

# Draft Terms of Reference for preparation of an Environmental Impact Statement

PROPOSAL NAME: Rustlers Roost & Quest 29

Open-cut Mine Redevelopment

LOCATION: Mount Bundey Locality, Arnhem

Highway, NT

PROPONENT: Primary Gold Limited

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#### **ACRONYMS**

AAPA Aboriginal Areas Protection Authority

ABA Acid base accounting
AMD Acid mine drainage

ANZECC & Australia and New Zealand Environment and Conservation Council & Agriculture and Resources

ARMCANZ Management Council of Australia and New Zealand

ARI Average recurrence interval CSM Conceptual site model

DENR Department of Environment and Natural Resources (Northern Territory) – now DEPWS

DEPWS Department of Environment, Parks and Water Security – formerly DENR

DITT Department of Industry, Tourism and Trade – formerly DPIR

DPIR Department of Primary Industry and Resources – now DITT

DoH Department of Health

EIA Environmental impact assessment
EIS Environmental impact statement
EMP Environment management plan

EPBC Act Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth)

ESCP Erosion and sediment control plan

ESD Ecologically sustainable development as defined by Part 1 Division 1 of the *Environment* 

Protection Act 2019

GDE Groundwater dependant ecosystems

GHG Greenhouse gas
LOM Life of mine
MCP Mine closure plan

ML Mineral leas

MMP Mining management plan (pursuant to the *Mining Act*)

MNES Matters of national environmental significance

NAF Non-acid forming

NMD Neutral metalliferous drainage

NORM Naturally occurring radioactive material

NT Northern Territory

NVIS National vegetation information system

PAF Potentially acid-forming

ROM Run of mine

SD Sustainable development

SGVs Site-specific guideline values (water quality guideline values derived by using reference-site data

as advised by ANZECC & ARMCANZ)

SOR Statement of reason

SWGs Livestock Drinking Water Guidelines

TARP Trigger action response plan

TOR Terms of reference

TPWC Act Territory Parks and Wildlife Conservation Act (Northern Territory)

TSF Tailings storage facility
WMP Water management plan

WRD Waste rock dump

#### 1 INTRODUCTION

#### 1.1 Overview

Primary Gold Limited (PGO)<sup>1</sup> has submitted a proponent initiated Environmental Impact Statement (EIS) Referral for its proposed redevelopment of the Rustlers Roost and Quest 29 open-cut mines (the Proposal) to be assessed under the *Environment Protection Act 2019 (EP Act)*. These Terms of Reference (TOR) set out the environmental matters that PGO proposes be addressed in an EIS for this Proposal. The EIS will also need to address all requirements in the *NT EPA General Guideline for Preparing a proponent initiated EIS referral* (NT EPA 2020).

#### 1.2 Background

The Proposal is to redevelop and expand a former open pit gold mining operation in the Mount Bundey locality, 100 km south-east of Darwin. The Proposal involves open cut mining of ore from a number of pits located across two separate mineral lease areas, referred to as Rustlers Roost and Quest 29. Ore from both areas will be processed at a central processing facility to produce gold bullion. The forecast life of mine is approximately seven years, after which PGO will rehabilitate the site. Full details of the Proposal are provided in the referral document submitted with this TOR.

In accordance with the *Environment Protection Regulation 48*, the referral documentation submitted by PGO includes a Draft TOR (this document) and a Statement of reasons that details why assessment by EIS is required and why these draft TOR are appropriate. If the NT Environment Protection Authority (NT EPA) decides that EIS is the appropriate method of assessment, these draft TOR will be finalised by the NT EPA after taking into account the submissions made during the public and government authority consultation period.

# 1.3 Assessment under Environment Protection and Biodiversity Conservation Act 1999

This proposal has not been referred under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) because the activities do not have potential for a significant impact on any Matters of National Environmental Significance (MNES) protected under Part 3 of the Act.

#### 1.4 Assessment timeline

An indicative assessment timeline is outlined in Table 1-1 based on the timeframes for key assessment milestones specified by the *EP Act*.

Table 1-1. Indicative assessment timeline

Key assessment milestones	Completion date
Submission of proponent initiated EIS Referral	Start to Mid-February 2021
NT EPA acceptance of proponent initiated EIS Referral (15 business days)	Start March 2021
Referral consultation period including draft Terms of Reference (30 business days)	Start April 2021
NT EPA Decision on accepted referral (35 business days)	End May 2021
NT EPA approves TOR	End May 2021
Draft EIS submitted to the NT EPA (proponent timeframe)	January 2022
Public and government authority consultation period (30-60 business days)	March 2022
Direction to prepare supplement issued (25 business days)	Start May 2022

<sup>&</sup>lt;sup>1</sup> PGO is a fully owned subsidiary of Hanking Australia Investment Pty Ltd.

Key assessment milestones	Completion date
Supplement submitted (proponent timeframe)	Start July 2022
Public and government authority consultation period (15 business days)	July 2022
Assessment report and draft environmental approval provided to Minister (45 business days)	Mid-September 2022
NT Ministers approval decision (30 business days)	End October 2022

#### 2 MATTERS TO BE ADDRESSED IN DRAFT EIS

This section describes the information requirements specific to this Proposal and the surrounding environment, that should be addressed in the draft EIS.

#### 2.1 Summary

A summary of the draft EIS should be written as a stand-alone document, able to be provided on request to interested parties who may not wish to read the whole EIS. The summary should provide the following at a minimum:

- Explanation of the approvals process and the function of the EIS.
- Clear and concise overview of the proposal, including key components and activities, lifespan, rehabilitation and closure outcomes and intended future use of the site.
- Details of the benefits of the proposal to the Territory.
- Details of consultation undertaken and outcomes.
- Summary of environmental impacts of the potential significant environmental impacts and proposed measures to avoid, mitigate or offset those impacts.

#### 2.2 Introduction

The introduction to the EIS should include the following:

- · Brief proposal overview.
- Background, rationale and key objectives of the proposal.
- · Proponent details and background.
- Details of the benefits of the Proposal to the local region and the Northern Territory and the measures that will be implemented to maximise these.
- Summary of the approvals process, including key stages, timeframes and function of the draft EIS.
- Table of the environmental factors and objectives addressed in the draft EIS.
- Table cross-referencing matters in the TOR and how each matter has been addressed.

#### 2.3 Stakeholder engagement

Provide details of any stakeholder engagement and consultation undertaken by the proponent to meet the requirements of section 43 of the *EP Act* and future engagement activities that will be undertaken throughout assessment and post-approval, including during construction and operation of the proposal.

#### 2.4 Alternatives

For each key component of the proposal, provide details of the alternatives considered or currently under consideration, including alternative locations, timing and design options.

Provide a comparison of the potential significant environmental impacts, across all relevant environmental factors associated with each alternative, and clearly explain if and how the preferred option(s) assist in avoiding or minimising major potential environmental impacts associated with the proposal.

The information provided is required to demonstrate that the planning and design phase of the proposal has included:

• Identification of local/regional environmental values and application of the mitigation hierarchy to avoid or minimise potentially significant environmental impacts where possible.

• Consideration of the potential for less environmentally damaging alternative approaches, methodologies or technologies, consistent with section 42(c) of the *EP Act*.

#### 2.5 Proposal description

The EIS must include a detailed description of the all aspects of the proposal illustrated using maps and figures. The information provided should cover all phases, including design, construction, operation, rehabilitation and closure of the proposed mining operation. Specific information requirements are outlined in Table 2-1.

Table 2-1. Information to be provided in project description

Expanded pit footprints Processing facilities Tailings storage facilities (TSF) Waste rock dumps (WRD) Temporary stockpiles Buildings, structures and laydown areas Water supply, water storage, stormwater and drainage infrastructure Haul routes and access roads Services infrastructure (i.e. water and power supply) Hazardous materials and waste storage facilities Explosive and fuel storages Other components.  Current land tenure and ownership of the land covered by the proposal. Location and boundaries of proposal area clearly identified (i.e. mineral titles and development envelope) in relation to surrounding land tenure, land use, environmental values and sensitive receptors.	
Location and boundaries of proposal area clearly identified (i.e. mineral titles and development envelope) in relation to surrounding land tenure, land use, environmental values and sensitive receptors.	
Details of land use history, including extent and nature of previous activities that may have caused soil, surface water and/or groundwater contamination or degradation. Location and approximate dimensions of areas to be disturbed and key proposal components (i.e. the direct disturbance footprint).	
Location and approximate dimensions of areas to be disturbed and key proposal	

Topic	Information requirements
	<ul> <li>enable development an AMD Management Plan that incorporates site-wide management of potentially acid-forming (PAF) material.</li> </ul>
	<ul> <li>Outcomes of investigations undertaken to determine the suitability of site derived and/or off site materials for use in construction and/or rehabilitation. The investigation will demonstrate that sufficient quantities of suitable-standard clays, benign and non-acid forming (NAF) material, are available to fulfil construction requirements for all proposed infrastructure builds and upgrades.</li> <li>Outcomes of investigations undertaken to assess soil quality (contamination) and integrity (stability/erosion) in existing mine landforms and other areas disturbed by previous mining activities, including the WRD's, heap leach pads and ponds.</li> <li>Design options considered, reasons for selection of the preferred option and how the proposed design avoids and/or mitigates potential impacts and risks to the surrounding environment.</li> </ul>
Construction	<ul> <li>Stages of mine development and timeframes.</li> <li>Seasonal considerations for mine development, including timing of land clearing and site preparation, availability of water and dewatering requirements.</li> <li>Methods used for vegetation clearing, topsoil stripping and details of how excess materials will be stored, reused, recycled or disposed.</li> <li>Construction materials required for each mine site component – including details of major types, quantities, specifications for different purposes such as lining and capping, sources (both on and off lease), storage requirements and potential hazards.</li> <li>Any new ancillary infrastructure and upgrades required to service the Proposal, including supply of electricity, water, sewerage and road access.</li> <li>Construction power and water supply.</li> </ul>
Mine operations	<ul> <li>Mining methods and equipment.</li> <li>Timeframes, proposal staging and ramp-up of production and progressive rehabilitation activities.</li> <li>Volumes of ore and waste rock to be mined annually.</li> <li>Types / categories, quantities and characterisation of materials to be mined (e.g. ore and waste rock etc.).</li> <li>Location, characteristics and quantities of any mined materials that could pose an environmental risk, including AMD or saline drainage, sodic or dispersive material, erosive material, material with other chemical/physical properties that will affect rehabilitation outcomes, fibrous minerals and naturally occurring radioactive material (NORM).</li> <li>Details of methods for handling, treatment, storage or disposal of these potentially problematic materials.</li> </ul>
Processing	<ul> <li>Overview of ore processing methods, major components and processing circuits.</li> <li>Process flow diagram showing all processing circuit inputs and outputs.</li> <li>Water requirements and management (treatment, sources and storages).</li> <li>Details of additives used, including physical and chemical properties, Safety Data Sheets, storage, handing and disposal requirements.</li> <li>Details of processing outputs, including types and volumes of rejects, tailings, product, and details of handling, treatment, transport and disposal requirements.</li> </ul>
Tailings management	<ul> <li>Quantities of tailings to be produced and managed.</li> <li>Physical and geochemical characterisation of tailings, indicating potential to contaminate surface water and groundwater.</li> <li>Methods of disposal and management of tailings.</li> <li>Analysis of potential complexing of tails, such as with cyanide, and of physiochemical mobility of contaminants under expected environmental conditions.</li> <li>Potential for reprocessing of tailings and details of how this will be managed.</li> <li>A draft Tailings Management Plan developed according to leading practice guidance Tailings Management Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia, 2016)</li> </ul>
Water Use and Management	<ul> <li>Water management system schematic and water balance for each proposal phase, based on the <i>Minerals Council of Australia Water Accounting Framework (MCA 2014)</i>. The water account should be prepared for low, average and high rainfall years.</li> <li>Forecast water demand for all mine site activities, including dust suppression, processing, wash-down, potable water and ablutions and other uses.</li> <li>Water sources and available volumes, including surface water, groundwater and mine dewatering (including details of seasonal variations).</li> <li>Systems for recycling and reuse of water, details of any treatment requirements and estimated volumes of water to be sourced from these systems.</li> </ul>

Topic	Information requirements	
	<ul> <li>Pit dewatering volumes and rates including quantification of the anticipated peak dewatering requirements.</li> <li>Discharge volumes, quality, treatment requirements timing and proposed locations.</li> </ul>	
Energy Use	<ul> <li>Energy requirements and sources.</li> <li>Considerations of renewable energy sources and justification of selected options.</li> <li>Estimate of greenhouse gas (GHG) emissions (scope 1 and scope 2) for each year of the project.</li> <li>Measures and/or initiatives to maximise energy efficiency and avoid and/or reduce GHG emissions, specifically relating to source and consumption of energy, and consistent with the NT Governments aspirational target of achieving net zero GHG emissions by 2050 (NT Government 2019).</li> </ul>	
Transport and traffic	Describe the traffic and transport activities during construction and operation. Include as a minimum:  Machinery and vehicle type, number, traffic volume, hours of operation and haulage routes.	
Waste and Hazardous Materials Management	<ul> <li>Expected waste streams and volumes for both industrial and domestic wastes at the mine and accommodation facilities.</li> <li>Information on potentially hazardous materials (including fuel) that will be used or produced (waste) and methods for storage, transport, handling, containment, disposal and emergency management of these materials.</li> <li>Legislation, guidelines and standards relevant to the types and volumes of waste and hazardous materials associated with the activities.</li> <li>Management strategies proposed for each waste stream that demonstrate consideration of the waste management hierarchy in accordance with the EP Act 2019 Clause 27.</li> </ul>	
Workforce and procurement	Provide a summary of the following for each phase of the proposal:  Estimated number of people to be employed.  Skills base required and likely sources of workforce (local, regional, international).  Details of workforce accommodation and transport requirements.  Goods and services required to support project delivery and where these will be procured.  Strategies proposed for maximising local employment and procurement.	
Rehabilitation and closure	A draft Mine Closure Plan (MCP) developed according to leading practice guidance (e.g. DIIS 2016; DMO & EPA 2015; ICMM 2019) and the principles of the International Council of Mining (ICMM 2015). As recommended by the ICCM (2015 and 2019), planning for mine rehabilitation and closure should be an integral part of early mining planning.  Provide details of proposed rehabilitation and closure planning for the Proposal, including;  Proposal specific closure objectives, standards and criteria and future land tenure and land-use arrangements.  Geochemical analysis of waste rock and ore required to inform design criteria for surface waste storage structures (WRD), TSF and materials management.  Landform designs (TSF, WRD and Annies dam wall upgrade) by appropriately qualified professionals in accordance with accepted industry guidelines and standards to ensuring it is a non-polluting and structurally stable.  Predicted post closure pit lake water quality assessment. Detail the impacts and risks of the final mine pit lake with focus on appropriate monitoring programs, risk avoidance measures and mitigation actions, in consideration of the Western Australia Guidelines for Preparing Mine Closure Plans (Interim guidance on pit lake assessment through a risk-based approach).  Predicted post closure water balance, including density driven exchange between pit lake and the surrounding groundwater.  Material sources, characterisation and indicative volumes available for site rehabilitation.  Closure implementation, including; rehabilitation techniques, staging and timing of rehabilitation and closure, removal of all infrastructure, methods of stabilisation, an outline of final rehabilitation, revegetation and closure plans for all key components.  Financial provisions for closure (both planned and unexpected), including protocols for securing a safe, stable and non-polluting mine-site.	

#### 2.6 Statutory framework

The draft EIS must provide information on the statutory framework including a description of any permits, consents, or other approvals that will be required from Northern Territory or Commonwealth agencies and/or authorities.

#### 2.7 Key environmental factors

The proponent has identified the five preliminary key environmental factors that may be significantly impacted by the proposal Table 2-2. These TOR focus on the information required to provide certainly with respect to the significance of impacts to each of these factors.

Table 2-2. Preliminary key environmental factors that will be addressed in the Draft EIS

	Theme	Factor	Environmental Objective
	Land	Terrestrial Environmental Quality	Protect the quality and integrity of land and soils so that environmental values are supported and maintained.
	1	Terrestrial Ecosystems	Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.
Water		Hydrological Processes	Protect the hydrological regimes of groundwater and surface water so that environmental including ecological health, land uses and the welfare and amenity of people are maintained.
	Water	Inland Water Environmental Quality	Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.
		Aquatic Ecosystems	Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.

The Draft EIS will provide background information and an assessment of each environmental factors listed in Table 2-2 and an assessment of how the environmental objectives listed above would be met, as outlined in the *NT EPA's General Guidance for Preparing a proponent initiated EIS* referral (NT EPA 2020). A proposal footprint (direct disturbance footprint) and zone of influence (indirect disturbance footprint) are to be established to identify the components of the environment (under each environmental factor) and their specific values that could be impacted by implementation of the proposal.

Sections 2.7.1 to 2.7.5 outline the information to be addressed for each preliminary key environmental factor. If additional potential environmental impacts are identified through the EIA process, they will be included in the Draft EIS in addition to those identified in Section 3.1.

#### 2.7.1 Terrestrial environmental quality

The Referral identified that erosion and sedimentation, contamination by hazardous materials and acid metalliferous / mine drainage (AMD) have the potential to cause land and soil degradation that could indirectly impact surface water and groundwater quality. Table 2-3 outlines the minimum information required in the EIS for assessment of these impacts to Terrestrial Environmental Quality. The EIS must also discuss any other impacts identified during stakeholder engagement, or that emerge during the assessment process.

Table 2-3. Minimum information required for assessment of terrestrial environment quality

Aspect	Specific information required		
NT EPA objective maintained.	NT EPA objective: Protect the quality and integrity of land and soils so that environmental values are supported and maintained.		
Environmental values	<ul> <li>Describe and map of the soil types and land unit(s) within the proposal area and surrounding areas that could experience impacts, and the environmental values and current land use that are supported.</li> <li>Location, characteristics and quantities of any contaminated soils present.</li> <li>Location and extent of any existing erosion and assessment of erosion risk by land/soil type.</li> </ul>		
Potential impacts and risks	<ul> <li>Detail potential impacts, risks and benefits to land and soils associated with each phase of the Proposal, including:         <ul> <li>Direct and indirect disturbances of existing mining landforms and contaminated soil.</li> <li>Erosion and sedimentation of existing and proposed mining landforms and indirect impacts to receiving waterways</li> <li>Soil and land contamination from AMD and hazardous materials.</li> <li>Erosion of mining land forms during mining and post-closure.</li> </ul> </li> <li>Use the outcomes of field studies, modelling and other evidence to determine the area of land and soils that could feasibly experience impacts (zone of impact and zone of influence) and to assess the consequence (significance) of impacts.</li> <li>Identify environmental values that could experience indirect impacts associated with land and soil disturbance and provide details of where these impacts are assessed in the EIS. Include consideration of indirect impacts to the following:</li> <li>Watercourses associated with release of contaminants, increased turbidity and sedimentation.</li> <li>Groundwater aquifers associated with release of contaminants from soil.</li> <li>Surrounding land-uses that could be affected by erosion and/or contamination of surface water or groundwater.</li> </ul>		
Avoidance, mitigation and management	<ul> <li>Describe the measures that will be implemented to avoid or mitigate potentially significant environmental impacts to land and soils, with consideration of section 26 (environmental decision-making hierarchy) and section 27 (waste management hierarchy) of the EP Act.</li> <li>Describe the measures that will be implemented to enhance or restore environmental quality during operations through rehabilitation of previously disturbed areas and/or post closure.</li> <li>Provide an AMD management plan that demonstrates adoption of best-practice approach to prevention and management of AMD in accordance with the GARD guide and the Preventing Acid and Metalliferous Drainage – Leading Practice Sustainable Development Program guidelines. The AMD management plan will:         <ul> <li>Provide an analysis and interpretation of geochemical characterisation programs and outline further material characterisation requirements throughout each phase.</li> <li>Identify occurrence and risks of AMD from proposed infrastructure.</li> <li>Demonstrate how AMD will be prevented by design.</li> <li>Detail a geological waste block model.</li> <li>Incorporate site-wide management of potentially acid-forming (PAF) material.</li> </ul> </li> <li>Provide a primary erosion and sediment control plan (ESCP) developed by a suitably certified person, in accordance with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008).</li> <li>Provide a draft Mine Closure Plan (MCP) in accordance with the Western Australia Guidelines for Preparing Mine Closure Plans and the Mine Closure - Leading Practice Sustainable Development Program.</li> <li>All mitigation measures should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>		
Monitoring and reporting	Describe the monitoring and reporting of potential impacts and risks to land and soils for each project phase, including:     Waste rock testing and placement     Mining landform stability     Visual assessment of erosion around the mine site and in receiving watercourses		

Aspect	Specific information required	
	<ul> <li>Surface and groundwater monitoring to provide early warning of AMD and erosion/sedimentation impacts.</li> </ul>	
	All monitoring activities should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.	
Residual impact	Assess the significance of any residual impact or risk of the proposal to identified values.	
Offsets	If any significant residual impact may remain after applying the environmental decision-making hierarchy, identify offsets and described how any proposed offset is consistent with the NT Offset Policy.	

#### 2.7.2 Terrestrial ecosystems

The Referral identified that threatened plant species, *Helicteres macrothrix* and *Stylidium ensatum* may be present in the proposal area based on habitat modelling prepared by NTG and therefore targeted surveys are required to confirm the species presence/absence. Surveys conducted for *Helicteres macrothrix* did not identify the species to be present in the proposal area (EcOz 2020). Multiple flora and fauna surveys undertaken in the area over time (LES 2016 and 2017) have not identified any other threatened species that are likely to be impacted by the proposal. If *Stylidium ensatum* is present, to be determined by field surveys in June/July 2021, the EIS will need to assess potential impacts to this species associated with land clearing and/or changes to hydrological processes.

Riparian vegetation communities and fauna could be indirectly impacted if there are downstream impacts to water quality from AMD or poor pit water quality post closure. These impacts are addressed in the Inland Water Quality section of this TOR (Section 2.7.4). If the assessment identifies there will be impacts to water quality, then the EIS will need to consider the indirect impacts to riparian vegetation and fauna.

Table 2-4 outlines the minimum information required in the EIS for assessment of these impacts to Terrestrial Ecosystems. The EIS must also discuss any other potential impacts identified during stakeholder engagement, or that emerge during the assessment process.

Table 2-4. Minimum information required for assessment of terrestrial ecosystems

Aspect	Specific information required		
1	<b>NT EPA objective:</b> Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.		
Environmental values	<ul> <li>Describe and map the extent and current condition of the following values in the proposal area and surrounding areas that could experience impacts:         <ul> <li>Vegetation communities and habitats present using the National Vegetation Information System (NVIS) database.</li> <li>Riparian vegetation and any other significant vegetation types.</li> <li>Introduced and invasive species including weed species declared under the Weeds Management Act.</li> </ul> </li> <li>Provide an assessment of NT and /or EPBC listed threatened species (both flora and fauna) presence, or likely occurrence, based on the results field studies.</li> <li>Detail the outcomes of targeted surveys undertaken for the threatened plant species Helicteres macrothrix and Stylidium ensatum.</li> <li>Provide details of survey program timing, locations and methodology to demonstrate appropriate and statistically sufficient survey designs.</li> <li>Surveys are to be undertaken at an appropriate time of year by a suitably qualified person that has demonstrated experience in surveying for and the identification of threatened species in the Northern Territory.</li> <li>If targeted surveys find S. ensatum, potential impacts should be evaluated and consideration given to referral under the EPBC Act.</li> </ul>		
Potential impacts and risks	<ul> <li>Detail potential impacts, risks and benefits to flora and fauna associated with each phase of the proposal, including:         <ul> <li>Land clearing impacts to threatened species and significant vegetation communities.</li> <li>Indirect impacts to riparian vegetation as a results of groundwater drawdown associated with dewatering of pits and water quality deterioration due to the mining activities.</li> <li>Altered fire regimes from land clearing and potential proliferation of weeds.</li> </ul> </li> </ul>		

Aspect	Specific information required
	<ul> <li>Indirect impacts to fauna from exposure to mine impacted water in downstream waterways and in the pit lakes.</li> <li>Use the outcomes of field studies, modelling and other evidence to determine the area within which flora and fauna could feasibly experience impacts (zone of impact and zone of influence) and to assess the consequence (significance) of impacts. The assessment should include:         <ul> <li>Groundwater modelling and baseline water quality assessments to predict the extent to which groundwater drawdown and seepage or discharge of mine affected water could impact riparian vegetation health over time.</li> <li>Prediction of post-closure discharge and pit lake water quality and thresholds for impacts to fauna.</li> <li>Consideration of potential cumulative impacts to riparian vegetation associated with existing land uses and other mining/extractives activities in the region.</li> </ul> </li> </ul>
Avoidance, mitigation and management	<ul> <li>Describe the measures that will be implemented to avoid or mitigate potentially significant environmental impacts to flora and fauna, with consideration of section 26 (environmental decision-making hierarchy) and section 27 (waste management hierarchy) of the EP Act.</li> <li>Describe any measures that will be implemented to restore impacted areas of vegetation and habitat post-closure. Provide details of closure-objectives and rehabilitation methods in the Mine Closure Plan.</li> <li>Where the presence of Helicteres macrothrix or Stylidium ensatum or cannot be ruled out, provide an evaluation of the potential direct, indirect, off site and cumulative impacts prepared in accordance with the Significant Impact Guidelines 1.1 under the Environment Protection and Biodiversity Conservation Act 1999.</li> <li>The evaluation of the potential impacts must be supported by a risk assessment and appropriate measures that would be implemented to avoid, mitigate and/or offset potential impacts, including referral to the Australian Government Department of Agriculture, Water and the Environment.</li> <li>The Department of Environment, Parks and Water Security (DEPWS) Flora and Fauna Division should be consulted on the proposed approach to manage potential impacts, and the results.</li> <li>All mitigation measures should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>
Monitoring and reporting	<ul> <li>Describe the monitoring and reporting of potential impacts and risks to flora and fauna for each project phase, including:         <ul> <li>Monitoring of groundwater drawdown and riparian vegetation condition during mining and post-closure.</li> <li>Monitoring of surface water quality during mining and post-closure as an early warning of potential impacts to riparian habitats and fauna.</li> <li>Weed surveys and reporting.</li> </ul> </li> <li>Include monitoring methods, effective controls and clear thresholds to inform remedial action and early identification of potential negative impact.</li> <li>All monitoring activities should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>
Residual impact	Assess the significance of any residual impact of the proposal to identified values.
Offsets	If any significant residual impact may remain after applying the environmental decision-making hierarchy, identify offsets and described how any proposed offset is consistent with the NT Offset Policy.

#### 2.7.3 Hydrological processes

The Referral identified that the proposal could cause drawdown of groundwater levels associated with pit dewatering during mining activities and further investigations are required to understand the groundwater flow regimes potential impacts. Impacts to surface water flows are unlikely to be significant as the mine site is located at the upper limits of a large catchment and discharges will occur only during the wet season and will be managed in accordance with a Waste Discharge Licence under the *Water Act*.

Table 2-5 outlines the minimum information required in the EIS for assessment of impacts to groundwater and surface water flow regimes. The EIS must also discuss any other potential impacts identified during stakeholder engagement, or that emerge during the assessment process.

#### Table 2-5. Minimum information required for assessment of hydrological processes

#### Aspect

#### Specific information required

**NT EPA objective:** Protect the hydrological regimes of groundwater and surface water so that environmental including ecological health, land uses and the welfare and amenity of people are maintained.

## Environmental values

- Describe the surface water flow regimes of the receiving waterways that may be impacted by the Proposal, including Mount Bundey Creek and Marrakai Creek and associated tributaries. Include descriptions and maps of the following:
  - Surface water catchments.
  - o Major and minor waterways, drainage lines and water bodies (natural and artificial).
  - Direction of flow and flow conditions.
  - Water control districts and water allocation plans.
  - o Declared beneficial uses, existing users and environmental values.
- Describe the existing groundwater conditions using baseline data collected from a network of groundwater bores and a site-specific groundwater model. Include descriptions and maps of the following:
  - o Groundwater flows direction, volumes and yield.
  - o Recharge zones and expressions.
  - Recharge rates.
  - Water table depth, including temporal variation.
  - Surface and groundwater connectivity.
  - Water control districts and water allocation plans.
  - Declared beneficial uses, existing users, and environmental values.

# Potential impacts and risks

- Detail potential impacts, risks and benefits to hydrological processes associated with each phase of the proposal, including:
  - Alteration of surface water flows associated with mine site discharges/surface water extraction.
  - Groundwater drawdown associated with dewatering of the pit during mining and groundwater extraction.
  - Groundwater mounding associated with seepage from the WRD, TSF and dams/water storages
  - Density driven flow and impacts to surrounding groundwater.
  - Flooding associated with dam overflows, dam wall failure etc.
- Use the outcomes of field studies, modelling and other evidence to determine the area within
  which surface water and groundwater regimes could feasibly experience impacts (zone of
  impact and zone of influence) and to assess the consequence (significance) of those impacts.
  The assessment should include:
  - Details of modelled discharge volumes and timing (derived from the site water balance model referred to in Section 2.5), and an assessment of how discharges could alter the flow regimes in receiving watercourses.
  - Modelling and mapping of groundwater drawdown during operations and predicted postclosure recovery of groundwater levels in the pit lakes, including hydrological classification in accordance with the WA closure guidelines.
  - Assessment of potential impacts to surface water courses, GDE's, beneficial uses and surrounding users associated with lowered groundwater levels. Include details on how the model was calibrated, validated and the key assumptions used.
  - Quantification of sustainable groundwater extraction limits and any approval or allocation required under the Water Act 1992.
  - Results of flood risk assessments and associated design criteria adopted for dams and storages to minimise downstream flooding. Identification of any sensitive receptors that could be impacted by unexpected failure.

#### Avoidance, mitigation and management

- Describe the measures that will be implemented to avoid or mitigate potentially significant impacts to hydrological processes, with consideration of section 26 (environmental decisionmaking hierarchy) and section 27 (waste management hierarchy) of the EP Act.
- Provide a Water Management Plan (WMP). The WMP should outline how impacts to surface and groundwater hydrology would be managed for all proposal stages and seasons, including (but not limited to):
  - Details of the site water management system and water balance used to inform mine site water management.
  - Measures to minimise water use and discharge, consistent with the environmental decision-making hierarchy and the waste management hierarchy.
  - Details of modelled discharge volumes and timing (derived from the site water balance model referred to in Section 2.5) and how these will be managed to minimise changes to hydrological regimes and protect environmental values.
- The Mine Closure Plan required in Section 2.5 (Rehabilitation & Closure) should identify the final structures (developed by a suitably qualified engineer) that are designed to divert, capture, retain and/or treat surface runoff and to prevent discharge of contaminated water from the site.

Aspect	Specific information required
	All mitigation measures should be substantiated and in accordance with best practice advice from relevant Northern Territory Government agencies.
Monitoring and reporting	<ul> <li>Provide a detailed monitoring program in the WMP that provides for early warning of impacts to surface water and groundwater hydrological regimes so that they are detected before there is any significant impact to environmental values or other users. The program will include as a minimum:         <ul> <li>A network of groundwater monitoring bores established under the guidance of a suitably qualified expert to detect impacts from key components of the mine site, including open pits, WRD and TSF.</li> <li>Groundwater, surface water and aquatic monitoring program, including details of monitoring methods, frequency and timing.</li> <li>Discharge monitoring sites, including point of discharge and compliance points proposed for inclusion in a Waste Discharge Licence. Measures proposed for recording and reporting discharge volumes and timing.</li> <li>Measures to quantify, record and report volumes of water extracted from surface and groundwater.</li> <li>Trigger action response plan (TARP) that includes proposed thresholds/triggers and corrective actions.</li> </ul> </li> <li>All monitoring activities should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>
Residual impact	Assess the significance of any residual impact of the proposal to identified values.
Offsets	If any significant residual impact may remain after applying the environmental decision-making hierarchy, identify offsets and described how any proposed offset is consistent with the NT Offset Policy.

#### 2.7.4 Inland water environmental quality

The Referral identifies mine site discharges (from sediment basins and controlled discharge of excess water) and release/seepage of contaminated water/AMD from the WRD and TSF, as the key source of potential impacts to surface water and groundwater quality during operations. Post-closure the open pit lakes, WRD's and TSF could be a source of AMD that could impact surface water and groundwater quality.

Table 2-6 outlines the minimum information required in the EIS for assessment of impacts to groundwater and surface quality. The EIS must also discuss any other potential impacts to water quality identified during stakeholder engagement, or that emerge during the assessment process.

Table 2-6. Minimum information required for assessment of inland water environmental quality

Aspect	Specific information required		
	NT EPA objective: Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.		
Environmental values	<ul> <li>Describe and map surface water courses and groundwater aquifers present within the proposal area and surrounds in accordance with the minimum information requirements in Table 2-5.</li> <li>Detail the chemical and physical characteristics (quality) of surface waters and groundwater within the area that may be affected by the proposal, through the collection of an appropriate baseline dataset. Identify any water quality standards and guidelines that would be used to describe the ecological values and health of surface water environments</li> <li>Describe and map the environmental values and beneficial uses supported in the proposal area and surrounding areas that could experience impacts.</li> </ul>		
Potential impacts and risks	<ul> <li>Detail potential impacts, risks and benefits to water quality associated with each phase of the proposal, including:         <ul> <li>Increased turbidity in downstream watercourses from erosion and sedimentation.</li> <li>Contamination of surface water and groundwater aquifer by mine site discharges and/or AMD.</li> <li>Hydrocarbon and other chemical contamination due to leaks and spills.</li> </ul> </li> <li>Develop a site conceptual site model (CSM) by an appropriately qualified and experienced person for the proposal describing;         <ul> <li>Sources of potential contaminants and mechanisms of their release.</li> <li>Pathways for transport,</li> </ul> </li> </ul>		

Aspect	Specific information required
	<ul> <li>Receptors (including potential for human and ecological exposure)</li> <li>Fate of any contaminated waters, and products, from the Proposal, and Proposal components and zone of influence.</li> <li>The minimum data required to support the CSM should include, but not be limited to:         <ul> <li>Laboratory and field results from the geochemical characterisation program.</li> <li>Hydrogeological characterisation and flow modelling.</li> <li>Physicochemical mobility of contaminants.</li> <li>Baseline surface and groundwater quality.</li> <li>Contaminant transport modelling of current and future seepage plumes.</li> <li>Biological receptors, vectors and their habitats.</li> <li>Identification of preferential flow pathways.</li> </ul> </li> <li>Use the outcomes of field studies, modelling and other evidence to determine the area within which surface water and groundwater quality could feasibly experience impacts (zone of impact and zone of influence) and to assess the consequence (significance) of those impacts. The assessment should include consideration of impacts on water quality and associated beneficial uses and ecological values associated with:</li></ul>
Avoidance, mitigation and management	<ul> <li>Describe the measures that will be implemented to avoid or mitigate potentially significant impacts to water quality, with consideration of section 26 (environmental decision-making hierarchy) and section 27 (waste management hierarchy) of the EP Act.</li> <li>The Water Management Plan prepared for the proposal must detail how impacts to surface and groundwater quality would be managed for all proposal stages and seasons. The WMP should demonstrate how water would be managed and treated to achieve a quality that provides for protection of at least 95% of aquatic ecosystem species. The WMP should include:         <ul> <li>Erosion and sediment control measures, including a Primary ESCP</li> <li>Details of discharge management measures, including treatment, discharge locations and timing.</li> <li>Measures to minimise discharges and seepage from the WRD and TSF, including a Tailings Management Plan and AMD Management Plan.</li> <li>Storage and handling of hazardous materials.</li> </ul> </li> <li>A Tailings Management Plan as outlined in section 2.5 (Tailings management) that includes details of how the tailings will be managed over the life of the mining operations to avoid or minimise discharge or seepage.</li> <li>A Mine Closure Plan as outlined Section 2.5 (Rehabilitation &amp; Closure) should address:         <ul> <li>Predicted post closure water balance, including density driven exchange between pit lake and the surrounding groundwater</li> <li>Post closure pit lake water quality</li> <li>Surface and groundwater quality in accordance with site-specific guideline values (SGVs) to meet final land use criteria.</li> </ul> </li> <li>All mitigation measures should be substantiated and in accordance with best practice advice from relevant Northern Territory Government agencies.</li> </ul>
Monitoring and reporting	<ul> <li>Provide a detailed surface water and groundwater monitoring program in the WMP to monitor the potential impacts identified from the proposal. The program will include as a minimum:         <ul> <li>Groundwater, surface water and aquatic monitoring program, including details of site selection and justification, frequency, analyte suite, sampling methodology, QA/QC protocols, including suitable maps.</li> <li>A summary of results and interpretation of baseline data, relevant ANZECC &amp; ARMCANZ (2000) aquatic protection guidelines and SGVs.</li> <li>Trigger action response plan (TARP) to ensure early identification of potential negative impacts and subsequent management/remedial action. Identify effective control sites and clear thresholds.</li> </ul> </li> <li>All monitoring activities should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>
Residual impact	Assess the significance of any residual impact or risk of the proposal to identified values.

Aspect	Specific information required
Offsets	If any significant residual impact may remain after applying the environmental decision-making hierarchy, identify offsets and described how any proposed offset is consistent with the NT Offset Policy.

#### 2.7.5 Aquatic ecosystems

The Proponent has identified that aquatic ecosystems have the potential to be impacted if there is a significant impact on water quality in downstream watercourses. The information required to assess the significance of potential impacts to water quality associated with the proposal are outlined in section 2.7.4.

Table 2-7 outlines the minimum information required in the EIS for assessment of impacts to aquatic ecosystems. The EIS must also discuss any other potential impacts to water quality identified during stakeholder engagement, or that emerge during the assessment process.

Table 2-7. Minimum information required for assessment of aquatic ecosystems

Aspect	Specific information required
NT EPA objective integrity and ecolor	e: Protect aquatic habitats to maintain environmental values including biodiversity, ecological ogical functioning.
Environmental values	Describe and map the aquatic habitats and species supported by those habitats within the proposal area and areas downstream that may be impacted by changes to water quality associated with the proposal. Include details of:     Permanent pools within surface water courses     Wetlands     GDE's.
Potential impacts and risks	Detail potential impacts and risks to aquatic ecosystems associated with each phase of the proposal, including:  Loss of habitat or species as a result of alteration of off-site surface water and groundwater quality, from AMD and discharge of poor quality water, and alteration of flows from mining activities.  Cumulative impacts to Mount Bundey Creek and Mary River associated with discharges from multiple mining and extractives activities in the catchment  Use the outcomes of field studies, modelling and other evidence to determine the area within which surface water and groundwater quality could feasibly experience impacts (zone of impact and zone of influence) and to assess the consequence (significance) of those impacts.
Avoidance, mitigation and management	<ul> <li>Describe the measures that will be implemented to avoid or mitigate potentially significant impacts to aquatic ecosystems, with consideration of section 26 (environmental decision-making hierarchy) and section 27 (waste management hierarchy) of the <i>EP Act</i>.</li> <li>Discuss as mitigation and management measures as outlined in Section 2.7.3 and 2.7.4</li> <li>All mitigation measures should be substantiated and in accordance with best practice advice from relevant Northern Territory Government agencies.</li> </ul>
Monitoring and reporting	<ul> <li>If potentially significant impacts to aquatic ecosystems are identified, provide an aquatic monitoring program in the Water Management Plan.</li> <li>All monitoring activities should be substantiated and in accordance with best practice guidelines and advice from relevant Northern Territory Government agencies.</li> </ul>
Residual impact	Assess the significance of any residual impact or risk of the proposal to identified values.
Offsets	If any significant residual impact may remain after applying the environmental decision-making hierarchy, identify offsets and described how any proposed offset is consistent with the NT Offset Policy.

#### 3 OTHER REQUIREMENTS

#### 3.1 Other environmental factors and matters

Where the environmental impact assessment process identifies potentially significant impacts to other environmental factors not specifically included in this TOR, the draft EIS must provide an assessment of these impacts.

#### 3.2 Stakeholder engagement and consultation

The Proponent is required under section 43 of the *EP Act* to engage and consult with stakeholders and other interested parties that may be affected by a proposal, to assist community understanding of the proposed action and its potential impact. The proponent will refer to the *NT EPA Environment impact assessment guidance for proponents - Stakeholder engagement and consultation* (NT EPA 2021a). The proponent must document the following in the EIS:

- · Identified stakeholders
- · Consultation undertaken, decision-making and outcomes
- · Alterations to the proposal as a result of stakeholder engagement
- Future plans for consultation
- · Agencies or authorities specific regulatory approvals.

#### 3.3 Public consultation requirements

The public consultation requirements for the EIS are outlined in Part 5 Division 6 of the Environment Protection Regulations 2020. Additional specific details are provided below.

#### 3.3.1 Submission period

The NT EPA proposes a period (usually between 30 and 60 business days) for consultation on the draft EIS. The duration of the period will be confirmed during the draft EIS pre-lodgement phase.

#### 3.3.2 Public consultation locations

The draft EIS should be provided to and be made available for public comment at the following locations:

- NT EPA, Level 1, Arnhemica House, 16 Parap Road, Parap
- Taminmin Community Library, Challoner Cct, Humpty Doo NT 0836
- A nearby Government office to be determined, such as the Electoral Division of Goyder, Legislative Assembly member's office at Coolalinga (Shop 4, Coolalinga (Woolworths Shopping Centre), Stuart Highway, NT 0835. E:mail: electorate.goyder@nt.gov.au)
- Northern Territory Library, Parliament House, Darwin
- Environment Centre Northern Territory, Unit 3, 98 Woods Street, Darwin
- Mines and Energy Information Centre, Department of Industry, Tourism and Trade, 3rd Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin
- Northern Land Council, 45 Mitchell Street, Darwin.

#### Attachment A - Relevant Guidance Material

As outlined in Attachment A of the NT EPA Draft Guidance of Preparing a Proponent initiated EIS referral the proponent is to refer to the guidance material considered relevant to the proposal. A list of such material is provided below but is not exhaustive. The most up-to-date and relevant evidence-based information has been referenced by the proponent.

- ANCOLD 2012. Guidelines on the Consequence Categories for Dams.
- ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian
  and New Zealand Governments and Australian state and territory governments, Canberra ACT,
  Australia. Available at <a href="https://www.waterquality.gov.au/anzguidelines">www.waterquality.gov.au/anzguidelines</a>.
- APEC 2018. Mine Closure Checklists for Governments, Asia-Pacific Economic Cooperation.
- Austroads, 2016. Guide to Traffic Management Part 12: Traffic Impacts Development.
- Barnett B., Townley L.R., Post V., Evans R. E., Hunt R. J., Peeters L., Richardson S., Werner A. D., Knapton A. and Boronkay A., 2012. Australian Groundwater Modelling Guidelines, Waterlines Report. National Water Commission, Canberra.
- Commonwealth of Australia, 2016. Preventing Acid and Metalliferous Drainage Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia, 2013. Significant Impact Guidelines 1.1 Matters of National Environmental Significance.
- Commonwealth of Australia, 2012. Aquatic ecosystems toolkit. Department of Sustainability, Environment, Water, Population and Communities.
- Commonwealth of Australia. 2016. Water Stewardship, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. 2016. Mine Closure, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. 2016. Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. 2016. Hazardous Materials Management, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. 2008. Cyanide Management, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. 2016. Tailings Management, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia. (2016). Biodiversity Management, Leading Practice Sustainable Development Program for the Mining Industry.
- Commonwealth of Australia, 2010 2014. Survey Guidelines for Nationally Threatened Species, available at <a href="http://www.environment.gov.au/epbc/policystatements">http://www.environment.gov.au/epbc/policystatements</a>
- Department of Environment and Natural Resources' NT Flora and Fauna Atlases at <a href="http://www.lrm.nt.gov.au/nrmapsnt">http://www.lrm.nt.gov.au/nrmapsnt</a>.
- Department of Mines and Petroleum and Environmental Protection Authority, 2015. Guidelines for Preparing Mine Closure Plans. Government of Western Australia.
- DoH, 2018. Health requirements for mining and construction. Department of Health, Environmental Health Branch. Available at: https://www.nt.gov.au/property/buildingand-development/health-and-safety/health-requirements-mining-constructionprojects. Last updated 1 March 2018.
- DoH, 2014. Code of practice for on-site wastewater management. Department of Health, Northern Territory Government.
- DoH, 2005. Guidelines for preventing mosquito breeding sites associated with mining sites. Medical Entomology, Department of Health. Northern Territory Government.
- IECA 2008. Best Practice Erosion and Sediment Control Guidelines. Picton NSW: International Erosion Control Association.

- INAP, 2009. The Global Acid Rock Drainage Guide (incorporating best practices and technology to address acid and metalliferous drainage issues). International Network for Acid Prevention.
- MCA, 2014. Water accounting framework for the minerals industry User guide. Minerals Council of Australia.
- NT EPA, 2020. Draft environment impact assessment guidance for proponents Preparing a proponent initiated EIS referral. Northern Territory Environment Protection Authority, Darwin.
- NT EPA, 2021a. Environment impact assessment guidance for proponents - Stakeholder engagement and consultation. Northern Territory Environment Protection Authority, Darwin.
- NT EPA, 2021b. Environment impact assessment, General technical guidance NT EPA Environmental factors and objectives. Northern Territory Environmental Protection Authority.
- NT EPA, 2018b. Guidance on adaptive management. Northern Territory Environment Protection Authority.
- NT EPA, 2018c. Opportunities and timeframes for community engagement in the environmental impact assessment process: Information for proponents and the public. Northern Territory Environment Protection Authority.
- NT EPA, 2013a. Environmental Assessment Guidelines on Acid and Metalliferous Drainage (AMD).
   Northern Territory Environment Protection Authority.
- NT EPA, 2013b. Guidelines for Assessment of Impacts on Terrestrial Biodiversity. Northern Territory Environment Protection Authority.
- NT EPA, 2013c. Guideline on Conceptual Site Models. Northern Territory Environment Protection Authority.
- NT EPA, 2013d. Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the NT. Northern Territory Environment Protection Authority.



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