Assessment Report 99

Assessment by Environmental Impact Statement (EIS)

Primary Gold Limited

Rustlers Roost and Quest 29 Open-cut Mine Redevelopment

April 2023

ntepa Northern Territory Environment Protection Authority

This assessment report has been prepared by the Northern Territory Environment Protection Authority (NT EPA) pursuant to section 64 of the *Environment Protection Act 2019* (NT) (EP Act). It describes the outcomes of the NT EPA's assessment of the Primary Gold Limited Rustlers Roost and Quest 29 open-cut mine redevelopment.

The proposal is a redevelopment of existing brownfield sites on Mineral Leases located within pastoral leases in the Mount Bundey locality located approximately 85 km south-east of Darwin. The proposal has been assessed by the NT EPA at the level of Environmental Impact Statement.

The assessment report documents potential environmental impacts and risks identified during the environmental impact assessment process, focusing on those that could be significant, and the measures and recommended conditions required to address potentially significant impacts.

In accordance with section 65 of the EP Act, the assessment report is for the Northern Territory Minister for Environment to consider when making a decision about whether to approve the action under the EP Act.

Dr Paul Vogel AM
NT EPA Chairperson

Northern Territory Environment Protection Authority
GPO Box 3675
Darwin
Northern Territory 0801

Summary

This assessment report has been prepared by the Northern Territory Environment Protection Authority (NT EPA) pursuant to section 64 of the *Environment Protection Act 2019* (NT) (EP Act). This Assessment Report and the draft Environmental Approval are provided to the Minister for Environment (Minister) for consideration in deciding whether to grant an environmental approval for the Rustlers Roost and Quest 29 open-cut mine redevelopment (the proposal).

Primary Gold Limited (the proponent) proposes to recommence open-cut gold mining across two mine sites (Rustlers Roost and Quest 29) with expansion of all existing open-cut pits, and development of two additional new pits.

The proposal is a redevelopment of existing brownfield sites on Mineral Leases (ML) located within pastoral leases in the Mount Bundey locality located approximately 85 km south-east of Darwin. The Rustlers Roost and Quest 29 open-cut mines are located approximately 11 km apart and will be connected by construction of a haul road.

The key supporting new infrastructure will include a processing plant and a tailings storage facility as well as waste rock dumps, and the rate of production will be up to five million tonnes per year over an approximate 10 year life of mine

The NT EPA assessed the proposal by Environmental Impact Statement (EIS) in accordance with the EP Act. The environmental impact assessment examined the potential for significant direct, indirect and cumulative environmental impacts on the environment.

The NT EPA identified and examined potential significant impacts on the following seven environmental factors:

1. Terrestrial environmental quality
2. Terrestrial ecosystems
3. Hydrological processes
4. Inland environmental water quality
5. Aquatic ecosystems
6. Air quality
7. Community and economy.

The proposal includes an entire development envelope of 790 ha which is the maximum area within which disturbance could occur. A large proportion of the proposal footprint encompasses historically disturbed areas, and the extent of new disturbance and clearing of vegetation is estimated to be about 47% of the development envelope (368.86 ha).

To address potentially significant impacts of the proposal on the key environmental factors, the NT EPA has recommended conditions for the Minister to consider, if an environmental approval is granted. The proponent and statutory decision makers were consulted on the draft environmental approval as required by regulation 160 of EP Regulations.

The NT EPA's assessment concludes that the proposal can be implemented and managed in a manner that is environmentally acceptable and therefore recommends that environmental approval be granted, subject to the recommendations and conditions detailed in the draft Environmental Approval (Appendix 1).

Contents

1. Introduction

This assessment report has been prepared by the Northern Territory Environment Protection Authority (NT EPA) pursuant to section 64 of the *Environmental Protection Act 2019* (EP Act). The report provides an evaluation of the potential significant environmental impacts of the Rustlers Roost and Quest 29 open-cut mine redevelopment (the proposal).

The proponent is Primary Gold Limited (Australian Business Number (ABN) 42 122 726 283), a minerals exploration company listed on the Australian Securities Exchange (ASX: PGO) and based in Perth, Western Australia. The company is the owner of Toms Gully, Rustlers Roost and Quest 29, which are three non-contiguous brownfield mine sites at Mount Bundey in the NT, where gold is the commodity of interest.

The NT EPA assessed the proposal by Environmental Impact Statement (EIS) in accordance with the requirements of the EP Act and Environment Protection Regulations 2020 (EP Regulations). This assessment report, and the draft Environmental Approval (Appendix 1) are provided to the Minister for Environment (Minister) for consideration in deciding whether to grant an environmental approval for the proposal, and concludes the NT EPA's environmental impact assessment process.

1.1. Location and context

Rustlers Roost and Quest 29 are brownfield sites (11 km apart) on Mineral Leases (ML) located in the Mount Bundey locality, approximately 85 km south-east of Darwin. The proposal is situated south-west of the Arnhem Highway on Old Mount Bundey Station, and on the adjacent McKinlay River Pastoral Station.

The proposal's footprint overlies two river basins (Adelaide River and Mary River) and three sub-catchments. The Rustlers Roost portion of the proposal area is predominantly located in the upper Mount Bundey Creek sub-catchment of the Mary River system. A portion of the western section of Rustlers Roost is located in the Marrakai Creek sub-catchment of the Adelaide River system.

The Quest 29 area of the proposal is predominantly located in the McKinlay River sub-catchment, which also flows into the Mary River system. A minor northern portion of Quest 29 is located in the upper Mount Bundey Creek sub-catchment of the Mary River system.

The region has a tropical monsoonal climate and is characterised by a dry to wet transition period from October to November, to a distinct wet season (December to March), followed by a wet to dry transition through April preceding the distinct dry season (May to September).

The annual average rainfall recorded at the Middle Point Rangers Station from 1957 to 2021 is 1,420 mm, with the highest rainfall occurring in January and the lowest in July. The average annual evaporation is 2,400 mm and exceeds the average annual rainfall. Evaporation is highest in October and lowest in February.

The proposal is located in the Pine Creek bioregion where the land types are typically hilly to rugged ridges with undulating plains. The Baker (Bkr), land system has been identified comprising sandstone hills in the northern section of the proposal area, and the Bend (Bnd) land systems comprising sandstone plains and rises is present in the southern section. The Flatwood (Flt) land system comprising alluvial floodplains is also present in the area.

Vegetation communities associated with the identified land systems include eucalypt woodlands on undulating rises and plains, extending onto low hills of Melaleuca low open woodland and Oryza tall closed tussock grassland.

The area surrounding the proposal contains a number of historic, predominantly gold mines, some of which continue to be assessed by various companies regarding potential to recommence operations.

Historical mining activities have resulted in significant disturbance to the landscape and surrounding environment.

Remnant disturbance and infrastructure remains on the site from past mining and exploration activities and includes the existing flooded pits, waste rock landforms, heap leach pads and ponds, water storage dams, and internal roads and tracks.

Table 1 describes the major components of the proposal. **Figure 1** shows the proposal location, and aquatic features of the Mary River and Adelaide River catchments and sub-catchments are shown in **Figure 2**. The permanent water features downstream of the proposal areas are shown in **Figure 3** and **Figure 4** shows the site layout.

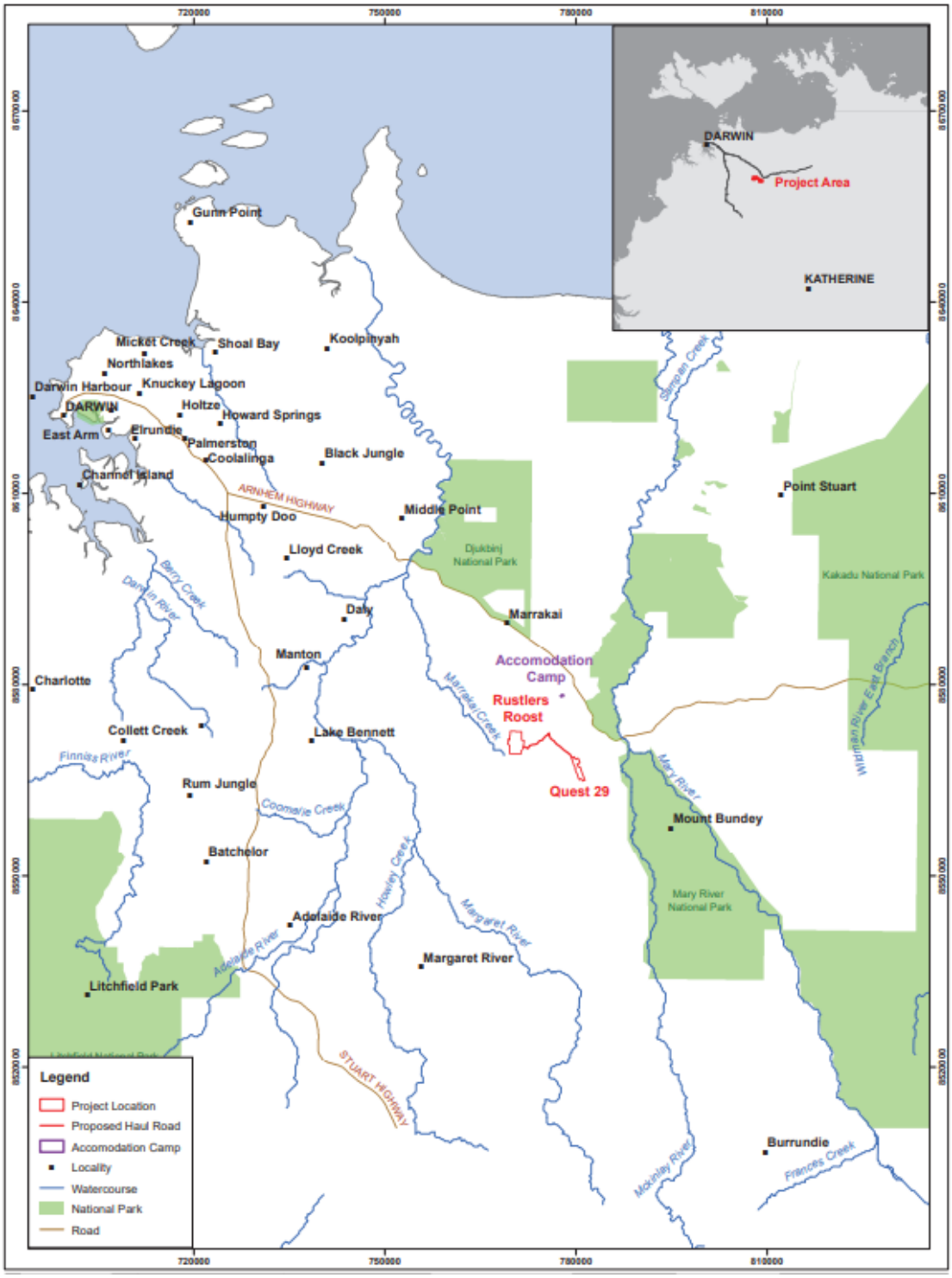

Figure 1 Location of the Rustlers Roost and Quest 29 open-cut mine redevelopment

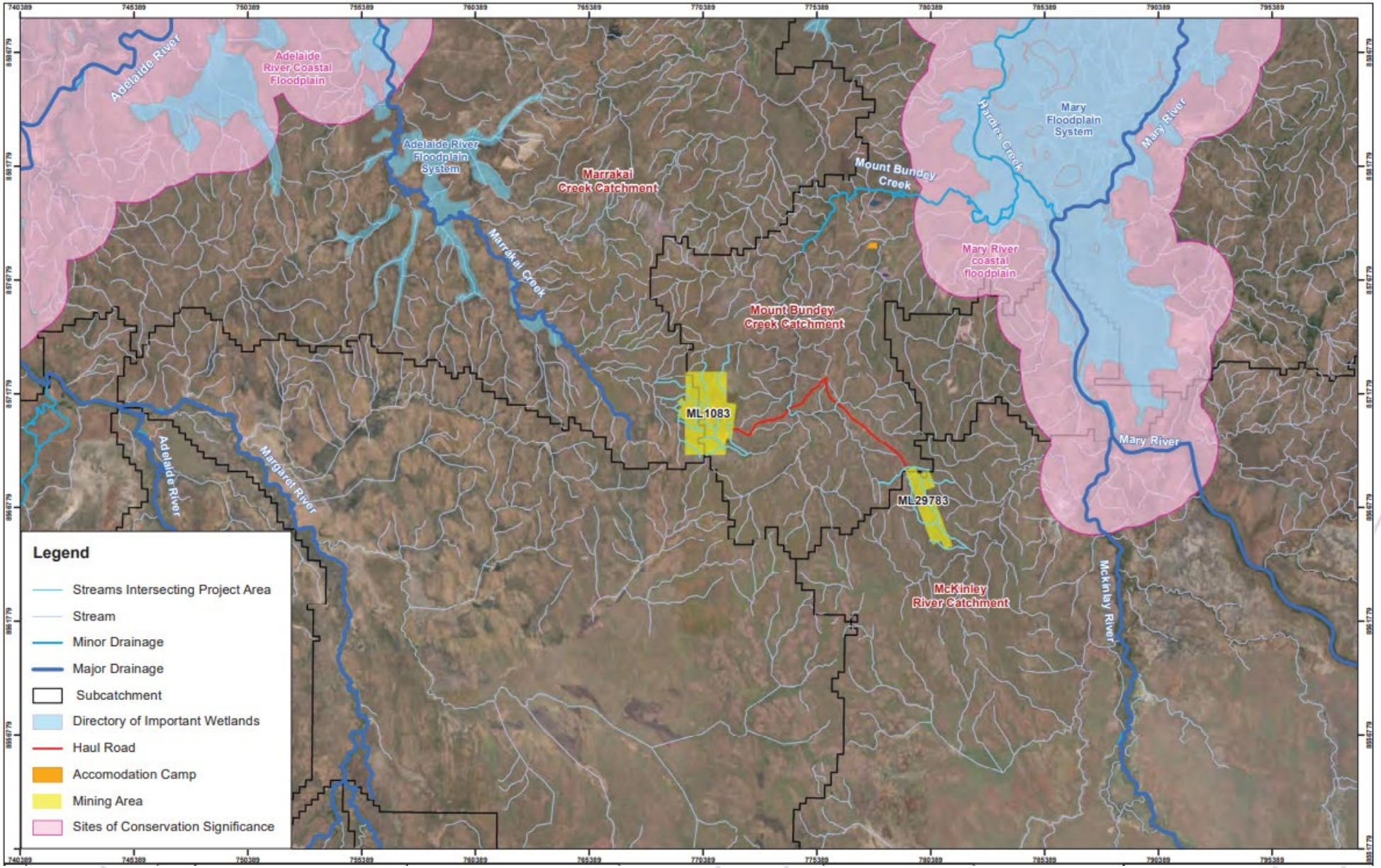

Figure 2 The aquatic features of the Mary River and Adelaide River catchments and sub-catchments

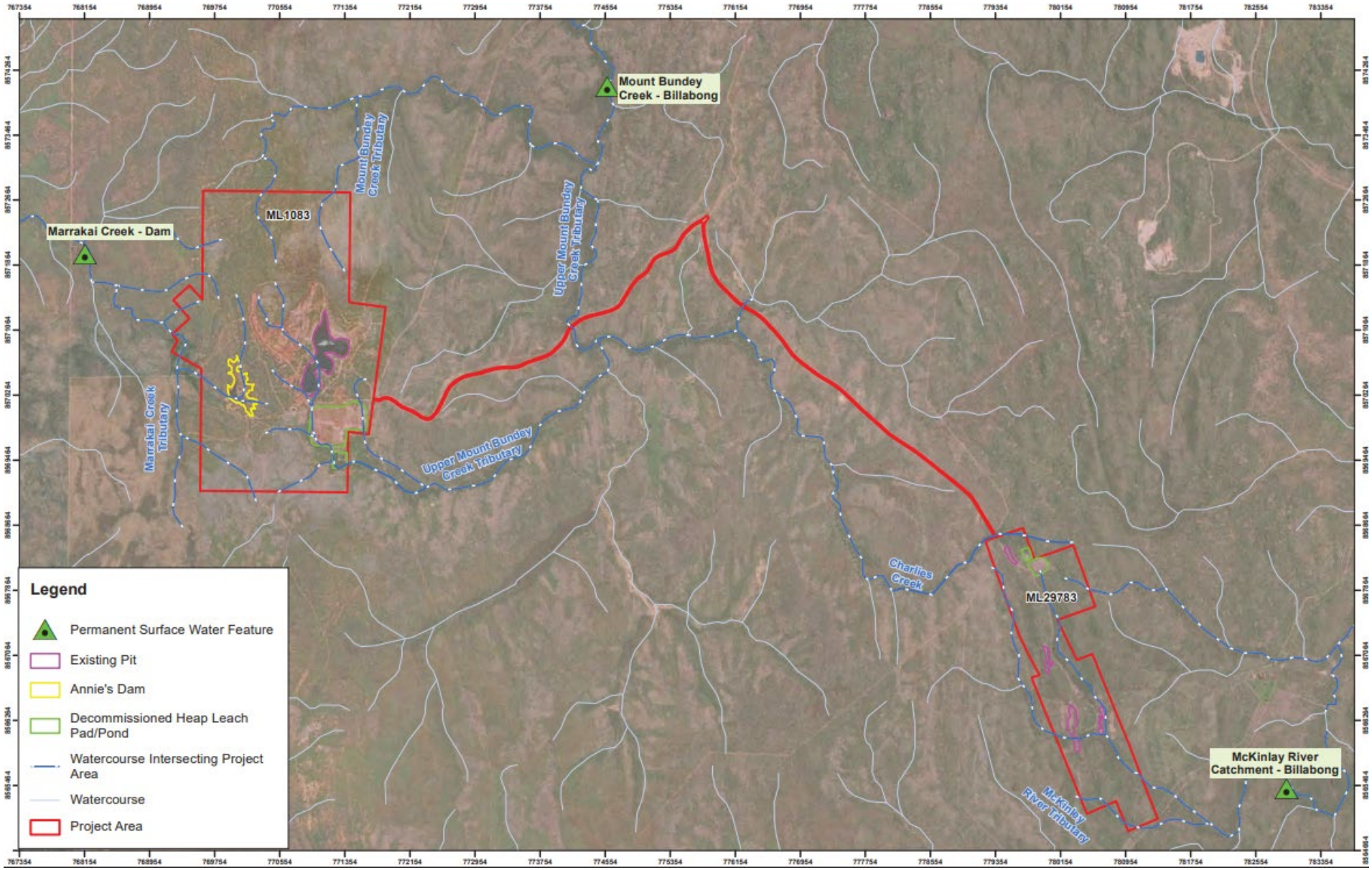

Figure 3 Surface water features with permanent water downstream of the proposal areas

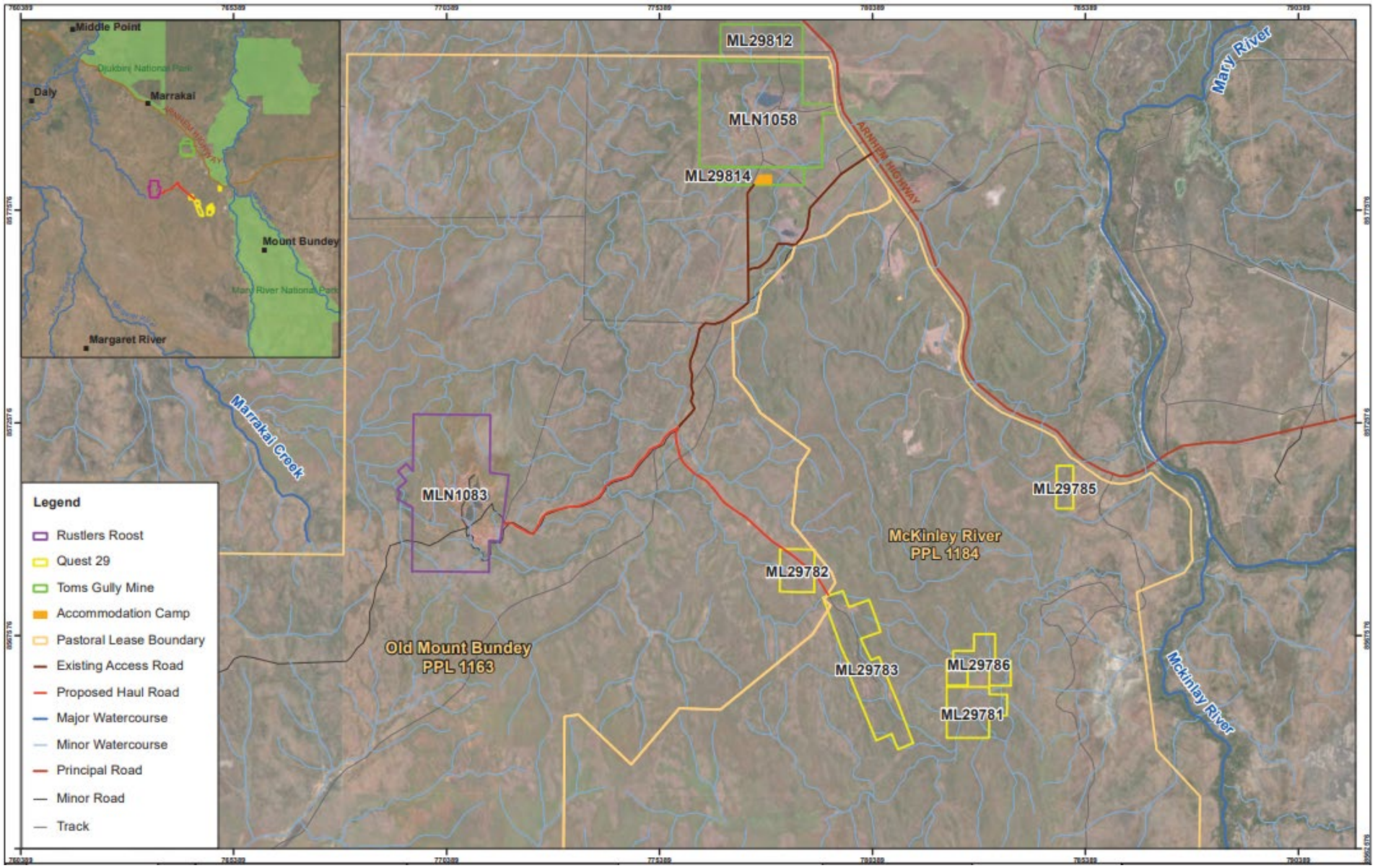

Figure 4 Layout of the Rustlers Roost and Quest 29 open-cut mine redevelopment

2. Proposal

The proposal is to redevelop the existing Rustlers Roost and Quest 29 brownfield mine sites by expanding open-cut gold mining operations and connecting the two non-contiguous sites that are 11 km apart with a haul road. In addition to the expansion of existing pits at Rustlers Roost, two new pits will be constructed (Annies Dam pit and Annies Oakley pit). At Quest 29 there will be an expansion of the five existing pits (Zamu, Taipan, South Koolpin, North Koolpin and BHS pits).

Ore mined at both sites will be processed at a new purpose-built processing facility located at the Rustlers Roost. A 31 Megawatt gas-fired power station located adjacent to the process plant will provide power for the plant and other operations. The rate of production will be up to 5 million tonnes per annum (Mtpa) over an approximately 10 year life of mine.

The development envelope within which disturbance could occur is 790 ha and following completion of mining activities, the disturbed elements of the proposal area will be closed and rehabilitated in accordance with an approved Mine Closure Plan (MCP).

Table 1 Proposal description

Aspect	Description
Commodity	Gold

Mining method	Open-cut mining (drill and blast)
	• Rustlers Roost:
	One main pit with depths from 50 m to 189 m and total pit area of 69.9 ha.
	Quest 29:
	• Five pits with depths from 25 m to 75 m and total pit area of 28.2 ha comprising:
	  ○ BHS pit (1.7 ha)
	  ○ North Koolpin pit (4.7 ha)
	  ○ South Koolpin pit (6.4 ha)
	  ○ Taipan pit (4 ha)
	  ○ Zamu pit (11.4 ha)

Rate of production	5 million tonnes per annum (Mtpa)
Life of mine	10 years
Processing	Carbon-in Leach (CIL) process with use of cyanide
Pit dewatering	Water will be transferred between existing pits at Quest 29 at various stages to allow for mining operations. During mining, pit water will be transferred from Rustlers Roost pit to an existing water storage dam and proposed ponds for reuse
Ore and waste delineation	74.3 Mt of waste rock for the life of mine into surface waste rock dumps (WRD) at Rustlers Roost and Quest 29 at current cut-off grade of 0.4 g/t
Mine waste management	Waste rock generated in the extraction and production process will be deposited in surface WRDs at Rustlers Roost and Quest 29, and will be used to backfill a number of pits where mine scheduling permits
Tailings	Disposal of 4 Mt per annum of potentially acid forming (PAF) tailings into the new Tailings Storage Facility (TSF) at Rustlers Roost encompassing 243.0 ha of land
Water supply and demand	• Overall water demand for operations is estimated to be 6.5 GL/yr. • Groundwater bores to supply potable water and raw water. • North end of new TSF dam will be utilised for pit dewatering and storage of process return water from the TSF/decant dam
Haul road	Approximately 10.9 ha (11 km long x 10 m wide)

Aspect	Description
Power supply	Generator and mains power for camp, and a 31 Megawatt (MW) gas-fired power station for process plant
Workforce	• Approximately, 100 people for the construction stage • Approximately 210 people during production
Capital investment	Estimated capital expenditure (CAPEX) of $282 million, with operational expenditure of approximately $344.3 million
Mine closure, rehabilitation and final landform	At the completion of mining activities, the mine site will be closed and rehabilitated in accordance with an approved Mine Closure Plan (MCP): • The processing plant and associated mining infrastructure will be removed from site and the areas rehabilitated • The final WRD and TSF landforms will be suitably shaped, capped, rehabilitated and remain in-situ • Abandonment bunds will be constructed around the remaining open pits, which will be left to form pit lakes • The historical heap leach facilities will be capped and revegetated and the backfilled pits will be covered with topsoil, shaped and revegetated. Haul roads, ROM, go-line and all other disturbed areas will be ripped and revegetated.

The proposed 31 Megawatt power station requires a gas supply with the likelihood that an independent power provider designs, builds and operates a gas pipeline to transfer gas to the power station from an existing supply. As the gas pipeline does not form part of the action, the potential significant impact of a pipeline has not been assessed.

Although the proponent has indicated that it may require groundwater in addition to surface water from Annie's Dam to supply potable and raw water for the action, it has not provided information to allow the assessment or evaluation of the potential impacts of pumping, and this matter is therefore outside the scope of this assessment.

3. Strategic context

3.1. Proposal benefits and alternatives

The redevelopment of Rustlers Roost and Quest 29 will enable the employment of approximately 210 people during production. For the construction stage, approximately, 100 people will be required and there is a commitment by the proponent that locally sourced construction personnel and material will be prioritised.

The proposal represents social and economic benefits, and an investment of $0.63 billion in the NT and the Mount Bundey region over the 10 year life of mine comprising an estimated capital expenditure (CAPEX) of $282 million, with operational expenditure of approximately $344.3 million.

3.2. Consistency of proposal with strategic planning

The proposal is consistent with the NT Government's commitment to creating jobs and economic growth, and with strategic plans and initiatives including:

- **Darwin Regional Plan** - identifies high level characteristics and needs that will shape development, management of growth and regional infrastructure.

- **NT Economic Development Framework** - establishes the directions and actions needed to accelerate the Territory's economic development, informs long term decision making and aims to deliver policy and regulatory certainty for investors.
- **The Territory's Economic Reconstruction** – the Territory Economic Reconstruction Commission sets out a blueprint to diversify the NT's industry base and take advantage of global market trends to accelerate the growth of its economy and lead the national economic recovery.

4. Statutory context

4.1. Overview

The proposal requires assessment by the NT EPA under the EP Act. The Northern Territory Minister for Environment is the approval authority. This assessment report and the draft environmental approval (Appendix 1) are available for the Minister to consider in making a decision on whether to grant or refuse an environmental approval for the proposal and conditions of the approval.

Pursuant to section 61 of the EP Act, the purpose of the environmental approval is to manage the potentially significant environmental impacts of a proposal during all phases. This includes planning, design, construction or carrying out of works, operation, rehabilitation, remediation and closure of the proposal.

Approvals requiring separate applications and processes are required for the proposal. It is the responsibility of the proponent to obtain all approvals that may be required. These may include, but are not limited to:

- pursuant to the *Mining Management Act 2001* (MM Act):
  - Approval of a Mining Management Plan and required information for the management of the mining site, and granting of an Authorisation to carry out approved mining activities.
- pursuant to the *Water Act 1992:*
  - Granting of a licence for the discharge of waste, and for the take of water
- pursuant to the *Radiation Protection Act 2004*:
  - Requirement for licensing a radiation source, and monitoring and recording of personal radiation exposure on mining sites.

A range of other approvals may be required under NT legislation. There may also be an obligation for the Proponent to report information about greenhouse gas emissions under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). The proponent is responsible for identifying and meeting its legislative obligations.

Section 92 of the EP Act (Environmental approval to prevail over other statutory authorisations) sets out the effect of the environmental approval in relation to other statutory authorisations. The recommended conditions in Appendix 1 may require the proponent to prepare and submit management plans and reports that may also be required by other statutory decision-making processes, and that there may be some level of environmental regulatory overlap.

However, it considers that the proponent may choose to develop the relevant plans and reports to meet requirements under one or more statutory authorisations e.g. the Water Management Plan required to be submitted to the Minister under the recommended conditions in Appendix 1 could potentially also be provided to the mining regulator to meet requirements under the MM Act.

4.2. Mandatory matters for consideration

In preparing this assessment report, the NT EPA considered the following information in accordance with regulation 157 of the EP Regulations:

- the proponent initiated EIS referral of the proposed action including a Statement of Reasons and draft Terms of Reference (TOR)
- submissions received on the proponent initiated EIS referral of the proposed action
- the significant variation of the proposed action under section 51 of the EP Act
- submissions received on the significant variation of the proposed action
- the draft EIS
- submissions received on the draft EIS
- the supplement to the draft EIS, and
- submissions received on the supplement to the draft EIS.

The NT EPA took into account the purpose of the environmental impact assessment process under section 42 of the EP Act including consideration of:

- the objects (EP Act, section 3)
- the principles of ecologically sustainable development (EP Act, Part 2 Division 1)
- the environmental decision-making hierarchy (EP Act section 26)
- the waste management hierarchy (EP Act section 27)
- ecosystem-based management
- impacts of a changing climate.

Refer to section 8 for further detail about matters that the NT EPA has taken into account during its assessment.

5. Consultation

The NT EPA published the Primary Gold Limited proponent initiated EIS referral of the proposed action for comment between 25 February 2021 and 9 April 2021. Submissions from eight government authorities were received along with a singular anonymous public submission.

The NT EPA considered the accepted referral and submissions, and decided the Rustlers Roost and Quest 29 open-cut mine redevelopment would require assessment under the EP Act at the level of Environmental Impact Statement (EIS). On 11 May 2021 the NT EPA published its Notice of Decision to accept the proponent initiated EIS referral of the proposed action, the NT EPA's Statement of Reasons, and the TOR for the proposal.

The proponent proposed and notified the NT EPA of a significant variation to the proposed action which was accepted on 26 August 2021, and published for comment between 30 August and 24 September 2021. The NT EPA considered the significant variation to the proposed action and submissions from five government authorities, and decided on 5 October 2021 that the assessment can continue with the existing assessment method (environmental impact statement) with existing terms of reference.

On 8 November 2021 the NT EPA published a statutory notice inviting public comment on the draft EIS for the Rustlers Roost and Quest 29 open-cut mine redevelopment. Interested persons were invited to make a submission by 13 January 2022. Submissions were received from five government authorities on the draft EIS along with a single public submission.

Primary Gold Limited was directed by the NT EPA on 17 February 2022 to prepare a supplement to the draft EIS, to address issues raised in the public submissions, and the comments from agencies that relate to the assessment of potentially significant environmental impacts.

The supplement to the draft EIS was made available for public consultation from 10 October to 28 October 2022. Five submissions were received from government authorities and no public submission was received.

In preparing this report, matters raised in the submissions were considered in relation to the proposal's potential environmental impacts. The issues raised in submissions are discussed in more detail in section 6 below.

The NT EPA consulted with, and invited submissions from the proponent and statutory decision-makers who may have a view on the draft environmental approval. Submissions were received from the proponent and others, and the NT EPA considered these submissions in finalising its recommendations to the Minister.

6. Assessment of key environmental factors

6.1. Overview

The NT EPA considers that significant impacts key environmental factors and objectives may occur, and that the proposal must be designed, planned, constructed, operated, rehabilitated, and closed taking into account:

- the principles of ecologically sustainable development
- the environmental decision making hierarchy
- the waste management hierarchy
- ecosystem based management and
- impacts of a changing climate.

The NT EPA identified that the proposal has the potential to have a significant impact on environmental values associated with seven key environmental factors[1] (**Table 2**).

Table 2 Key environmental factors

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.
	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 values including ecological health, land uses and the welfare and amenity of people are maintained.

[1] NT EPA Environmental factors and objectives

THEME	FACTOR	ENVIRONMENTAL OBJECTIVE
	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.
AIR	Air quality	Protect air quality and minimise emissions and their impact so that environmental values are maintained.
PEOPLE	Community and economy	Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians.

The NT EPA considered other environmental factors during its environmental impact assessment; however, the impact on those factors was not considered to be significant.

In considering the key environmental factors and the recommended conditions in Appendix 1, the NT EPA took into account other statutory decision-making processes that can avoid or mitigate the potentially significant impacts of the proposal on the environment.

6.2. Terrestrial environmental quality

6.2.1. Environmental values

The proposal is located in the Pine Creek bioregion where land types typically consist of hilly to rugged ridges with undulating plains. Associated vegetation communities are eucalypt woodlands with patches of monsoonal forests. Three land systems (Baker, Bend and Flatwood) feature in the proposal area.

The northern section of the Rustlers Roost and most of the Quest 29 development envelope are located within the Sandstone Hills land system class. The southern section of Rustlers Roost, the south-eastern portion of Quest 29 and most of the footprint of the haul road lies within Sandstone Plains and Rises class.

Soil type LK22 is commonly associated with hilly to steep hilly ranges and strike ridges that are mainly associated with greywacke, siltstones, and some sandstone. The soils of the hill slopes are typically shallow stony and gravelly loams and sand. A small north-western section of Rustlers Roost is associated with this soil type.

Tb134 soil types are found in strongly undulating to hilly lands, typically on greywacke, siltstones, and sandstones with rock outcrops interspersed with gently sloping to flat-floored valleys. The chief soils of the basal hill slopes and the valleys are hard, acidic and neutral, yellow mottled soils that are usually in association with yellow and grey earths. The soils of the hill slopes are shallow stony and gravelly loams and sands associated with variable areas of stony and gravelly soils and yellow earths. Rustlers Roost is mostly characterised by this soil type.

The western side of the proposal's accommodation camp area lies within undulating to rolling and hilly granitic terrain featuring rock outcrops and tors on the crests and upper slopes. The chief soils are sandy acidic yellow mottled soils on the undulating to rolling areas, with associated podzolic soils containing ironstone gravels on gently undulating to flat portions, and gritty and gravelly sands and possible silicious sands on crests and upper slopes.

The main topsoils in this area are classified as acidic Rudosols with a pH of between 4.3 – 4.9 containing low concentrations of organic carbon. Surveys conducted by the proponent also

identified the presence of Kandosols (red, yellow and brown earths) and Hydrosols within the proposal area associated with natural drainage and creek lines, wetlands, and floodplains.

6.2.2. Consultation

Matters raised during the NT EPA's consultation relating to potentially significant impacts on terrestrial environmental quality include:

- concerns about the proximity of the WRD and TSF to the current mineral lease boundary, and the impacts of erosion and sedimentation encroaching into the areas outside the mineral lease
- lack of a thorough understanding of waste rock characterisation including potential for soil and water contamination from acid and metalliferous drainage (AMD)
- uncertainty about suitable, sufficient and available non-acid forming (NAF) material required to manage AMD seepage risks, and to facilitate the rehabilitation of TSF and WRD's
- the lack of adequate information on AMD management, including the suitability of waste rock cover systems, contingency planning, residual risks etc.
- the requirement to manage erosion and sediment issues in a way that is best practice and consistent with the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control document (IECA 2008).

6.2.3. Factor assessment and recommended regulation

In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings, recommendations and recommended conditions of approval are presented below in **Table 3**.

Table 3 Assessment for Terrestrial environmental quality, recommendations and recommended conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
Potentially significant impacts on the quality of surrounding land and soils could occur as a result of: • Land clearing (369 ha) for new mine infrastructure and constructed landforms. The disturbance could result in soil erosion, land and water quality degradation, and sedimentation caused by stormwater runoff. • Contaminants of concern (CoC) generated from potential AMD sources such as waste rock dumps and tailings. The contamination would have a detrimental effect on land and soils. • Dust generation and emissions from the mining operations, smelter and gas powered power station. Emissions would directly impact the land	The proponent's application of the management hierarchies[2] includes measures to avoid and mitigate potential significant impacts on terrestrial environmental quality: • Implementation of an erosion and sediment control plan (ESCP) that has been prepared by a Certified Professional in Erosion and Sediment Control (CPESC) and a Chartered Professional Engineer (CPEng) to provide a best-practice framework for implementation of effective erosion and sediment control over the life of mine. The key elements of the proposed ESCP: • Identifies areas vulnerable to erosion and details measures to be implemented to manage erosion. • Includes erosion hazard and risk assessment, catchment	Impacts to land and soil quality as a result of the action that results in soil contamination and land degradation.	Remediation and rehabilitation of contaminated areas will be required to be completed according to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM 1999) and the National Remediation Framework (NRF) (CRC CARE 2018).	Regulated through recommended conditions: **Condition 1: Limitation and extent** • Limitations and extent to include maximum clearing area for the action **Condition 4-2: Contaminated site remediation** • If the environment is contaminated above the baseline contamination assessment conducted prior to substantial disturbance, it must be remediated. • At the end of mining, the approval holder is required to assess the approved extent of the action for contamination in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (as amended); Regulation by other regulatory processes: MM Act including management plans.

[2] Environmental decision-making hierarchy and Waste management hierarchy (*Environmental Protection Act 2019* sections 26 and 27).

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
and soils through contamination. The potential for impacts on water quality as a consequence of soil erosion and AMD are addressed in section 6.4 of this report.	analysis, erosion, and sediment controls. • Drainage controls i.e. clean and dirty water diversions. • Sediment basins i.e. design, construction and management. • Considers specific focus areas e.g. haul roads, clearing, stockpiles, dumps, and crossings. • Considers rehabilitation and soil stabilisation.			
		Soil erosion and sedimentation.	The proponent will be required to prepare and implement an erosion and sediment control plan consistent with the International Erosion Control Association Australasia (IECA) 2008 - Best Practice Erosion and Sediment Control.	Regulated through recommended conditions: **Condition 5: Erosion and sediment control** The approval holder must: Implement an ESCP on commencement of substantial disturbance that is developed by a CPESC.
		Remediation, rehabilitation or restoration activities, and mine closure requirements.	The proponent is required to prepare a Mine Closure Plan (MCP) that is consistent with contemporary best practice guidance to manage closure and	Regulated through recommended condition: **Condition 2, 3, 8, 9 and 10: Mine closure and rehabilitation**

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
			rehabilitation (including unplanned closure and progressive rehabilitation). This is consistent with the mining regulator's requirements under the MM Act. This would support achievement of the NT EPA's objective for terrestrial environmental quality.	Regulated through existing regulatory processes: MM Act (Mining authorisation, MMP and MCP).

6.2.4. Conclusion against the NT EPA objective

With the implementation of the proponent's proposed management measures, commitments, recommendations, and conditions for avoidance, monitoring, and mitigation of impacts identified in the draft Environmental Approval (Appendix 1), the NT EPA considers that the proposal can be conducted in such a manner that its objective for terrestrial environmental quality is likely to be met.

6.3. Terrestrial ecosystems

6.3.1. Environmental values

The proposal is located within the Pine Creek bioregion[3] where native vegetation and habitats associated with the proposal are identified as open forest on the alluvial floodplain, and open woodland on sandstone plains, creek lines and riparians zones[4]. The pit lakes and water bodies that are within the existing disturbed areas are also identified as potential habitat areas.

Clearing of about 369 ha is proposed to accommodate the proposal. The loss of habitat as a result of the clearing is likely to impact fauna and flora including threatened species. The proponent has conducted fauna surveys and assessed with a focus on threatened species.

The clearing of about 4.85 ha of riparian vegetation is also proposed. The majority is in the upper Mount Bundey Creek tributary for construction of the TSF (4.58 ha), and a minor portion of clearing is on the tributary to Marrakai Creek on the western edge of the development envelope for the TSF (0.27 ha).

Two flora species *(Stylidium ensatum* and *Acacia praetermissa)* listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) were assessed as potentially occurring within the proposal area. Baseline flora and vegetation surveys have been completed by the proponent and the targeted threatened species, *Helicteres macrothrix*, *Goodenia quadrifida* and *Schoutenia ovata* were not recorded within the survey areas during the surveys carried out in November 2016 and May 2017.

Four threatened fauna species were detected within the proposal areas and were observed at Rustlers Roost (Partridge pigeon, Black-footed tree-rat, Northern brushtail possum, and Merten's water monitor). An additional four threatened fauna species were determined to potentially occur in the proposal area based on the assessment of habitat suitability (Gouldian finches, Red goshawks, Yellow-spotted monitor and Mitchell's water monitor).

It has been reported that in three surveys have been conducted (2016, 2017 and 2022), threatened species were not detected due to frequency of fires and altered food availability and refuges (hollows) as a result of farming activities. It was also observed that breeding habitat in the survey areas were considered likely to be sub-optimal e.g. for Gouldian finch, the breeding habitat were dominated by Small-fruited Bloodwood (*Corymbia dichromophloia*), Bloodwood (*C. bleeseri*), Darwin Woollybutt (*E. miniata*) and Ironwood (*Erythrophleum chlorostachys*), and not Salmon Gums.

[3] Under the Interim Biogeographic Regionalisation for Australia (IBRA): Pine Creek Bioregion
[4] Wetlands, riparian vegetation and mangroves as defined in the NT Planning Scheme Land Clearing Guidelines (DEPWS 2021).

6.3.2. Consultation

Matters raised during the NT EPA's consultation relating to potentially significant impacts on terrestrial ecosystems include:

- uncertainty regarding the significance of the proposal's impact on flora and fauna including threatened species, sensitive or significant vegetation and their values in regional settings
- groundwater drawdown from pit dewatering and seepage, and discharge of mine affected water could significantly impact riparian vegetation
- providing protection to the significant values of the Mary River and Adelaide River coastal floodplains, as well as a number of parks and reserves located nearby and downstream of the proposal area
- implementing effective weed management and pest management.

6.3.3. Factor assessment and recommended regulation

In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings, recommendations, and recommended conditions of approval are presented below in Table 4.

.

Table 4 Assessment for Terrestrial ecosystems, recommendations and conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
Terrestrial ecosystem values have the potential to be impacted through: • Land clearing to the extent that it would cause habitat fragmentation, disrupt foraging and breeding behaviours, and potentially impacting on fauna populations in the area.	The proponent has proposed the following measures to minimise impacts on terrestrial ecosystems: Implementation of a mine closure plan including the following: • Progressive rehabilitation implemented according to Mine Closure - Leading Practice Sustainable Development Program guidelines • Rehabilitation effort to support ecological linkages, and • Implementation of an environmental management system (and management plans) according to AS ISO 14001 Environmental Management Systems.	Reduction of vegetation and woodland communities, and impacts to habitat including riparian zones, protected and threatened species.	• Clearing of about 369 ha is proposed noting that approximately 31% of the proposal area has been previously cleared, disturbed or modified from mining activities. • The loss of habitat is likely to impact fauna and flora (threatened species). • There is potential for significant impact to two threatened species, *H. macrothrix* and *S. ensatum* listed as Endangered under the EPBC Act and the TPWC Act which occur in the proposal area. • Threatened fauna species (Gouldian finches, Red goshawks, Yellow-spotted monitor and Mitchell's water monitor) were determined to potentially occur based on the assessment of habitat suitability. • Clearing about 4.85 ha of riparian vegetation for the construction of TSF is proposed mostly in the upper Mount Bundey Creek tributary (4.58 ha).	Regulated through recommended conditions. **Condition 1: Limitation and extent** • Limitations and extent to include maximum clearing area. **Condition 6: Threatened species** • Conduct pre-clearance surveys to identify presence of threatened species. • Implement a trapping program immediately prior to any clearing to capture and relocate affected fauna in consultation with DEPWS Flora and Fauna Division. **Condition 19: Environmental Performance Report** - on completion of the mine life. Regulation by other regulatory processes: • MM Act including management plans, and • TPWC Act.

6.3.4. Conclusion against the NT EPA objective

With the implementation of the proponent's proposed management measures, commitments, recommendations, and conditions for avoidance, monitoring, and mitigation of impacts identified in the draft environmental approval (Appendix 1**)**, the NT EPA considers that the proposal can be conducted in such a manner that its objective for terrestrial environmental quality is likely to be met.

6.4. Hydrological processes and inland water environmental quality

6.4.1. Environmental values

The proposal is the redevelopment of existing open-cut pits at the Rustlers Roost and Quest 29 mine sites. The Quest 29 part of the proposal is sited entirely within the Mary River catchment, and the Rustlers Roost part of the proposal is located on the divide between the Adelaide River catchment and Mary River catchment (**Figure 2**, **Figure 3** and **Figure 4**). The watercourses at the upper reaches of the catchments where the proposal is located are ephemeral and flows are intermittent in response to local rainfall events typically during the wet season.

Quest 29 mostly lies within the McKinlay River sub-catchment of the Mary River catchment. A small (northern) portion of Quest 29 is located in the upper Mount Bundey Creek sub-catchment of the Mary River system. Rustlers Roost is mostly located in the upper Mount Bundey Creek sub-catchment of the Mary River system, and a portion (the western section) of Rustlers Roost is located in the Marrakai Creek sub-catchment of the Adelaide River system.

The surface and groundwater quality and environmental flows of the Mary River and tributaries, and the Adelaide River and tributaries supports riparian vegetation, terrestrial and aquatic groundwater dependent ecosystems, provides beneficial uses that includes water supply from groundwater resources. The Mary River regional catchment has declared environment, riparian and cultural 'beneficial uses' under the *Water Act 1992*.

The beneficial uses declaration for Mount Bundey Creek is 13 km downstream of the proposal and is for aquatic ecosystem protection (for the upper and lower creek sections), and stock water supply for the middle 7.8 km section of the creek (downstream of Toms Gully Mine and east of the Arnhem Highway).

6.4.2. Consultation

Matters raised during the NT EPA's consultation relating to potentially significant impacts on hydrological processes and inland water environmental quality include:

- information has not been provided to adequately describe the proposal's site water balance, groundwater supply requirements, and the environmental risks related to groundwater drawdown
- uncertainty regarding the potential environmental risks related to Annie Oakley Pit whose southern edge overlies the mineral lease boundary and a creek line
- uncertainty regarding the potential environmental risks associated with the proposed expansion of the TSF to include the area occupied by Annies Dam. The dam potentially acts as a groundwater source
- concerns regarding the potential impacts on surface water runoff in the Mount Bundey Creek catchment due to the proposed construction of the WRDs
- concerns regarding potential adverse impacts on the water quality as a result of erosion and movement of sediments, mine water discharges, and seepage from WRDs and the TSF

- the need for improvements to the groundwater model to inform management of water holding structures, controlled waste water discharges, and potential impacts on water quality and aquatic ecosystems
- the need to develop Site-Specific Trigger Values (SSTVs) for Mount Bundey Creek. The hydrological and hydraulic model for the mine site predicts a significant impact on surface water flows (during 1% and 0.1% AEP events) and water quality with elevated metals concentrations of cadmium at the mine outlet to Mount Bundey Creek
- the requirement for approvals, permits or licenses under the *Water Act 1992* for bore work, water abstraction, and interference with a waterway (such as Mount Bundey Creek).

6.4.3. Factor assessment and recommended regulation

In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings, recommendations, and conditions of approval are presented below in **Table 5**.

Table 5 Assessment for Hydrological processes, recommendations and recommended conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
Hydrological processes are likely to be significantly impacted as a result of: • Dewatering the flooded pit voids. • Drawdown and lowering of the water table that is likely to extend at least 5 km to the north and 3 km to the south of the Rustlers Roost pits, and 2 km to the south-west of the Quest 29 pits. • Increased (artificial) and unseasonal flows into the naturally ephemeral streams via discharges. • There will be a lowering of the water table as the cone of depression develops. Aquatic and terrestrial ecosystems with a reliance on	The proponent has committed to limiting dewatering and discharge to occur only during the wet season and managing the discharge water quality with constructed sediment traps at the nominated discharge points.	Altered environmental flows (surface and groundwater) as a result of drawdown (lowering of the water table) from pit dewatering.	• Pit dewatering must occur prior to mining operations, and will continue during mining with wastewater discharge deemed necessary at the nominated discharge points in Mount Bundey Creek and Marrakai Creek. A discharge rate of 300 L/s is proposed. • Groundwater drawdown effects as a result of pit dewatering (lowering the water table) could significantly impact terrestrial and aquatic GDEs that exist within the area of predicted drawdown. • The proponent has identified that there is a high likelihood of riparian vegetation within the areas of drawdown (typically composed of medium sized trees including *Eucalyptus bigalerita*, and *Lophostemon grandifloras*) with uncertainty regarding the riparian vegetation groundwater use patterns. • Increased and unseasonal flows into the naturally ephemeral	Regulated through recommended conditions: **Condition 1 and 12: GDEs** Discharge water quality must not exceed the freshwater default guideline values for slightly-to-moderately disturbed systems 95% Species Protection Level (SPL). • Develop and implement a Groundwater Dependent Ecosystem Monitoring Program (GDEMP) that includes an assessment of the ecological condition of Type 3 GDEs. • Develop and implement pit dewatering according to an approved Trigger Action Response Plan (TARP) with appropriate triggers and limits. Regulation by other regulatory processes: • MM Act to include management plans i.e.

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
groundwater such as riparian vegetation would be significantly impacted. • Increased (artificial) and unseasonal flows into the naturally ephemeral streams could impact hydrological processes as well as inland water environmental quality through increased sedimentation and reduced water quality. Waterlogging could occur along sections of creek lines impacting riparian vegetation.			streams could impact hydrological processes as well as inland water environmental quality through increased sedimentation and reduced water quality. • Waterlogging could occur along sections of creek lines impacting riparian vegetation.	Water Management Plan and MCP. • *Water Act 1992*
Seepage and generation of AMD and leachate from the constructed TSF and WRDs will result in long-term degradation of land, soils and ecology of the site, cause permanent damage of ecosystem capacity to provide	To limit seepage through the floor of the TSF, the proponent has committed to investigating the TSF basin ground conditions and proposed a	Seepage and generation of leachate and AMD from the TSF will potentially result in significant impact to quality of surface and groundwater with permanent damage of	The TSF will have a 48 Mt capacity with multiple lifts to a 31 m final (max) height with a footprint of over 243 ha. The finalised TSF lining design requirements will be determined from the geochemical characterisation of the waste and ore.	Regulated through recommended conditions: **Condition 8 and 10: TSF** Ensure the TSF is designed, constructed, operated and closed to be safe, stable *and* protects the environment. Regulation by other regulatory processes:

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
services and habitat for biota and for people, and pollution of the surrounding environment.	compacted soil basin liner (CSL) comprising primarily of reworked in-situ soil over the entire TSF footprint, which will also be overlain with a 1.5 mm smooth HDPE liner. The proponent has ensured that the design of the TSF incorporates an underdrainage system to reduce pressure head, includes embankment toe drains, and a cut-off trench, and seepage beneath the composite liner system, will be collected by a Leachate Collection and Recovery System (LCRS).	ecosystem capacity to provide ecological services, habitat and beneficial uses.	Potential significant impact to the environment could be due to failure of tailings dam seepage controls causing groundwater and surface water contamination from seepage and leachate.	• *Water Act 1992* to include licensing water extraction (surface and groundwater) and waste discharge (WDL). • MM Act
There is a risk of environmental exposure to elevated levels of Naturally Occurring Radioactive Material (NORM) occurs during	Additional sampling and testing of NORM is proposed.	Some waste material may contain significant concentrations of NORM and could	Due to the variable nature of the geology and orebodies at RR and Q29, the WRDs will require waste characterisation and special	Regulated through recommended conditions: **Condition 8 and 9: WRD** Conditions include provisions for WRD design and

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
mining operations, processing and in the waste stream. There are also human health concerns.		pose a residual radiation risk. Seepage, leachate, AMD and NORM emanating from the waste storages would result in contaminants entering waterways, impacting the environment that includes surface and groundwater quality.	treatment (e.g. liming) to mitigate generation of leachate and seepage. There is a high level of uncertainty in the current level of waste rock characterisation to quantify the NAF/PAF material, and to improve confidence in the volume estimations of NAF/PAF. The waste material is known to contain Naturally Occurring Radioactive Material (NORM). Significant impacts are likely to be: • Long-term degradation of, land, soils and hydrology and ecology of the site. • Permanent damage of ecosystem capacity to provide services and habitat for biota and for people. • Pollution of the surrounding environment.	construction, waste characterisation (testing), treatment and selective placement, monitoring requirements, and closure. **Condition 8: Naturally Occurring Radioactive Materials (NORM)** • Radiation management, and limits of exposure. Regulation by other regulatory processes: • MM Act i.e. Water Management Plan, AMD Management Plan, MCP. • *Radiation Protection Act 2004*
The proposal includes gold processing with cyanide. There is a risk of exposure to cyanide and other hazardous materials that could harm the environment through the processing circuit,	Design, storage and handling of hazardous materials will be to Australian Standards and regulations.	Hazardous materials in large quantities will be stored and used on site (cyanide, HCl, NaOH, diesel fuel, flocculants, smelting fluxes etc) and poses a significant risk to the environment.	The Carbon-in Leach process uses a dilute alkaline cyanide solution to leach (dissolve) gold from the ore material. The potential toxicity of cyanide is a risk to biota in terrestrial and aquatic ecosystems.	Regulated through recommended conditions: **Condition 11: Cyanide management** • Implement a cyanide management plan with contingency measures that is consistent with the

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
tailings dam and via seepage. There are wildlife protection, and also human health risks.		Cyanide is a known toxicant and if present in terrestrial and aquatic ecosystems, wildlife is at risk of being poisoned.	There will be residual cyanide including weak acid dissociable (WAD) cyanide and other contaminants in the TSF post mining. The monitoring and analysis of total and WAD cyanide (by distillation) is considered to be a reliable measure of toxic cyanide. The safe no-discharge WAD cyanide limit is 50 mg/L (from Australian Government Department of Resources 2008, 'Cyanide management', Canberra). Bird mortalities tend to occur when the WAD cyanide concentration is above 50 mg/L. The NT EPA has adopted a precautionary approach in setting the cyanide limits and levels to be conservatively below the 50 mg/L limit for the protection of wildlife.	International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold. • Establish trigger levels and limits for monitoring and reporting. Regulation by other regulatory processes: • MM Act including management plans. • *Work Health and Safety (National Uniform Legislation) Act 2011* and codes of practice. • *Dangerous Goods Act 1998*
Post closure, impacts to the environment could be due to the generation of AMD and leachate from the pit lakes, constructed TSF and WRDs contaminating	For closure, the TSF profile would be shaped to achieve dry conditions, and would include a low permeability layer capping for water shedding, and to	Post closure, the Rustlers Roost main pit will remain as pit voids to form a pit lake. At Q29, North and South Koolpin and Taipan pits will remain	The pits that are backfilled with waste material becomes a potential source of groundwater contamination. The post closure pit voids that flood and form pit lakes are conceptualised to dynamically interact with the surrounding	Regulated through recommended conditions: **Condition 12 and 14: Pit Lakes (Post closure water quality)** • Monitor pit lake water quality to ensure the water quality does not

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
groundwater and the receiving environment.	reduce long term infiltration, oxidation, and seepage.	as pit voids to form a pit lakes. The post closure pit lakes and backfilled pits water quality deteriorates and becomes sources of contamination.	groundwater, with the pit lake sometimes acting as a sink and sometimes as a source. Lake water in the Rustlers Roost pit is predicted to have high concentrations of contaminants of potential environmental concern (CPEC). There is a high risk that in the long term, the post closure pit lake water quality further deteriorates and results in contamination of groundwater and pollution of surrounding environment along the regional groundwater flowpath via contaminant transport processes. The poor quality water entering the groundwater system ultimately could report to waterways impacting the downstream environment. Additionally, due to its poor water quality, the post mining pit lake itself cannot provide beneficial uses and ecosystem services. Contingency/mitigation measures would include pit lake water treatment. The post closure monitoring of pit lake water quality for a minimum	exceed ANZG livestock drinking water quality guideline values. • Remediate the pit lake water quality guideline values are exceeded. Regulation by other regulatory processes: • MM Act to include management plans i.e. Pit Backfill Management Plan, Water Management Plan, AMD Management Plan, and MCP.

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
			period of 20 years is required to ensure pit lake water quality does not exceed the ANZG livestock drinking water quality guideline values at any time.	

6.4.4. Conclusion against the NT EPA objective

With the implementation of the proponent's proposed management measures, commitments, recommendations, the conditions for avoidance, monitoring, and mitigation of impacts identified in the draft environmental approval (Appendix 1), and regulation under the MM Act, the *Water Act 1992* and *Radiation Protection Act 2004* (if applicable), the NT EPA considers that the proposal can be conducted in such a manner that its objective for hydrological processes and inland water environmental quality is likely to be met.

6.5. Aquatic ecosystems

6.5.1. Environmental values

The proposal is located in the upper reaches of the Mary River and tributaries, and the Adelaide River and tributaries (**Figure 2**, **Figure 3** and **Figure 4**), and the reaches of these watercourses that are in close proximity and associated with the proposal (Marrakai Creek, Mount Bundey Creek, Charlies Creek, McKinlay River and its tributaries) are ephemeral in nature.

In the Mount Bundey Creek sub-catchment (of the Mary River catchment), and downstream of Rustlers Roost and Quest 29 (about 7.5 and 11 km respectfully), is the Mount Bundey Creek Billabong that is a known permanent water feature. Also in the Mary River catchment, but in a McKinlay River tributary and sub-catchment, about 3 km downstream from Quest 29 is the McKinlay River Billabong.

A number of parks and reserves along with the Mary River and Adelaide River Coastal Floodplains, which are recognised as international sites of conservation significance (SoCs) are located downstream of the proposal area.

6.5.2. Consultation

Matters raised during the NT EPA's consultation relating to potentially significant impacts on terrestrial environmental quality include:

- potential adverse impacts to aquatic ecosystems including GDEs from changes in water quality and surface flows, and groundwater drawdown extending beyond the mineral lease
- the extent and values of GDEs at the risk of being impacted by drawdown and changes in groundwater quality identified by robust site-specific surveys including assessment of satellite data
- concerns regarding meeting the adequate species protection level in the receiving environment of Mount Bundey Creek and Marrakai Creek during mine water discharges
- providing an assessment to understand how surface flows during mine water discharges may impact riparian vegetation and aquatic ecosystems
- uncertainty regarding management, mitigation and contingency measures to protect the greater environment from uncontrolled discharges, contaminants seepage and lowering of the water table during groundwater drawdown.

6.5.3. Factor assessment and recommended regulation

In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings, recommendations, and conditions of approval are presented below in **Table 6**.

Table 6 Assessment for Aquatic ecosystems, recommendations and conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
The proposed mine dewatering (causing drawdown) would strongly vary the quantity and quality, and behaviour of surface and groundwater flows.	Limiting dewatering and discharge to occur only during the wet season, selection of discharge point, and managing the water quality through dilution processes (discharge into a passing flow).	Aquatic ecosystem and habitat degradation in (ephemeral) Marrakai Creek, Mount Bundey Creek, Charlies Creek, McKinlay River and its tributaries from altered environmental flows.	The receiving environment is of high conservation importance and the proponents groundwater modelling predicts drawdown effects with lowering of the water table. The cone of depression caused by the drawdown extends at least 5 km to the north and 3 km to the south of the Rustlers Roost pits, and 2 km to the south-west of the Quest 29 pits.	Regulated through recommended conditions: **Condition 7, 11 and 12: Overarching Outcomes/Objectives** • Protection of Marrakai Creek, Mt Bundey, Charles Creek, and McKinlay River and tributaries • Species Protection Level for operational phase • Species Protection Level for post closure Regulation by other regulatory processes (see below).
The proposal has the potential to significantly impact the values of a number of parks and reserves along with the Mary River and Adelaide River Coastal Floodplains located downstream of the proposal area, which are recognised as international SoCs.	Prepare and implement erosion and sediment control with the aim to improve the water quality leaving the proposal areas. Collection and treatment of mine affected water to meet SSTV criteria.	Degradation or loss of aquatic ecosystems and habitat could occur due to reduced water quality as a result of sedimentation and contamination.	Seepage, leachate and AMD emanating from waste storages (the TSF and WRDs), and post closure pit lakes entering waterways would contribute to degradation or loss of aquatic ecosystems and habitat	**Condition 1, 7 and 14: Aquatic ecosystem protection** To ensure that contaminant levels in water released from the mine site are sufficiently low so that there is no measurable significant impact to water quality outside the proposal boundary. To include: • Refinement of existing numerical groundwater model and solute transport model once further adequate site data is collected and modification of current water management plan. • Monitoring and reporting regime.

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers

				• For surface water - ANZECC 95% protection levels for slightly-to-moderately disturbed ecosystems, or development of SSTVs.
				• For groundwater - the guideline values are the ANZG freshwater default guideline values for 80% SPL.
				• Where natural background values exceed ANZG freshwater default guideline values, or if default guideline values have not been set by ANZG, site specific guideline values must be derived in accordance with ANZG.
				Condition 1 and 12: GDEs
				
				Regulation by other regulatory processes:
				• MM Act including management plans e.g. Water Management Plan and AMD Management Plan.
				• *Water Act 1992* including granting of:
				  ○ WDL
				  ○ Water Extraction License for groundwater (GWEL)
				Make-up water of 365 ML/y supplied from the adjacent borefield is proposed.

6.5.4. Conclusion against the NT EPA objective

With the implementation of the recommended conditions for avoidance, monitoring, and mitigation of impacts identified in the draft environmental approval (Appendix 1), and regulation under the MM Act and the *Water Act 1992*, the NT EPA considers that the proposal can be conducted in such a manner that its objective for aquatic ecosystems is likely to be met.

6.6. Air quality

6.6.1. Environmental values

The proposal will include mining operations supported by a 31 Megawatt power station and gold processing operations (and smelter) that would produce emissions including pollutants that may impact air quality and sensitive receptors.

These sensitive receptors are predominantly located to the north-east of the proposal and have been used in the modelling to assess impacts to the nearest receptors, as well as for all receptors.

The proponent's air quality assessment has identified sensitive receptors that include local residents and the proposal's accommodation camp, natural features (wetlands, National Parks, and conservation areas), in addition to 12 locations representing Indigenous sites of importance. The locations of the Indigenous sites of importance has been suppressed.

The proponent's air quality assessment included modelling to predict total emissions from the proposal such as particulate matter, nitrogen dioxide (NO_2), carbon monoxide (CO), and sulfur dioxide (SO_2) that have the potential to impact sensitive receptors, and ground level concentrations of pollutants at the sensitive receptors with the potential to cause degradation to air quality, and potential for significant impact to identified sensitive receptors.

Additionally, the proponent prepared a greenhouse gas (GHG) abatement plan (with proposed both interim and long-term emissions targets) to assist with the identification and mitigation of potential Scope 1, Scope 2 and Scope 3 GHG emission sources. During the proposed 1 year construction phase, the reported baseline yearly scope 1 and scope 3 emissions are 38,600 and 99.7 tonnes of CO_2 respectively. Approximately 95% of emissions are associated with clearing about 369 hectares as part of construction.

For the operational phase (10 years), the baseline yearly scope 1, 2 and 3 emissions is 215,000, 1,790, and 23,500 of tonnes CO_2 respectively.

The NT EPA recommends that the proponent manage project emissions and compliance with NT Government policy 'Greenhouse Gas Emissions Management for New and Expanding Large Emitters' and report on scope 1 and 2 greenhouse gas emissions as required to the Clean Energy Regulator.

6.6.2. Consultation

Matters raised during the NT EPA's consultation relating to potentially significant impacts on air quality include:

- lack of certainty regarding the proponent's understanding of carbon offsets, and
- the need for a development of GHG abatement plan.

6.6.3. Factor assessment and recommended regulation

In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings and recommendations of approval are presented below in Table 7.

Table 7 Assessment for Air quality, recommendations and conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
Impacts to air quality and sensitive receptors from emissions and pollutants generated by the proposal.	The proponent has proposed mitigation measures that include: • Limiting high dust generating activities. • Apply dust suppression • Monitoring and reporting.	Impacts to air quality includes degradation to air quality and ground level concentrations of pollutants at sensitive receptors, and potential significant impact to identified receptors. • Receptors include important wetlands, international SoCs, national parks, and residential uses. • Sensitive receptors include indigenous sites of importance (12 sites recorded).	• Manage project emissions and compliance with NT Government policy 'Greenhouse Gas Emissions Management for New and Expanding Large Emitters' • Report on scope 1 and 2 greenhouse gas emissions as required to the Clean Energy Regulator.	Regulated through recommended conditions: **Condition 15: Air Quality** Proponent is required to achieve the ambient air quality *National Environment Protection (Ambient Air Quality) Measure* goal, and to monitor and report total emissions including pollutants of concern at sensitive receptors against criteria in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2022). Regulation by other regulatory processes: • MM Act • Reporting to the Clean Energy Regulator.

6.6.4. Conclusion against the NT EPA objective

With the implementation of the proponent's proposed management measures, commitments, recommendations, and conditions for avoidance, monitoring, and mitigation of impacts identified in the draft Environmental Approval (Appendix 1), the NT EPA considers that the proposal can be conducted in such a manner that its objective for air quality is likely to be met.

6.7. Community and economy

6.7.1. Environmental values

The nearest community to the proposal area about 14 km away is the Marrakai community of about 500 people, and the nearest regional population centre is Humpty Doo on the outskirts of Darwin (about 46 km to the northwest). The economy of the area is mainly based on extractive industries (quarries) pastoral activity, and tourism that includes recreational fishing.

Locally, vegetable growing is the leading industry with 15.3% employment compared to quarry industries employing 3.5%, road freight/transport (3.8%), and tourist accommodation garnering 3.2%.

The Mary River National Park is managed by the Limilngan and Uwynmil Traditional Owners and the Parks and Wildlife Commission of the Northern Territory through a joint management agreement. The national park protects and conserves outstanding natural, cultural and visitor values and provides opportunities for the public to enjoy high quality experiences. The national park protects part of Chambers Bay and the Mary River Coastal Floodplains, which are defined as international SoCS. The floodplain and Chambers Bay include a complex mosaic of wet and dry habitats which support large and diverse populations of waterbirds.

6.7.2. Consultation

The Stakeholder Engagement Plan (SEP), provided with the draft EIS, identifies Indigenous Stakeholders and Traditional Owners; government agencies (NT and Commonwealth); local commercial businesses, pastoral stations and land holders; special interest groups i.e. the Amateur Fishermen's Association of the Northern Territory (AFANT), and the general public as key stakeholders.

The SEP specifies that consultation and engagement with key stakeholders occurred during the early planning and Draft EIS development stages. The community engagement was mainly undertaken by phone or email rather than any active engagement means.

During the NT EPA's consultation on this proposal, matters raised relating to potential significant impacts on community and economy include:

- lack of effective communication with key stakeholders, specifically with neighbouring local businesses (hospitality, tourism, pastoralism etc.) and growing the agricultural industry in Marrakai
- lack of thorough understanding of the proposal's potential impacts on the environment and social/economic benefits
- potential disturbance of sacred sites, heritage items and objects
- concerns of potential impacts on nearby roads (Arnhem Highway, unsealed mine access roads) and road users' safety from the increased road traffic that includes heavy vehicle/road trains warrants a traffic impact assessment and management plan
- potential impacts on downstream land uses for agriculture, pastoralism and tourism as a result of significant adverse impacts on inland water environmental quality

- uncertainty about the proposal's impacts on general amenity and visitors; and
- concerns regarding mine workers heath, including recommendation of ensuring accommodation camp's compliance with the NT Health requirements for mining and construction camps and Medical Entomology mining sites mosquito preventing guidelines.

The proposal could provide significant benefit to the community through employment opportunities, increased economic activity, and also identifies a need for an improved communication approach. While the SEP specifies engagement with Indigenous Stakeholder and Traditional Owners, there is no evidence of engagement that has occurred with this specific stakeholder group.

The NT EPA strongly promotes the preparation and implementation of a Community and Stakeholder Engagement Plan (CSEP) to ensure meaningful engagement with all stakeholders during all phases of proposal planning and implementation. The CESP must include:

- the use of appropriate methods to engage with all stakeholders including Indigenous Stakeholder and Traditional Owners
- flexibility to respond to newly identified stakeholders
- engagement with stakeholders on plans for environmental management, mine closure, employment opportunities/training, and transport of workers/goods, and
- reporting to stakeholders on water quality and the health of aquatic ecosystems in all relevant catchments during operations and closure.

6.7.3. Factor assessment and recommended regulation

The NT EPA has considered the potential significant impacts of the proposal on the community and economy. In assessing whether the residual impacts of the proposal will meet the NT EPA environmental factor and objective, and whether reasonable and appropriate regulatory conditions can be imposed, the assessment findings, recommendations, and conditions of approval are presented below in **Table 8**.

Table 8 Assessment for Community and economy, recommendations and conditions of approval

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
The potential impacts and risks identified include direct and indirect economic, social, health and safety risks relevant to the general public such as: • Opportunities for employment, increased economic activity, and local community benefit as a result of the proposal. • Amenity and infrastructure impacts due to an increased road traffic associated with the proposal. • Disturbance of sites/objects of heritage significance heritage items or places and sacred sites. • The unplanned closure and failure to rehabilitate the action resulting in contamination of the environment	The proponent commits to comply with conditions of the Aboriginal Areas Protection Authority (AAPA) certificate in order to avoid impacts to sacred sites. AAPA notes that this is the appropriate mechanism for protecting sacred sites. The proponent commits to employ strict operational boundaries as necessary and as required by internal proponent policies and legislation for protection of cultural heritage values. Heritage Branch considers that all heritage and archaeological issues have been adequately addressed in the EIS.	Downstream land uses including quarrying for construction materials, tourism, cattle grazing, growing fruit and vegetables, aquaculture, and traditional Aboriginal land use could be impacted by the proposal. The social, economic and cultural values are strongly associated with downstream aquatic ecosystems. There are sacred sites and known and listed heritage items and places within the proposal area and Authority Certificate C2022/055 has recently been issued to Hanking Australia Investments Pty Ltd.	• The downstream aquatic ecosystem values are acknowledged in several parks and reserves that include the Mary River National Park and Djukbinj National Park. • These sites are visited by local, interstate and international visitors for outstanding natural, cultural and visitor values including recreational fishing and wildlife watching. • Impacts to aquatic ecosystems in these areas as a result of the proposal would likely have economic and social impacts due to reduced opportunities for tourism and recreation, and could also result in a degradation of the environmental and cultural values.	Regulated through recommended conditions: • As above conditions for Aquatic Ecosystems • As above conditions for Inland Water Environmental Quality Regulation by other regulatory processes: • MM Act including management plans. • *Radiation Protection Act 2004* • *Northern Territory Aboriginal Sacred Sites Act. 1989.* • *Heritage Act 2011.*

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
downstream of the proposal. • Cumulative impacts of the proposal and other developments in the region.				
Impacts to the local and Territory community values.	The proponent commitments include: • Upgrade of the intersection for entry to the site from the Arnhem Highway in accordance with the Development Guidelines for NT Government Controlled Roads. • Prioritising employment from the local area and region, and provision of training and development for local residents. • Development and implementation of a procurement policy prioritising local and regional procurement. • Providing accommodation on site for all drive-in drive-out	There is potential economic and community risk that includes unplanned closure of the proposal resulting in significant impacts to the downstream environment.	The local and Territory community values would be significantly impacted through unplanned closure. The impacts to the local community and economy could be managed and regulated under other statutory decision-making processes e.g. the MM Act, and appropriate regulatory conditions.	Regulated through recommended conditions: **Condition 2, 3, 8, 9 and 10: MCP** (as above for Terrestrial Ecosystems factor) **Condition 9: Environmental Performance Report** (on completion of the mine life) Regulation by other regulatory processes: • A mining authorisation is required under the MM Act; that includes implementation of a MCP. • For the intersection upgrade, the proponent will require Road

Potentially significant impact	Avoidance and mitigation of impacts	Residual impact to environmental value	Assessment finding	Recommended conditions and regulation by other statutory decision-makers
	employees, and providing transport to site for local employees. • Undertake ongoing stakeholder identification and analysis in accordance with the Stakeholder Engagement Plan, including on closure matters.			Agency Approval from the Department of Infrastructure, Planning and Logistics (DIPL) in accordance with the Development Guidelines for Northern Territory Government Controlled Roads.

6.7.4. Conclusion against the NT EPA objective

With the implementation of the recommended conditions for avoidance, monitoring, and mitigation of impacts identified in the draft environmental approval (Appendix 1), and regulation under the MM Act, *Northern Territory Aboriginal Sacred Sites Act 1989*, *Radiation Protection Act 2004*, the *Heritage Act 2011* and the *Water Act 1992*, the NT EPA considers that the proposal can be conducted in such a manner that its objective for community and economy is likely to be met.

7. Whole of environment considerations

The NT EPA has considered connections and interactions between the key environmental factors together with other environmental factors in its consideration of impacts to the whole of environment.

When the separate environmental factors of the proposal were considered together in a whole of environment assessment, the NT EPA formed the view that the impacts from the proposal would not alter its views about whether the proposal could meet its factor objectives.

The NT EPA considered the potential significant impacts of the proposal on terrestrial ecosystems including the loss of habitat and threatened species from land clearing and mining activity, habitat degradation or loss from mine dewatering (drawdown effects), and residual impacts from rehabilitation and closure.

The NT EPA considers that an environmental performance report is required from the proponent at the mine closure phase, given the interconnected environmental values in the area likely to be affected by the proposal, to validate the proponent's modelled predictions of groundwater mounding, drawdown and recovery of the groundwater table post mining, and water quality of the mined out flooded pit voids. The NT EPA has recommended a condition to this effect.

The purpose of the environmental performance reporting is to provide the proponent and the Minister with a current evaluation of the performance of the proposal with respect to actual impacts on environmental values over the life of the project compared to those predicted during the environmental impact assessment process.

The total land clearing for the action amounts to 370 ha within the approved extent to accommodate mining by open cut methods, as well as the construction and operation of mining infrastructure that includes a gas powered power plant and gold processing plant. The proponent has conducted an air quality and greenhouse gas assessment for the Rustlers Roost and Quest 29 Mine Redevelopment to address emissions to the environment as a result of the action.

The proponent has considered alternative siting of the TSF, haul roads and the landfill to reduce the project footprint and total area of land clearing. The use of alternate sources of energy was considered by the proponent to be achievable, and the proponent has committed to a completing a feasibility study to assess power alternatives.

The NT EPA also notes that due to the relatively small spatial and temporal scale of the action, the effects of a changing climate on the proposal will likely have a diminished effect. The NT EPA is of the view that these impacts would not lead to any substantial negative effect on achievement of the NT EPA's environmental objectives.

8. Matters taken into account during the assessment

Matters taken into account during the assessment	Consideration
Objects of the EP Act	
To protect the environment of the Territory	The proponent's referral and this assessment report, including the NT EPA's recommended conditions for an environmental approval, provide detail about how the environment of the Territory would be protected from potentially significant environmental impacts that could occur as a result of implementation of the proposal.
To promote ecologically sustainable development so that the wellbeing of the people of the Territory is maintained or improved without adverse impact on the environment of the Territory	The NT EPA's consideration of the principles of ecologically sustainable development in relation to the proposal is addressed below.
To recognise the role of environmental impact assessment and environmental approval in promoting the protection and management of the environment of the Territory	The NT EPA recognises the importance of the environmental impact assessment and approval processes in the protection and management of the environment of the Territory. The NT EPA has assessed the potential environmental impacts of the proposal to inform an environmental approval decision by the Minister that, in the NT EPA's view, promotes the protection and management of the Territory.
To provide for broad community involvement during the process of environmental impact assessment and environmental approval	The NT EPA's public consultation undertaken during its assessment of the proposal provides for community involvement during the environmental impact assessment process. Submissions received in relation to the proposal have been taken into account in the preparation of the recommended conditions for an environmental approval.
To recognise the role that Aboriginal people have as stewards of their country as conferred under their traditions and recognised in law, and the importance of participation by Aboriginal people and communities in environmental decision-making processes.	The NT EPA recognises the role of Aboriginal people as stewards of their country and the importance of participation by Aboriginal people and communities in environmental decision-making. The public consultation process provided an opportunity for interested persons to make a submission in relation to the proposal.
Principles of ecologically sustainable development	
Decision-making principle 1. Decision-making processes should effectively integrate both long-term and short-term environmental and equitable considerations.	The NT EPA has considered the decision-making principle in its assessment and has had particular regard to this principle in its assessment of terrestrial environmental quality, terrestrial ecosystems, hydrological processes, inland water environmental quality, aquatic ecosystems, air quality, and community and economy.

Matters taken into account during the assessment	Consideration
2. Decision-making processes should provide for community involvement in relation to decisions and actions that affect the community.	The NT EPA notes the interconnectedness between environmental factors and recognises that the mitigation measures to avoid and minimise impacts on the factors listed above may also reduce the significance of impacts on other environmental factors. The NT EPA considers that design requirements are a combination of the application of the environmental decision-making hierarchy under section 26 of the EP Act, the waste management hierarchy under section 27 of the EP Act, and the principles of ESD. The NT EPA has recommended conditions for environment protection outcomes to be achieved through design, construction, operation and maintenance, and appropriate disposal of waste. The NT EPA notes that air quality and human health would also be regulated through the *Work Health and Safety (National Uniform Legislation) Act 2011* and *Radiation Protection Act 2004*. The NT EPA considers that its environmental impact assessment and recommended conditions for an environmental approval have identified and mitigated both short-term and long-term environmental impacts, and that this has not resulted in any compromise between short and long term environmental and equitable considerations. The community has been provided the opportunity for involvement in the environmental impact assessment process during public consultation on the proposal, and the submissions received have been taken into account in the preparation of this report and the recommended conditions to inform the Minister's decision on environmental approval.
Precautionary principle 1. If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. 2. Decision-making should be guided by: (a) careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and (b) an assessment of the risk-weighted consequences of various options.	This principle was considered by the NT EPA when assessing the impacts of the proposal on the key environmental factors. The proponent has identified measures to avoid or minimise impacts on the environment. The NT EPA has considered these measures during its assessment, and has recommended conditions for environment protection outcomes to be achieved. From its assessment of this proposal the NT EPA has concluded that the environmental values will be protected provided its recommended conditions, and the proponent's commitments, are implemented. The proposal may result in some irreversible impacts associated with loss of vegetation from clearing and potential groundwater dependent ecosystem loss, however those residual impacts are not considered significant.

Matters taken into account during the assessment	Consideration
Principle of evidence-based decision-making Decisions should be based on the best available evidence in the circumstances that is relevant and reliable.	The NT EPA has considered the available evidence during the course of its assessment of the proposal, and this scientific evidence provides the foundation for its decision making and recommended conditions. In its assessment of the proposal, where the NT EPA considered that further evidence is required to inform the management of potentially significant impacts terrestrial environmental quality, terrestrial ecosystems, hydrological processes, inland water environmental quality, aquatic ecosystems, air quality, community and economy, and culture and heritage, the NT EPA has recommended conditions requiring the proponent to undertake additional work to provide further evidence about how the impact would be effectively avoided and/or mitigated.
Principle of intergenerational and intragenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.	It is important to protect the sensitive cultural, environmental and water resource values of the Adelaide River catchment and the Mary River catchment for the benefit of future generations. The NT EPA considers that the recommended conditions for an environmental approval would provide an appropriate degree of protection for these values and not constrain the ability of future generations to continue to access the cultural and water resources for a range of beneficial uses. The NT EPA has considered the principle of intergenerational equity and intragenerational equity in its assessment. From the assessment of this proposal the NT EPA has concluded that the environmental values will be protected and that the health, diversify and productivity of the environment will be maintained for the benefit of future generations.
Principle of sustainable use Natural resources should be used in a manner that is sustainable, prudent, rational, wise and appropriate.	The NT EPA has considered the importance of sustainable use of resources and this principle during the environmental impact assessment process. The NT EPA considers that this principle is closely linked to the principles of intergeneration and intragenerational equity, and conservation of biological diversity and ecological integrity.
Principle of conservation of biological diversity and ecological integrity Biological diversity and ecological integrity should be conserved and maintained.	This principle was considered when assessing the impacts of the proposal on the environmental values of the Adelaide River catchment and the Mary River catchment. Terrestrial environmental quality, terrestrial ecosystems, hydrological processes, inland water environmental quality, aquatic ecosystems, air quality, and community and economy could be significantly impacted by the proposal if appropriate measures were not implemented to avoid and mitigate impacts. The assessment of these impacts is provided in this report. Biological diversity and ecological integrity are likely to be conserved due to the avoidance, minimisation and mitigation measures that will be implemented by the proponent and the

Matters taken into account during the assessment	Consideration
	conditions recommended by the NT EPA to ensure that environmental protection outcomes are achieved. From its assessment of this proposal the NT EPA has concluded that the proposal would not further compromise the biological diversity and ecological integrity of the affected areas.
Principle of improved valuation, pricing and incentive mechanisms 1. Environmental factors should be included in the valuation of assets and services. 2. Persons who generate pollution and waste should bear the cost of containment, avoidance and abatement. 3. Users of goods and services should pay prices based on the full life cycle costs of providing the goods and services, including costs relating to the use of natural resources and the ultimate disposal of wastes. 4. Established environmental goals should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, which enable persons best placed to maximise benefits or minimise costs to develop solutions and responses to environmental problems.	This principle was considered by the NT EPA when assessing the impacts of the proposal. The NT EPA notes that the proponent would bear the costs relating to containment of contaminants, avoidance and abatement of pollutants to the terrestrial, aquatic and air environment.
Environmental decision-making hierarchy	
1. In making decisions in relation to actions that affect the environment, decision-makers, proponents and approval holders must apply the following hierarchy of approaches in order of priority: (a) ensure that actions are designed to avoid adverse impacts on the environment; (b) identify management options to mitigate adverse impacts on the environment to the greatest extent practicable;	The extent to which the proponent has applied the environmental decision-making hierarchy in its design of the proposal and the proposed measures to avoid and then mitigate significant impacts has been considered. Where the NT EPA was not satisfied that this hierarchy had been applied, it has recommended conditions requiring that the proponent take reasonable measures to avoid and/or mitigate impacts. With regard to waste and pollution that would be generated by the proposal, the NT EPA has focussed on strategies to avoid the generation and disposal of waste and pollution, in particular for discharges to land, water and emissions to air.

Matters taken into account during the assessment	Consideration
(c) if appropriate, provide for environmental offsets in accordance with this Act for residual adverse impacts on the environment that cannot be avoided or mitigated.	The NT EPA has had regard to this hierarchy during the assessment of the proposal and did not identify any residual impacts that would require offsetting.
2. In making decisions in relation to actions that affect the environment, decision-makers, proponents and approval holders must ensure that the potential for actions to enhance or restore environmental quality is identified and provided for to the extent practicable.	The proposal is located in an area that is subject to extensive disturbances from historical mining and exploration with existing levels of measurable contamination. The NT EPA has recommended conditions requiring rehabilitation and closure of the action, to ensure that environmental quality is enhanced or restored to the highest extent practicable. Proposed rehabilitation and closure of the site may improve the environmental quality of the site if undertaken successfully.
Waste management hierarchy	
1. In designing, implementing and managing an action, all reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment. 2. For subsection (1), waste should be managed in accordance with the following hierarchy of approaches in order of priority: (a) avoidance of the production of waste; (b) minimisation of the production of waste; (c) re-use of waste; (d) recycling of waste; (e) recovery of energy and other resources from waste; (f) treatment of waste to reduce potentially adverse impacts; (g) disposal of waste in an environmentally sound manner.	The NT EPA has considered the waste management hierarchy in its assessment and has had particular regard to this principle in its assessment of terrestrial environmental quality, terrestrial ecosystems, hydrological processes, inland water environmental quality, aquatic ecosystems, air quality, and community and economy. The proponent is required to adopt fundamental principles as outlined in the Northern Territory Circular Economy Strategy 2022-2027 and must comply with waste management hierarchy and the environmental decision-making hierarchy.
Ecosystem-based management	
Management that recognises all interactions in an ecosystem, including ecological and human interactions.	The NT EPA considered the importance of ecosystem-based management for achieving both sustainable development and biodiversity protection goals.

Matters taken into account during the assessment	Consideration
	With consideration of the link between terrestrial environmental quality, terrestrial ecosystems, hydrological processes, inland water environmental quality, aquatic ecosystems, and community and economy, the NT EPA also considered the connections and interactions between parts of the environment to inform a holistic view of impacts to the whole environment. The NT EPA formed the view that the impacts from this proposal can be managed to be consistent with the NT EPA's environmental factors and objectives.
The impacts of a changing climate	
The effects of a changing climate on the proposal and resilience of the proposal to a changing climate	The NT EPA considered the working design life of the proposal (10 years) in the context of resilience to climate change, and how climate change may impact the proposal. The NT EPA had regard to measures and controls relating to extreme weather events such as flooding and high intensity rain events. The NT EPA considered that specific conditions did not need to be recommended to address this requirement. The NT EPA had regard to this matter during its assessment of the proposal.

9. Conclusion and recommendation

The NT EPA has considered the proposal by Primary Gold Limited to develop the Rustlers Roost and Quest 29 open-cut mine redevelopment. The NT EPA's assessment of the proposal identified potentially significant environmental impacts associated with the key environmental factors.

The NT EPA considers that the proposal can be implemented and managed in a manner that is environmentally acceptable and therefore recommends that environmental approval be granted subject to the conditions recommended in Appendix 1.

10. Definitions

Note: The terms used in this report have the same meaning as the terms defined in the *Environment Protection Act 2019* and Environment Protection Regulations 2020.

AMD	Acid and metalliferous drainage, meaning any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.
ANZG	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. 2018. Available at www.waterquality.gov.au/anz-guidelines
default guideline value	A guideline value recommended for generic application in the absence of a more specific guideline value (e.g. a site-specific guideline value) in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Formerly known as 'trigger values'.
ecologically sustainable	Meeting the principles of ecologically sustainable development as defined in Part 2 Division 1 of the EP Act, to ensure that development improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.
emergency	An event not authorised by the environmental approval for the action or other relevant statutory authorisation, with the potential to cause significant environmental harm if urgent action is not taken.
environmental harm	Direct or indirect alteration of the environment to its detriment or degradation, of any degree or duration, whether temporary or permanent.
ESC	Erosion and sediment control
GDE	Groundwater Dependent Ecosystem
mine affected water	Includes the following types of water: • pit water, dam water, processing water; • water contaminated by a mining activity • rainfall runoff which has been in contact with any areas disturbed by the action which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage such runoff, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water; • groundwater which has been in contact with any areas disturbed by the action which have not yet been rehabilitated; • groundwater from the mine dewatering activities; • a mix of mine affected water and other water. Does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by the action that have not yet been completely rehabilitated, has only been in contact with: • land that has been rehabilitated to a stable landform and either revegetated in accordance with the approved MCP • land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the

	water has been in contact does not cause environmental harm to waters or groundwater.
PAF	Potentially acid forming mine waste. Waste is classified as PAF where the net acid producing potential (NAPP) is positive (excess acidity) and the net acid generation pH (NAGpH) is below 4.5
spillway	A weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the water storage structure (i.e. dam, sediment basin, tank etc.), normally under flood conditions or in anticipation of flood conditions.
stormwater	Water flowing over ground surfaces, in natural streams and drains as a direct result of rainfall over a catchment and consists primarily of rainfall runoff.
waste	A solid, a liquid or a gas; or a mixture of such substances, that is or are left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.
water	Surface water, groundwater and tidal waters; and coastal waters of the Territory, within the meaning of the *Coastal Waters (Northern Territory Powers) Act 1980* (Cth); and water containing an impurity.

Appendix 1 – Draft Environmental Approval

Draft Environmental Approval

PURSUANT TO SECTION *69* OF THE *ENVIRONMENT PROTECTION ACT 2019*

Approval number	EP2021/005
Approval holder	Primary Gold Pty Ltd
Australian Business Number (ABN)	42 122 726 283
Registered business address	Level 26, 140 St Georges Terrace, Perth WA, 6000 Australia

Action: Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment

Recommence open-cut gold mining across two mine sites (Rustlers Roost and Quest 29) with expansion of all existing open-cut pits and development of two new pits. The key supporting infrastructure will include an 11 km upgraded access track/haul road connecting the two sites, a new purpose-built carbon-in-leach (CIL) gold processing plant, and a tailings storage facility (TSF) at Rustlers Roost. The action includes clearing 369 ha for the construction of the tailings dam and waste rock dumps, and a 31 megawatt gas-fired power station located at Rustlers Roost.

Pit dewatering will occur prior to commencement of mining (by open-cut drill and blast) as well as during mining, and the wastewater will be discharged to a waterway under a waste discharge licence.

Constructed waste rock dumps will feature at both Rustlers Roost and Quest 29. The majority of the waste material generated by the action will be disposed of in surface waste rock dumps. A proportion of the waste material will be used to backfill a number of open-cut pits at both Rustlers Roost and Quest 29.

The approximate life of mine is 10 years and post-mining, with several residual pit voids left in place (i.e. not backfilled) to form pit lakes. Rehabilitation of the action will be completed in accordance with the conditions of this environmental approval.

Advisory notes:

i. Approval is granted under section *69* of the *Environment Protection Act 2019* (EP Act) for the action to be undertaken in the manner described, including with implementation of the environmental management measures, commitments and safeguards documented in the Environmental Impact Statement (EIS) (comprising the Draft EIS, and the Supplement to the Draft EIS). If there is an inconsistency between the EIS and this environmental approval, the requirements of this environmental approval prevail.

ii. This approval does not authorise the approval holder to undertake an activity that would otherwise be an offence under the *Water Act 1992*.

iii. All statutory authorisations as required by law must be obtained and maintained as required for the action. No condition of this environmental approval removes any obligation to obtain, renew or comply with such statutory authorisations.

iv. Management actions relating to threatened species must be developed in consultation with Flora and Fauna Division of the Department of Environment, Parks, and Water Security (DEPWS).

v. The approval holder has a duty to notify the Chief Executive Officer of DEPWS of incidents in accordance with Part 9 Division 8 of the EP Act.

vi. Submission of all notices, reports, documents or other correspondence required to be provided to the CEO and/or Minister as a condition of this approval must be provided in electronic form by emailing environmentalregulation@nt.gov.au

Table 1 Description and indicative metrics for action elements provided in the EIS

Action element	Description
Commodity	Gold
Rustlers Roost open-cut pits	1) Rustlers Roost Main Pit (existing) – mined to -125 m AHD 2) Annie Oakley Pit (planned for development) – mined to 5 m AHD 3) Annie's Dam Pit (planned for development) – mined to 35 m AHD
Quest 29 open-cut pits	1) BHS Pit (existing) – mined to 48 m AHD 2) North Koolpin Pit (existing) – mined to 22 m AHD 3) South Koolpin Pit (existing) – mined to -3.5 m AHD 4) Taipan Pit (existing) – mined to -11 m AHD 5) Zamu Pit (existing) – mined to -36 m AHD
Rustlers Roost WRD's	1) Northern WRD and 2) Southern WRD
Quest 29 WRD's	Quest 29 WRD
Waste rock – criteria for Non Acid Forming (**NAF)** material	Total sulfur content ≤0.2%
Waste rock – criteria for Potential Acid Forming (**PAF)** material	Total sulfur content >0.2%
Tailings storage facility (TSF) metrics	a) Maximum crest height 50 m b) Total capacity 48.0 Mt c) Tailings volume 28.9 Mm^3
Production	5 Mt of ore per annum on-site, or more than 50 Mt of ore over the life of mine.
Processing	Carbon-in Leach (CIL) process with use of cyanide
Life of Mine (LOM)	10 years
Rustlers Roost pits at end of mining (post-closure)	1) Rustlers Roost Main Pit – pit lake 2) Annie Oakley Pit - backfilled 3) Annie's Dam Pit - backfilled
Quest 29 pits at end of mining	Zamu Pit - backfilled with waste material from BHS Pit, North Koolpin Pit, South Koolpin Pit and Taipan Pit.

Note: this environmental approval applies to the action elements and extent shown in Figures 2 and 3.

Draft Environmental Approval

Address of action	Rustlers Roost - NT Portion 4937 on Old Mount Bundy Station Perpetual Pastoral Lease 1163. Quest 29 - NT Portion 4938 on McKinlay River Station Perpetual Pastoral Lease 1184.
NT EPA Assessment Report number	99
Decision maker	NOT FOR SIGNING Hon Lauren Jane Moss MLA, Minister for Environment, Climate Change and Water Security
Date of approval	NOT FOR APPROVAL

Environmental performance conditions

1 Limitations and extent of action

1-1 When implementing the action, the approval holder must ensure the action does not exceed the following limitations and extent:

Action element	Figure	Limitation or maximum extent
Total clearing	Figure 1, 2 and 3	No more than 370.0 ha to be cleared within the **approved extent**.
Rustlers Roost clearing	Figure 2	No more than 333.4 ha to be cleared within the **approved extent** on MLN 1083.
Quest 29 clearing	Figure 3	No more than 26.2 ha to be cleared within the **approved extent** on ML 29783.
Landfill	Figure 1	No more than 1.1 ha to be cleared within the **approved extent** on ML 29814**.**
Accommodation camp	Figure 1	No more than 7.3 ha to be cleared within the **approved extent** on ML 29814.
Haul road	Figure 1	No more than 2.0 ha to be cleared within the **approved extent**.
Groundwater drawdown and zone of influence – Marrakai Creek sub-catchment	Figure 4	<1 m drawdown is the **limit value** measured along the east bank of Marrakai Creek**,** as required by condition 12**.**
Groundwater drawdown and zone of influence - Upper Mount Bundey sub-catchment	Figure 4	<1 m drawdown is the **limit value** measured along the west bank of Upper Mount Bundey Creek, as required by condition 12**.**

2 Action implementation, rehabilitation and closure

2-1 The action must be rehabilitated and closed in such a manner that the approval holder can demonstrate that it:

(1) is physically safe to humans and animals;

(2) is geo-technically stable;

(3) is non-polluting, non-contaminating;

(4) is progressively rehabilitated as disturbed land becomes available;

(5) supports productive, self-sustaining, resilient ecosystems;

(6) achieves improvement to the local biophysical environment; and

(7) does not cause **material environmental harm** or **significant environmental harm**.

3 Mine closure plan (MCP)

3-1 The approval holder must prepare a **MCP**, before **substantial disturbance**, that:

(1) achieves the outcomes in condition 2-1; and

(2) is consistent with contemporary best practice guidance on mine closure[1] (with particular regard to pit lakes), and transition to the agreed post-mining land use;

3-2 The approval holder must provide the **Minister** a copy of any **MCP** approved by the **responsible Minister** (that may supersede the version required by condition 3-1), within 10 business days after the date of the **MCP** being approved.

4 Terrestrial environmental quality

4-1 The approval holder must implement and close the action to meet the following environmental objective:

(1) protect the quality and integrity of land and soils so environmental values of the **Adelaide River Catchment** and **Mary River Catchment** are supported, maintained and improved where possible.

4-2 To support the achievement of condition 4-1(1):

(1) prior to **mining activity,** the approval holder must conduct a baseline contamination assessment of the **approved extent**, in accordance with the National Environment Protection (Assessment of Site Contamination) Measure.

(2) the approval holder must take all reasonable steps and measures to ensure that exceedances of the baseline contamination levels required under condition 4-2(1) are not exceeded during the **life of the action**.

(3) if the environment is contaminated above the baseline contamination assessment conducted prior to **mining activity**, it must be remediated in accordance with the CRC CARE National Remediation Framework prior to closure of the action.

(4) the remediation required in condition 4-2(3) must, to the greatest extent practicable, meet the objectives and outcomes of condition 3-1(1) and condition 3-1(2) to result in a measurable improvement to the post-closure biophysical environment that allows for the agreed post-mining land use.

(5) to achieve the required improvement to the post-closure biophysical environment required in condition 4-2(4), the approval holder must apply the **best practicable technology** (**BPT**) that produces the maximum environmental benefit that can be reasonably achieved.

5 Erosion and sediment control

5-1 The approval holder must implement an Erosion and Sediment Control Plan (**ESCP**) on commencement of **substantial disturbance** for the **life of the action** that is:

[1] Best practice guidance on mine closure includes: the International Council on Mining and Metals (ICMM) Integrated Mine Closure Good Practice Guide (2019), the Queensland Government Guideline for Progressive Rehabilitation and Closure Plans (2021), and the Statutory Guideline for Mine Closure Plans in Western Australia (2023).

(1) developed by a Certified Professional in Erosion and Sediment Control (**CPESC**), in accordance with International Erosion Control Association Australasia 2008, *Best Practice Erosion and Sediment Control*;

(2) monitored by the **CPESC** and by the approval holder; and

(3) reviewed and revised by the **CPESC** within 12 months of **substantial disturbance**, or at any time if:

(a) ongoing monitoring identifies a failure of the temporary and permanent erosion control systems described in the **ESCP**; or

(b) an accelerated or changed work program is required.

5-2 The approval holder must report on its compliance with the **ESCP** and condition 5-1. Each report must be:

(1) prepared by a **CPESC**; and

(2) submitted to the **Minister** by 30 May each year during the **life of the action** unless otherwise directed by the **Minister** in writing.

6 Terrestrial ecosystems

6-1 The approval holder must implement and complete the action to meet the following environmental objective:

(1) protect terrestrial habitats to maintain flora and fauna values including biodiversity, ecological integrity and ecological functioning.

6-2 To support the achievement of condition 6-1 the approval holder must:

(1) conduct pre-clearance surveys to identify presence of habitat and **threatened species**;

(2) implement a trapping program immediately prior to any clearing to capture and relocate affected fauna; and

(3) implement progressive rehabilitation that ensures habitat re-establishment and restoration in accordance with condition 2-1, and the MCP required by condition 3-1.

6-3 The surveys and programs required in conditions 6-2(1) and 6-2(2) must be prepared and implemented in consultation with the Flora and Fauna Division of the Department of Environment, Parks, and Water Security (DEPWS).

7 Inland water environmental quality and hydrological processes

7-1 The approval holder must implement the action to meet the following environmental objectives and outcomes:

(1) protect the quality of surface waters and groundwater so that the environmental values of the Adelaide River and tributaries (Marrakai Creek) including ecological health, land uses, and cultural values are maintained; and

(2) protect the quality of surface waters and groundwater so that the environmental values of the Mary River and tributaries (Charlies Creek and upper Mount Bundey Creek), and the McKinlay River and tributaries, including ecological health, land uses, and cultural values are maintained.

7-2 To support the achievement of condition 7-1(1), and condition 7-1(2), the relevant guideline values:

(1) for surface water quality, are the Australian and New Zealand guidelines for fresh and marine water quality (**ANZG**) freshwater default guideline values for slightly to moderately disturbed systems 95% species protection level;

(2) for groundwater quality, are the **ANZG** freshwater default guideline values 80% species protection level; and

(3) must be site specific and derived in accordance with **ANZG** where natural background levels exceed **ANZG** freshwater default guideline values, or default guideline values have not been set by **ANZG**.

7-3 The site-specific guideline values required by condition 7-2(3) must be:

(1) derived prior to any **substantial disturbance**, from the collected water quality dataset and baseline study as detailed in **ANZG**; and

(2) derived for the physical and chemical indicators appropriate to the mineralogical properties of mined material and the range of declared **beneficial uses**, in accordance with **ANZG**.

(3) reviewed by an **independent qualified person** to ensure it is consistent with achievement of the environmental objectives and outcomes required by condition 7-1; and

(4) submitted with the review required in condition 7-3(3), and a statement addressing how the reviewer's findings have been addressed, to the **Minister** for approval at least three months before **substantial disturbance**.

8 General conditions for mine waste

8-1 To support the achievement of condition 7-1(1) and 7-1(2) the approval holder must:

(1) implement ongoing waste characterisation of **PAF**/**NAF** during the mining phase that includes a program of:

(a) in-pit testing

(b) multi-phase column testing

(c) carbon and sulfur testing.

(2) implement ongoing geochemical testing and characterisation of materials segregated for the construction of mining infrastructure;

(3) implement testing and management for Naturally Occurring Radioactive Materials (NORM) according to the **national directory for radiation protection**. Testing must include any radionuclide in the Uranium (U) and Thorium (Th) decay chain; and

(4) implement continuous updates, ongoing development, and refinement of the waste/ore block model, and the sulfur model.

8-2 To support the achievement of condition 7-1(1), 7-1(2) and condition 8, the approval holder must appoint an **independent qualified person** to conduct an audit of quality assurance / quality control (**QA/QC**) procedures for waste rock identification and handling performance, the test work, and the model updates 12 months after **substantial disturbance**, and at 12 monthly intervals thereafter, for the **life of the action**.

(1) the findings of the initial audit required by condition 8-2, and any subsequent audits must be submitted to the **Minister** in a report within three months of conducting the audit together with remedial actions committed to by the proponent; and

(2) the reports required by condition 8-2(1) must be prepared by the **independent qualified person** referred to in condition 8-2.

8-3 Prior to commencing construction of the **mine waste storages**, the approval holder must:

(1) obtain certification from an **independent qualified person** with suitable qualifications and experience that the design plans for the mine waste storages meet an appropriate engineering standards and are consistent with internationally accepted contemporary best practice guidance; and

(2) obtain certification from the **independent qualified person** with suitable qualifications and experience that the construction of the mine waste storages is in accordance with the certified design plans.

8-4 The **independent qualified person** with suitable qualifications and experience required under condition 8-3 must be a professional engineer who is a member of Engineers Australia and has either a Chartered or National Engineering Register credential in civil, structural, and/or geotechnical engineering or holds equivalent professional qualifications with knowledge of principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of mine waste structures.

9 Waste Rock Dump (WRD) and acid and metalliferous drainage (AMD)

9-1 To support the achievement of condition 7-1(1) and condition 8-2, **WRD**s must be:

(1) designed to minimise water and oxygen ingress and control advection processes, limit seepage and generation of **AMD**; and

(2) constructed to include:

(a) a basal layer that achieves a saturated hydraulic conductivity of less than 1 x 10^{-9} m/s over a minimum thickness of one metre;

(b) a seepage management system that includes interception, collection, treatment and disposal;

(c) an outer annulus of **NAF** material encapsulating a core of **PAF** waste material;

(d) acid neutralising treatment and selective placement of the encapsulated **PAF** waste material;

(e) a capping layer and cover system; and

(f) a drainage system to prevent erosion.

(3) monitored to evaluate the performance of **AMD** management. The monitoring must include:

(a) settlement rates during the construction phase;

(b) the integrity of the engineered cover systems;

(c) oxygen concentration profiles;

(d) dump temperature profiles; and

(e) seepage rates and groundwater levels and quality.

(4) the approval holder must conduct auditing and reporting on **QA / QC** and the performance of **AMD** management required by condition 9-1(3) at 12 monthly intervals for the **life of the action**. The required audits and reporting must be undertaken by an **independent qualified person**.

(5) the reports required by condition 9-1(4) must be submitted to the **Minister** within two months of conducting the audit.

(6) any recommended actions to address findings in the reports required by condition 9-1(4) must be implemented.

10 Tailings Storage Facility (TSF)

10-1 To support the achievement of condition 7-1(1) and condition 7-1(2), the approval holder must ensure the TSF is designed, constructed, operated, monitored, decommissioned, and closed in accordance with:

(1) the Australian National Committee on Large Dams' (**ANCOLD**) Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure (ANCOLD 2012a);

(2) other **ANCOLD** guidelines that consider flood capacity, dam break and consequence, safety, seismic hazard and earthquakes, and impact on public safety, public infrastructure, and the environment; and

(3) consideration of the required management of cyanide under condition 11.

10-2 The **TSF** must be designed and constructed to:

(1) limit seepage with the use of liner materials to achieve a saturated hydraulic conductivity of less than 1×10^{-9} m/s;

(2) include a compacted basal clay liner with a minimum thickness of one metre, and overlain with a synthetic **geomembrane** to further reduce seepage;

(3) include embankments that are constructed utilising the downstream raise method; and

(4) installation of an underdrainage system with embankment toe drains and cut-off trenches, and an integrated system for leachate collection and recovery.

10-3 To support the achievement of condition 7-1(1), the TSF must be operated in accordance with an approved **Operating Manual for Tailings Storage**.

(1) the operating manual required by condition 10-3 must:

(a) be prepared by an **independent qualified person** with suitable qualifications and experience in the design, construction, operation, monitoring, management, and rehabilitation of a high risk TSF.

(b) include provisions for tailings and water management, surveillance, inspections, monitoring, reporting and independent audits.

(c) include provisions for the decommissioning, rehabilitation, closure and post-closure monitoring and management requirements of the TSF.

10-4 Prior to **mining activity**, the approval holder must ensure that:

(1) a geotechnical investigation, mapping program and reporting is completed on the **TSF** footprint to confirm the characteristics of the near surface ground conditions;

(2) specific testing and **QA/QC** on material intended for construction of the **TSF** is completed; and

(3) sufficient suitable construction materials are available for the constructed TSF to be safe, stable and protects the environment during its operation, and to meet the requirements of conditions 2-1 and 10-2.

10-5 The materials testing, **QA/QC**, geotechnical investigation and reporting required by condition 10-4 must be undertaken by an **independent qualified person** and submitted to the **Minister** within two months of completing the investigation.

10-6 To support the achievement of condition 7-1(1) and condition 2-1, the **MCP** required in condition 3-1 must include:

(1) an evaluation of in-pit disposal of tailings as part of decommissioning and mine closure;

(2) a program of tailings testing and characterisation to ensure the closure design of the TSF includes:

(a) a low permeability layer capping to reduce long term infiltration and oxidation;

(b) water shedding capacity;

(c) resistance to erosion; and

(d) a growth medium to promote vegetation establishment.

11 Cyanide management

11-1 To support the achievement of condition 7-1, the approval holder must prepare and implement a **Cyanide Management Plan** that:

(1) complies with the International **Cyanide Management Code** and management framework (ICMI);

(2) ensures cyanide levels of the aqueous component of the tailings slurry stream do not exceed: 20 mg CNWAD/L (90 percentile over six months), and 30 mg CNWAD/L (maximum permissible limit at any time), at the **process plant**.

11-2 The plan required by condition 11-1 must be prepared by an **independent qualified person** and include monitoring and reporting on cyanide use on the site. The plan must make provision for, but is not limited to:

(1) containing cyanide contaminated waters entirely within the mine site;

(2) maintaining weak acid dissociable (WAD) cyanide levels at the **process plant** to the levels stated in condition 11-1(2);

(3) contingency measures for cyanide reduction; and

(4) reporting of wildlife deaths occurring due to cyanide.

11-3 The plan must include, but not be limited to, provision for:

(1) monitoring of CNWAD levels of the aqueous component of the tailings slurry stream at the process plant;

(2) monitoring CNWAD levels in the decant water of the tailings dam;

(3) An on-site laboratory for quickly establishing CNWAD levels in the liquid at the process plant and in the decant ponds for monitoring purposes;

(4) establishing a monitoring regime for detection of cyanide movement beneath and adjacent to the TSF; and

(5) monitoring of CN(FREE) at locations where employees are operating.

12 Aquatic and groundwater dependent ecosystems

12-1 The approval holder must implement, remediate and complete the action to meet the following environmental objectives:

(1) protection of the Adelaide River and tributaries (Marrakai Creek).

(2) protection of the Mary River and tributaries (Charlies Creek and upper Mount Bundey Creek).

(3) protection of the McKinlay River and tributaries.

(4) protect terrestrial and aquatic **groundwater dependent ecosystems** to maintain environmental values including biodiversity, ecological integrity and ecological functioning.

12-2 To support the achievement of condition 12-1 the approval holder must:

(1) develop and implement an environmental monitoring program that includes measures for monitoring of the potential impacts of the action on **groundwater dependent ecosystems (GDE)** that are within the zone of influence of groundwater drawdown and recovery; and

(2) conduct dewatering of the pits according to a **Trigger Action Response Plan (TARP)**.

12-3 The **TARP** required in condition 12-2(2) must be reviewed by an **independent qualified person** to ensure it is consistent with achievement of the environmental objectives and outcomes required by condition 12-1. The **TARP** must:

(1) be submitted, with the review and a statement addressing how the reviewer's findings have been addressed, to the **Minister** at least three months before substantial disturbance;

(2) be implemented for the **life of the action**;

(3) specify quantitative **limit values** to demonstrate compliance with condition 12-1;

(4) include quantitative **trigger values** to initiate contingency and/or management actions to ensure achievement of the environmental objective in condition 12-1;

(5) include contingency and/or management actions for exceedances of **trigger values** and **limit values**; and

(6) identifies requirements for notifying the **Minister** on any exceedance of **trigger values** or **limit values**, including:

(a) date, time and cause of any exceedance;

(b) any contingency and/or management actions implemented;

(c) the outcomes of investigative, contingency and/or management actions, stop work or recommencement actions; and

(d) a timeframe within which the **Minister** would be notified.

12-4 The **TARP** required in condition 12-2(2) must be:

(1) updated annually by an **independent qualified person** to ensure it is consistent with achievement of the environmental objectives and outcomes required by condition 12-1; and

(2) for the life of the action, submitted each year by 30 October to the **Minister** for approval.

12-5 To support the achievement of condition 12-2(1), the approval holder must:

(1) prior to commencement of dewatering of the pits, expand the groundwater monitoring network with **key bores** to monitor seepage, water level and quality of groundwater.

(2) prior to **mining activity**, prepare a baseline **groundwater dependent ecosystem** characterisation report that includes at a minimum:

(a) seasonal **baseline data** for surface water flows and quality in waterways and/or waterbodies that could be affected by the action;

(b) seasonal **baseline data** for groundwater levels and quality in aquifers that could be affected by the action;

(c) vegetation assessment for the terrestrial **groundwater dependent ecosystems**; and

(d) aquatic value characterisation for the aquatic **groundwater dependent ecosystems**.

(3) implement monitoring of pit **lake water quality** and surrounding groundwater using **key bores** for the **life of the action**.

13 The report required by condition 12-5(2) must be:

(1) reviewed by an **independent qualified person** to ensure it is consistent with achievement of the environmental objectives and outcomes required by condition 12-2(1); and

(2) submitted, with the review and a statement addressing how the reviewer's findings have been addressed to the **Minister** for approval 3 months prior to **substantial disturbance**.

14 Post-closure pit Lake Water Quality

14-1 To support the achievement of condition 12-1 and the objectives of condition 2-1, the approval holder must;

(1) ensure pit **lake water quality** does not exceed the **ANZG** livestock drinking water quality guideline values at any time during post closure;

(2) monitor pit **lake water quality** post-closure for a minimum of 20 years to demonstrate achievement of 14-1(1);

(3) update, calibrate and validate the models used to predict the post-closure pit **lake water quality** and groundwater quality, and

(4) remediate the **lake water quality** if **ANZG** livestock water quality guideline values are exceeded in accordance with the MCP required by condition 3-1, and the requirements of condition 4-2.

15 Air Quality

15-1 The approval holder must implement, remediate and complete the action to protect quality of air, and minimise emissions and their impact on the environment.

15-2 To support the achievement of condition 15-1, for the **life of the action** the approval holder must:

(1) monitor the ambient concentrations of all air pollutants emitted from the proposal at the boundary and at relevant sensitive receptors and indigenous sites of importance;

(2) ensure that ground level concentrations of pollutants of concern:

(a) achieves the ambient air quality *National Environment Protection (Ambient Air Quality) Measure* goal,

(b) meets the objectives and achieves compliance against the impact assessment criteria provided in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2022); and

(3) report the results of monitoring against the National Environment Protection (Ambient Air Quality) Measure to the **CEO**.

15-3 Prior to **substantial disturbance**, the approval holder must prepare an **Air Quality Management Plan** (**AQMP**).

15-4 The **AQMP** required by condition 15-3 must be prepared by an **independent qualified person** and include, but is not limited to:

(1) details of all emission sources including odour and particulates;

(2) the type and locations of air quality monitoring stations and equipment;

(3) control measures that will be implemented for each emission source to minimise the potential risks to adverse air quality; and

(4) contingency measures to be implemented to respond to complaints or if dust impacts are identified.

16 Commencement of action

16-1 This approval expires five (5) years after the date on which it is granted, unless **substantial disturbance** has commenced on or before that date.

16-2 Within 10 business days of **substantial disturbance** of the action the approval holder must provide notification in writing to the **Minister**.

17 Change of contact details

17-1 The approval holder must provide notification in writing to the **Minister** of any change of its name, physical address or postal address for the serving of notices or other correspondence within 10 business days of such change.

18 Compliance reporting

18-1 The approval holder must:

(1) advise the **Minister** of any potential non-compliance within seven (7) days of that non-compliance being known, and describe the corrective and preventative actions taken;

(2) within six months of **substantial disturbance**, obtain from an **independent qualified person**, a report on compliance with the conditions of this environmental approval; and

(3) obtain further such reports at regular intervals not exceeding 12 months from the report referred to in condition 18-1(1); and

(4) submit each report to the CEO within 90 days of its completion.

18-2 The reports required by condition 18-1(1) and condition 18-1(3) must:

(1) be endorsed by the approval holder's Chief Executive Officer or a person delegated to sign on the approval holder's Chief Executive Officer's behalf;

(2) include a statement as to whether the approval holder has complied with the conditions of this approval; and

(3) identify all non-compliances and describe corrective and preventative actions taken.

19 Environmental Performance Report

19-1 The approval holder must submit an Environmental Performance Report to the **Minister** on completion of the **mine life**.

19-2 The report required by condition 19-1 must be prepared by an **independent qualified person**.

19-3 The Environmental Performance Report must verify and report on impacts of the action on the state of the following environmental values:

(1) terrestrial environmental quality;

(2) terrestrial ecosystems;

(3) hydrological processes and quality;

(4) inland water environmental quality;

(5) air quality;

(6) community and economy, culture and heritage; and

(7) the whole of environment within the area of influence of the action.

19-4 The Environmental Performance Report must include:

(1) a comparison of the predicted impacts of the action on environmental values (identified in condition 19-3), and the actual impacts of the action as verified by environmental monitoring data; and

(2) an assessment of the cumulative impacts of the action and other actions for which the approval holder is responsible on the environmental values of the **Adelaide River Catchment** and the **Mary River Catchment**.

20 Provision of environmental data

20-1 All environmental monitoring data required to be collected or obtained under this environmental approval must be retained by the approval holder for a period of not less than 10 years commencing from the date that the data is collected or obtained.

20-2 The approval holder must, as and when directed by the **Minister**, provide any validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (such as maps)) relevant to the assessment of the action and implementation of this environmental approval, to the **Minister** in the form and manner, and at the intervals specified, in the direction. Culturally sensitive data held by the approval holder may be subject to access terms and conditions imposed by traditional owners which the approval holder is required to maintain.

Definitions

The terms used in this approval have the same meaning as the terms defined in the *Environment Protection Act 2019* and Environment Protection Regulations 2020.

Adelaide River Catchment	The catchment area of the Adelaide River and tributaries as depicted in Figure 1.
AMD	Acid and metalliferous drainage, including neutral and saline drainage
ANCOLD	The Australian National Committee on Large Dams (**ANCOLD**) Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure (ANCOLD 2012a)
ANZG	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 www.waterquality.gov.au/anz-guidelines. Note: The ANZG (2018) Water Quality Guidelines replaces the previous ANZECC/ ARMCANZ (2000) guidelines. Without updates to the trigger values for irrigation and general water use and as the revised livestock drinking water guidelines are yet to be published, the default guidelines values from ANZECC/ ARMCANZ (2000) will apply.
approved extent	The extent identified in Figure 2 and Figure 3 of this approval that is the Project area identified in the EIS and includes equipment, plant and structures, whether stationary or portable, and the land and water on which the action is situated.
AQMP	Air Quality Management Plan

beneficial uses	uses of water specified in subsection (3) of the *Water Act 1992*
BPT	Best practicable technology that produces the maximum environmental benefit that can be reasonably achieved.
CEO	The Chief Executive Officer of the Department of Environment, Parks and Water Security (or another name for that department, which may vary from time to time), or their delegate.
Clean Energy Regulator	The independent statutory authority established by the *Clean Energy Regulator Act 2011* for the administration of schemes legislated by the Australian Government to measure, manage, reduce or offset Australia's carbon emissions (https://www.cleanenergyregulator.gov.au/).
CPESC	Certified Professional in Erosion and Sediment Control
Cyanide Management Code	The International Cyanide Management Code For the Manufacture, Transport, and Use of Cyanide in the Production of Gold that is administered by the International Cyanide Management Institute (CMI).
EP Act	*Environment Protection Act 2019*.
ESCP	Erosion and Sediment Control Plan.
geomembrane	A manufactured low-permeability sheet or liner, such as high-density polyethylene (HDPE) that meets the specifications of Geosynthetic Research Institute (https://geosynthetic-institute.org/specifications.htm).
groundwater dependent ecosystems (GDEs)	Refers to ecosystems that are dependent on the surface expression (aquatic GDEs) or subsurface expression (terrestrial GDEs) of groundwater for all or part of their water requirements. The terrestrial GDEs are typically riparian vegetation dominated by the presence of *Eucalyptus bigalerita*, and *Lophostemon grandifloras* that rely on access to groundwater for its water requirements.
independent qualified person	A qualified person as defined under section 4 of the **EP Act**; and who also meets the following requirements: a) was not involved in the preparation of the approval holder's **Referral** or **EIS**; and b) is independent of the personnel involved in the design, construction and operation of the action; and c) has obtained written approval from the **CEO** to be the qualified person to satisfy the **independent qualified person** reporting requirements under this approval.
key bores	The groundwater monitoring bores for the purpose of updating the hydrogeochemical and groundwater models, and for informing management responses and corrective actions to drawdown triggers and limits.
lake water quality	The water quality of pit lakes that is the volume weighted averaged concentration determined by profiling the pit with surface, mid-depth and bottom samples, and with profiling to be undertaken at three locations.
life of the action	The period of time from **substantial disturbance** until the issue of a closure certificate under section 213 of the **EP Act**, or revocation of

	the environmental approval by the Minister at the request of the approval holder under section 114 of the **EP Act**.
Mary River Catchment	The catchment area of the Mary River and tributaries as depicted in Figure 1
material environmental harm	Environmental harm that as defined in section 8 of the EP Act.
MCP	Mine Closure Plan
mine waste storages	Any structure, landform or residual void under this approval that is designed, constructed or used to store mine waste that includes, but is not limited to, waste rock, PAF material, tailings, radioactive material, asbestos containing material, and residues from water treatment.
Mining activity	Mining activity has the same meaning as in the *Mining Management Act 2001*.
national directory for radiation protection	The National Directory for Radiation Protection – 2nd Edition (2021) by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).
PAF	Potentially acid forming.
process plant	The mineral processing facility for the recovery of gold from ore in a series of steps to produce gold dore.
QA/QC	Quality Assurance/Quality Control
significant environmental harm	Environmental harm that as defined in section 9 of the EP Act.
Species Protection Level	The degree of protection afforded to a water body based on its ecosystem condition (current or desired health status of an ecosystem relative to the degree of human disturbance).
substantial disturbance	Means substantial disturbance of a mining site as defined under section 35(3) of the *Mining Management Act 2001*.
threatened species	Threatened fauna and flora species listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that are known or have potential to occur within the proposal area including but not limited to: Fauna (Northern Quoll, Pale field-rat, Black-footed tree-rat, Yellow-snouted gecko, Northern brushtail possum, Yellow-spotted monitor, Merten's water monitor, Mitchell's water monitor, Red goshawk, Partridge pigeon Gouldian finch) and Flora (*Schoutenia ovata*, *Helicteres macrothrix*, and *Stylidium ensatum*).
TSF	Tailings Storage Facility
WRD	Waste rock dump

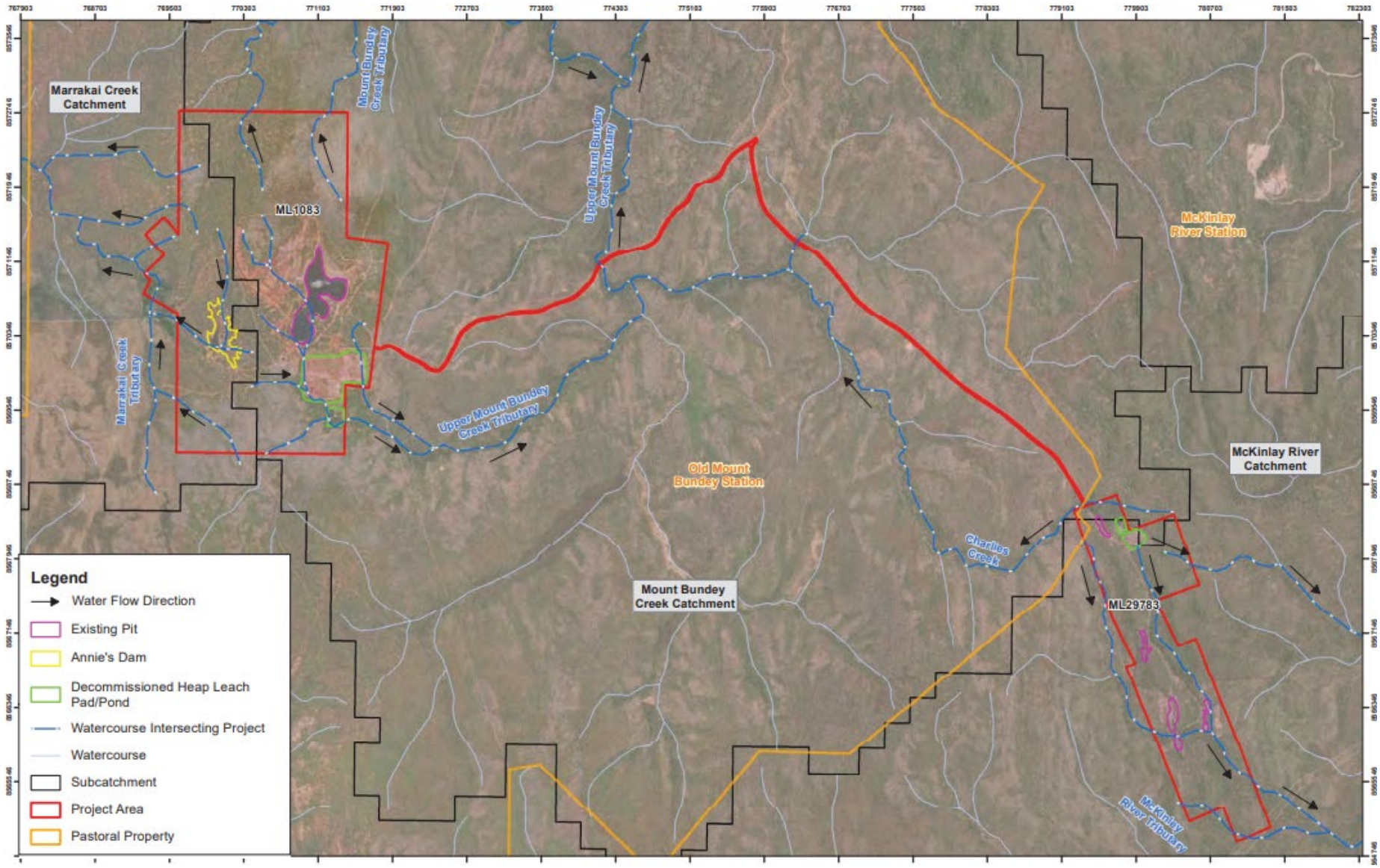

Figure 1 Layout of the Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment showing Marrakai Creek in the Adelaide River catchment, and Mount Bundey Creek and McKinlay River in the Mary River catchment

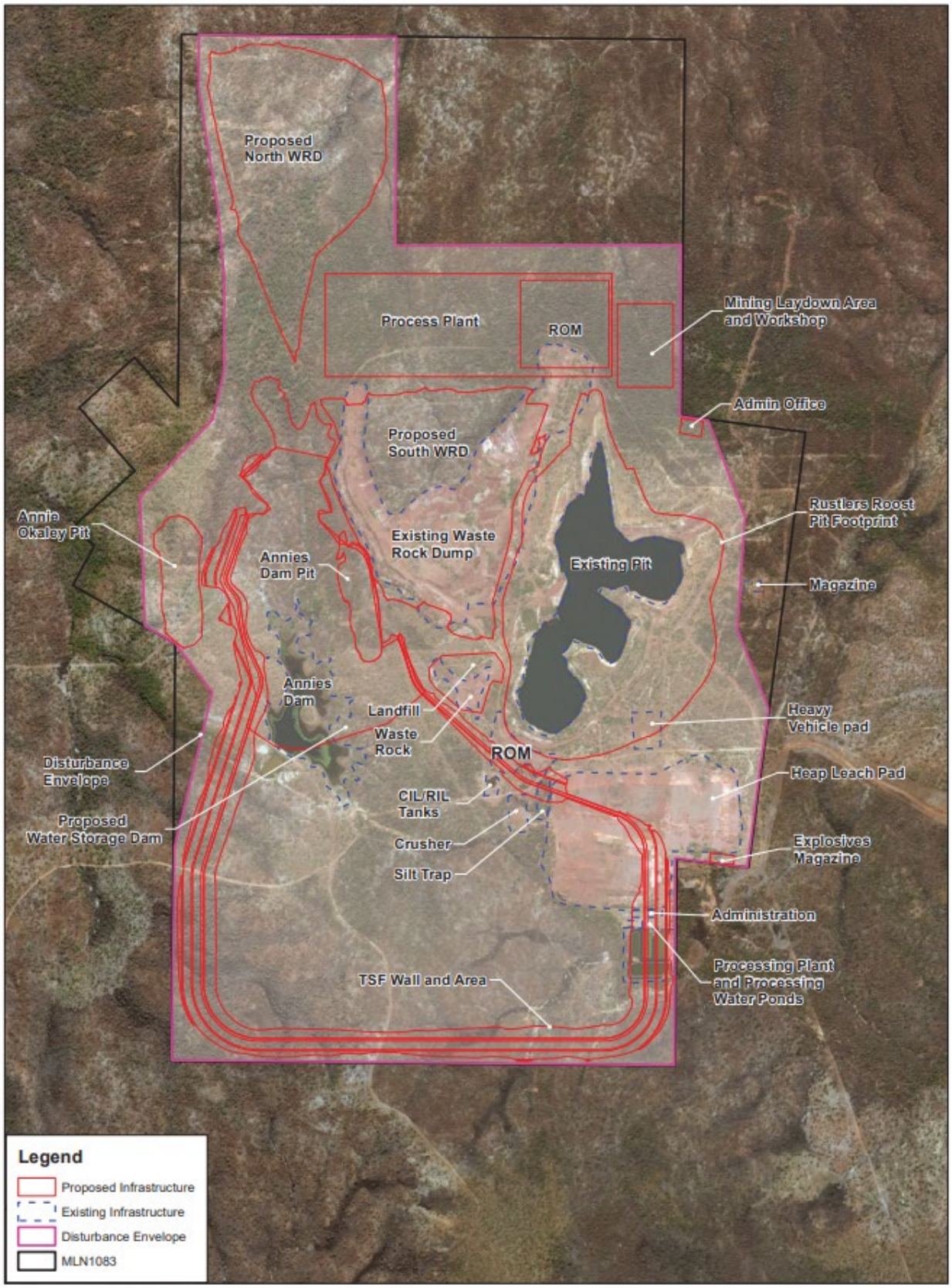

Figure 2 Rustlers Roost action elements and extent – mineral lease, existing infrastructure, and proposed disturbance envelope

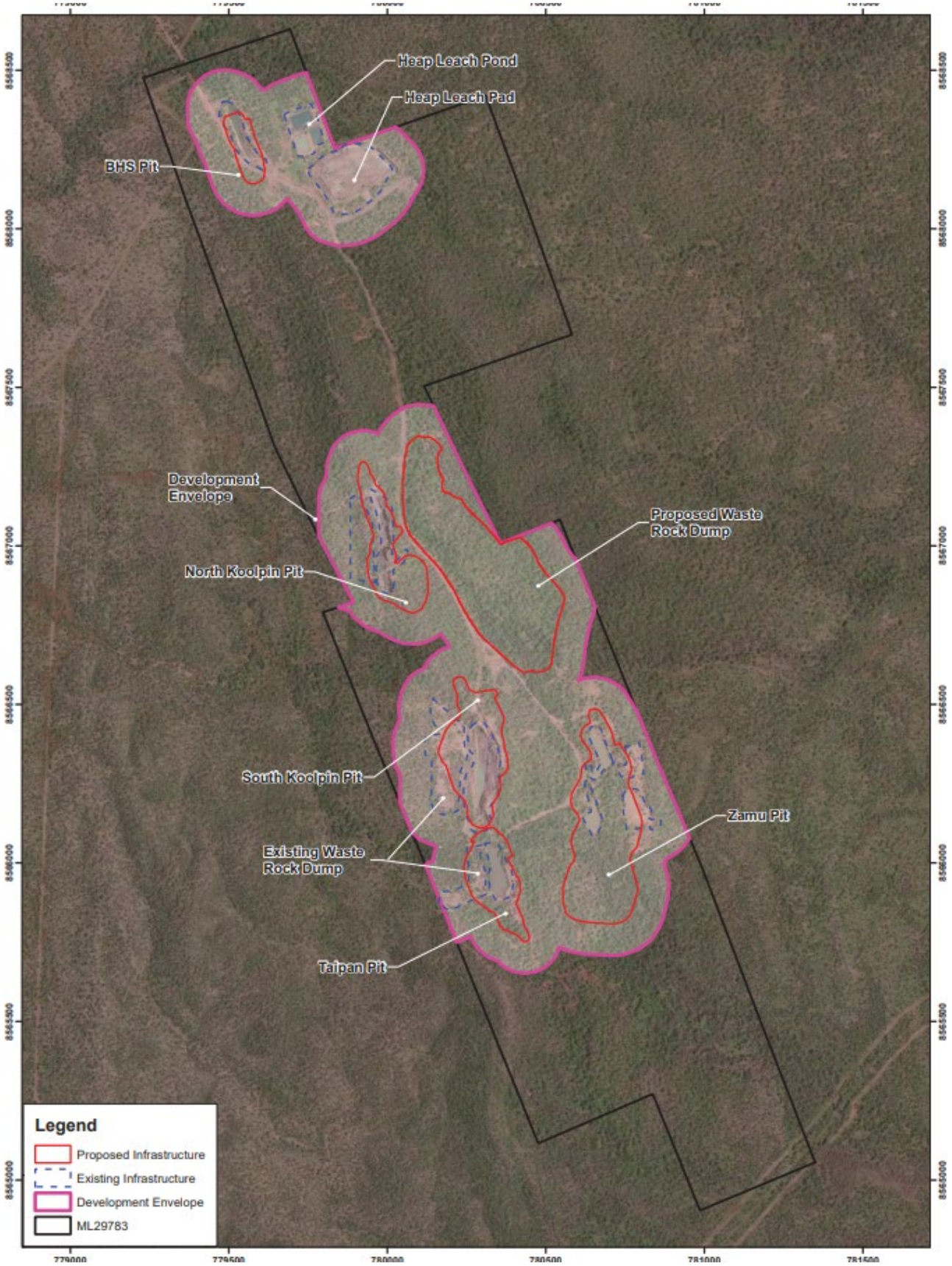

Figure 3 Quest 29 action elements and extent – mineral lease, existing infrastructure, and proposed disturbance envelope

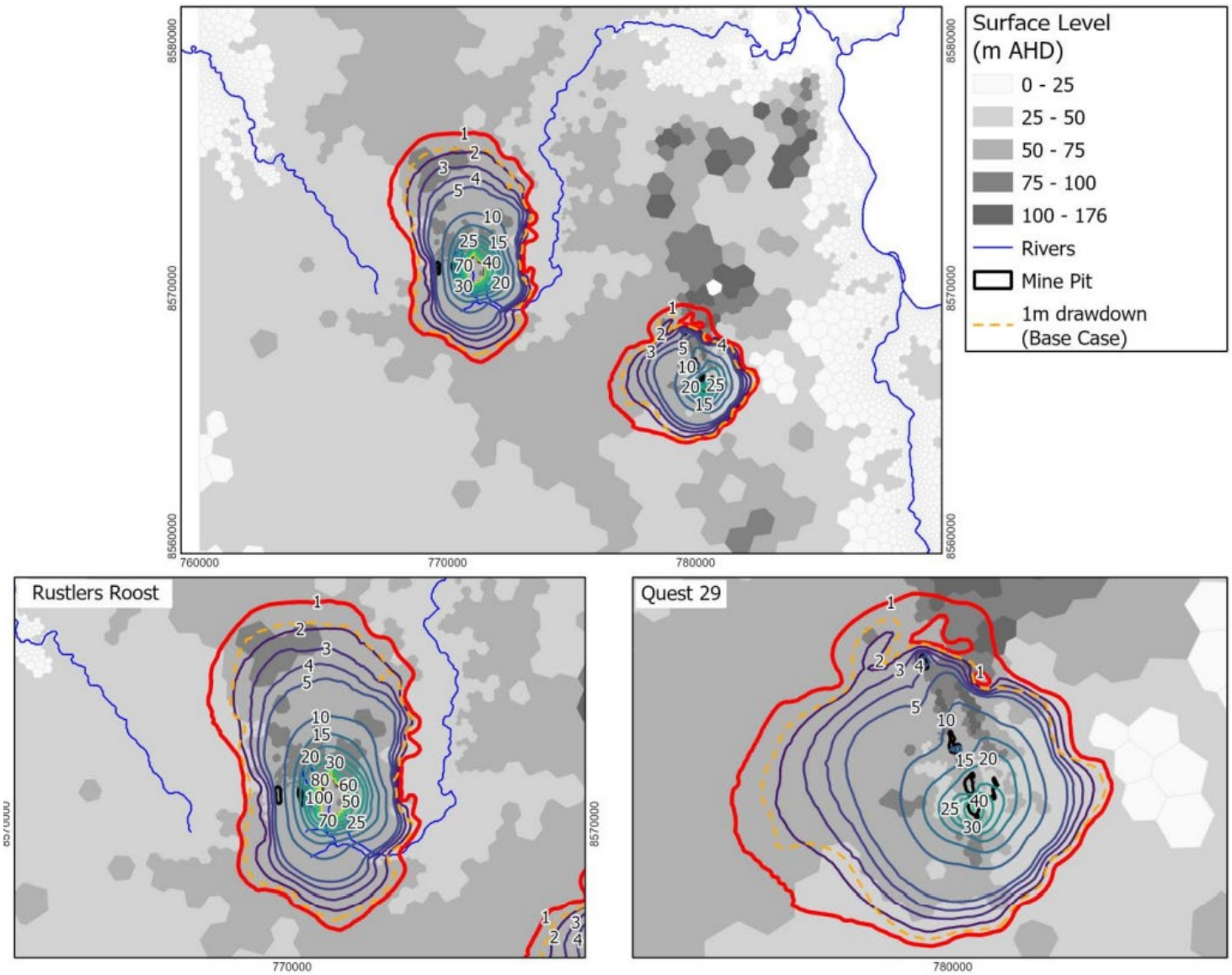

Figure 4 Map of the modelled 95th percentile maximum groundwater drawdowns (m), and the 1 m drawdown limit at Rustlers Roost and Quest 29

Appendix 2 – Environmental impact assessment timeline

Date	Assessment stages
23 February 2021	NT EPA accepts the proponent initiated Environmental Impact Statement EIS (EIS) referral for the Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment.
11 May 2021	NT EPA decided environmental impact assessment required - assessment by EIS.
25 February 2021 to 9 April 2021	Public consultation on the proponent initiated EIS referral (Referral form, main report, statement of reasons and draft terms of reference (TOR)).
26 August 2021	NT EPA accepts the notice of a significant variation of the proposed action (NOSV).
30 August 2021 to 24 September 2021	Public consultation on the proponent's NOSV (Significant variation form and main report).
5 October 2021	NT EPA decides: • the assessment can continue with the existing assessment method (environmental impact statement) with existing terms of reference and • the timeframe for the proponent to submit the draft EIS is 2 years from the date of the decision.
8 November 2021 to 13 January 2022	Public consultation on the draft EIS for the Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment
17 February 2022	NT EPA directs the proponent to: • consider and address issues raised in the submissions received on the draft EIS • prepare a Supplement to the Draft EIS to address comments and issues raised in the public submissions, and the comments from government authorities, and • provide additional information required by the NT EPA to ensure the NT EPA has sufficient information to complete the environmental impact assessment process.
10 October 2022 to 28 October 2022	Public consultation on the Supplement to the draft EIS for the Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment.
10 October 2022 to 10 March 2023	NT EPA prepares the assessment report and draft environmental approval for the Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment.
10 March to 30 March 2023	NT EPA consultation with proponent and statutory decision makers on the draft environmental approval.
18 April 2023	NT EPA's assessment report and draft environmental approval is provided to the Minister for Environment, Climate Change and Water Security by the NT EPA.
within 30 business days after receiving the NT EPA's assessment report	Minister's decision on the environmental approval. (If the Minister does not make a decision within 30 business days after receiving the assessment report the Minister is taken to have accepted the NT EPA's recommendation for approval)