

Statement of Reasons

PNX METALS LIMITED – HAYES CREEK PROJECT

PROPOSAL

PNX Metals Limited (the Proponent) submitted the Notice of Intent (NOI) for the Hayes Creek Project (the Proposal) to the Northern Territory Environment Protection Authority (NT EPA) on 27 August 2018 for consideration under the *Environmental Assessment Act* (EA Act). The Department of Environment and Natural Resources requested further information on the biodiversity survey methodology and this was provided by the Proponent on 11 September 2018.

The Proponent proposes to mine polymetallic ore bodies at Mount Bonnie and Iron Blow and process ore at Fountain Head (Figure 1) over a total of eight years. Processing would produce concentrates of zinc and gold/silver that would be transported by truck to the Port of Darwin for shipment to international markets. The Proposal areas would be rehabilitated (progressively where possible) using native species over an unspecified period.

The Proposal includes:

- Mining:
 - expansion and mining of an existing open pit at Mount Bonnie
 - development and mining of a new underground mine at Iron Blow
 - storage of waste rock as follows:

Type	from Mount Bonnie	from Iron Blow
non-acid forming (NAF)	new permanent waste rock dump at Mount Bonnie	in mined out stopes underground
potentially acid forming (PAF)	temporary storage in waste rock stockpiles (WRS) during operations, and ultimate sub-aqueous storage in the former Mount Bonnie pit	in mined out stopes underground or sub-aqueously in the Mount Bonnie pit
- Processing at Fountain Head:
 - construction of administration offices, workshop, processing plant, and a power generation plant
 - development of new road crossings of the railway and gas pipeline for access
 - processing of ore, involving multi-metal recovery using crushing, milling, and flotation
 - use of an unspecified volume of water from the pit – for processing
 - sub-aqueous storage of all tailings in the existing flooded pit
- clearing of approximately 33 ha of native vegetation (combined total clearing at all three sites)
- local and interstate sourcing of the workforce (150 construction personnel; 130 operation personnel), that would be accommodated at existing mining camps in the area
- transport of ore in covered road trains via public and private roads within the Proposal area.

The Proposal is located approximately 170 km south of Darwin, about 10 km east of Hayes Creek Wayside Inn on the Stuart Highway. The Proposal area straddles the Northern Goldfields loop tourist drive, which passes the Grove Hill Hotel (~ 5km north of Iron Blow – see Figure 1) and within 1 km of Iron Blow and 2 km of Mount Bonnie. The nearest towns are Adelaide River and Pine Creek, located to the north and south respectively.

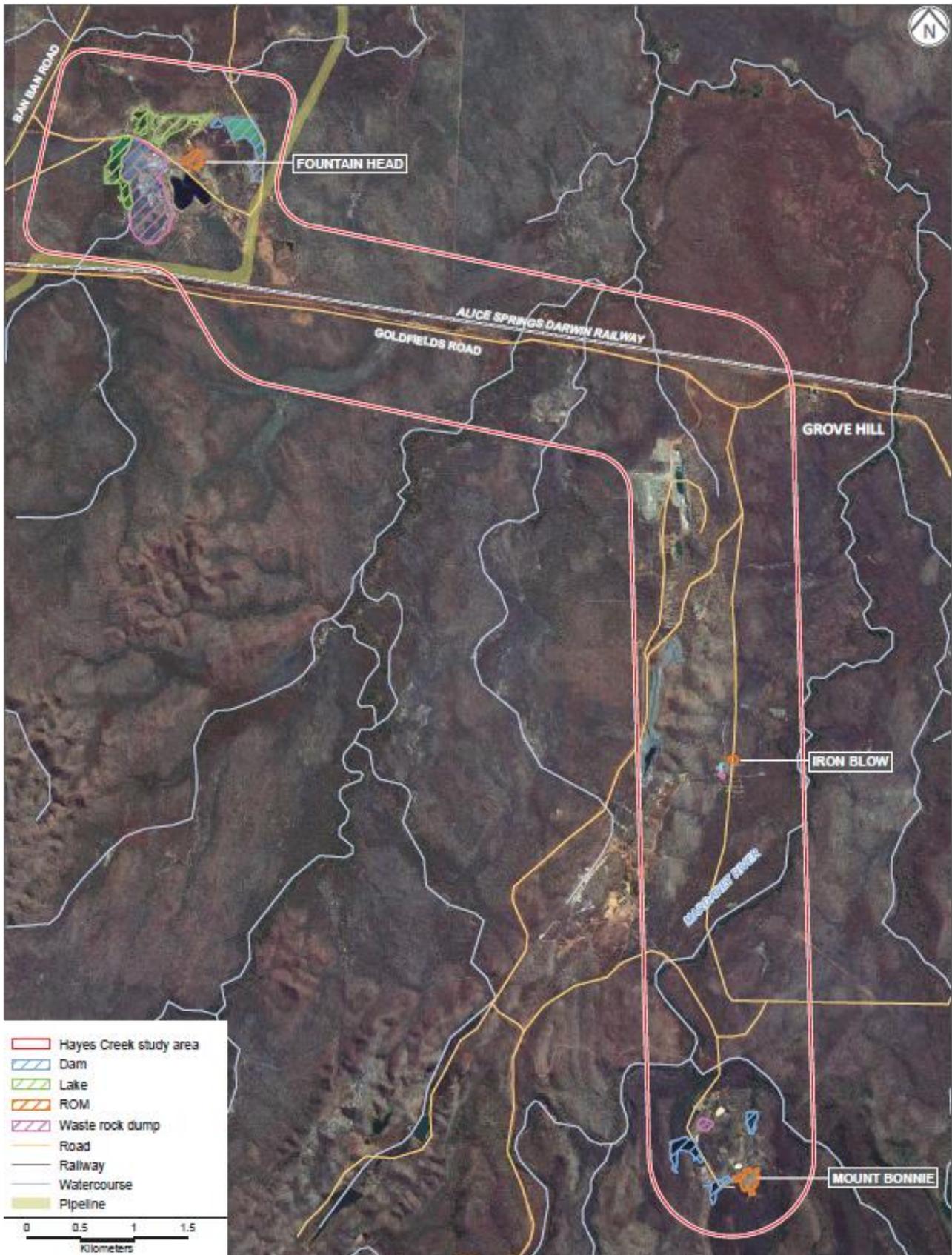


Figure 1: The Proposal is for mining at Mount Bonnie and Iron Blow, and processing at Fountain Head

All three sites have been previously mined for various metals in the last 135 years. Legacy components include water-filled open pits, waste rock dumps, tailings storage facilities, dams, process plant sites, an ore stockpile, and other infrastructure and disturbance.

The Proposal includes the decommissioning and rehabilitation of the various sites over an unspecified period, including:

- removal of infrastructure
- removal of contaminated material
- reshaping of new landforms including the NAF waste rock storage at Mount Bonnie
- revegetation of disturbed areas and new landforms with native species
- if necessary, treatment of the water column above the in-pit tailings storage facility at Fountain Head.

CONSULTATION

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

JUSTIFICATION

The NOI and further information were assessed against the NT EPA’s environmental factors and objectives¹. The NT EPA identified six key environmental factors that may be significantly impacted by the Proposal (Table 1).

Table1: Key environmental Factors

Theme	Key Environmental Factor
Land	1. Terrestrial flora and fauna
	2. Terrestrial environmental quality
Water	3. Aquatic ecosystems
	4. Inland water environmental quality
	5. Hydrological processes
People and communities	6. Social, economic and cultural surroundings

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 NOI stated that two threatened species are known to occur in the Proposal area:

- Gouldian finch (*Erythrura gouldiae*) – listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and vulnerable under the *Territory Parks and Wildlife Conservation Act* (TPWC Act). A group was recorded during field surveys in May 2017 on an existing vehicle track.

¹ NT EPA, 2018. *NT EPA Environmental Factors and Objectives*. Northern Territory Environmental Protection Authority, Darwin. Available at: <https://ntepa.nt.gov.au/environmental-assessments/env-assessment-guid>

Suitable habitat occurs across 55% of the Proposal area. Proposed clearing would affect 5% of this habitat.

- Merten's water monitor (*Varanus mertensii*) – listed as vulnerable under the TPWC Act. An individual was recorded in the existing Iron Blow pit in 2016.

The DENR Flora and Fauna Division advised that the extent of suitable habitat for threatened species within the proposed disturbance footprint is minimal and clearing activities are largely restricted to previously disturbed areas.

The NOI stated that the floodplain monitor, listed under the TPWC Act, and 23 threatened species (21 fauna and 2 flora), listed under the EPBC Act have the potential to occur within 20 km of the Proposal area. The Proponent conducted a flora and fauna field survey and did not detect any of these additional species. The DENR Flora and Fauna Division advised that the field survey methods used were suitable, with the exception of methods to detect the ghost bat (*Macroderma gigas* – Vulnerable, EPBC Act), however it considered the proposed mining activities would present a low risk to the ghost bat.

In addition, riparian vegetation occurs along ephemeral creeks and Margaret River tributaries downstream of the Proposal area.

The NOI identified the potential for impacts to flora and fauna due to the clearing of vegetation and habitat, reduced conditions for plant growth due to dust deposition, and the spread of weed or feral animal species. The NT EPA notes that there is also potential for impacts on flora and fauna species or reduction in habitat quality, including threatened species and riparian vegetation, through erosion and sedimentation (discussed in section 2), exposure to contaminated water (discussed in section 4) and altered hydrological conditions (discussed in section 5).

The NOI concluded that it is unlikely that the Proposal would have a significant impact on listed threatened species and communities or migratory species that occur or potentially occur in the area. The DENR Flora and Fauna Division agreed with this conclusion, provided that leading-practice mitigation, monitoring and mine closure strategies are implemented to avoid impacts to downstream environmental values. The NT EPA considers that this requirement would be addressed through the assessment of other factors, particularly terrestrial environmental quality (section 2) and inland water environmental quality (section 4).

In conclusion, the NT EPA considers that while there is a low risk of significant impacts on terrestrial flora and fauna, further quantification of the residual impact to threatened species is required to demonstrate that the NT EPA's objective for this factor can be met.

2. Terrestrial environmental quality

Objective: Maintain the quality of land and soils so that environmental values are protected.

The Proposal requires clearing of native vegetation, construction of waste landforms, storage of benign and non-benign mined material, and the management of fuels and other reagents. These activities have the potential to contribute to the erosion or contamination of land and soils.

A significant risk is posed by the storage of non-benign mined material which, if not managed and remediated appropriately, could release contaminants into the environment into the long term, potentially resulting in legacy impacts following closure. The NT EPA considers that the NOI has not provided sufficient information to enable an assessment of the proposed management measures including closure. The NT EPA considers that comprehensive and effective mine closure planning and implementation will be essential for the prevention of future legacy impacts. A draft Mine Closure Plan is needed to demonstrate how successful

rehabilitation (geotechnically stable, non-polluting/non-contaminating) would be achieved post closure. The NT EPA considers that leading-practice mitigation, monitoring and mine closure strategies must be implemented to avoid impacts to water quality and downstream aquatic ecosystems.

During operation there is potential for contamination of land and soil to occur from spills or from leaching from mined materials. There is also potential for erosion due to vegetation clearing, altered surface water hydrology, and the placement of mined materials on the soil surface. The NT EPA is supportive of the proposed standard mitigation measures outlined in the NOI, including bunds, drains, diversion channels, sediment traps, oil traps, and soakage pits. However the NT EPA considers that the information provided in the NOI is not sufficient to assess the effectiveness of proposed management measures, especially in relation to waste classification and potential legacy conditions in the Proposal area.

In conclusion, the NT EPA considers that there is potential for significant impact on terrestrial environmental quality and that the information provided in the NOI is not sufficient to assess the likelihood and extent of the potential impacts. Uncertainty remains about whether the NT EPA's environmental objective can be met.

3. Aquatic ecosystems

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

The downstream surface water environment sustains important aquatic ecosystem values that depend on the existing quality and quantity of water in the system. In the vicinity of the Proposal these occur in the Margaret River and its ephemeral tributaries, including ephemeral creeks. Further downstream is the Adelaide River coastal floodplain Site of Conservation Significance² and conservation reserves including Djukbinj National Park³.

Alteration to water quality or hydrology (as discussed in sections 4 and 5) may affect the health and survival of aquatic species, which may in turn affect ecosystem function. The NOI discussed a number of measures to avoid, mitigate and manage the potential impacts. However, without a better understanding of the current level of impact; the potential for future impacts to inland water environmental quality and an assessment of proposed management measures, the NT EPA cannot assess the likelihood and severity of potential impacts on aquatic ecosystems.

Depending on the likelihood of impacts to surface water quality, work may be required to characterise the current condition of downstream aquatic ecosystems, and to design monitoring programs to detect, assess and remedy any impacts attributable to the Proposal.

The NT EPA considers that there is potential for significant impact on aquatic ecosystems and that the information provided in the NOI is not sufficient to assess the likelihood and extent of the potential impacts. Uncertainty remains about whether the NT EPA's environmental objective for this factor can be met.

4. 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.

² http://www.territorystories.nt.gov.au/bitstream/handle/10070/254075/12_adelaide.pdf

³ https://dtc.nt.gov.au/data/assets/pdf_file/0006/249036/Adelaide-River-Conservation-Reserves-JM-Plan-August-2014_final.pdf

The Proposal area is situated in the upper catchment of the Margaret River, a major tributary of the Adelaide River. This river system supports aquatic ecosystems and significant riparian vegetation. Downstream land uses include conservation, tourism, aquaculture, horticulture, and pastoralism. A major proposal, Adelaide River Off-stream Water Storage (AROWS), a critical component of Darwin's future water supply⁴, is planned in the same catchment as the Proposal.

There are limited groundwater users in the vicinity of the Proposal area, although the Grove Hill Hotel is located within 5 km of the Iron Blow site. There are potentially other values dependent on the current groundwater quantity and quality, including environmental and/or cultural.

The Proposal will require the handling of hazardous chemicals and non-benign mined materials (including tailings) that have the potential to contain or generate contaminants that, if released, could lower the quality of environmental groundwater or surface water and impact environmental values. The proposed activities also require the removal of groundwater to enable mining. If this water has poor quality and is released at the surface (e.g. for dust suppression, as proposed in the NOI), it could lower the quality of surface water downstream from the Proposal area. The Department of Environment and Natural Resources (DENR) Water Resources Division advised that yields from aquifers in areas of mineralisation can be much greater than predicted from a desktop assessment, and may necessitate discharge. There is also the potential for the release of poor-quality pit water post-closure that could impact on downstream values.

The NOI acknowledges that mined materials will contain potentially acid forming (PAF) material that requires appropriate management. It also outlines proposed measures to prevent the generation and release of resulting contaminants to the environment. However, the NT EPA considers the following knowledge gaps prevent assessment of the suitability of the proposed management strategies:

- results of waste characterisation to give greater confidence in the predicted quantity and quality of materials capable of generating acid, neutral, saline, metalliferous and/or other non-benign drainage
- baseline groundwater quality in the vicinity of the proposed waste storage facilities and pits, which may affect how water can be used around the site or discharged
- baseline groundwater movement and quantity which may influence water quality due to the migration of contaminants from previous mining activities
- baseline surface water quality in the Margaret River to enable detection of potential future impacts
- a water balance for the Proposal
- potential impacts of groundwater extraction (for dewatering) and contamination on other groundwater users in the area
- hydrological conditions (water levels and potential overflow) and water quality of the final pit lakes at Fountain Head and Mount Bonnie, and potential impacts to people and fauna post-closure
- baseline geochemistry of legacy components at the sites to be used.

Further, the NOI does not specify measures that would prevent the generation and seepage of acid and metalliferous drainage (AMD) from PAF waste rock temporarily stockpiled at Mount Bonnie.

In conclusion, the NT EPA acknowledges there is potential for significant impacts to inland water environmental quality resulting from proposed mine pit dewatering, AMD from ore and waste rock stockpiles and mine pits/voids, potential overflow of pits post-closure and hazardous

⁴ Advised by Power and Water Corporation. See Darwin Region Water Supply Strategy https://www.powerwater.com.au/data/assets/pdf_file/0008/61469/darwin-water-strategy-2013.pdf

chemical spills. The information provided in the NOI is not sufficient to enable an assessment of the potential impacts and the suitability of the proposed mitigation and management measures. There remains uncertainty about whether the NT EPA's environmental objective for this factor can be met.

5. Hydrological processes

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

Surface water flows at the Proposal sites drain into ephemeral creeks that join the Margaret River within 1 km (Mount Bonnie and Iron Blow) or more (Fountain Head). Groundwater in the vicinity of the Proposal occurs within local aquifers in fractured rocks, and to a minor extent in fractured/weathered basement rocks. There are few other users of groundwater in the area, the closest being Grove Hill Hotel, about 5 km from the Iron Blow site.

The NOI identified that the Proposal is likely to reduce the quantity of water in local creeks due to the diversion, retention and management of water that comes into contact with disturbed areas. This could impact riparian vegetation and aquatic ecosystems in local creeks. The likely reduction in surface water flows and resulting potential impacts are uncertain at this stage until a water balance is developed for the Proposal.

The NOI also identified that water may be discharged from the Mount Bonnie pit (following storage of PAF) material and/or the Fountain Head in-pit tailings storage. The likelihood of this and its potential impacts cannot be assessed by the NT EPA until further characterisation of groundwater and surface water regimes is completed.

The NT EPA considers that there is also potential for changes to the groundwater hydrological regime due to dewatering requirements for mining and the presence of permanent pit lakes following closure. This could affect the quantity and quality of water available to other users in the area, including any groundwater dependent ecosystems. Without a characterisation of local groundwater hydrology there is insufficient information to assess this potential impact.

In conclusion, the NT EPA considers that there is potential for significant impact on hydrological processes and there is uncertainty about whether the NT EPA's objective for this factor can be met.

6. Social, economic and cultural surroundings

Objective: Protect the rich social, economic, cultural and heritage values of the Northern Territory.

Little information was provided in the NOI on the range of stakeholders that may be affected by the Proposal. The region has predominantly pastoral land use with some mining, and it also has tourism values. Local roads are used by landholders, mine operators and tourists. The Northern Goldfields loop tourist drive and the Ghan passenger railway service pass directly through the Proposal area. The Grove Hill Hotel is located within 5 km of the Proposal area. The Stuart Highway is used extensively for commercial and recreational purposes. The nearby small towns of Adelaide River and Pine Creek (populations ~240 and ~380 respectively) have high levels of unemployment.

The Proposal will require the use of public and private roads, including a section of the Northern Goldfields loop and construction of a new railway crossing. The Stuart Highway will be used for transport of materials and product to and from Darwin Port. The NT EPA considers that trucks entering, leaving and using the Stuart Highway have the potential to significantly impact other users. Use of the Stuart Highway and local roads could also significantly impact

tourists and tour operators. There is uncertainty regarding other potential socio-economic impacts of the Proposal as no consultation has been conducted with the community to identify concerns.

The potential socio-economic impacts of the Proposal were not comprehensively addressed in the NOI. The NT EPA acknowledges that there are potential economic benefits to businesses in Adelaide River and Pine Creek through service provision to the mine workforce. There is an opportunity for training and employment of the local population and for setting Aboriginal employment targets. There is also potential for negative economic and social impacts from the Proposal. For example, any contamination of soil or introduction and/or spread of weeds could lower the economic productivity of pastoral land. Potential social impacts could include changes to amenity of the landscape (e.g. a waste rock stockpile) and changes to community cohesion; lifestyle; aspirations; and physical, mental, social and spiritual health and wellbeing. The NT EPA considers that engagement with the community and relevant agencies is necessary to understand the full range of potential social and economic impacts associated with the Proposal and to develop appropriate mitigation and management measures.

Broader cultural considerations were not comprehensively addressed in the NOI. These could include potential impacts on traditional Aboriginal connections to land, and are likely linked with social issues discussed above.

The NT EPA considers there is potential for significant impacts to social, economic and cultural surroundings as a result of the Proposal. The information provided in the NOI is not sufficient to enable an assessment of the potential impacts and any mitigation and management measures. There remains uncertainty about whether the NT EPA's environmental objective for this factor can be met.

CONCLUSION

The NT EPA considers that the Proposal has the potential to have significant environmental impacts to the following NT EPA factors:

1. Terrestrial flora and fauna
2. Terrestrial environmental quality
3. Aquatic ecosystems
4. Inland water environmental quality
5. Hydrological processes
6. Social, economic and cultural surroundings.

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

Detailed matters for 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 review.

DECISION

The Hayes Creek Project 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
CHAIRMAN

NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

14 DECEMBER 2018

Attachment 1: Northern Territory Government Agencies consulted on the Notice of Intent

Department	Division
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 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 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