will impose additional noise stimuli as well as noise stimuli over longer periods than those natural weather events.	avoidance behaviours (bird may move away from source to a point where the noise no longer masks their call) • >65 dBA: frequent alarm or flight responses, masking, and may affect nesting and roosting.			
Airblast and Vibration	• Minimal impacts during construction • Increased impacts during operation (often daily blasts) • Peak impacts during blasting	• Reduced breeding success • Blasting impacts could spook nesting birds resulting in abandonment • Reduced appeal / use of habitat • Reduced availability of food resources.	Possible	Minor	Low
Light	• Introduction of new light sources during construction • Ongoing generation of light due to safety requirements during operation.	• Increased nuisance factor • Potential impact of reduced breeding success • Reduced appeal / use of habitat.	Possible	Minor	Low

9 Monitoring

Monitoring will be undertaken to assess the effects of management actions on the Gouldian Finch population and its habitat in the Yinberrie Hills. Monitoring methods, including those being implemented during the pre-construction period are described in the *Mt Todd Gold Project Gouldian Finch Monitoring Methodology* (GFMM) provided in full in **Appendix C** Monitoring Methodology, and summarised in **Table 11 Summary of monitoring program indicators, objectives and techniques**. The overarching goal of the GFMM is to prevent long term harm from the Mt Todd Gold Project to the Yinberrie Hills Gouldian Finch population by:

The GFMM includes monitoring methods for a series of environmental variables including those predicted to change as a result of the Mt Todd Gold Project, as well as the effects of those variables on the Yinberrie Hills Gouldian Finch population. In addition, key population indicators will be monitored including:

- Extent and condition of a key foraging food species (Cockatoo Grass, *Alloteropsis semialata*).
- Gouldian Finch population size and distribution
- Relative health of finches (via stress physiology and body condition)

The GFMM population surveys were originally intended to follow a 'before-after-control-impact' design. However, pre-construction surveys have indicated that there are currently no populations/areas of habitat that are suitable control sites (Charles Darwin University, 2018). The survey design has been modified to rely on changes within the Yinberrie Hills detected through comparison of pre-disturbance and post-disturbance data.

The triggers that will be used to determine respond to changes is the parameters being monitored are described in **Section 12 Reporting**. Monitoring data will also inform changes to this GFMP and the GFMM through the adaptive management approach as described in **Section 13 Review and Audit**. An annual audit and monitoring report will be prepared annually for the GFMMP, as discussed in **Section 14 Roles and Responsibilities** below.

Table 11 Summary of monitoring program indicators, objectives and techniques

Variable	Objectives	Techniques	Location	Timing	Outputs
Environmental (extrinsic) indicators					
Airborne particulate concentrations	Test concentrations of dust in finch habitats.	Install particulate monitors to carry out monitoring of airborne particulate concentrations (PM_{10}).	Airborne particulate monitoring stations. Control sites.	Real time monitors (operating continuously).	Data collected from both PM_{10} particulate loggers for varying monitoring locations
Dust deposition	Test dust deposition levels in key finch habitats.	Install dust deposition gauges.	Dust deposition stations	Once per month.	Baseline and ongoing dust deposition levels.
Noise	Test noise levels in finch habitats. Test project operational noise controls / effect threshold levels and to more accurately define the potential for risk.	Install noise loggers at selected monitoring stations.	Noise monitoring stations	Until blasting ceases, or until such time that it is considered that noise levels are such that no adverse effects to Gouldian Finches are likely.	Baseline and ongoing ambient noise levels collected from each monitoring station
Blast levels	Test blasting levels in finch habitats. Test project operational blasting controls / effect threshold levels and to more accurately define the potential for risk.	Install blast monitoring units at selected monitoring stations.	Blasting monitoring stations	Until blasting ceases or such time that it is considered that blasting levels are such that no adverse effects to Gouldian Finches are likely.	Blast level log

Variable	Objectives	Techniques	Location	Timing	Outputs
Fires	Assess against objectives and indicators described in the Bush Fire Management Plan Monitor extent, timing and frequency of fires Determine what proportion of, and/or influence from, mine-related fires (i.e. asset protection burns and unintended ignitions from road crews or increased traffic) have overall.	Documentation and mapping of fire regimes. Comparison to fire regimes recommended for the species (e.g. Lewis, 2003). Analysis of the North Australian Fire Information website.	Within 10 km of the Controlled Action (i.e. within habitat considered 'important', 'marginal' and 'distant').	Annually	Documentation of fire regimes GIS mapping
Light	Test light levels in finch habitats. Test light modelling and to more accurately define the potential for risk.	Test light levels using a lux meter at monitoring stations.	To be confirmed following final lighting specifications developed during the detailed design phase.	To be confirmed following final lighting specifications developed during the detailed design phase.	Light level log and, if required, audit report and recommendations.
Water quality	Test water quality in mine-related water bodies.	Analyse water for levels of contaminants.	Water samples taken at the mine's dams or any potential waterbodies with effluent.	Three times per year (two during the dry season and one during wet season).	Water quality data
Meteorological Conditions	Monitor meteorological conditions across the site.	Install weather station.	Within the mine infrastructure zone.	Daily	Weather log

Variable	Objectives	Techniques	Location	Timing	Outputs
Biological indicators					
Stress physiology and body condition	Determine whether mine-related dust is causing a decline of the Yinberrie Hills Gouldian Finch population by testing predicted dust effect thresholds. Predict how the Yinberrie Hills Gouldian Finch population will respond to forecast dust levels.	Capture bird via mist netting or walk in traps and measuring: Body condition via a muscle score. Haematological condition via blood sampling.	Yinberrie Hills (impact site). 2 control locations.	Biannually	Causal effects, trends between populations, and recommendations to mitigation (if required).
Relative abundance of Gouldian Finches (population index)	Use point counts of Gouldian Finches to calculate population indices. Detect changes in indices.	Waterhole counts	A selection of known waterholes in the Yinberrie Hills (Figure 3 Gouldian Finch habitat in the SOCS).	Annually during late dry season when water is limited and birds congregate at available waterholes	Population index Raw data for waterhole counts
Relative abundance and distribution of a key non-breeding season food resource (*Alloteropsis semialata*)	Locate patches of *A. semialata*. Assess and monitor patches for extent and condition. Test dust deposition levels in these locations.	Traverse potential *A. semialata* habitat during the early wet season when the species is flowering/seeding.	Areas of potential *A. semialata* habitat identified during early wet season searches.	Annually, during the early wet season.[2]	Record of extent and condition attributes GIS mapping with locations Causal effects, trends of dust levels, and recommendations to mitigation (if required).

[2] A dedicated survey approach will be developed in conjunction with the outputs from Liedloff *et al*. (2009).

Variable	Objectives	Techniques	Location	Timing	Outputs
Gouldian Finch presence / absence	Record incidental sightings to test presence throughout year.	Key environmental staff trained in the recognition of Gouldian Finches and their calls. Records locations with GPS and in the Mt Todd Gouldian Finch sightings database.	Mining lease and Yinberrie Hills.	Continually	Additional contextual (or anecdotal) information

10 Contingency Response and Corrective Actions

Where monitoring data indicates that performance targets are not being achieved, or results are trending away from the established norm, management responses will be required. A staged series of responses, based on the level of departure from the performance trigger and provided in the Trigger Action Response Plan (TARP) in **Table 12 Trigger Action Response Plan**. The TARP provides for the relevant action management response which varies from continuing monitoring and review, to modifying, or stopping operations. The TARP includes mechanisms for the review of management action success.

Table 12 Trigger Action Response Plan

Trigger level	Trigger value	Response
Distribution and abundance *Alloteropsis semialata*		
Normal State	Nil, or minimal (<10%), reduction in distribution and extent of *A. semialata* habitat, as a primary consequence of mining activities.	Undertake monitoring as per the GFMM (**Appendix C Monitoring Methodology**)
Moderate exceedance	Between 10% and 30% reduction in distribution and extent of *A. semialata* habitat, as a primary consequence of mining activities.	• Investigate trigger in consultation with the NT EPA and/or DENR (and others, if appropriate) including comparison against control site data • Identify whether additional remedial action is required in consultation with the NT EPA and/or DENR (and others, if appropriate) • Implement remedial action as agreed by the NT EPA and/or DENR (and others, as appropriate) • Monitor success of remedy. • Consider, in consultation with the NT EPA and/or DENR, habitat improvement specific to *A. semialata* through the use of fire or supplementary establishment of *A. semialata* individuals. • Consider, in consultation with the NT EPA and/or DENR, establishment of a vegetation buffer between the core breeding and foraging areas and key emissions sources.
High exceedance	>30% reduction distribution and extent of *A. semialata* habitat, as a primary consequence of mining activities.	Develop strategy, in consultation with the NT EPA and/or DENR, to ensure viability of *A. semialata* habitat important (i.e. within 3 km) to the Yinberrie Hills Gouldian Finch population is enhanced.

Trigger level	Trigger value	Response
Dust emission		
Normal State	1-hour average PM_{10} ≥ 130 µg/m^3 but ≤ 165 µg/m^3	• Review operations and continue to monitor dust emissions • Assess whether elevated dust levels are due to elevated regional background concentrations or are due to emissions from the Mine.
Moderate exceedance	1-hour average PM_{10} ≥ 165 µg/m^3 but ≤ 200 µg/m^3	If emissions from the Mine are identified as having a significant impact on the measured PM_{10} concentrations: • Reduce speed of equipment / vehicle • Implement dust suppression – ensure water cart is operating effectively in key dust-producing areas • Consider holding off on blasting • Note changed state and monitor for further change

Trigger level	Trigger value	Response
High exceedance	1-hour average PM_{10} ≥ 200 µg/m^3	If emissions from the Mine are identified as having a significant impact on the measured PM_{10} concentrations: • Reduce speed of equipment / vehicle • Review planned operation with consideration to exposed areas • Implement additional dust suppression – Water cart – Chemical stabilisers – Water sprays on stockpiles and any other dusty areas • Cease any non-critical truck movements on unpaved haul roads • Cease any non-critical movement of dozers, graders and other dust generating mobile equipment • Hold off on blasting • Note changed state and monitor for further change.
Noise		
Normal State	At all three monitoring stations: • Noise monitoring station 1: ≤85 dBA LAeq • Noise monitoring station 2: ≤65 dBA LAeq • Noise monitoring station 3: ≤50 dBA LAeq	Undertake monitoring as per this Program.

Trigger level	Trigger value	Response
Moderate exceedance	At a minimum one of three monitoring stations (as per: • Noise monitoring station 1: >85 dBA LAeq • Noise monitoring station 2: 65-85 dBA LAeq • Noise monitoring station 3: 50-65 dBA LAeq	Consideration given to designing and installing a suitably high and long bund wall along the western edge of the Waste Rock Dump.[3]
High exceedance	At a minimum one of three monitoring stations • Noise monitoring station 2: >85 dBA LAeq • Noise monitoring station 3: >65 dBA LAeq	Relocation or temporary suspension of noise-producing activities until meteorological conditions become more favourable Establishment of a vegetation buffer between the core breeding and foraging areas and key emissions sources to reduce noise levels Undertake alternative actions as agreed with the NT EPA, DENR and/or others.
Blasting		
Normal State	At both monitoring stations: • Blast monitoring station 1: <130 dBL • Blast monitoring station 2: <110 dBL	Undertake monitoring as per this Program.

[3] An exceedance of 65 dBA was modelled as a result of dump trucks during a worst case 'snap-shot' scenario. Given that less than 1% of the core breeding habitat is predicted to be affected, this mitigation option should not be executed until considered warranted during both the detailed design phase of the Project and Noise Monitoring Program.

Trigger level	Trigger value	Response
Moderate exceedance	One exceedance at any of the following monitoring stations: • Blast monitoring station 1: >130 dBL • Blast monitoring station 2: >110 dBL	• Consider refining the blasting processes if possible (e.g. new blasting procedures or technology may be available) • Consider conducting additional vibration impact assessments, including quantification, qualification, modelling and assessment of acceptability of impacts under operating conditions. • Reschedule blasting activities if meteorological conditions have the potential to increase air blast levels over the core Gouldian Finch habitat • Refining the blast design parameters so the initial blasts are as small as practical and uses low MIC where possible
High exceedance	Multiple exceedances at any of the following monitoring stations: • Blast monitoring station 1: >130 dBL • Blast monitoring station 2: >110 dBL	Temporarily halt blasting activities until the following is achieved: • Reschedule blasting activities if meteorological conditions have the potential to increase air blast levels over the core Gouldian Finch habitat • Refining the blast design parameters so the initial blasts are as small as practical and uses low MIC where possible. • Undertake alternative actions as agreed with the NT EPA, DENR and/or others.

11 Adaptive Implementation

The environmental impact assessment process has been undertaken to obtain Project approvals and information and knowledge refinement has continued post approval through ongoing baseline studies. Despite this, there remains a level of uncertainty around the potential impacts from the Project on the Gouldian Finch population in the Yinberrie Hills SOCS. Subsequently the "Precautionary Principle" is applied to management measures and monitoring program development. As the Project progresses impacts resulting from its development and operation are measured and assessed against baseline information and modelling predictions. Operational and environmental management activities are progressively improved through this learning process which is termed 'adaptive management' (Gleeson and Gleeson, 2012). The purpose of adaptive management in the context of the Project is to obtain knowledge of the Gouldian Finch population and use it to minimise adverse impacts on the population and its habitat and modify practices to achieve management performance targets.

Vista Gold has developed an adaptive management approach that is designed to detect short-term changes to the Yinberrie Hills Gouldian Finch population to ensure its long-term conservation. The monitoring data obtained through the implementation of this program will be used to assess and periodically evaluate any changes to finch populations and foraging habitat. In the event that a performance indicator (trigger) is exceeded then the TARP (**Table 13 Roles and responsibilities**) will be implemented.

The design of these studies will be reviewed as more information becomes available. In particular, key monitoring periods including the pre-construction baseline (designed to trial several methodologies) will provide valuable information that will be utilised to refine methodologies. In addition, control sites and will require close review over the initial stages of the Project. Consultation with the TAC (if relevant), or relevant government agencies will be undertaken to ensure optimum methodologies continue to be utilised as the science is improved.

12 Reporting

In accordance with Condition 17 of the EPBC Approval, an annual compliance report will be prepared addressing all approval conditions including implementation of all plans and strategies. This report will be published on the Vista Gold website within three months of every twelve month anniversary of the commencement of the action. This report will:

- Address compliance with Approval conditions;
- Describe the status of work activities and mitigation activities undertaken;
- Identify any significant events or activities that occurred over the previous 12 months that may have impacted the Gouldian Finch population (i.e. moderate or high exceedances as per the TARP);
- Present and provide interpretation of monitoring results from the previous 12 months;
- Outline the effectiveness of the mitigation measures currently implemented and discuss any statistical trends regarding the population; and
- Outline developments scheduled to occur in the next 12 months that may impact the Gouldian Finch population.

13 Review and Audit

Following commencement of construction a formal audit will be conducted in accordance with Condition 17 of the Approval. The audit and subsequent annual monitoring report will be prepared in accordance with the content outlined in **Section 12 Reporting** above.

The GFMP and GFMM will also be reviewed in the event that the following occur:

- Stakeholders raise issues that necessitate a review;
- There are changes to the management requirements (e.g. if there are changes to related approvals);
- Where unpredicted impacts or consequences have required implementation of moderate or high exceedance events as per the TARP; and
- Monitoring, incident, or audit processes demonstrate that a review is warranted.

In addition to the formal auditing required by the Approval, the site Environmental Management Systems (EMS) will include a number of self-auditing and checking mechanisms. The EMS will be designed and implemented to be consistent with the ISO 14001: 2015 Standard which operates on the underlying principle of continuous improvement and includes routine auditing and checking processes. These EMS audits and checks will be documented and where findings indicate departure from the policy, plans, procedures, etc. corrective actions will be implemented.

This GFMP will be the subject of annual technical review and evaluation following the audit required by Condition 17. The review will consider the findings of the Condition 17 audit, relevant internal EMS audit and check findings and monitoring results. The review will be prepared with input from the TAC and TAC members will be required to sign off on the reviewed document.

14 Roles and Responsibilities

The responsibility for implementation, monitoring and review of the GFMP lies with the Mt Todd Mine Manager. As such, the Mine Manager has the ultimate responsibility for the implementation of the GFMP and GFMM and shall make appropriate resources available. The roles and responsibilities in implementing the GFMP are outlined in **Table 13 Roles and responsibilities**.

It should be noted that a number of these roles will not be created until the Project commences.

Table 13 Roles and responsibilities

Role	Responsibility
Mine manager	• Liaison with government environmental agencies; • Ensuring all technical and financial resources are made available to meet the requirements of the plan; and • Sign off on corrective actions and responses.

Environment manager	• Coordinate sufficient resources to implement the requirements of the GFMP and GFMM
	• Implementation, risk management, monitoring and review of this program, including:
	  • Reporting triggers/non-conformances internally to the Mine Manager as appropriate
	  • Annual reviews of this program
	  • Annual audits and contingency responses.
	• Reporting triggers/non-conformances to external stakeholders.

Consulting ornithologist and/or botanist	• Extended field work and expert advice • Multi-criteria and statistical analyses (with assistance from DENR, or a consulting biostatistician, as required) • Design and analysis, or coordination of, research programs.
DENR and/or NT EPA	• Ongoing advice on trigger thresholds and associated management responses • Advice and review of multi-criteria and statistical analyses • Advice on the design and development of research programs
Jawoyn Rangers	• Assist in undertaking surveys in accordance with the GFMP and GFMM under responsibility of the Environment Manager
TAC	• Provide expert advice to Vista Gold and its consultants / contractors on technical aspects of management plans and strategies related to the Gouldian Finch.

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APPENDIX A

Evidence of the suitability of the experts preparing the GFMP

Suitably qualified experts

As required by condition 3 of EPBC 2011/5967, the GFMP must be prepared by suitably qualified experts. The Approval defines a suitably qualified expert(s) as a person with relevant tertiary qualifications and a minimum of ten (10) years demonstrated experience relevant to the requirements of the condition of approval.

The suitably qualified experts who contributed to the preparation of the GFMP are listed in **Table 1**, along with their relevant qualifications and experience. One page summary CVs for each contributor have also been provided.

Table 1 Suitably qualified contributors to the GFMP

Contributor	Role	Qualifications	Experience
Paul McHugh	Report author, risk assessment	Bachelor of Applied Science	Paul has over twelve years' experience in environmental management, planning, approvals, auditing and the development and implementation of environmental monitoring programs.
Dr Sarah Smith	Report author, technical input	PhD in Zoology Certificate IV Project Management Bachelor of Science (Hons)	Sarah is an ecologist with 10 years experience. She has worked with stakeholders from industries including energy, mining, urban development, government and natural resource management. Sarah has experience in mining management, environmental approvals, biodiversity surveys and flora and fauna monitoring. Sarah also has experience translating technical reports into accessible formats for landholders and the general public.
Paul Tett	Report author, risk assessment	Bachelor of Science (Ecology) Certified Environmental Practitioner ISO14000 Environmental Management Systems Auditor	Paul has over twenty five years' experience of leading, developing and delivering environmental assessments, strategies and solutions across a diverse range of disciplines within the mining, industrial and development sectors.
Paul Turyn	Technical input, air, noise and vibration	Bachelor of Environmental Engineering	Paul has over nineteen years' experience across industrial, private, government, oil and gas and mining sectors. Specifically his experience includes environmental management, planning, approvals and auditing along with environmental monitoring and interpretation.

CURRICULUM VITAE

PAUL MCHUGH

ASSOCIATE

Environmental Management, Asia Pacific

QUALIFICATIONS

GradDip. OH&S	2017	Graduate Diploma of Occupational Health and Safety, Central Queensland University
D. QA	2009	Diploma of Quality Auditing, SAI Global
B.App Sci	2005	Bachelor of Applied Science, Queensland University of Technology

EXPERTISE

- Environmental Management, planning, approvals and auditing.
- Safety Management, Incident Investigation, risk assessments and auditing.
- Environmental Monitoring, compliance and reporting.
- Water treatment and discharge management.
- Construction and rehabilitation project management.

Paul McHugh is an Environmental and Health and Safety management professional with 12 years' experience working in the Northern Territory in both the government and private sector.

Within the Private sector Paul's work experience has included environmental and safety management of remote mining operations, completion of regulatory reports including NPI, NGER, and Mining Management Plans, coordination of Emergency Response Teams and Medics, Community engagement and Traditional Owner liaison, and project management and project direction of construction of fuel storage and waste management facilities, rehabilitation and remediation of waste rock landforms and mine disturbance areas.

Within regulatory agencies Paul has experience with the development and implementation of environmental monitoring programs, the audit and assessment of mining management plans encompassing exploration, extractives, mining and rehabilitation operations, and compliance auditing.

PROJECT EXPERIENCE

Environmental Management, Approvals and Auditing

In positions with regulatory agencies, mining operations and consultancy Paul's work experience encompasses:

- Development, Implementation and maintenance of the Environmental Management Plans and Systems for multiple operational, care and maintenance and rehabilitation of lease areas.
- Development and conduct of audits and inspections against approval criteria, Australian Standards, and management systems.
- Liaison with government and non-government organisations to ensure that the operation is meeting all stakeholder expectations
- Preparation of required plans and submissions to attain government approvals for exploration and development works.

Environmental Monitoring Compliance and Reporting

In various roles within the Northern Territory Paul has had experience with the monitoring of environmental variables. Specific experience includes:

- Implementation, maintenance, and refinement of environmental monitoring programs.
- Assessment, interpretation and reporting of environmental monitoring data to both technical and lay audiences.
- Provision of technical advice, reports, presentations, and recommendations to the Minerals and Energy group, other NT Government departments, mine operators, and stakeholders.
- Completion of investigations and compilation of reports identifying cause(s) and proposed mitigation and corrective actions.
- Submission of plans, reports, notifications, and applications in compliance with legislative requirements, including NPI, NGERS, Incident Notifications, Risk Management Plans, Mining Management Plans, and Annual Environmental Reports.

CURRICULUM VITAE

SARAH SMITH

ASSOCIATE

Ecology, Asia Pacific

QUALIFICATIONS

PhD	2001	PhD Zoology, University of Adelaide
Cert IV	2010	Certificate IV Project Management, Certificate IV Building and Construction, 2010
BSc (Hons)	1998	Honours Science, Bachelor of Science, University of Sydney

EXPERTISE

- Mining Management
- Environmental approvals
- Biodiversity surveys
- Flora and fauna monitoring

Sarah is an ecologist who has worked with stakeholders from industries including energy, mining, urban development, government, and natural resource management. Sarah has experience with mine environmental approvals, mining management, mine closure, rehabilitation and monitoring within the Northern Territory. Sarah has lived and worked in the Northern Territory for the last decade and is familiar with Territory landscapes, habitats, conservations values, threatened and significant species and threats to NT biodiversity. She has a PhD in zoology and eight years' post-doctoral research experience resulting in more than 25 scientific publications. Sarah also has experience translating technical reports into accessible formats for landholders and the general public.

PROJECTS

Mt Todd Mine – Environmental approval conditions, Vista Gold (2017 – 2018)	Sarah is working with Vista Gold to satisfy the conditions appended to the federal environmental approval for resumption of gold mining at the site. The approval conditions include undertaking a Northern Quoll and Crested Shrike-tit habitat assessment, conducting relevant Gouldian Finch habitat attribute assessments to form baseline data for the offset sites and development of Terms of reference for the Gouldian Finch Technical Advisory Committee.
Kirkland Lake Gold – Pulse discharge report (2018)	Sarah prepared the environmental report on Kirkland Lake Gold's Pulse water discharge as required by the Water Discharge license.
Landbridge Industry and Logistics Park – Environmental Services, Landbridge (2017-2018)	Sarah is managing an SLR and subconsultant team to provide environmental services including acid sulfate soils assessment, PFAS contamination of groundwater, site contamination, stormwater drainage, biting insect management, flora/vegetation, fauna, wetlands and waterways, cultural heritage/ archaeology. Sarah is coordinating the team and managing
Tanami Gas Pipeline – EIS technical appendix fauna, Eco Logical Australia (2017)	Sarah provided technical oversight of fieldwork and reporting on listed threatened and migratory fauna species for a gas pipeline project proposed for the Tanami region of the Northern Territory
	KEY PROJECTS PRIOR TO SLR
Ranger Mine – closure plan, Energy Resources of Australia (2017)	Sarah managed a team of staff who worked with ERA staff to produce the closure plan for Ranger Uranium Mine. The plan was developed to meet the requirements of the Western Australian mine closure guidelines (in the absence of NT guidelines) and to pre-emptively address the anticipated concerns of the wide range of stakeholders with an interest in the outcomes of Ranger closure (including but limited to the Office of the Supervising Scientist, the Department of the Environment, the Department of Mines and Energy, Gundjeihmi Aboriginal Corporation, and Kakadu National Park).
Koolpinyah Project, Flynn Project and Walker Gossan Project - Mining Management Plans (2017)	These three projects involved providing additional information requested by DME to ensure that the submitted MMPs were compliant with the requirements of the Mining Management Act.

CURRICULUM VITAE

PAUL TETT

ASSOCIATE

Environmental Management, Asia Pacific

QUALIFICATIONS

BSc (AES)	1990	Bachelor of Science (AES)
CEnvP	2014	Certified Environmental Practitioner
C.dec	2013	Commissioner for Declarations
		ISO14000 Environmental Management Systems Auditor (2002)

EXPERTISE

Experienced environmental manager, (consulting and site experience) with a 25 year record of leading, developing and delivering environmental strategies and solutions across a diverse range of disciplines within the mining, industrial and development industries. The ability to assemble and manage multidisciplinary project teams including in house staff and sub-consultants to ensure timely delivery of quality service, documentation and environmental outcomes. Extensive knowledge of current State and Commonwealth environmental legislation and the ability to research and acquire additional knowledge as required by changing policy, practice and legislative evolution.

Extensive technical understanding of key environmental aspects and associated management associated with land, air, noise, water, waste, social and economic and Cultural Heritage. Paul's expertise includes:

- Safe and efficient project management;
- Procedural development;
- Legislative interpretation and application;
- Development and implementation of Environmental Management Systems (EMS) consistent with the ISO14000 series of standards;
- Environmental Auditing;
- Environmental planning and assessment, including Environmental Authority (EA) applications, development of Environmental Impact Statements (EIS) and Environmental Management Plans (EM Plan);
- Practical on site Environmental Management;
- Liaison with government, community, landholders and other key stakeholders

PROJECTS

Project experience

- Project Manager for Codrilla Coal Mine Project. EIS Process from inception to grant of EA and MLs.
- Project Manager for Olive Downs and Moorvale West EA Applications and EIS Processes, including Pre-lodgement meetings, baseline scoping and study provider selection.
- Project Manager Coppabella Underground ML applications and Environmental Assessment process. Including, Baseline studies and regulator engagement.
- Project Manager for Olive Downs North Coal Mine, ML and EA Application Process from baseline studies to grant of EA and MLs.
- Project Manager for Extractive Industry (Sand Quarry) Development Application (DA) and EA application from inception to grant. Impact Assessment level of approval.

TECHICAL RESPONSIBILITIES

- Preparation of environmental management documentation for both greenfield and brownfield operations.
- Providing advice to staff and clients relative to compliance with Local, State and Commonwealth legislation, plans, guidelines and policies.
- Management and implementation of water and air quality monitoring programs for mining and industrial clients.
- Contracted secondment to mining operations as required to perform site environmental professional duties.

CURRICULUM VITAE

PAUL TURYN

PRINCIPAL / OFFICE MANAGER

Environmental Management, Asia Pacific

QUALIFICATIONS

MSc	Current	Masters of Occupational Hygiene and Toxicology
BSc	1999	Bachelor of Environmental Engineering
HND		Asbestos Assessor Licence – ASB2-448166
HND		NATA approved signatory for asbestos fibre counting and volume measurement

EXPERTISE

Paul Turyn is a Principal Environmental Engineer with 19 years' experience working in Environment and Engineering sectors in the industrial, private, government, oil and gas and mining environment.

Paul has worked in the Northern Territory full time for almost 10 years and has experience in the delivery of projects ranging from environmental and engineering assessments, land development, construction, mining and remediation/rehabilitation.

His work experience encompasses both project management and project direction managing complex technical projects with tight delivery times and sensitive information. He has managed large scale projects incorporating environmental approvals, engineering design, air quality impact assessment, regulatory reporting advice, occupational hygiene assessment and advice, hazardous materials consultancy and a diverse range of environmental and occupational monitoring and assessment programs.

PROJECTS

Environmental Management, Approvals & Reporting

- Environmental risk assessment, comparison analysis and approvals development for a luxury hotel development at the Darwin waterfront.
- Environmental Management Planning, Approvals and Development Application for privately funded marine Infrastructure Development at East Arm.
- Environmental assessment and approvals supplement for the re-development of a legacy mine in the Northern Territory, inclusive of Air Quality Impact Assessment, Ecological Risk Assessment, Noise and Blasting Impact Assessment, negotiation with NT EPA, DLRM, DME/DPIR and DoE.
- Notice of Intent and Dredge Management Plan for the expansion of the East Arm Port facility – inclusive of marine sediment assessment for subsequent onshore disposal.
- Draft Environmental Impact Statement for the All Tides Access project associated with the Darwin Port Corporation "Vessel Greater Than Panamax" feasibility study.
- Environmental Management Plan and Environment Plan development for reentry drilling program in the Beetaloo Basin for approval by NT Department of Mines and Energy/DPIR
- Environmental Management Plan for 2D seismic exploration across approx. 3000kms in the Beetaloo, inclusive of ecological assessments, rehabilitation calculations, compliance auditing, cultural heritage.

General Environmental Monitoring & Reporting

- Implementation of real time PM10 monitoring, PM10 Low Volume Air Sampling, concurrent airborne asbestos fibre monitoring, stockpile inspection, management and maintenance program at RAAF Base Darwin Married Quarters.
- Environmental management and monitoring, inclusive of air quality, noise and water quality, for the duplication of Tiger Brennan Drive, Darwin-Palmerston.
- Environmental management and monitoring, inclusive of air quality, noise, water quality and acid sulphate soils, for the extension of Roystonea Avenue in Palmerston.

MEMBERSHIPS

Professional Membership

Member of Engineers Australia

Executive Committee member of Consult Australia Northern Territory

Member of the Clean Air Society Australia and New Zealand

NT Branch Committee Chair of Australian Land and Groundwater Association

Other contributors

In addition to the suitably qualified experts listed in **Table 1**, additional contributors have been utilised for input into the GFMP. These contributors are listed in **Table 2**.

Table 2 Other contributors

Contributor	Role	Qualifications	Experience
Loren Yallop	Report author	Batchelor of Environmental Science Diploma of Project Management	Loren has six years' experience working in environmental management and mining compliance. She has worked on environmental assessments/environmental impact statements, mining management plans and ecological assessments as well as environmental monitoring and management reports. She has prepared numerous environmental management plans for a variety of clients.
Meg Lamont	Calculation of mining lease and habitat areas Preparation of figures	Masters in Environmental Management Bachelor of Science (Environmental Biology)	Meg has 9 years GIS experience working with large databases and also has experience in project coordination and people management. Meg's expertise lies in utilising CADD, cadastral & aerial imagery databases to conduct quality analysis on spatial data. Meg is also experienced at conversion of GPS files & Geo-reference spatial data.
Sarah Perkins	Cross check of GFMP against guidance note and EMP guideline requirements	Bachelor of Environmental Science	Sarah has 2.5 years' experience working in the mining sector and as an environmental consultant. She has a thorough understanding of the operational and reporting requirements relating to mining in the Northern Territory including Waste Discharge Licences, Mine Management Plans, NPI/NGERS reporting and on-site water balances and surface water management.

APPENDIX B

Conditions of approval reference table

Approval conditions	GFMP section
Condition 3: The Approval holder must prepare and submit to the **Department** a Gouldian Finch Management Plan (the Plan) detailing how the objectives outlined in Condition 2 of this approval will be achieved. The Plan must be prepared by a **suitably qualified expert{s).** The Approval holder must not commence the action unless the Minister has approved the Plan. The approved Plan must be implemented. The Plan must be prepared in accordance with the **Department's Environmental Management Plan Guidelines** and include, but not be limited to:	
a. objectives to be achieved for the **Gouldian Finch,** including by defining significant reduction or decrease as it applies to each objective specified in condition 2, based on baseline data	**Section 4, Table 3.**
b. components of the action that may impact on the **Gouldian Finch,** and commencement and completion dates for those components	**Section 2.2**, **Table 2**
c. performance targets to achieve or maintain the objectives.	**Section 6**
d. identify and manage risks of failure to achieve performance targets.	**Section 10, Table 12**
e. include baseline information from which performance targets are derived.	**Gouldian Finch Management Methodology – Appendix C**
f. detailed monitoring methodology including: i. the purpose of monitoring and its functional relationship to operational decisions. ii. monitoring objectives including provisions for early warning, early control and for improved predictive capacity. iii. variables to be measured which are appropriate to detect changes in a manner which allows for timely implementation of corrective actions. iv. frequency of monitoring. v. interpretation and analysis of monitoring data to inform the contingency response and corrective actions.	**Section 9, Table 11, Appendix C**
g. management triggers that will enable actual or potential adverse impacts to the Gouldian Finch to be avoided, mitigated or minimised in a timely manner.	**Section 6, Section 10, Table 12**
h. detailed management measures to be implemented to achieve performance targets, management triggers for implementing a contingency response(s), and corrective actions that may be implemented.	**Section 7, Section 10, Table 12**
i. mechanisms to review performance targets and triggers based on monitoring data including processes for validation of predictive models used in determining performance targets and management triggers	**Section 11**
j. responsibilities and accountabilities including data handling, technical review, self-auditing and reporting requirements.	**Section 13, Section 14**

APPENDIX C

Monitoring Methodology

See Attachment U2

APPENDIX A

Dust Monitoring and Mitigation Program

See Appendix I of the MMP

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