

# Statement of Reasons

## NT MINING OPERATIONS – UNION REEFS NORTH UNDERGROUND MINE

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### PROPOSAL

NT Mining Operations Pty Ltd (the Proponent) owned by Kirkland Lake Gold, submitted a Notice of Intent (NOI) for the Union Reefs North Underground Mine (the Proposal), to the Northern Territory Environment Protection Authority (NT EPA) on 9 April 2019 for consideration under the Environmental Assessment Act 1982 (EA Act).

The Proposal is to construct, operate and rehabilitate an underground gold mine at the Union Reefs Project Area approximately 220km south of Darwin, between Adelaide River and Pine Creek, Northern Territory. Underground mining is proposed for two years, with the possibility of an extension of operations.

The Proposal area is within Mineral Lease 1109 which is part of a greater area of a highly modified brownfield site with historic gold mining over 140 years and recent mining over the past 40 years. Four pit lakes exist as a result of previous open cut gold mining, these are Union North, Prospect, Lady Alice and Crosscourse. Previous mining has also produced adits which provide specialised habitat for cave dwelling bats.

The Proposal includes:

- new underground mining to 220m below ground level via new access portal within the existing Prospect Pit, including:
  - ongoing pit and underground mine dewatering
  - development and production blasting
  - surface and underground waste rock storage
  - underground exploration drilling (to define mineral resource and extend life of mine)
- dewatering and construction of the underground access portal in Prospect Pit
- blasting operations comprising:
  - mine development for initial excavation of waste material to access ore (maximum charge of 35kg, one firing every 12 hours with 8 second blast spread)
  - mine production later in the life of mine to extract ore (maximum charge of 40kg, one firing every 24 hours with the blast spread over half a second)
- permanent waste rock storage as the portal access bench (36,000 tonne)
- temporary stockpile of waste rock in Prospect Pit to be progressively returned underground as backfill (151,200 tonne)
- processing of 279,089 tonnes of ore yielding 39,232 gold ounces
- water and tailings storage in Crosscourse Pit Lake
- use of existing infrastructure for ore processing, fuel and workshop facilities, office complex, offsite accommodation
- new infrastructure for underground mining includes: mine ventilation system, onsite haul road, explosives magazine, water storage using two 30 000 litre water tanks
- shared workforce of existing 130 employees and contractors, anticipated to increase to 300 personnel during processing and mining operations
- haulage for processing contained to private roads within the Proposal area.

The proposed water and energy requirements are:

- water use 47 to 63 megalitres per year (ML/yr)

- water sources:
  - dewater from Prospect Pit and the underground mine (254 to 347 ML/yr)
  - through existing pipelines from Dam C and Crosscourse Pit Lake
- wastewater generated 78.5 to 473 ML (averaging 276ML/yr)
- explosive (40 tonnes) and detonator (25kg) storage
- electricity use of 9 to 12 million kilowatts per year
- diesel consumption 720,000 litres per year
- annual greenhouse gas emissions of 9639 tonnes CO<sub>2e</sub>.

The existing mine closure plan (2015) will be updated to incorporate the Proposal and updated mine closure guidelines.

On 7 June 2019 the Proponent submitted an Action Plan for management of ghost bats in the Union Reefs project area.

The Proposal has been referred to the Australian Government Department of Environment and Energy for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

## CONSULTATION

The NOI has been reviewed as a notification under the EA Act in consultation with Northern Territory Government (NTG) advisory bodies (see Attachment A) and the responsible Minister, in accordance with clause 8(1) of the Environmental Assessment Administrative Procedures.

## JUSTIFICATION

The Notice of Intent and ghost bat Action Plan were assessed against the NT EPA's environmental factors and objectives. The NT EPA identified four key environmental factors that may be significantly impacted by the Proposal (Table 1). The NT EPA considered the importance of other environmental factors during the course of its assessment; however, the impact on those factors was not identified as potentially significant.

Table 1: Key environmental factors considered for this assessment

Theme	Environmental Factor	Objective
Land	Terrestrial flora and fauna	Protect the Northern Territory's flora and fauna so that biological diversity and ecological integrity are maintained.
Water	Hydrological processes	Maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
	Inland water environmental quality	Maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected.
	Aquatic ecosystems	Protect the aquatic ecosystems to maintain the biological diversity of flora and fauna and the ecological functions they perform.

## 1. Terrestrial flora and fauna

**Objective:** Protect the NT's flora and fauna so that biological diversity and ecological integrity are maintained.

The proposed activities occur largely in areas where flora and fauna have been subject to past disturbance. The Proposal area includes 354 hectares (ha) of rehabilitated land and 139ha of existing disturbed areas from previous mining.

One threatened wattle species, *Acacia praetermissa*, and riparian vegetation, including rainforest patches, are known to occur near the Proposal area. The Proposal is not likely to significantly impact these values due to the location of activities and application of management measures (e.g. weed management plan) presented in the NOI.

Eight threatened fauna species are recorded from or near the Proposal area. Given the previous extent of disturbance, there is a low likelihood for the Proposal area to contain important habitat for, or significant populations of, the following threatened fauna: northern quoll, black-footed tree-rat, Gouldian finch, partridge pigeon, yellow-spotted monitor, Mertens' water monitor the northern leaf-nosed bat. One species, the ghost bat, may be significantly impacted by the Proposal.

### *Ghost bat*

The ghost bat, *Macroderma gigas*, is listed as Vulnerable under the EPBC Act, but not listed as a threatened species under the Territory Parks and Wildlife Conservation Act 1976 (TPWC Act).

Four mine adits from historic mining activity in the Proposal currently provide day time roosting and/or night time refuge habitat for a local colony(s) of ghost bats. Nearby railway culverts within Mineral Lease 1109 provide additional night time refuge and feeding sites. Previously (1993-1996) eight adits identified to have a very low level of bat usage were closed or mined. The NT EPA recognise that the use of man-made structures represents post closure return to ecological function and that the adits are important habitat for current and future populations of cave-dwelling bats. The NOI indicates that other abandoned mine workings and natural caves within and near the Proposal area may be suitable for use by ghost bats.

The NOI describes ghost bat activity as determined by echolocation and thermal infra-red video recordings as well as the observation of scats and feeding sign. Preliminary results of baseline monitoring indicate that of the four used adits, the Union North and OK adits are the most important for ghost bats in the Proposal area. The NOI identifies the greatest threats to ghost bats from proposed mining activities as noise and vibration associated largely with blasting, mining operations such as dewatering and haulage activities (in proximity to the adits). These are summarised as:

- damage to roost sites through internal collapse or entrance blockage
- relocation of bats to suboptimal roosts on nights following noise or vibration disturbance with potential for increased mortality due to use of inferior, energy draining roosts
- daytime abandonment of roosts due to excessive noise or vibration with potential for predation by raptors and exposure to hot conditions while trying to find alternative roosts.

Actions, management and mitigation measures proposed in the NOI to reduce impacts on ghost bats include, but are not limited to:

- minimising ground vibration by limiting blast charge weights
- long term monitoring to determine seasonal roost usage and regional importance of roost sites
- developing an effective monitoring strategy and adaptive management response to avoid impact on ghost bats and other obligate cave dwelling bat species.

The Ghost Bat Action Plan provided did not appear to include the monitoring and mitigation measures proposed in the NOI nor did it contain details of an effective monitoring strategy and appropriate management responses in accordance with the final point above.

Ghost bat populations have been shown to be genetically distinct at regional and local scales and so impacts to a small number of individuals can result in a significant impact at the local, and potentially regional, population scale.

The DENR Flora and Fauna Division supports the current approach of long term ghost bat monitoring to understand seasonal information and the significance of sites within the Proposal area and region. However, the information provided in the NOI and Action Plan is not sufficient to assess the seasonal use nor regional significance of the mine adits within the Proposal area. Further to this, evidence is required to provide certainty around the outcome of ghost bat relocation to demonstrate that closing the two known roosting adits is unlikely to result in significant impact on an important sub-population of ghost bats.

In conclusion, the NT EPA considers that further assessment is required to determine whether adit closure is acceptable or represents a significant impact on ghost bats at both local and regional scales. The information provided in the NOI is not sufficient to assess the extent and consequence of the potential impacts. Uncertainty remains about whether the NT EPA's environmental objective for Terrestrial flora and fauna is likely to be met.

## 2. Hydrological processes

**Objective:** Maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.

The NOI indicates that the groundwater system of the Proposal area is comprised of two main aquifers, a shallow aquifer associated with weathered basement rock and a deep aquifer comprising fresh but fractured and mineralised rock. Hydrological connectivity between these aquifers, the Pine Creek borefield (which represents the town's water supply) and existing mine pit lakes is recognised as being highly directional. Surface water from the Proposal area drains to the north from ridges through ephemeral creeks and streams to the Mary River via the McKinlay River.

The Proposal involves reducing and maintaining the water level of the Prospect Pit Lake during the construction of the underground access portal. Complete dewatering of the Prospect Pit is proposed over seven months and dewatering of inflows to the underground mine and Prospect Pit will be ongoing. Dewatering could result in a propagation of drawdown effects for significant distance along the zone of permeability within the aquifer.

The potential impacts and risks to Hydrological processes from the Proposal therefore include effects of mine dewatering on surface waterways and groundwater aquifers in the region.

The NOI does not provide sufficient information on connectivity of mine generated water, surface water flows and groundwater systems nor details of a monitoring plan necessary to monitor potential drawdown effects. Uncertainty remains around potential impacts and risks to surrounding water bodies and aquifers from dewatering the pit and underground mine as well as from water transfer among pits and across the site.

The NT EPA considers that the information provided in the NOI is not sufficient to assess the extent and consequence of the potential impacts on hydrological processes and therefore whether the NT EPA's environmental objective for Hydrological processes is likely to be met.

### 3. Inland water environmental quality

**Objective:** Maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected.

The Proposal area comprises various water bodies as a result of previous open cut gold mining. The Proposal includes stockpiling waste rock permanently as part of the portal access as well as temporarily within the dewatered Prospect Pit, to be returned underground both during operations and upon closure. All mine water, process water and tailings are proposed to be retained within the existing Crosscourse Pit Lake, which has previously received tailings during other phases of activity.

Potential impacts and risks to inland water environmental quality from the Proposal include:

- potential impacts on groundwater quality from acid, metalliferous and saline drainage (AMD) from surface waste rock storage
- post closure risks to water quality in Prospect and Crosscourse mine pit lakes.

The NOI provides water quality for some pits but not others. Water quality has not been presented for Lady Alice Pit, Dam A, Dam C and Union North Pit, and for water that is predicted to enter the underground voids. Further information is also required on waste rock characterisation.

Uncertainty remains about the water balance, water quality predictions and appropriate management of water during and post mining. The NT EPA is not able to determine whether the NT EPA's environmental objective for Inland water environmental quality is likely to be met.

### 4. Aquatic ecosystems

**Objective:** Protect aquatic ecosystems to maintain the biological diversity of flora and fauna and the ecological functions they perform.

Aquatic ecosystems are present as permanent pools along the McKinlay River, approximately 200m from the boundary of Mineral Lease 1109. These aquatic ecosystems represent the surface expression of groundwater and can be regarded as groundwater dependant ecosystems (GDE). The NOI does not identify the value, significance or the potential for the Proposal to impact on these aquatic ecosystems. Based on the altered groundwater quality from previous on-site activities and the hydrological connectivity between existing mine pit lakes and dams, the Proposal has the potential to significantly impact on both the groundwater recharge and quality of the aquatic ecosystems of McKinlay River during and post mining.

The NOI did not specifically address impacts from the Proposal on aquatic ecosystems and therefore there is significant uncertainty around the value and sensitivity of aquatic ecosystems, and the potential for impacts on those ecosystems including cumulative impacts with other actions in the Proposal area.

Given the insufficient information in the NOI and uncertainties regarding hydrological and water quality impacts from the Proposal as noted previously, the NT EPA is not able to determine whether the NT EPA's environmental objective for Aquatic ecosystems is likely to be met.

## CONCLUSION

The NT EPA considers that the Proposal has the potential to have significant environmental impacts on the following NT EPA environmental factors: Terrestrial flora and fauna, Hydrological processes, Inland water environmental quality and Aquatic ecosystems.

The NT EPA considers that a more comprehensive evaluation of these impacts and mitigation measures is required by the Proponent to address remaining uncertainty, and consequently enable the NT EPA to form a view about whether its environmental objectives can be met.

The matters for a targeted assessment will be set out by the NT EPA in Terms of Reference for the Proposal. Draft Terms of Reference will be available for public comment.

## **DECISION**

The Union Reefs North Underground Mine is capable of having a significant effect on the environment and its environmental significance is such that the preparation of an environmental impact statement is necessary with respect to the proposed action.



DR PAUL VOGEL AM MAICD  
CHAIRMAN

NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

7 AUGUST 2019

**Attachment A: Northern Territory Government Agencies consulted on the Notice of Intent**

<b>Department</b>	<b>Division</b>
Department of Environment and Natural Resources	Flora and Fauna Water Resources Weeds Environment Bushfires NT Rangelands
Department of Infrastructure, Planning and Logistics	Lands Planning Infrastructure Transport
Department of Primary Industry and Resources	Fisheries Mining Compliance Petroleum Primary Industry
Department of Tourism, Sport and Culture	Heritage Tourism NT Arts and Museums Parks and Wildlife
NT Police, Fire and Emergency Services	Business Improvement and Planning
Department of Health	Environmental Health Medical Entomology
Department of Trade, Business and Innovation	Economics and Policy Strategic Policy and Research
Department of Local Government, Housing and Community Development	Maintenance Planning Housing supply
Power and Water Corporation	
Aboriginal Areas Protection Authority	Technical
Department of the Attorney-General and Justice	Commercial Division NT Worksafe
Land Development Corporation	
Department of the Chief Minister	Economic and Environmental Policy