Appendix 11. Fountain Head Gold Project – Socio-economic Impact Assessment Report

FOUNTAIN HEAD GOLD PROJECT

SOCIO-ECONOMIC IMPACT ASSESMENT

01238D_12_V4

MAY 2021

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PNX Metals

Fountain Head Gold Project

Socio-economic Impact Assessment

01238D_12_v4, April 2021

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Executive Summary

PNX Metals Limited (PNX) proposes to recommence mining at Fountain Head, which was most recently undertaken from 2007 to 2009 by GBS Gold. However, the site has a long history of gold mining and exploration dating back to the 1800s.

PNX submitted a notice of intent (NOI) for the Fountain Head Gold Project (the Project) in December 2019. The Northern Territory (NT) Environmental Protection Authority (EPA) determined that an environmental impact statement (EIS) is required, and the assessment of economic and social impacts is an essential part of this process.

This socio-economic impact assessment (SIA) supports regulatory decision-making for the Project and provides:

- A characterisation of the socio-economic environment relevant to planned Project activities.
- An assessment of the potential positive and negative socio-economic impacts that may occur within the local and regional area in response to the Project.
- Measures to avoid or minimise negative impacts and maximise Project benefits.

The SIA has been undertaken in accordance with relevant NT legislation and guidelines, and good industry practice.

The Project will be completed over a 3.5-year period. It will involve recommencing mining in an area that has been recently mined and, in a region where mining is a significant employer. It will comprise a relatively small workforce (estimated 134 workers), sourced from within the NT and local communities where possible. Others will be bused in and out from Darwin and will be accommodated at a camp close to the Project site.

There will be no accommodation camp facilities constructed on site and the Project is currently evaluating options including utilising and expanding existing accommodation facilities near Fountain Head. The workforce will be transported by bus from the selected camp with the daily commute to and from work to be less than 1 hour per journey. There will be approximately 80 persons housed at the camp at any one time (day and night shift).

It is proposed that power requirements will be provided by an on-site diesel-fired power station. Water for processing will be sourced on site whilst potable water will initially be trucked to site from Pine Creek or Adelaide River, and will later be sourced from on-site sources (if viable). The Project will use public roads to transport equipment and supplies to and from the Project site from Darwin, and the Project workforce between site and their accommodation.

The Project is located on Ban Ban Springs Station, an operating cattle station approximately 170 km south of Darwin and approximately 13 km east of the Stuart Highway. Other land uses in the surrounding area include pastoral leases, freehold blocks, mining, the Adelaide to Darwin

railway line, the Amadeus Gas Pipeline easement, and the Darwin to Katherine Electricity Transmission Line.

The Project is located on the traditional lands of the Warai and Wagiman peoples. Six Aboriginal places and five archaeological objects, as defined under the *NT Heritage Act 2012* were recorded during an archaeological survey of the Project area in 2019. Five archaeological sites have been recorded during previous surveys, and custodians have also noted that large (greater than 3 m tall) termite mounds in the area have cultural significance (AAPA, 2021).

There are no population centres located immediately adjacent to the Project area. The main population centres in the Project area are Pine Creek (in Victoria Daly local government area (LGA), located approximately 50 km southeast of the Project area and Adelaide River (in Coomalie LGA) located approximately 50 km to the northwest. The populations of these towns are small (fewer than 400 people at the last census) and have high Aboriginal populations.

The largest industry (by employment) in the Victoria Daly LGA is mining and in Coomalie LGA the largest employer is the education and training sector, followed by accommodation and food services (id, Undated(h); id, Undated(i)). Employment in Adelaide River and Pine Creek is primarily in education and public administration, accommodation services and cattle farming, and in Pine Creek, the mining industry is also an important employer. Unemployment in Adelaide River and Pine Creek is high compared to NT and Australia.

The Project will deliver some key benefits to local communities and the NT economy. Most negative residual impacts were assessed as ***Negligible*** or ***Low*** after the implementation of the management measures outlined in this report. The potential impact on Aboriginal places located within the Project footprint area is assessed as ***Moderate***, due to the high cultural significance of these sites.

Both the potential positive and negative impacts associated with the Project are summarised in Table ES1.

Table ES1 – Summary of Socio-economic Impacts

Impact	Residual Rating	Report Section
Economic benefits (royalties and mining levy payments) to the NT government	***Positive***	Section 3.2
Stimulation of the regional and local economy via payments made to workers and support for local business	***Positive***	
Increased employment and training opportunities for local communities	***Positive***	Section 3.3
Community expectations regarding employment (and Project benefits in general) are not met	***Negligible***	
Disruption to operations of the Bonaparte Gas pipeline (BGP) and the Adelaide to Darwin railway line	***Low***	Section 3.4
Reduction in land suitability for pastoral activities due to: • Loss of access to the Fountain Head lake for stock watering • Reduction in groundwater quality	***Negligible***	
Increased pressure on local health and emergency services	***Low***	Section 3.5

Impact	Residual Rating	Report Section
Strengthened social cohesion	***Positive***	Section 3.6
Improved visual amenity	***Positive***	
Reduced safety of freight trains and passengers travelling the Adelaide to Darwin railway line	***Negligible***	Section 3.7
Loss or damage to known cultural heritage objects/artefacts or Aboriginal places	***Low*** (objects), ***Moderate*** (places)	Section 3.8
Loss or damage to unknown cultural heritage objects/artefacts	***Low***	

Glossary

Term	Definition
baseline	an initial value of a measure, parameter or variable
bore	a hydraulic structure that facilitates the monitoring of groundwater level, collection of groundwater samples, or extraction (or injection) of groundwater. Also known as a well, monitoring well or piezometer, although piezometers are typically of small diameter and only used for measuring the groundwater elevation or potentiometric surface
contaminant	something which contaminates, i.e., renders impure via pollution. In ecology, a substance which may degrade an environment (e.g., soil or water) due to toxicity to humans, animals or plants, or detriment to beneficial uses
contamination	making or being made contaminated; to pollute a substance with another, unwanted, substance. Considered to have occurred when the concentration of a specific element or compound is established as being greater than the normally expected (or quantified) background concentration
cumulative impact	an impact that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones.
disturbance	the interruption of a settled condition
drawdown	lowering of hydraulic head
groundwater	the water held in the pores in the ground below the watertable
impact	a marked effect or influence. Negative or positive effect/s caused directly or indirectly by an event or activity, or by the release of a substance into the environment, causing a change in the biological, physical and/or socio-economic environment.
mitigation	action(s) taken to avoid or reduce the impact of an activity on the environment, sociocultural and/or socioeconomic interests
overburden	the layers of clay, rock and similar covering or overlying a useful ore deposit. Also referred to as waste rock
project area	includes the mining tenement and area immediately surrounding the Project location
receptor	an entity (which may include an environmental value, conservation significance value, individual/s or communities of flora or fauna, as well as individuals, households or communities of people) that is exposed to a stressor. The sensitivity of a receptor interacts with the magnitude of an impact to derive an impact significance rating
recorded sacred sites	are sites that have not been evaluated or placed in the Register but there is information indicating that they are nonetheless significant according to Aboriginal tradition and therefore “sacred sites” within the meaning of the *NT Aboriginal Sacred Sites Act 1989*
registered sacred sites	are sacred sites that Aboriginal custodians have asked the Authority to protect and that have subsequently been documented and evaluated by the Authority and entered in the Register of Sacred Sites in accordance with the *NT Aboriginal Sacred Sites Act 1989*
remediation	the action of remedying something, of reversing or stopping environmental damage. Ecology: the restoration of an environment, land or groundwater contaminated by pollutants, to a state suitable for other, beneficial uses

Term	Definition
residual (impact)	those impacts that remain after the effective implementation of avoidance, mitigation and management measures, which are designed to reduce the likelihood, consequence, magnitude or severity of the impact

Abbreviations

Abbreviation	Definition
4WD	four-wheel drive
AAPA	Aboriginal Area Protection Authority
ABS	Australian Bureau of Statistics
ANZAC	Australian and New Zealand Army Corps
AMD	acid, metalliferous and saline drainage or acid mine drainage
APA	Australian Pipeline Group
AROWS	Adelaide River off-stream storage scheme
AS/NZS	Australian standard/New Zealand standard
BIBO	bus-in, bus-out
BGP	Bonaparte Gas Pipeline
DEE	Department of Environment and Energy
DENR	Department of Environment and Natural Resources
DEPWS	Department of Environment, Parks and Water Security (formerly DENR)
DITT	Department of Industry, Tourism and Trade (formerly DPIR)
DPIR	Department of Primary Industry and Resources
DSTC	Department of Sport, Tourism and Culture
DTBI	Department of Trade, Business and Innovation
DTF	Department of Treasury and Finance
EIS	environmental impact statement
EPA	Environmental Protection Authority
EPBC	environmental protection and biodiversity conservation
ESIA	economic and social impact assessment
FIFO	fly-in, fly-out
FMG	feldspathic metagreywacke
GP	general practitioner
GRP	gross regional product
GSP	gross state product
H1, H2	half 1, half 2 (of the year)
HLF	heap leach facility
IAIA	International Association for Impact Assessment
IAP2	International Association for Public Participation

Abbreviation	Definition
ICE	Institution of Civil Engineers
IFC	International finance corporation
ILUA	indigenous land use agreements
LGA	local government area
LNG	liquified natural gas
NIEIR	National Institute of Economic and Industry Research
NLC	Northern Land Council
NOI	notice of intent
NT	Northern Territory
pa	per annum
PL	pastoral lease
PM_{10}	particulates with aerodynamic diameter less than 10 μm
$PM_{2.5}$	particulates with aerodynamic diameter less than 2.5 μm
PFES	Police, Fire and Emergency Services
SEIFA	socio-economic indexes for areas
PWC	Power and Water Corporation
SEMP	social and economic management plan
SIA	socio-economic impact assessment
SMI	Scanlon-Monash Index
SMS	safety management study
TIA	transport impact assessment
TMP	transport management plan

1. Introduction

1.1 Project Overview

PNX Metals Limited (PNX) hold a significant base and precious metals tenement portfolio, primarily in the Northern Territory (NT), and in South Australia. Their focus is the development of two projects:

- The Hayes Creek Project, comprising deposits of zinc, gold and silver across 14 mineral leases, including the Iron Blow and Mount Bonnie deposits located in the Pine Creek region of the NT.
- The Fountain Head Gold Project, containing the Fountain Head gold deposit, which is located at the proposed site for processing of ore and storage of tailings for the Hayes Creek Project.

As a result of recent exploration activity, PNX have identified the Fountain Head Gold Project (the Project) as the immediate priority to generate early cashflow from the existing gold resources at this site, whilst preserving the future value of the Hayes Creek Project.

PNX proposes to recommence mining of Fountain Head, which is located on Ban Ban Springs Station, approximately 170 km south of Darwin in the Northern Territory (NT), and approximately 13 km east of the Stuart Highway (Figure 1.1). The area is part of the Northern Territory Goldfields where extensive mining and exploration activity dates to the 1870s.

Most recently, GBS Gold mined the Fountain Head and Tally Ho deposits between 2007 to 2009. GBS Gold were mining at Fountain Head when they went into receivership in August 2008. No rehabilitation of the waste rock stockpile (WRS) has been undertaken and the pits have become flooded. The site has remained under care and maintenance since 2009 with past activities leaving the site highly disturbed.

The recommencement of mining at Fountain Head will include the following activities:

- Dewatering and expansion of existing open pit.
- Remediation and extension of existing water storage dam (evaporation pond) walls.
- Construction and progressive rehabilitation of the integrated waste landform (IWL).
- Establishment of potentially acid-forming (PAF) waste rock stockpile adjacent to the pit.
- Construction of crushing facilities and gold processing plant (CIP).
- Construction of supporting infrastructure, i.e., workshops, power station, roads, offices.
- Operation of gold processing plant, storage and mixing, electrowinning, operation of carbon regeneration kiln.
- Ongoing dewatering of the pit and evaporation pond.

- Final rehabilitation of the IWL, evaporation pond and removal of infrastructure, e.g., process plant, and reshaping and rehabilitation of disturbed areas.

PROJECT LOCATION

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 1.1

SCALE: 1:1,200,000 @ A4

0 5 10 20 KM

GDA2020 MGA Zone 52

- Populated place
- Site
- Major gold deposit
- Major base metal deposit
- Roads
- Railway
- Watercourse

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DATA SOURCE:
Project data from PNX Metals, 2021.
Base data from NT Government, 2021 & GEODATA 250K, 2006.
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1.2 Purpose and Objectives

This socio-economic impact assessment (SIA) provides a characterisation of the socio-economic environment relevant to planned Project activities and an assessment of the potential positive and negative socio-economic impacts that may occur within the regional and local area in response to the Project. It further identifies the measures to avoid or minimise negative impacts, and maximise Project benefits, and performance measures to monitor progress. It has been undertaken in accordance with relevant NT legislation and guidelines, and good industry practice (outlined in Section 1.4.9).

Key objectives of the SIA are to:

- Characterise the socioeconomic environment, including the people and communities, social structures, infrastructure, and values, of the area around the proposed Project.
- Identify and assess the potential positive and negative economic and social impacts of the Project on the surrounding area and the region.
- Outline measures to avoid, mitigate or manage the negative primary and secondary impacts and enhance the positive impacts of the Project on the locality and the region.
- Encourage development of new and/or expansion of existing businesses in the locality.
- Foster sustainable development and community wellbeing of the surrounding communities (i.e., Adelaide River and Pine Creek).
- Inform regulatory decision-making for the Project.

1.3 Scope

The scope of the SIA was established based on industry good practice for scoping impact assessments, and the direction provided by the NT Environmental Protection Authority (EPA) in their final Terms of Reference (Table 1.1). The scope also considers:

- Proposed Project activities that could result in predictable direct and indirect impacts and benefits.
- Project phases; covering all stages of the Project, including, planning, construction, operations, closure, and rehabilitation.
- The Project area of influence, or the geographic locations (e.g., which include both local and regional towns/cities) that Project activities could potentially impact.
- The people, organisations, social structures, infrastructure, and values in the Project area of influence. This may also include transient users (e.g., transportation businesses and visitors who do not permanently reside in local communities and supply chains e.g., contractors, suppliers, and related services).
- The regional economies and industries in which the Project will operate.

The scope of this report excludes traffic and transport, which is captured in the Fountain Head Gold Project Traffic Impact Assessment (TIA) and Traffic Management Plan (TMP).

Table 1.1 – NT EPA Terms of Reference Minimum Requirements for Assessment of Social, Economic and Cultural Surroundings

Aspect	Information Required	Report Section
Social values	Describe, using maps where appropriate, the existing social, economic and cultural values of the region, including:	
	• Population and demographics of the Proposal area and nearby towns, using the most recent statistics	Section 2.2
	• Economy in the region such as tourism and recreation, pastoral and mineral industries	Section 2.3
	• The railway corridor land and operators using the railway	Section 2.1
	• Water users in the area, including the location of groundwater bores in the immediate vicinity and offtake points for surface water users in the vicinity and downstream	Section 2.1
	• Areas listed on Australian Government and Northern Territory Government registers of historic and/or cultural heritage	Section 2.5
	• A description and location of Aboriginal and non-Aboriginal sites, places or objects of historic or cultural heritage value, based on archaeological and/or anthropological survey and any other research	Section 2.8
	• The spiritual or cultural significance of places to Aboriginal people, including those associated with water, and details of any current utilisation of these areas	Section 2.8
Potential impacts and risks	Identify, quantify and/or discuss the following potential impacts for all phases of the Proposal, including post-closure:	
	• Social and economic benefits and impacts in the region, addressed in an Economic and Social Impact Assessment (ESIA) in accordance with NT EPA (2013) that provides an independent analysis of the social and economic value and potential impacts of the Proposal on a local/regional, NT and national scale, including:	
	– Overall contribution to economy, as expressed by the estimated capital and annual operational expenditure and estimated total revenue	Section 3.2
	– Training and employment, including for Aboriginal people	Section 3.3
	– Impacts on local accommodation if workers are not accommodated in a mining camp	Section 3.5
	– Changes to economic and social activity in regional centres, which may have positive and/or negative impacts on local people	Section 3.3 and 3.6
	– Potential social impacts associated with not achieving the proposed economic benefits	Section 3.3
	– Reduction in the availability of water of appropriate quality for other water users (current or future) in the vicinity or downstream	Section 3.5
	– Changes to social, cultural and recreational values through potential water contamination, if applicable, pending assessment of inland water environmental quality	Section 3.4
	– Potential impacts on existing and future transport infrastructure and road users from project transport requirements long term stability of landforms and any discharge of contaminated water	See TIA and TMP
	• Biophysical and intangible (e.g. amenity or access) changes to sacred sites, heritage places or other places with identified cultural or social values, including downstream water and land	Section 3.8

Aspect	Information Required	Report Section
	• Potential impacts and risks from blasting activities on people travelling on the AustralAsia Railway	Section 3.7
Mitigation and management	Outline the measures for avoiding, mitigating, or offsetting adverse impacts identified above. These may be incorporated into management plans and are to include: • Strategies for engaging with local Aboriginal communities to facilitate employment including identification of suitable roles, how training may be delivered, and how cultural values would be accommodated • Assessment criteria that will give early warning in the event that management measures are not achieving the expected benefits or are not avoiding negative impacts • Procedures that would be implemented in the event that any items or sites of heritage and/or cultural significance (additional to those identified in the EIS) are identified during implementation of the Proposal • Measures to avoid or minimise a reduction in water of suitable quality available to any other water users • Measures to avoid impacts to sacred sites[1] • Measures to avoid impacts to heritage and archaeological sites • An outline of a plan for ongoing communication with stakeholders • Timing of blasting activities in relation to train operations e.g., the Ghan train schedule • Approach to procurement of goods and services sourced from the local area.	Section 3.3 Section 3 Section 3.8 Section 3.4 Section 3.8 Section 1.4 Section 3.4 Section 3.2 and 3.3
Monitoring and reporting	Address, at a minimum: • Social and economic benefits and impacts, including ease of identification of impacts and consideration of the concerns of the community about the level of risk of an impact that would trigger remedial action	Section 3

The general setting (showing the Project area and surrounding land uses, local government boundaries and infrastructure) and Project area of influence are shown in Figure 1.2.

1.4 Legislation and Standards

This section outlines the NT and Commonwealth legislation and industry standards that are relevant to the SIA.

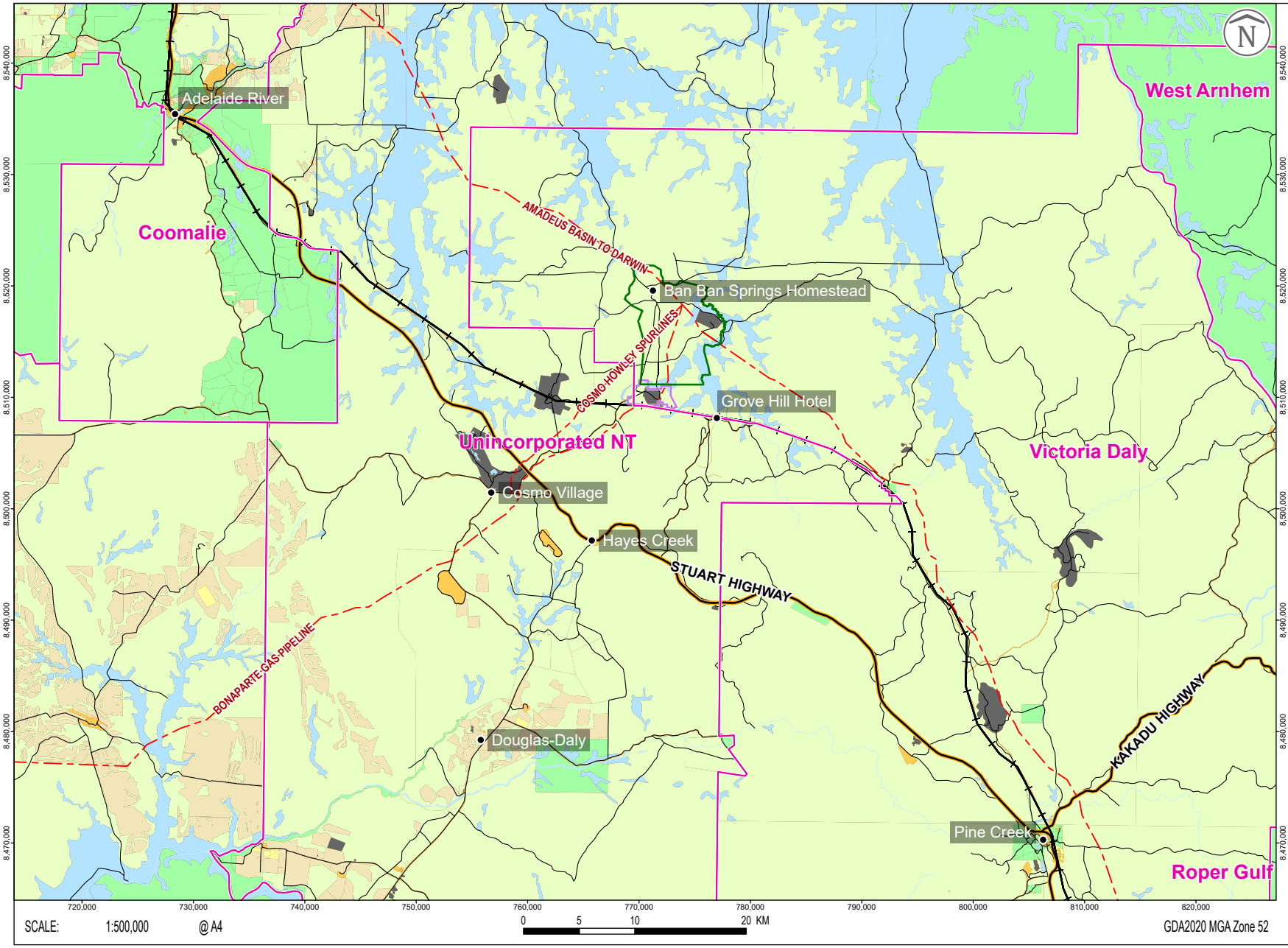
In the Northern Territory, environmental permitting of mining activities is regulated under the *Environmental Protection Act 2019* and the *Mining Management Act 2001*. The *Mining Management Act* is administered by the Department of Industry, Tourism and Trade (DITT) and provides the framework for the authorisation of mining activities, the management of mining sites, the protection of the environment on mining sites, the provision of economic and social benefits to communities affected by mining activities, and for related purposes.

1 Provide evidence that an Authority Certificate has been obtained or is under application in accordance with the *Northern Territory Aboriginal Sacred Sites Act 1989*.

SOCIAL SETTING AND THE PROJECT AREA OF INFLUENCE

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 1.2



- Populated place
- Major road
- Minor road
- Railway
- Gas pipeline
- Watercourse
- Project area
- Local government area
- Ban Ban Springs

Land use

- Conservation and natural environments
- Production from relatively natural environments
- Production from dryland agriculture and plantations
- Production from irrigated agriculture and plantations
- Intensive uses
- Water
- Mining

Issue Date: 2021.05.10

Map ID: 01238D_SIA_GIS002_v0-c

Figure Number: 01238D_SIA_F01.2_GIS_v0-c

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DATA SOURCES:
Project data from PNX Metals, 2021.

1.4.1 Northern Territory Environmental Assessment Act 1982

The *Environmental Assessment Act 1982* (*EA Act*) and associated procedures are administered by the Department of Environment, Parks and Water Security (DEPWS) and provides a framework for the assessment of the environmental effects of development proposals and for the protection of the environment. The assessment of economic and social impacts is an essential part of environmental impact assessment, as the Act defines 'environment' as 'all aspects of the surroundings of man including the physical, biological, economic, cultural and social aspects'.

A Notice of Intent (NOI) was submitted to the NT EPA in December 2019 for consideration of the appropriate level of assessment for the Project. A decision that the preparation of an EIS was required under the *EA Act* was made in March 2020. While the *EA Act* has been replaced by the *Environment Protection Act 2019* (*EP Act*) which commenced implementation on 28 June 2020, the NT EPA's assessment of the proposal was not completed prior to this time and transitional agreements have been established to allow for the environmental impact assessment to continue under the current *EA Act* with a modified process as defined in s. 296 of the *EP Act*.

This SIA has been prepared to support the EIS in accordance with the Statement of Reasons and the final Terms of Reference (May 2020) both issued by the NT EPA which define the issues that must be addressed in the EIS. The NT EPA Guidelines for the Preparation of an Economic and Social Impact Assessment (NT EPA, 2013) have also been used to guide the structure and content of this report.

1.4.2 Northern Territory Aboriginal Sacred Sites Act 2013

The *Northern Territory Aboriginal and Sacred Sites Act 2013* protects sacred sites on all land in the NT and is administered by the Aboriginal Areas Protection Authority (AAPA). The AAPA works with custodians to record sites of physical, spiritual and cultural significance and maintains the Register of Sacred Sites. Development proponents in the NT must apply to AAPA for an Authority Certificate, which sets out where work can be undertaken and any areas that cannot be developed.

1.4.3 Heritage Act 2011

The *Northern Territory Heritage Act 2011* can give conservation protection to a variety of places that have been declared as 'heritage places' under the Act. The Act protects places that are on the Heritage Register by requiring development proponents to obtain a works approval. Sites that are Aboriginal or Macassan (Indonesian) archaeological places are automatically protected under this Act because they have been declared to be heritage places.

1.4.4 Aboriginal Land Rights (Northern Territory) Act 1976

The Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* establishes the functions and responsibilities of the Land Councils tasked with protecting the rights of all Aboriginal people in the NT, particularly in the areas of land claims. The Land Councils also advance Aboriginal employment and training and participate in the management of mineral tenements on Aboriginal lands.

1.4.5 Mineral Royalty Act 1982

The *Mineral Royalty Act 1982* imposes a royalty on all minerals extracted in the Northern Territory except for uranium, petroleum and extractive minerals of a specified kind. Royalties are payments made to the NT government as the owner of the minerals, in consideration of a right granted to extract and remove minerals and are calculated in respect of the net value of the minerals taken or produced.

1.4.6 Mineral Titles Act 2010

The *Mineral Titles Act* establishes a framework for granting and regulating mineral titles that authorise exploration for, and extraction and processing of, minerals and extractive minerals in the NT. The Act also considers the need for land access agreements and compensation where landowners have experienced any damage or loss due to exploration or mining activities.

1.4.7 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act* 1999 requires that actions likely to have a significant impact on a matter of national environmental significance (including World Heritage properties, National Heritage places, wetlands of international importance, listed threatened species, ecological communities and migratory species) be assessed under the Act.

In February 2019, PNX submitted a referral under the EPBC Act for the development of the Hayes Creek Project, which is another mining Project which included processing at Fountain Head that is undergoing separate assessment. The Department of Agriculture, Water and Environment (AWE) after a period of public consultation, determined that the proposed activity was not a controlled action and would not require approval under the Act.

PNX have not submitted an additional referral for this Project on the basis that there are no additional matters to be considered that were not already addressed in the Hayes Creek Project referral.

1.4.8 Native Title Act 1993

Under the *Native Title Act 1993* Aboriginal and Torres Strait Islander people can have their traditional rights and interests to land and waters of Australia formally recognised by Australian law. The Act gives Indigenous peoples who hold native title rights and interests, or who have made a native title claim, the right to be consulted and, in some cases, to participate in decisions about activities proposed to be undertaken on the land. Native Title claimants may enter into agreements with other interested parties, on the nature of land use and access to land, including the protection of cultural heritage resources. These agreements are known as Indigenous Land Use Agreements (ILUAs).

1.4.9 Industry Standards

The following industry standards have guided this report:

- International Finance Corporation (IFC) performance standard 1: Assessment and Management of Environmental and Social Risks and Impacts (IFC, 2012).

- International Association for Impact Assessment (IAIA) Social Impact Assessment: Guidance for Assessing and Managing the Social Impacts of Projects (Vanclay et al., 2015).
- International Association for Public Participation's (IAP2) core values of engagement (IAP2, 2019a).
- IAP2 'Spectrum of Public Participation' (IAP2, 2019b).
- NT EPA Guidelines for the Preparation of an Economic and Social Impact Assessment (NT EPA, 2013).
- Minerals Council of Australia (MCA) Minerals Industry Framework for Sustainable Development, (MCA, 2005).
- AS/NZS ISO 31000:2018 Risk Management – Principles and Guidelines.

1.5 Methodology

1.5.1 Overview

Figure 1.3 shows the main stages of the SIA process that underpin the methodology used in this report, which are:

- Screening and scoping: the socio-economic values and sensitivities are identified, options and alternatives for the Project are examined, and the spatial area of influence is determined.
- Baseline characterisation: the socio-economic setting is characterised using relevant data to provide a baseline from which to identify potential impacts.
- Impact assessment: the potential impacts and benefits and mitigation measures are identified, and residual impacts are assessed.
- Monitoring and reporting: performance indicators for ongoing monitoring and a reporting framework are designed and implemented.

1.5.2 Screening and Scoping

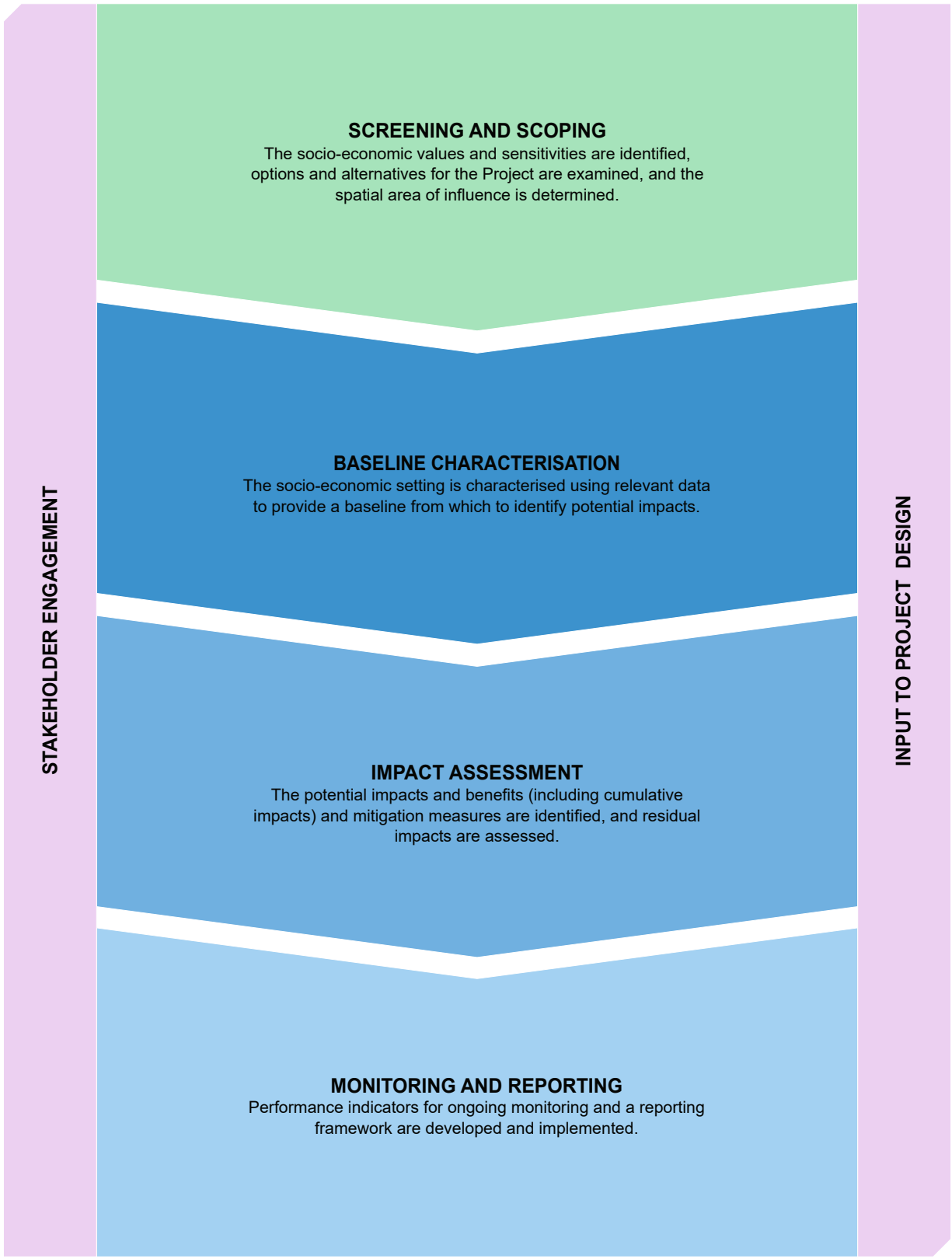
Screening and scoping for this report involved early identification of the socio-economic values and sensitivities and potential impacts (which were documented in the NOI) and considered alternatives for Project design. Feedback received from the EPA and government advisory bodies on the NOI requested that additional information be provided on:

- The range of stakeholders that may be affected by the Project and the extent of engagement that has taken place.
- The potential for the Project to impact on road users.
- The potential socio-economic impacts and benefits, in particular those derived from Project employment.

STAGES OF THE SOCIO-ECONOMIC IMPACT ASSESSMENT PROCESS

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 1.3



- The significance and potential impacts on archaeological sites in the Project area.

The information requested has been addressed through additional studies and the results are presented in this report, and in the EIS. Project design alternatives have considered known Aboriginal places and objects (Sections 2.8 and 3.8). The final arrangement of infrastructure will be arranged to avoid known sites where possible.

The Project area of influence (Figure 1.2) was determined based on the geographical extent of the potential impacts and the locations of the socio-economic values and sensitivities. Factors that informed the spatial area of influence include:

- The proposed Project footprint, including any associated infrastructure.
- Local government boundaries.
- Darwin and local regional centres (i.e., Batchelor, Katherine) where government services are provided and where workers will be transported to/from.
- Towns/communities in the area surrounding the Project location.
- Land uses (i.e., mining, pastoralism, conservation) and users in the area surrounding the Project location.
- Transportation routes (i.e., roads, railways).
- Catchment areas.

1.5.3 Baseline Characterisation

The baseline characterisation draws on insights from PNX personnel, desktop research, stakeholder engagement, physical survey (for cultural heritage only), and local knowledge of people and institutions. It comprises:

- Bibliographic review: a desktop exercise reviewing existing literature, including company documentation, studies previously undertaken in the study area and with publicly available information. Table 1.2 outlines some of the key resources used.
- Stakeholder feedback: results from stakeholder engagement activities have been incorporated into the impact assessment.
- Targeted, semi-structured interviews with key company personnel and regulatory authorities.

The baseline characterisation is organised under the following headings in Section 2:

- General setting.
- Population and demographics.
- Economy.
- Employment and education.

- Infrastructure and services.
- Social cohesion.
- Community health and safety.
- Cultural heritage.
- Attitudes to the Project.

Table 1.2 – Key Resources Relevant to the Baseline Characterisation

Resource	Disciplines	Description
Australian Bureau of Statistics (ABS) – census data	Demographics, education, employment, housing and accommodation	ABS data was drawn from Australian, NT and local census datasets to characterise the demographic, education and economic environment for the Project area. The most recent census was 2016 and the datasets used include the state/suburb and local (town) datasets.
id. The population experts	Demographics, economy	The id. website presents community and economic profiles based on data drawn from other datasets (including the ABS and National Institute of Economic and Industry Research (NIEIR)). Data from id. was used to characterise regional demography and economy.
NT Department of Treasury and Finance (DTF) economic group	Population trends, economy	The DTF economic briefs provide up-to-date analysis of the Territory's current position and performance in relation to the Territory and national economy. Data was used to support a characterisation of the NT economy and forecast population trends.
NT Department of Trade, Business and Innovation (DTBI)	Employment, economy	The Northern Territory state of the economy report provides recent employment data and analysis on industry contributions to the NT economy.

1.5.4 Impact Assessment

1.5.4.1 Overview

The impact assessment methodology used in this report aligns with the NT EPA regulatory requirements for an EIS under the *Environmental Assessment Act 1982*.

This section provides an overview of the impact assessment methodology used in this report, which consisted of:

- Identifying Project activities and potential impacts of those activities on socio-economic values (identified in the baseline characterisation) by describing the Project and associated activities, particularly within the context of potential interactions with the existing environment. Impacts were also identified from existing resource Projects in the

NT and Australia, and only credible impacts (i.e., those that are reasonably expected due to Project activities) were considered for assessment.

- Determining appropriate avoidance, mitigation and management measures that will address the potential impacts and are both technically and economically feasible and are assumed to be implemented in a timely manner during Project development.
- Undertaking a residual impact assessment using the significance assessment method (Section 1.5.4.2), considering the implementation of mitigation and management measures (for construction, operation and closure).

The impact assessment is organised under the following headings in Section 3:

- Economy and regional development.
- Employment and training.
- Local industry and land users.
- Infrastructure and services.
- Social cohesion and amenity.
- Community health and safety.
- Cultural heritage.

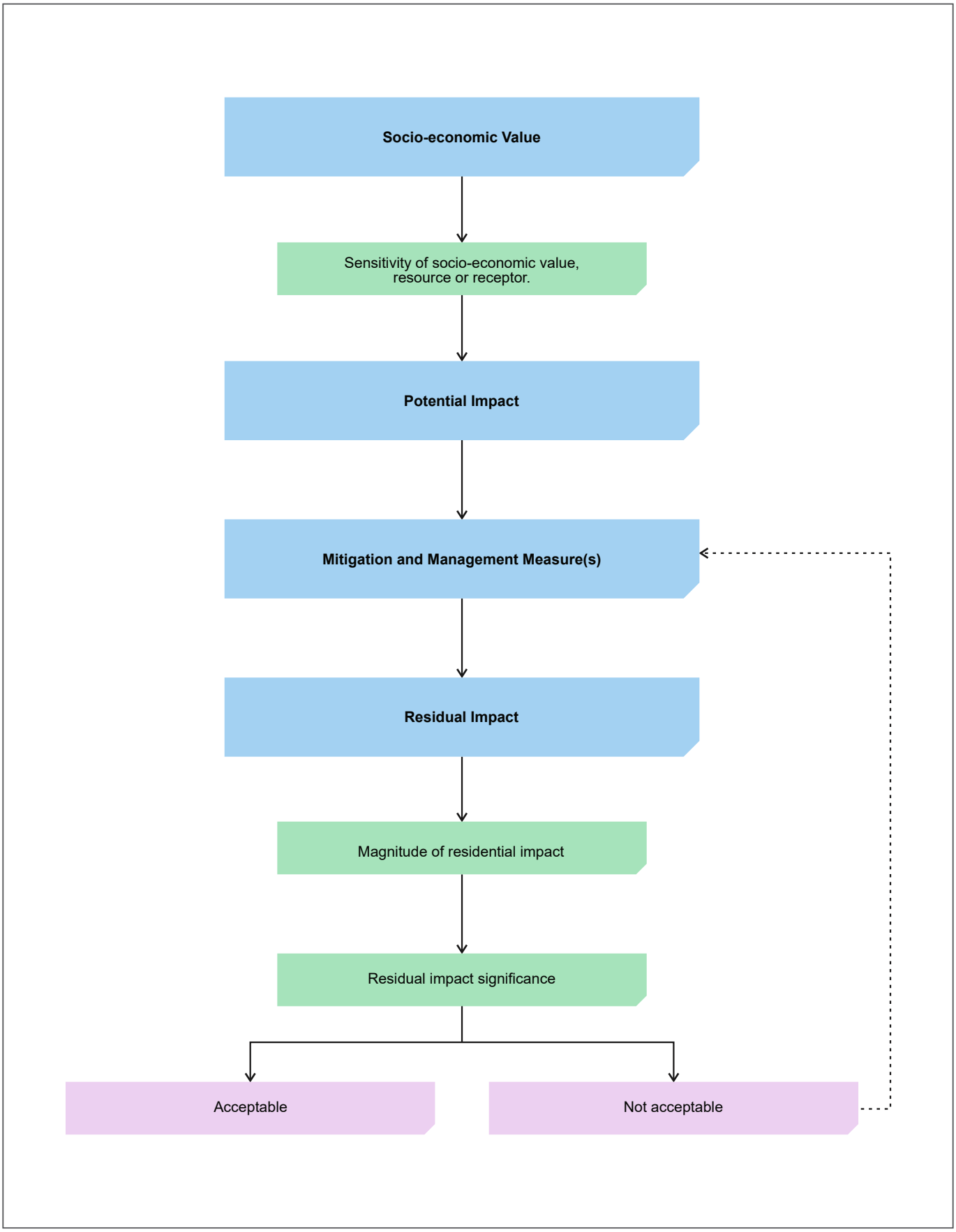
1.5.4.2 Significance Assessment Method

The significance assessment approach will be used to assess potential socio-economic impacts. The method is based on understanding the vulnerability of a socio-economic value or receptor to determine the potential severity of impacts. The method assesses credible impacts that are expected to occur during the Project's life cycle. The approach for this method is shown in Figure 1.4.

Values or receptors are the individuals, organisations, groups or resources that can be affected by Project activities. For this report, receptors can be broadly defined as:

- Local communities (i.e., Adelaide River and Pine Creek) and landowners surrounding the Project development area.
- Local businesses.
- Visitors to the region.
- Social and human capital (i.e., social networks and organisations, culture, decision-making structures and skills, education, health and leadership capacity).
- Cultural heritage values.
- Victoria Daly and Coomalie local councils.

FIGURE 1.4


Socio-economic Value
Sensitivity of socio-economic value, resource or receptor.
Potential Impact
Mitigation and Management Measure(s)
Residual Impact
Magnitude of residential impact
Residual impact significance
Acceptable
Not acceptable

- NT government.
- Project workforce (including supply chain, sub-contractors etc).

The sensitivity of a value is determined based on its intrinsic value as well as its susceptibility or vulnerability to threatening processes. Key attributes that define sensitivity of the socio-economic context include:

- Formal status: this may be assigned by statutory or regulatory authorities or by appropriately recognised national or international organisations. For example, requirements under the *Mineral Titles Act 2010* or the *NT Heritage Act 2011*.
- Replacement potential: an assessment of the potential for any losses of the environmental value used or important to a community to be replaced by an equivalent or representative example.
- Resilience to change: an assessment of the capacity of social systems, communities or heritage objects or places to adapt to change.
- Importance: it's worth to local communities and society, its iconic or symbolic importance to cultural value systems.
- Cultural and archaeological significance: an assessment of cultural heritage significance of places and objects using criteria under Section 11 of the *NT Heritage Act 2011*.

Applying these elements enables the sensitivity of a social receptor to be ranked as high, medium, or low, as described by the model criteria in Table 1.3.

Table 1.3 – Sensitivity Criteria

Sensitivity	Description
High	• Value or receptor has limited or no capacity to adapt to change. • Value or receptor is unaffected by this impact prior to Project interaction or has been affected and has demonstrated no capacity to adapt to change. • Many stakeholders have expressed concern about the value. • The potentially affected community is highly reliant on the environmental value that may be affected, or the value may hold significant cultural heritage or traditional value. • There is a lack of skilled and experienced labour 'pool'.
Medium	• Value or receptor has some resilience to change. • Some sign of exposure to this impact is already evident in the value or receptor prior to Project interaction. • Some stakeholders have expressed concern about the value. • The potentially affected community is somewhat reliant on the environmental value that may be affected, or the value is moderately important from a cultural heritage or traditional perspective. • Some skills in labour 'pool' with only limited experience.
Low	• Value or receptor is easily adaptable/resilient to change (or no change required). • Value or receptor is already demonstrating resilience to this impact prior to Project interaction.

Sensitivity	Description
	• No stakeholders expressed concern about this value. • The potentially affected community is not reliant on the value that may be affected, or it holds no cultural heritage or traditional value. • Highly skilled and experienced labour 'pool'.

The magnitude of a potential impact reflects the predicted size and nature of change based on several key factors. For the purposes of this assessment these key factors are defined as follows:

- Duration: the timescale of the effect, whether short (6-12 months), medium (1-5 years) or long term (i.e., effectively permanent).
- Geographical extent: the spatial extent of the impact where this is defined as site (i.e., the Project area), local (extending to the towns of Pine Creek and Adelaide River), regional (i.e., the Katherine region) or widespread (i.e., NT-wide or national in scale).
- Severity: the scale or degree of change (both positive and negative) from the existing condition, due to the environmental impact.

Applying the above key factors enables the magnitude of an impact to be ranked as high, moderate, low, negligible or positive as described in Table 1.4.

Table 1.4 – Magnitude Criteria

Magnitude	Description
High	• An impact that is long lasting, widespread, and leads to substantial and possibly irreversible change to the environmental and/or social value. • To address the impact, avoidance of the value through appropriate design responses and/or implementation of site-specific environmental and/or social management controls are required.
Moderate	• An impact that is short term and is contained within the region where the Project is being developed, but that extends beyond the area of disturbance to the surrounding area. • It is possible to reduce or largely reverse the impacts/changes via specific environmental and/or social management controls.
Low	• An impact that is temporary or short term and localised in extent. • The change can be effectively mitigated and reversed through routine environmental and/or social management controls.
Negligible	• An impact that is unlikely to be detectable or completely reversed with respect to natural and social variability.
Positive	• A beneficial impact on an environmental and/or social value.

Potential socio-economic impacts will be assessed prior to and after mitigations have been implemented. Project mitigations have been derived following the mitigation hierarchy of avoidance, minimisation, rehabilitation and offset. Project mitigations have then been developed from the early stages of Project design, through input from specialist studies and knowledge of industry good practice.

The significance of an impact on a value or receptor was determined using the significance matrix presented in Table 1.5 which combines the likely magnitude of an impact with the sensitivity of the value or receptor. The magnitude of an impact was assessed considering the application of mitigation measures which were expected to reduce the impact's severity, geographic extent or duration. The result is a significance rating for the residual impact.

Table 1.5 – Significance Assessment Matrix

		Sensitivity of Value		
		High	Medium	Low
Magnitude of Impact	High	Major	High	Moderate
	Moderate	High	Moderate	Low
	Low	Moderate	Low	Negligible
	Negligible	Negligible	Negligible	Negligible
	Positive	Positive	Positive	Positive

The classification (major, high, moderate, low, negligible and positive) for significance of an impact is defined as follows:

- Major: when an impact will potentially cause widespread or irreversible harm to a socio-economic value that is of high importance to regional communities. Avoidance of the value/impact through appropriate design responses is the only effective mitigation.
- High: when proposed activities are likely to worsen processes affecting the core characteristics or structural elements of a socio-economic value. Although replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred to preserve the socio-economic value's status or intactness.
- Moderate: where a socio-economic value is somewhat resilient to change but would be further degraded due to the scale of the impact or its susceptibility to further change. The socio-economic value is adequately represented in the region, and replacement, if required, is achievable.
- Low: where an environmental value is of local importance, but temporary changes will not adversely affect its viability, provided that routine management controls are implemented.
- Negligible: where an impact to a socio-economic value will not result in any noticeable change in its intrinsic value, and as such, the proposed activities will have negligible effect on its viability.
- Positive: where a Project activity will have a beneficial impact on a socio-economic value.

1.5.4.3 Cumulative Impacts

Cumulative impacts are defined as the total impact arising from the Project in conjunction with other current or future activities (e.g., by that of developers, local communities, government). The analysis of the Project's incremental impacts combined with the effects of other known activities provide a holistic understanding of the likely impacts of the Project's presence as opposed to

considering the Project's impacts only in isolation. Cumulative impacts have been considered and integrated into Section 3 of this report.

1.5.5 Monitoring and Reporting

Monitoring and reporting on social performance are necessary to evaluate the effectiveness of the avoidance, mitigation and management measures proposed in the impact assessment.

Monitoring considers legislative requirements, good industry practice and stakeholder feedback. The results of monitoring will inform any corrective actions required and future management actions.

1.5.6 Stakeholder Consultation

Stakeholder consultation is a fundamental process underpinning the SIA, aiming to ensure affected stakeholders understand Project impacts and benefits and the opportunity to communicate any concerns and to contribute to Project design. Meaningful stakeholder engagement supports the early identification of issues, addresses community expectations of input into decisions that affect them, and leads to better decision-making.

In accordance with the NT EPA's recommended approach, PNX have used the International Association for Public Participation's (IAP2) core values of engagement (IAP2, 2019a) to guide their stakeholder engagement approach.

The objectives of PNX's stakeholder engagement program are to:

- Enable early, effective two-way communication between PNX and Project stakeholders, that meets government requirements and community expectations.
- Build government and community understanding and support for the Project.
- Assist in identifying key social and environmental issues that need to be addressed.
- Ensure that those potentially impacted by the Project can raise issues and concerns, and for stakeholder feedback to inform Project design and development.

Stakeholder identification and analysis (i.e., determining the level of interest and influence of each stakeholder or group) helped identify those potentially affected by or interested in the Project. Table 1.6 outlines key Project stakeholders.

Table 1.6 – Stakeholder Groups and Individuals

Group	Individual Stakeholders
Traditional Owners and Aboriginal organisations	• Northern Land Council (Daly, Katherine) • Aboriginal Areas Protection Authority (AAPA) • Jawoyn Association Aboriginal Corporation • Warai and Wagiman representatives • Pine Creek Aboriginal Advancement Association Incorporated (Kybrook Farm)
Local community and businesses	• Adelaide River Inn • Grove Hill Hotel (Pine Creek)

Group	Individual Stakeholders
	• The Lazy Lizard (accommodation in Pine Creek) • Amateur Fisherman's Association NT • Adelaide River and Pine Creek residents
Local Landholders	• Ban Ban Springs Station • Douglas Station
Government and service providers	• Commonwealth Department of Agriculture, Water and the Environment (AWE) • NT Department of Industry, Tourism and Trade (DITT) • NT Environment Protection Authority (EPA) • NT Department of Environment, Parks and Water Security (DEPWS) • NT Department of Infrastructure, Planning and Logistics (DIPL) • NT Department of Territory Families, Housing and Communities • Parks and Wildlife Commission of the NT (Katherine) • NT Police, Fire and Emergency Services (PFES), including: – NT Fire and Rescue Service – NT Emergency Service – Adelaide River Police Station – Pine Creek Police Station • Worksafe NT • Power and Water Corporation (PWC) • Victoria Daly Regional Council - Pine Creek • St John Ambulance NT
Members of Parliament and local council officials	• Member for Lingiari, Hon Warren Snowdon (Labor Party) • Member for Daly, Hon Ian Sloan^ (Country Liberal Party) • NT Minister for Mining and Industry, Hon Nicole Manison# • NT Minister for Environment, Hon Eva Lawler • Coomalie Community Government Council • Victoria Daly Regional Council – Mayor – Brian Pedwell – CEO – Russell Anderson – Councillor Pine Creek Ward – Gaye Lawrence
Industry and local operators	• Kirkland Lake Gold (NT Operations) • Bacchus Resources • Bridge Creek Mining • Australian Pipeline Group (APA) • One Rail Australia (previously GWA) • AustralAsia Railway Corporation (ARC)

The results of stakeholder identification and analysis provide a framework that guided the engagement methods and tools employed for each individual or stakeholder group. Engagement approaches were based on the IAP2 'Spectrum of Public Participation' (IAP2, 2019b). Engagement activities were tailored to the results of the stakeholder analysis, ensuring that consultation with stakeholders with a greater interest and influence over Project outcomes incorporate methods that support the 'consult', 'involve' and collaborate' goals described in IAP2 (2019b).

The concept of free, prior and informed consent (FPIC) has been applied to stakeholder engagement and considers:

- Free: no coercion, harassment or retribution.
- Prior: before any activity starts.
- Informed: full disclosure.
- Consent: that communities have a real choice.

Free, prior and informed consent is considered particularly important for vulnerable and disadvantaged communities (Vanclay et al., 2015).

Stakeholder engagement activities commenced mid 2019 during Project scoping and continued throughout the development of the EIS that this report supports. PNX proposes to continue to engage with local and NT stakeholders throughout the Project construction, operations, closure and rehabilitation phases, as outlined in Table 1.7 and in accordance with the NT EPA's document 'Opportunities and Timeframes for Community Engagement in the Environmental Impact assessment Process (NT EPA, 2018a) and NT EPA's Stakeholder Engagement and Consultation. Environmental impact assessment guidance for proponents (NT EPA, 2021).

Table 1.7 – Planned Stakeholder Engagement Activities

Stakeholder Group	Planned Activities	Timing
Traditional Owners and Aboriginal organisations	• Engage around employment and training opportunities for local Aboriginal people. • Consult about the planned salvage of Aboriginal places or objects, and/or any chance finds.	Pre-construction, construction
Local community and businesses	• Inform community and businesses about key Project aspects and impacts. • Provide regular updates on activities that may affect the local community. • Inform communities and businesses about employment and procurement opportunities.	Pre/draft EIS Pre-construction, construction, operations, closure and rehabilitation
Local landholders	• Inform landowners about key Project aspects and impacts. • Seek feedback from landholders on potential impacts affecting them. • Provide regular updates on activities that may affect landowners.	Pre/draft EIS Pre-construction, construction, operations, closure and rehabilitation
Government and service providers	• Provide information about key Project aspects and impacts. • Liaise with relevant departments about Project alternatives, permits and approvals required.	Pre/draft EIS
Members of Parliament and local council officials	• Inform Members of Parliament about key Project aspects and impacts.	Pre/draft EIS

Stakeholder Group	Planned Activities	Timing
Industry and local operators	• Inform local industry about key Project aspects and impacts. • Provide regular updates on activities that may affect local industry.	Pre/draft EIS Pre-construction, construction, operations, closure and rehabilitation

2. Social and Economic Context

2.1 General Setting

The Project is located approximately 170 km south of Darwin in the Northern Territory and approximately 13 km east of the Stuart Highway. The Project area is located within the Katherine region and the Victoria Daly local government area (LGA) and within the Pine Creek ward. The Victoria Daly LGA is mainly rural, with some areas used for defence purposes (id, Undated(a)). There are several small townships and indigenous communities in the LGA, which is broken down into five wards (or communities) (VDRC, 2018). Rural land is used largely for pastoral purposes (cattle grazing), with some tourism along the Daly and Victoria Rivers (id, Undated(a)).

The Project is within the NT Goldfields, which has been mined since 1870, when alluvial gold was first discovered by workers of the Overland Telegraph Line. There are a number of historic and operational mines within the vicinity of the Project area. Cosmo Gold Mine owned by Kirkland Lake Gold, located approximately 15 km to the west of the Project was the only operating mine in the area, until recently announcing it would go into care and maintenance. Ore from Cosmo was processed approximately 70 km south at Kirkland Lake Gold's Union Reef's processing facility which is also under care and maintenance.

The Project tenements are situated on Ban Ban Springs station, an operating cattle station on pastoral lease (PL 1111). The station covers an area of 1,873 km^2 with a carrying capacity of approximately 12,000 head of beef cattle for domestic and international markets.

The Adelaide to Darwin rail line passes approximately 540 m to the south of the Project location. This line has passenger (the Ghan runs twice a week in both directions) and freight services which pass the Project location at all times of day and night. The Project will utilise existing road networks, including the Stuart Highway for delivery of reagents and consumables from Darwin and Adelaide, Fountain Head Road and Ban Ban Springs Road, all of which are bituminised and in a serviceable condition for the current volume of traffic.

There are several national parks within the broader regional area, including Kakadu National Park to the northeast of the Project location, Nitmiluk to the south-east and Litchfield to the west. These parks receive approximately 200,000, 271,000 and 321,000 visitors per year respectively (ABC News, 2019; DTSC, 2020a).

There are no population centres located immediately adjacent to the Project area. The Grove Hill Hotel (currently closed) is located approximately 5.5 km to the east of the Project location. Hayes Creek is a small roadside settlement located approximately 13 km south west of the Project area and consists of a caravan park and a hotel/tavern complex with a petrol station and post office. The main population centres in the Project area are Pine Creek, located approximately 50 km southeast of the Project area in Victoria Daly LGA, and Adelaide River located approximately 50 km to the northwest of the Project area in Coomalie LGA. Figure 1.2 in Section 1.3 shows the towns, local government areas, parks and land uses in the Project area.

The Jawoyn people are the Traditional Owners of 50,000 km^2 of land and waters east of (and incorporating) Pine Creek. The Project is located on the traditional lands of the Warai and Wagiman peoples. Warai country extends west to include the area around Batchelor, then runs

south-east along the watershed between the Douglas/Daly and the Adelaide/Margaret Rivers, and includes the headwaters of McKinlay River which runs back almost to Pine Creek (AUSTLANG, Undated), including the land on which the Project is located. The Wagiman traditional lands extend to the east of the Project area and include Pine Creek. The Warai, Wagiman and the Jawoyn are part of the Gunwinyguan language group (AUSTLANG, Undated).

The Northern Land Council (NLC) lodged a Native Title application (NTD6021/2001) over an area just to the east of the Project location, on Ban Ban Springs Station in 2001, on behalf of the Warai and Angwinmil Peoples. This application was accepted however, to date no determinations of native title have been made for this application.

There is an active ILUA for the Power and Water Corporation's (PWCs) access to power infrastructure overlaying the Project mining tenement. Figure 2.1 highlights the land vested under various Indigenous legislation and agreements around the Project area. The green areas are existing ILUAs for pipeline easements and the hatched areas are registered native title determinations.

2.2 Population and Demographics

2.2.1 Northern Territory

The NT has the lowest population of any state or territory in Australia, and significantly higher proportion of the population who are Aboriginal and Torres Strait Islander (29.5%) compared to other states and Australia as a nation (2.7%) (ABS, 2018). The NTs average growth rate is the lowest in Australia, and population density is 0.16 people per km^2 (Population Australia, 2020).

Taylor and Wilson (2016) suggest that the low growth trend is being driven by sustained net negative interstate migration which is a result of a lack of immigration of women and young families with children, declines in the arrivals of those aged 20-39 years, smaller increases to departures in many age groups, especially 40-59 years and migration loses from Darwin's suburbs, Alice Springs and East Arnhem regions. Taylor and Wilson's (2016) analysis of the 2016 census data indicated a greater movement of the NT population than in other Australian states and territories. Much of the movement was in the 20 to 29-year old age category, which were significantly higher for the NT than for all other states except the Australian Capital Territory, which possibly reflects people moving for job and educational opportunities.

Northern Territory Department of Treasury and Finance (DTF) population projections predict that annual growth will continue at 0.5% (between 2016 and 2021). Table 2.1 highlights the actual (2016 census) and predicted population forecasts for Aboriginal and non-Aboriginal peoples in the NT as a total and forecast by age group.

INDIGENOUS ESTATES SURROUNDING THE PROJECT AREA

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 2.1

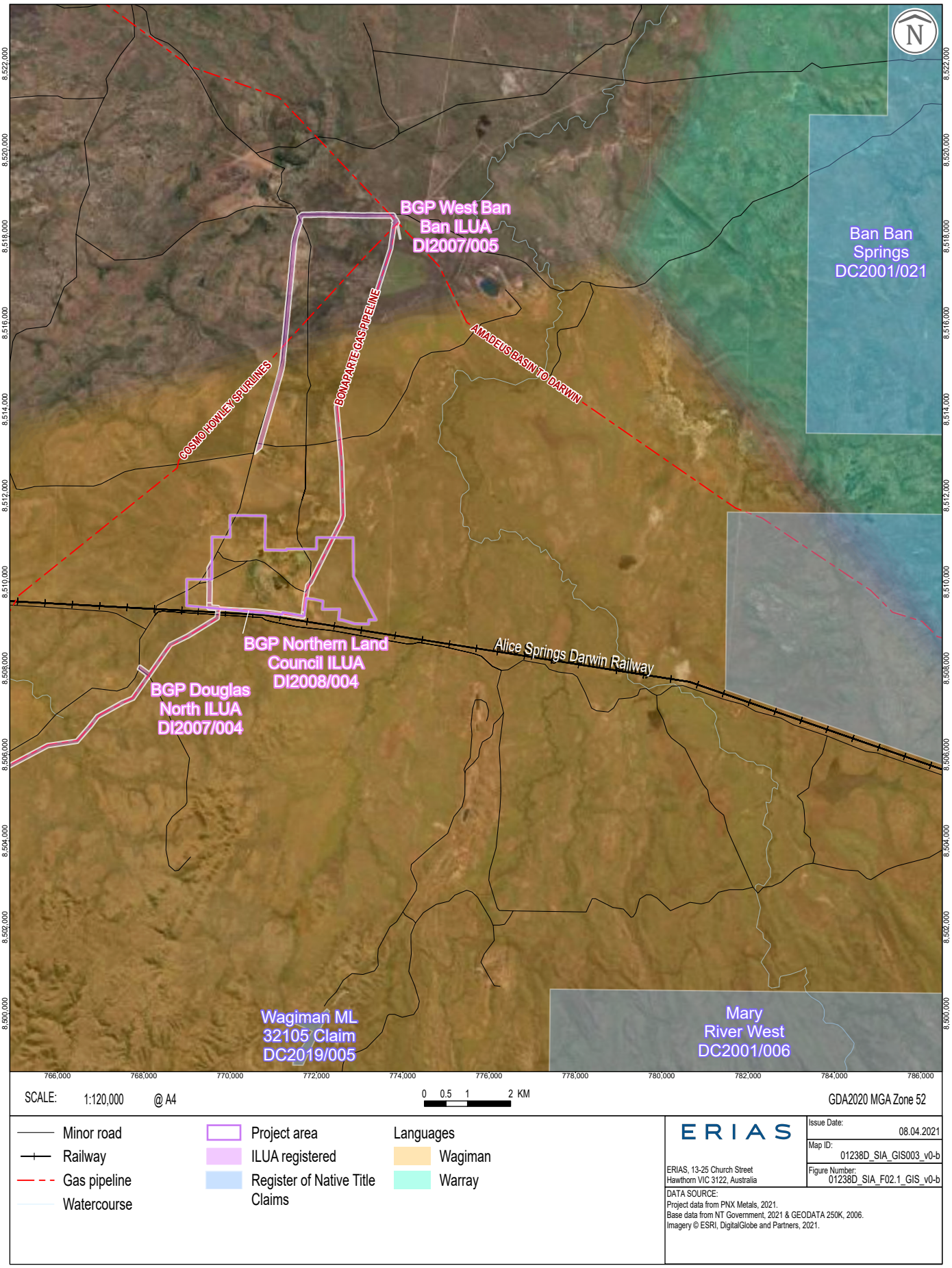


Table 2.1 – Northern Territory Resident Population, Actual Results and Projections by Broad Age Groups, 2016 to 2046

	2016	2021	2026	2031	2036	2041	2046
Aged under 15							
Aboriginal	22,127	22,103	22,276	22,989	23,834	24,743	25,723
Non-Aboriginal	31,471	31,957	32,996	35,098	37,664	40,511	43,711
Total	53,598	54,060	55,272	58,087	61,498	65,254	69,434
Aged 15-64							
Aboriginal	49,725	53,530	57,033	59,930	62,623	65,710	69,206
Non-Aboriginal	125,399	123,477	128,510	137,831	149,265	161,816	175,259
Total	175,124	177,006	185,543	197,761	211,888	227,526	244,465
Aged 65 and over							
Aboriginal	2,694	3,685	4,771	6,005	7,377	8,533	9,458
Non-Aboriginal	14,262	16,975	19,582	21,922	24,101	26,128	28,250
Total Population	16,956	20,660	24,353	27,927	31,478	34,661	37,708
Total	245,678	251,727	265,168	283,775	304,864	327,440	245,678
Aboriginal	74,546	79,318	84,080	88,924	93,834	98,986	74,546
Non-Aboriginal	171,132	172,408	181,088	194,850	211,031	228,454	171,132

Source: NT DTF, 2019.

The NT's median age is 32 years, and its population shows steady population aging, with the median ages and proportion of persons aged 65 and over projected to grow steadily. However, the Aboriginal population is ageing faster, as the median age of the Aboriginal population projected to increase by 22.5% from 2016 to 2046 in comparison to the 4.8% increase in the median age of the non-Aboriginal population over the same period (NT DTF, 2019).

The proportion of Aboriginal persons aged 15 years and under is projected to decline 17% over the same period. In contrast, the proportion of non-Aboriginal persons aged 15 years and under is projected to decline by only 3.9%. This reflects a greater decrease in the proportion of Aboriginal women of child-bearing age relative to non-Aboriginal women of the same age (NT DTF, 2019).

According to Australia census data (ABS, 2016a), 51.7% of people in the NT are male and 48.3% are female. A gender imbalance is evident at all age groups after 14 years of age, particularly after 60 years since only small numbers of women retire in the NT (Taylor and Wilson, 2016).

The ABS (2016a) describe the top five ancestries for people in the NT are: Australian, English, Australian Aboriginal, Irish and Scottish, and the top five languages (other than English) spoken in the NT are: Kriol, Djambarrpuyngu, Greek, Warlpiri and Murrinh Patha. The top six countries of birth for people living in the NT are: Australia, England, New Zealand, Philippines, India and the United States of America (ABS, 2016a).

People living in the NT most commonly identified as being non-religious (29.4%), Catholic (20%), Anglican (8.4%) and Uniting Church (5.7%) (ABS, 2016a). Sixteen percent of census respondents did not state a religion, and the remaining 20.5% comprise less commonly identified religions (e.g., Greek Orthodox, Buddhist, Australian Aboriginal Traditional Religions) (ABS, 2016a).

2.2.2 Local Government Areas

In 2019 the population of the Victoria Daly LGA was estimated at around 3,155 people, with a median age of 27 years (based on 2016 census data) (id, Undated(a)). The NT DTF (2020e) reports that between 2018 and 2019, the Daly-Tiwi-West Arnhem statistical area experienced negative (-0.1%) growth. The Coomalie LGA has an estimated population of 1,370 people (id, Undated(b)).

Table 2.2 outlines selected sub-population categories for the Victoria Daly and Coomalie LGAs in comparison to Regional NT. The data shows that the local government area has a higher percentage of Aboriginal and Torres Strait Islanders than for the Regional NT and a lower percentage of employment compared to Regional NT.

Table 2.2 – Selected Sub-population Categories for Victoria Daly and Coomalie LGAs

2016	Victoria Daly LGA		Coomalie LGA		Regional NT	
Population Group	*Number*	*% of Pop.*	*Number*	*% of Pop.*	*Number*	*% of Pop.*
Males	1,445	51.4	693	52.7	45,287	50.6
Females	1,369	48.6	623	47.3	44,157	49.4
Aboriginal and Torres Strait Islanders	1,821	64.7	318	24.2	45,588	51.0
Australian citizens	2,375	84.4	992	75.4	74,478	83.3
Employed population	737	82.8	453	90.6	78,800	88.1
Total Population	2,814		1,316		89,444	

Source: Australian Bureau of Statistics, Census of Population and Housing 2011 and 2016 (usual residence). Compiled and presented in profile.id by id, the population experts (Undated(b) and Undated(c)).

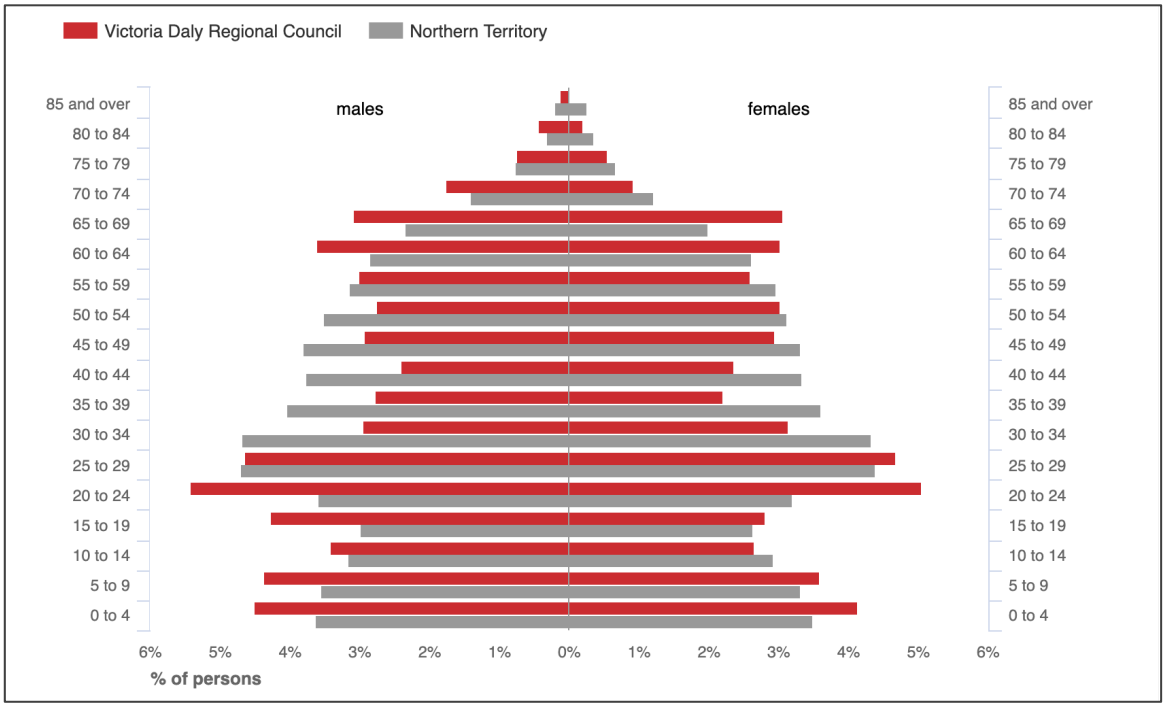
Figure 2.2 provides a comparison between the population age and sex of the Victoria Daly LGA compared to the NT. It shows that the LGA has a higher proportion of younger people (under 24 years old), and a higher proportion of adults between 60 and 70 years than the NT more broadly.

Figure 2.3 shows a comparison between the population age and sex of the Coomalie LGA compared to the NT. It shows that the LGA has a lower proportion of people under 45 years old, and a higher proportion of adults over 50 years than the NT more broadly.

Population data for Adelaide River and Pine Creek are presented in Table 2.3 and Figure 2.4 below. The data shows that Adelaide River has the same male to female ratio as for the NT more broadly, whereas Pine Creek has a stronger gender imbalance (where there were 21 more males than females at the last census). Both towns have high percentages of Aboriginal people, and their median age is much lower than (approximately half) the non-Aboriginal population.

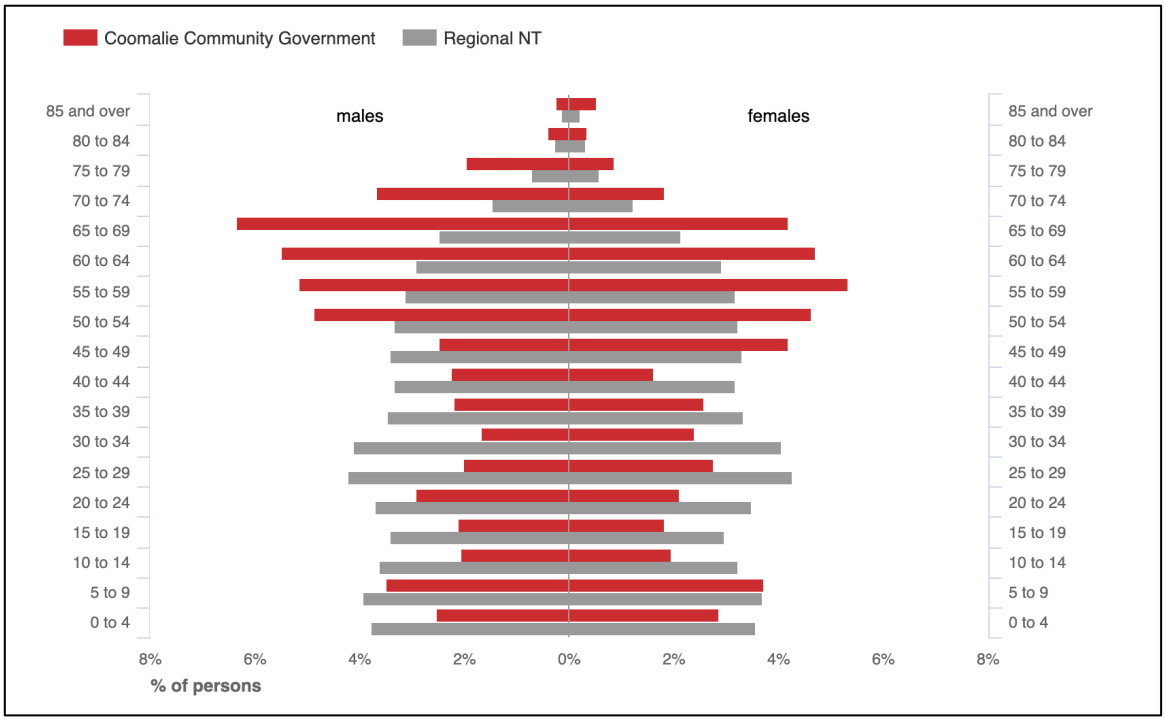
The population of Pine Creek (urban centre/locality) has fluctuated significantly between 2001 to 2016 (census dates), likely linked to the town's reliance on local mining activities, whereas Adelaide River's population has steadily increased over this time (Figure 2.4).

Figure 2.2 – Age-sex Pyramid for Victoria Daly LGA Compared to the Northern Territory



Source: Australian Bureau of Statistics, Census of Population and Housing, selected years between 1991-2016 (Enumerated data). Compiled and presented in profile.id by .id, the population experts (Undated(d)).

Figure 2.3 – Age-sex Pyramid for Coomalie LGA Compared to the Northern Territory



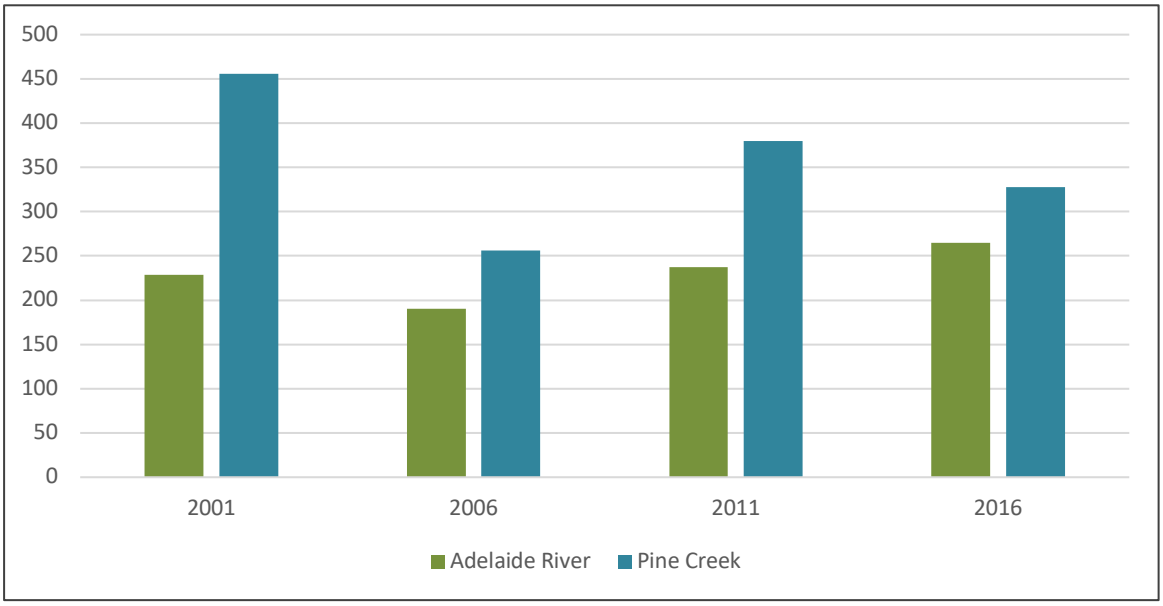
Source: Australian Bureau of Statistics, Census of Population and Housing, selected years between 1991-2016 (Enumerated data). Compiled and presented in profile.id by .id, the population experts (Undated(e)).

Table 2.3 – Population and Demographics of Adelaide River and Pine Creek

Location	Population (% Male/ female)	Aboriginal and Torres Strait Islanders (%)	Aboriginal and Torres Strait Islanders Median age	Non-Aboriginal and Torres Strait Islanders Median age	Growth Rate (2011 – 2016)
Adelaide River	353 (51.8/48.2)	25.1%	22	47	49%
Pine Creek	328 (53.2/46.8)	46%	21	39	-13%
Northern Territory	228,833 (51.8/48.2)	25.5%	25	32	8%

Source: ABS 2011a and 2011b, 2016b and 2016c. Data is taken from State Suburb (code SSC).

Figure 2.4 – Population Trends of Adelaide River and Pine Creek



Source: Data is taken from Census Quickstats (ABS, 2016d) Urban Centre Localities (code UC/L) as this data is consistently presented across census years. Note that Adelaide River's 'State Suburb' population is higher than the Urban Centre data.

In both Pine Creek and Adelaide River, approximately 75% of residents were born in Australia (ABS, 2016b, 2016c).

The ABS (2016c) describes the top five ancestries for people in Adelaide River as Australian, English, Aboriginal Australian, Irish and Scottish, and the top five languages (other than English) spoken as Tagalog, Dutch, Indonesian and Japanese (however the percentages of speakers are less than four people for all languages). People living in Adelaide River mostly identify as being non-religious (31.2%), Catholic (20.1%), Anglican (14.7%) and Australian Aboriginal Traditional Religions (5.9%). Eighteen percent of census respondents did not state a religion, and the remaining 10.1% comprise less commonly identified religions (ABS, 2016c).

The top five ancestries for people in Pine Creek as Australian, Aboriginal Australian, English, Scottish and Irish, and the top five languages (other than English) spoken as Wagiman (5.7%), Mayali (3.8%), Kriol (1.6%), Telugu (1.3%) and French (0.9%) (ABS, 2016b). People living in Pine Creek identify as being non-religious (29.4%), Anglican (12.2%), Catholic (10.7 %) and Pentecostal (10.1%). Nearly thirty percent (29.7%) of census respondents did not state a religion, and the remaining 7.9% comprise of less commonly identified religions (ABS, 2016b).

2.2.3 Socio-economic Indices

The ABS produce a product known as socio-economic indexes for areas (SEIFA) that ranks areas throughout Australia according to their socio-economic advantage and disadvantage. The ABS broadly define relative socio-economic advantage and disadvantage in terms of people's access to material and social resources, and their ability to participate in society (ABS, 2016e). The SEIFA is built on variables from census data, including income, education, employment, occupation, housing and other indicators (ABS, 2016e). A higher score on the index means a lower level of disadvantage. Table 2.4 shows the various SEIFA scores for local government areas in the NT based on the 2016 census data. Coomalie and Victoria Daly LGAs rank as the eighth and tenth most disadvantaged areas in the NT respectively, and both are lower than the NT and Australia as a whole (id, Undated(f)).

Table 2.4 – Index of Relative Socio-economic Disadvantage

NT Local Government Area	2016 Index
Darwin	1,041
Litchfield	1,040
Palmerston	1,027
Unincorporated NT	1,023
Wagait	1,011
Alice Springs	1,007
Katherine	991
Coomalie	**877**
Barkly	679
Victoria Daly	**657**
Tiwi Islands	630
West Arnhem	622
Roper Gulf	597
MacDonnell	581
East Arnhem	562
Central Desert	492
West Daly	441
Belyuen	435
NT and Australia	***2016 Index***
Northern Territory	938
Australia	1,002

Source: Australian Bureau of Statistics, Census of Population and Housing 2016. Compiled and presented in profile.id by .id, the population experts (Undated(f)).

2.2.4 Visitor Population

The Project area has a transient visitor population, predominantly from intrastate (i.e., within the NT), accounting for 53% of the visitor source market. Interstate visitation accounts for 37% of the market share, and is at its peak from March to September, and international visitors are a smaller market segment (10%) and visit primarily from June to September (Tourism NT, 2018).

Visitor numbers to the region (based on a three-year average from 2016 – 2018) were 186,000 intrastate visitors, 132,000 interstate visitors and 35,000 international visitors (Tourism NT, 2018).

2.3 Economy

The history of the NT's economic development has largely been driven by the resources sector, but also has a relatively large public sector and a significant defence force presence. The NT economy has experienced an ongoing pipeline of major Project investments by both the public and private sectors over the past 15 years, stimulating the expansion of the NT economy, exports and industries (NT DTF, 2020b). In recent years, the construction and mining industries have been the main drivers of economic growth, however the NT DTF reports that with the contraction of these industries, the NT is facing challenging economic conditions over coming years, with contracting population and employment growth, and declining levels of private investment and residential construction (NT DTF, 2018).

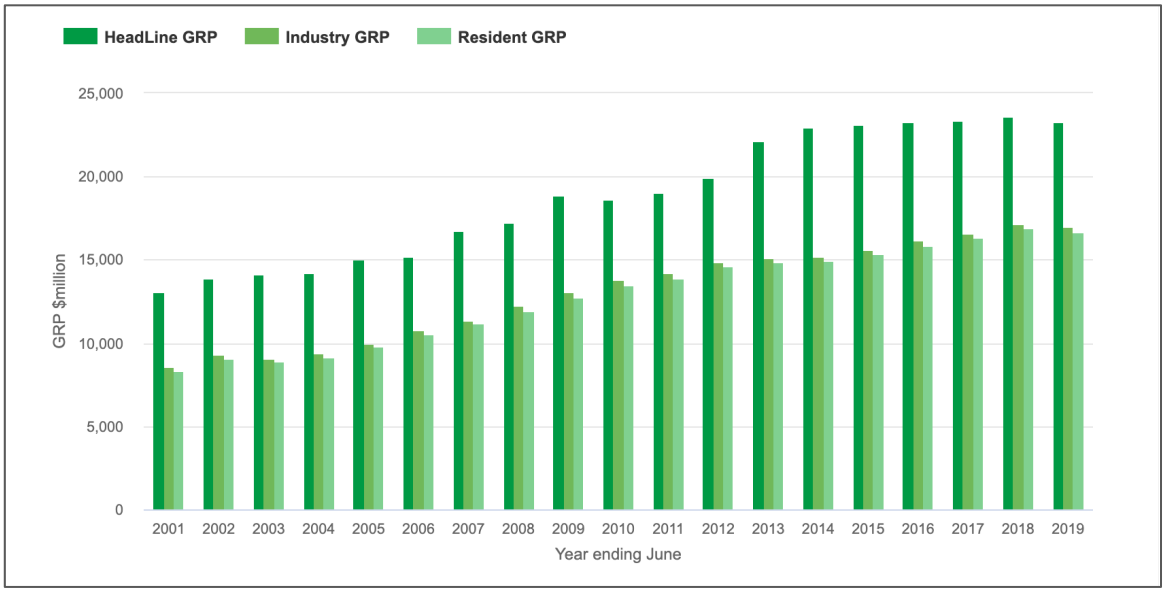
The NT's Gross Regional Product (GRP) was $23.29 billion in the year ending June 2019. Figure 2.5 shows a steady growth trend in GRP from 2001 through to 2018. In 2018-19, the NT economy declined by 1.5% to $26.1 billion (NT DTF, 2020b).

The main industries people in the NT work in are public administration and safety (20.9%), health care and social assistance (10.0%), education and training (8.9%), construction (8.2%), retail trade (8.1%), accommodation and food services (6.2%), professional, scientific and technical services (4.9%), other services (4.8%), transport, postal and warehousing (4.7%) (Population Australia, 2020).

Compared to the national economy, the NT economy has greater contributions to production from mining and manufacturing, construction, government and community services (e.g., public administration and safety, health care, education), the service industries (e.g., food and accommodation, transport, financial, professional), retail and wholesale trade and agriculture, forestry and fishing. In 2018-19 these six sectors together make up 78.6% of the total of industry sector contributions to the NT's Gross State Product (GSP) (NT DTF, 2018). Figure 2.6 identifies the percentage contribution to the NT GSP by sector.

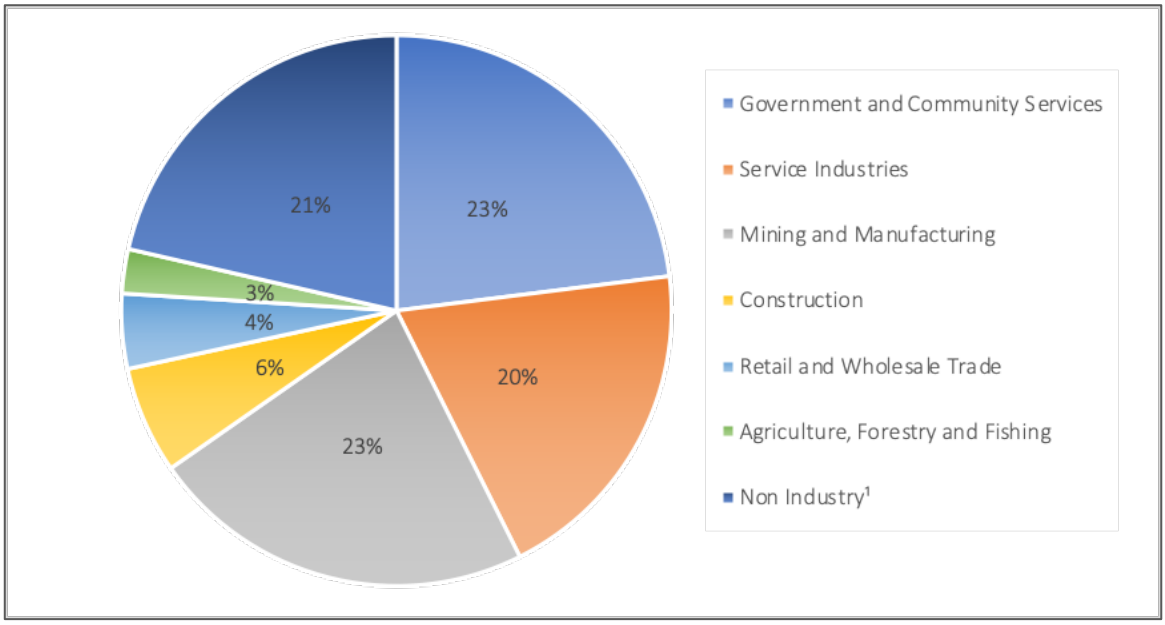
The largest industry (by employment) in the Victoria Daly LGA is mining (id, Undated(h)), however cattle and farming are the primary land use. There are 45 businesses registered in the area and 1,087 local jobs (id, Undated(h)). The dry season sees an influx of visitors that come to see nearby parks and attractions including Litchfield, Kakadu and Nitmiluk (Katherine) Gorge national parks, and the LGA provides accommodation, food and other visitor services during the season. In Coomalie the largest employer is the education and training sector, followed by accommodation and food services (id, Undated(i)).

Figure 2.5 – Northern Territory Gross Regional Product



Source: National Institute of Economic and Industry Research (NIEIR) 2019. Compiled and presented by (id, Undated(g)).
Note: in the context of this graph, GRP is equivalent to Gross State Product (GSP).
Headline GRP is a measure of size or net wealth generated by the local economy.
Local Industry GRP shows the value produced by local industries.
Local Residents GRP refers to the economic output (or the income received) by people living in the area regardless of where they work.

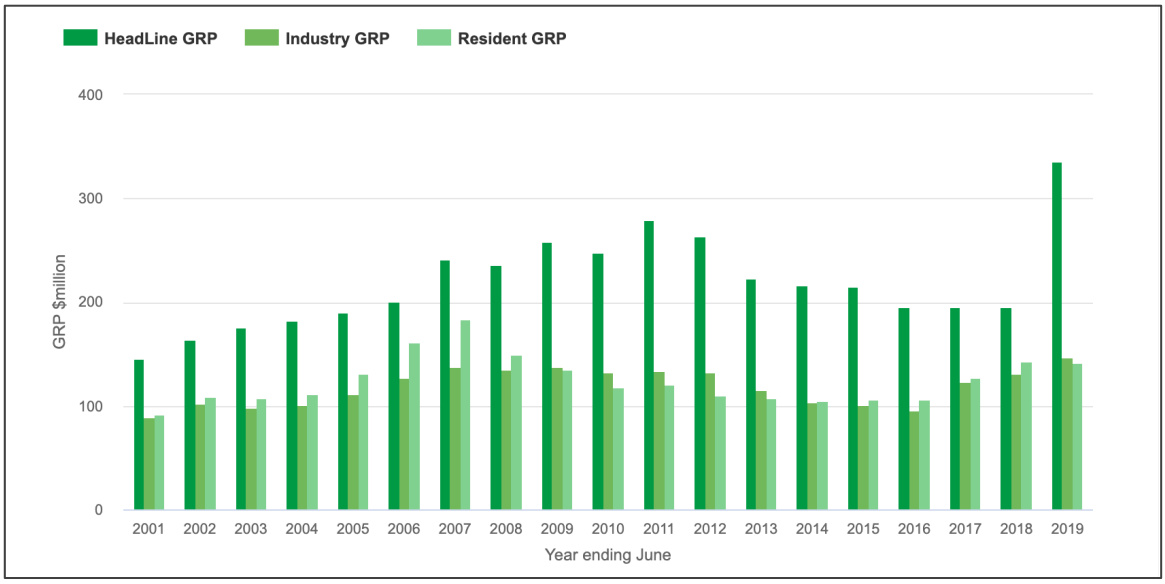
Figure 2.6 – Contributions by Sector to the NT Gross State Product 2018-19



Source: Department of Treasury and Finance; ABS, Australian National Accounts: State Accounts, Cat. No. 5220.0 as presented in NT DTF (2020c).
Note: The mining and manufacturing sector incorporates petroleum production.
[1]Non-industry components include ownership of dwellings, taxes less subsidies and statistical discrepancies.

Figure 2.7 shows the GRP for the Victoria Daly LGA. In comparison to Figure 2.5, which shows the GRP for the NT, Victoria Daly's GRP has fluctuated through growth and decline over the past 18 years, which is likely a function of the high reliance of the regional economy on the mining and construction sectors and a smaller reliance on the public administration and safety sector than the NT as a whole (id, Undated(h)).

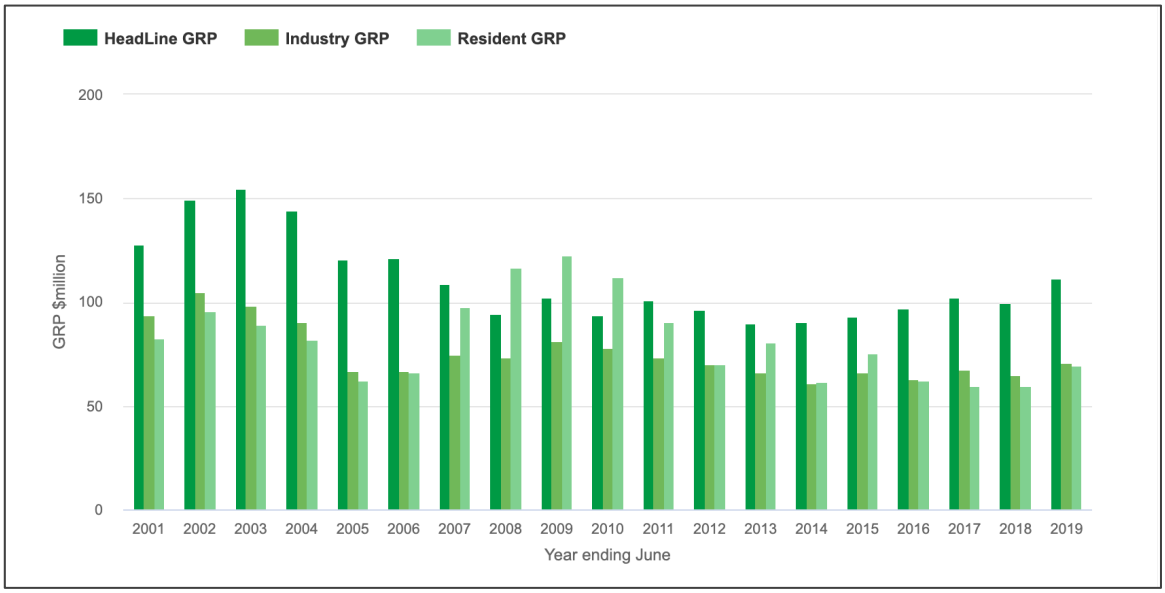
Figure 2.7 – Victoria Daly LGA Gross Regional Product



Source: National Institute of Economic and Industry Research (NIEIR) 2019. Compiled and presented by (id, Undated(h)).

Figure 2.8 shows the GRP for the Coomalie LGA.

Figure 2.8 – Coomalie LGA Gross Regional Product



Source: National Institute of Economic and Industry Research (NIEIR) 2019. Compiled and presented by (id, Undated(j)).

2.3.1 Government and Community Services

The government and community services combined sector comprises public administration and safety, education and training, and health care and social assistance. The outputs from these sectors are predominantly supplied and or funded by the public sector, including Commonwealth, NT and local governments (NT DTF, 2020c).

The government and community services industry is a significant contributor to the NT economy in terms of its contribution to GSP and employment. Historically, this industry contributes to at least a fifth of NT GSP ($6.2 billion in 2018-19) and over a third of NT employment (51,601 people employed in 2018-19). Growth over the next few years is expected to be relatively constrained as the NT Government implements a range of budget repair measures in response to reduced Commonwealth funding; however, this may be partially offset by expected growth in the defence sector (NT DTF, 2018; NT DTF, 2020c).

The government and community services sector is represented in the Project area through employment in education in Adelaide River and local government in Pine Creek (Section 2.4.1).

2.3.2 Service Industries

Service industries cover a wide variety of sectors that, while individually small, combine to contribute a large proportion of the NT's GSP. The value of service industries increased by 8.4% in 2016-17, driven by growth in professional, scientific and technical services, administrative and support services, and financial and insurance services (NT DTF, 2018). Employment in service industries grew by 5.6% in 2016-17 (NT DTF, 2018). The NT Government is committed to investing in developing industries, particularly related to services such as the creative industries, tropical health, environmental services and renewable energy. While these industries are individually small, they offer significant growth opportunities for the NT economy (NT DTF, 2020c).

Tourism is an important economic driver for the NT, contributing approximately 6.2% of NT employment and is a significant industry in regional areas (NT DTBI, 2019; NT DTF, 2020c). Tourism's contribution to the NT economy is captured in a range of industries. These include accommodation and food services, retail trade, culture and recreation, and transport. In 2017-18 the tourism industry in the NT is estimated to have contributed 4.4% to GSP (NT DTF, 2020d). Accommodation is perhaps the largest representative of the services industry in the Project area (Section 2.4.1).

Tourism Research Australia (2020) reports that in 2017-18, the Katherine Daly tourism region directly added $94 million to the NT GRP and indirectly added $61.8 million. Most visitors to the region were from intrastate (42%) and interstate (41%).

2.3.3 Mining, Energy and Manufacturing

Mining, energy and manufacturing contribute to the NT economy through international trade, private investment and employment. Mining and manufacturing accounted for 22.7% of NT economic output in 2018-19 and are also a significant driver of the NT's construction industry, as mining and manufacturing projects generally require significant levels of construction activity (NT DTF, 2020c). In 2016-17, the mining and manufacturing industry contributed 16.8% of total GSP in the NT, compared to a high of 33.6% of GSP in 2008-09 (NT DTF, 2018).

The main minerals produced and processed in the NT are bauxite, gold, manganese and zinc/lead concentrate. Key energy commodities are oil, natural gas, uranium, and the production of LNG. The mining, energy and manufacturing sector is expected to grow rapidly over the coming years, largely driven by growth in LNG production (NT DTBI, 2019). Mining is a key industry in the Project area, with iron ore and gold mining providing employment in Pine Creek (Section 2.4.1).

Manufacturing in the NT consists mainly of small-scale production of various products for export and domestic consumption, and mining-related processing (NT DTBI, 2019).

2.3.4 Construction

The construction sector has been particularly strong in recent years and one of the NT's largest industries, due mainly to the development of major resource projects (e.g., INPEX Ichthys LNG Gas Project). Residential and non-residential construction activity also experienced an increase in activity. In 2018-19 the NT construction industry contributed 8.4% to the total resident workforce, which was the fourth largest employing industry in the NT (NT DTF, 2020c). However, in 2018-19 the construction industry has contracted from $3 billion in 2017-18 to $1.6 billion as the INPEX Ichthys Project transitioned into operations (NT DTBI, 2019).

Over the next few years, growth is forecast to further moderate with the completion of the construction phase of some resource projects (NT DTBI, 2019).

2.3.5 Agriculture, Forestry and Fishing

The agriculture, forestry and fishing industry is much smaller than the other key industries in the NT in terms of its contribution to both GSP and employment, however these industries continue to be a significant employer and source of economic activity in regional and remote areas contributing $697 million to the NT economy and employing 1,899 people in the NT in 2016-17 (NT DTF, 2018; NT DTBI, 2019).

The key livestock commodities of the NT include cattle, buffaloes and crocodiles. In the horticultural sector the main commodities include fruit (mangos, melons, bananas and pineapples), Asian vegetables, and plant nursery products (NT DTF, 2018). Forestry includes sandalwood and African Mahogany production.

The pastoral industry (cattle in particular) is a major contributor to incomes in regional areas of the NT, contributing 41% of the total value of the NT rural industries and fisheries production in 2016-17 (NT DPIR, 2017). It also generates considerable flow-on benefits to other industries, particularly transport and storage, business to business services, and retail trade services.

The key markets for NT cattle are interstate markets (for further growing or slaughter) and live exports overseas (mainly Indonesia). However, live cattle exports have been declining over recent years (NT DTF, 2018). In the Project area, pastoralism is the dominant land use, with beef cattle farming providing employment to both Adelaide River and Pine Creek residents (Section 2.4.1).

The commercial fishing sector includes wild catch fish (such as barramundi, snapper, and shark), crustaceans (mainly prawns and mud crabs) and aquaculture (pearls). Fisheries production in the NT has strong potential in the coming years with the expansion of aquaculture production (NT DTBI, 2019).

2.3.6 Other Mining Operations in the Project Area

There are a number of abandoned mine sites and one recently operating mine in the broader Project area. The Cosmo Gold Mine, owned and operated by the Canadian company Kirkland Lake Gold, is located approximately 15 km to the west of the Project area, and was the only mine in the immediate area that was operating, until a recent announcement (in March 2020) to suspend test mining and processing at the Cosmo mine and the Union Reefs processing plant. The decision impacts approximately 250 employees, with up to 40 employees being retained to advance Kirkland Lake's existing rehabilitation and exploration work plans in the NT. Sixty per cent of company employees are locally based (Australian Mining, 2020).

Bacchus Resources have been undertaking exploration activity at the Woolwonga project site, located approximately 7 km north-east of the Project area since 2017. There is no evidence to suggest that the Woolwonga project will move into mining operation within the Project life.

2.4 Employment, Education and Training

2.4.1 Employment

The NT labour market is characterised by a relatively skilled labour force with a high level of labour participation and low unemployment (NT DTBI, 2019). The NT attracts a large number of people on a fly-in fly-out (FIFO) basis, who are mostly employed in mining and energy-related activities. As these workers are not resident in the NT, they are not included in the NT's labour force figures (or population figures) (NT DTF, 2020f).

The NT DTF (2020a) reported estimated employment figures for the NT for February 2020 at 133,204 people, a year-on-year change of -3.8%. The unemployment rate was 5.5% and the participation rate was 75.4%, which is higher than that for Australia (66%). Regional statistics show the unemployment rate increased between 2018 and 2019 in the Greater Darwin and Katherine regions, while falling in the Alice Springs, Barkly and Daly-Tiwi-West Arnhem regions (NT DTBI, 2019).

In the year to February 2020, the largest contributor to NT employment was from the education and training sector, and the largest detractor from resident employment was the mining, energy and manufacturing sector (NT DTF, 2020f). The largest employer by industry sector in the NT is the government and community services sector, employing 33,393 people full time, and 11,812 part time (NT DTF, 2020f).

Aboriginal employment in the NT is much lower than the non-Aboriginal population, with only 27.3% of the Aboriginal working age population (40,760) being employed in 2016, compared to 76% of non-Aboriginal working age population (119,329) (NT DTF, 2020g).

The most recent data available for communities of Adelaide River and Pine Creek is the 2016 census data (ABS, 2016b and 2016c). Based on this data, people of working age (15 to 64 years of age) comprised 57.8% of Adelaide River's population (compared to 62.6% in 2011) and 64.8% of Pine Creek's population (compared to 65.9% in 2011). For the same period in the Northern Territory, 71.3% of the population were of working age, compared to 65.8% of the national population (ABS, 2016b and 2016c).

The ABS (2016b and 2016c) records that 128 people reported being in the labour force in the week before census in Adelaide River. Of these 62.5% were employed full time, 21.1% were

employed part-time and 10.9% were unemployed. There were 147 people who reported being in the labour force in Pine Creek in the week before census. Of these 49% were employed full time, 27.9% were employed part-time and 20.4% were unemployed (ABS, 2016b and 2016c).

Employment profiles for Adelaide River and Pine Creek, compared with NT rates are detailed in Table 2.5. Unemployment in Adelaide River and Pine Creek is high compared to NT (7%) and Australia (6.9%) (ABS, 2016a, 2016b and 2016c).

Table 2.5 – Employment for Adelaide River, Pine Creek and the Northern Territory

Status	Adelaide River	Pine Creek	Northern Territory
Employed full time	80 (62.5%)	72 (49%)	74,100 (67.1)
Employed part time	27 (21.1%)	41 (27.9%)	21,493 (19.5%)
Away from work	7 (5.5%)	4 (2.7%)	7,112 (6.4%)
Unemployed	14 (10.9%)	30 (20.4%)	7,685 (7%)
Total labour force	128	174	110,390

Source: ABS 2016a, 2016b, 2016c. Data is taken from State Suburbs (code SSC).
Note: The total labour force is derived from self-reported census data. Questions used to determine the labour force include whether the respondent was working or looking for work.

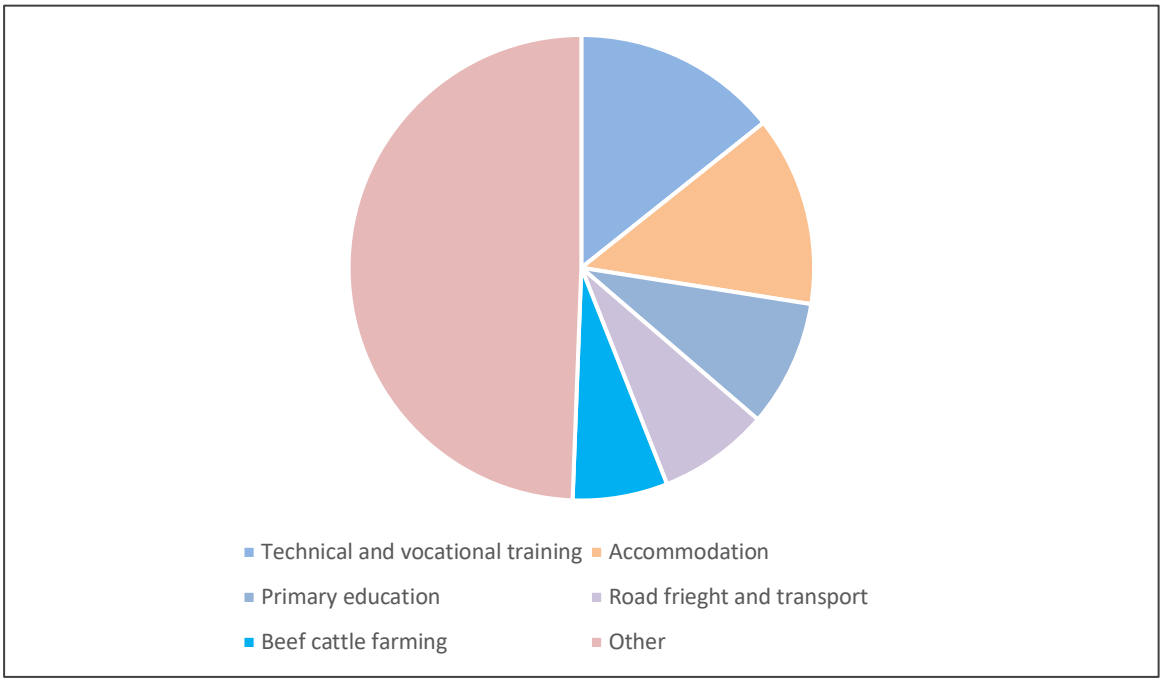
Figure 2.9 is based on 2016 census data and shows that the largest employer in Adelaide River was technical and vocational education (14.3%), followed by accommodation (13.2%) and primary education (8.8%). Road freight transport and beef cattle farming accounted for 7.7% and 6.6% of responses respectively.

The most common occupations in Adelaide River included labourers (18.5%), community and personal service workers (15.1%), clerical and administrative workers (14.3%), managers (12.6%), and technicians and trades workers (11.8%).

In Pine Creek at the time of the 2016 census, the largest employer was the accommodation industry (14.4%), followed by beef cattle farming (11.1%), local government administration (7.8%), iron ore mining (5.6%) and gold ore mining (5.6%) (Figure 2.10).

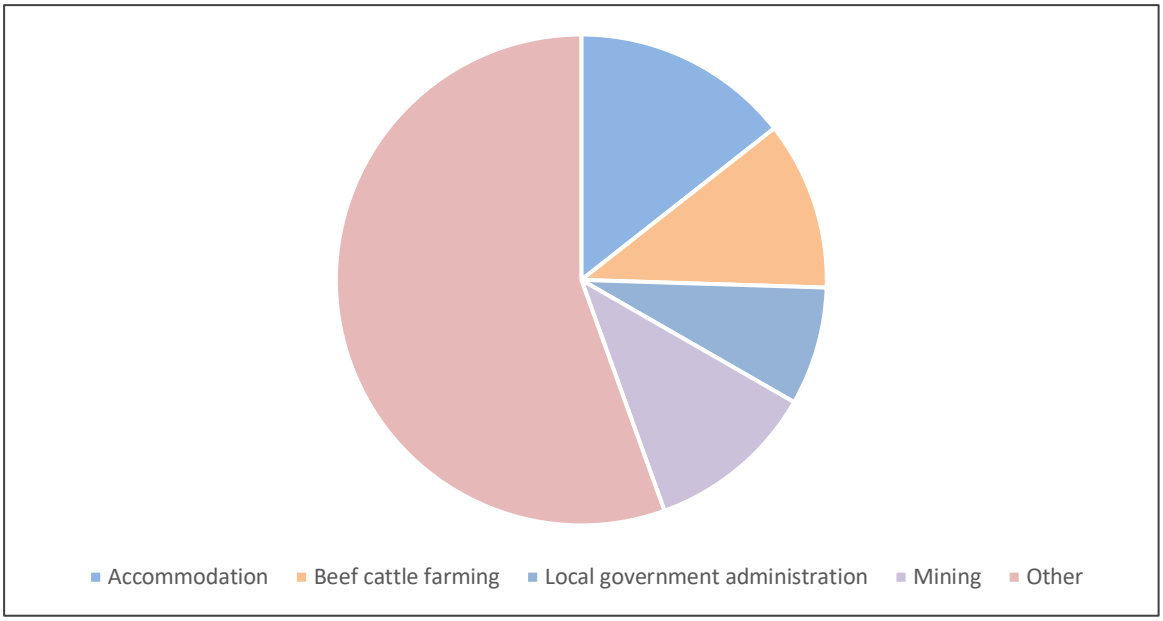
The most common occupations were managers (21.0%), followed by technicians and trades workers (14.3%), community and personal service workers (13.4%), machinery operators and drivers (11.8%), laborers (10.9%), professionals (10.1%) and clerical and administrative workers (10.5%) and sales workers (2.5%).

Figure 2.9 – Employers by Industry in Adelaide River



Source: ABS, 2016c. Data is taken from State Suburbs (code SSC).

Figure 2.10 – Employers by Industry in Pine Creek



Source: ABS, 2016b. Data is taken from State Suburbs (code SSC).

Household incomes in the Project area range from $527 (median weekly incomes) for Adelaide River residents, to $466 (median weekly incomes) for Pine Creek residents (ABS, 201b and 2016c). Household income statistics for Adelaide River and Pine Creek are outlined below in Table 2.6.

Table 2.6 – Household Income in Adelaide River and Pine Creek, 2011 and 2016

Project Area	Median Weekly Household Income	
	2011	*2016*
Adelaide River	$781	$1,017
Pine Creek	$1,153	$945
Northern territory	$1,674	$1,983
Australia	$1,234	$1,438

Source: ABS 2016a, 2016b, 2016c. Data is taken from State Suburbs (code SSC).

The median weekly household incomes in both townships are below the Northern Territory and Australian average.

2.4.2 Education and Training

In the NT 35.6% of people were attending an educational institution. Of these, 25% were in primary school, 16.2% were in secondary school and 13.6% were in a tertiary or technical institution. The remaining 45.2% were in preschool, an 'other' education institution or did not respond. Of people aged 15 and over, 12.7% reported having completed Year 12 as their highest level of educational attainment, 16.5% had completed a certificate III or IV and 7.2% had completed an advanced diploma or diploma. Seventeen percent reported having a bachelor's degree or above (ABS, 2016). These results are similar to the national levels of education attainment, although the percentage of Australians reporting having attained a bachelor's degree or above is slightly higher (22%).

For Aboriginal and Torres Strait Islander peoples in the NT, education attainment is much lower than the total population, with 10.2% reported having completed Year 12 as their highest level of educational attainment, 7.9 had completed a certificate III or IV, 2.3 had completed an advanced diploma or diploma, and 2.4% attained a bachelor's degree or higher (ABS, 2016f).

The NT DTF (2020e) reports that there were 3,380 apprentices and trainees in-training at the end of September 2019, an increase of 7% from the same time in 2018. Nationally, apprentices and trainees in-training decreased by 0.5 per cent over the same period. The gender ratio of males to females for apprentices and trainees was 2:1, compared with the national average of 3:1 (NT DTF, 2020e). The occupation category which had the most apprentices and trainees in-training was technicians and trade workers (51%), community and personal service workers (21.6%), and labourers and machinery operators and drivers (6.7%).

During the 2016 census, in Adelaide River, 33.8% of people were attending an educational institution comprising 33.3% at primary school, 9.8% at secondary school and 5.7% at a tertiary or technical institution. Of people aged 15 and over, 13.5% reported having completed Year 12 as their highest level of educational attainment, 17.1% had completed a certificate III or IV and 3.9% had completed an advanced diploma or diploma (ABS, 2016c). Only 6.4% of people in Adelaide River reported having attained a bachelor's degree or higher (ABS, 2016c).

In Pine Creek, 28.1% of people were attending an educational institution comprising 24% at primary school, 19.8% at secondary school and 3.1% at a tertiary or technical institution. Of people aged 15 and over, 6.9% reported having completed Year 12 as their highest level of educational attainment, 11.6% had completed a certificate III or IV and 3.9% had completed an

advanced diploma or diploma (ABS, 2016b). Only 6.6% of people in Pine Creek reported having attained a bachelor's degree or higher (ABS, 2016b).

2.5 Infrastructure and Services

2.5.1 Government and Community Services

2.5.1.1 Health and Education Services

Adelaide River is serviced by a community health centre which is run by the NT Government. The centre is serviced by two registered nurses and a doctor, who is based in Batchelor and visits once a week. The centre is open 9 am to 5 pm Monday to Friday but remains available for emergencies 24 hours.

Adelaide River has a small primary school, which was established in 1950 and moved to its current site, 100 m from the Adelaide River itself, in 1956. The nearest secondary schools and tertiary education facilities are located in Batchelor (approximately 30 minutes' drive away).

Pine Creek has a community health centre, with a visiting general practitioner (GP) on Wednesdays (for local residents only). The town has a primary school and an early childhood unit. The nearest high school is in Katherine (approximately 1-hour drive away).

2.5.1.2 Police and Emergency Services

The NT Police, Fire and Emergency Services (NT PFES) comprises over 2,200 employees, and 600 volunteers. There is a police station in both Adelaide River and in Pine Creek. Both towns also have a Fire and Emergency Volunteer Group, trained in road crash rescue.

Bushfires NT is part of the NT DEPWS (formerly the Department of Environment and Natural Resources (DENR)) and is responsible for rural bushfire management in the NT. Bushfires NT works with landowners and the community to manage bushfires through mitigation, management and suppression activities, and by coordinating landowner and volunteer participation in response to significant fires (NT DENR, 2020).

St John Ambulance Australia (NT) Inc are funded by the NT Government to provide emergency road ambulance and patient transport services. The closest St John Ambulance location to the Project area is in Katherine. There are no registered airstrips in the Pine Creek area. In an emergency, small planes can access the McDonald Airstrip, 15 km from town.

Mine rescue and medical personnel are also located at Cosmo and Union Reefs.

2.5.1.3 Power and Water Supply

Power is supplied to both towns by the high-voltage transmission lines that run between Darwin and Katherine. The towns are connected to each other and to Darwin via the Stuart Highway, which runs between Port Augusta in South Australia, through Alice Springs to Darwin. It is the principle north-south route through central Australia and is used for freight transport and domestic travel. Pine Creek is located at the junction of Stuart Highway and Kakadu Highway, which is principally used by visitors to the national park.

Water supply is provided by the Power Water Corporation (PWC). Most (95%) of the remote potable water supplies are sourced from groundwater, however Pine Creek also has access to

surface water supplies (PWC, 2020). PWC (2020) states that there are more than 260 production bores servicing remote communities across the NT.

The NT Government is planning to develop the Adelaide River off-stream storage scheme (AROWS) within the next 10-20 years to meet future demand for water in and around Darwin. AROWS will involve the extraction of water from the Adelaide River during wet season flows and potentially the construction of an off-stream storage reservoir.

Other water users in the vicinity of the Project area are primarily pastoralists, who access water via groundwater bores or stream offtake points. There are 10 known functioning bores within 10 km of Fountain Head (BOM, 2020). One bore located outside the mine lease approximately 800 m northeast of the pit is periodically used by Ban Ban Station for stock watering. The remaining known functional bores within 10 km of Fountain Head are located at Grove Hill, North Point and Princess Louise.

2.5.1.4 Recreation and Events

The Adelaide River Show Society precinct is located on the southern side of the Adelaide River and incorporates display pavilions, a caravan park, a public swimming pool and a grass turf racing track. The showgrounds are home to several community and sporting organisations and host annual events including the ANZAC Day Breakfast, the Adelaide River Show and the Adelaide River Races. The caravan park contains 40 powered sites and unlimited unpowered sites. Adelaide River also has sporting facilities including a cricket/netball court, a football oval, outdoor cricket pitch and a multi-sport asphalt playing court.

A non-denomination church building is shared by various religious organisations.

In Pine Creek, the local council supports core functions of parks and gardens maintenance and waste management and delivers programs such as the community night patrol, outside of school hours care and support sports and recreation activities. It has a shopping centre, indoor and outdoor sporting facilities, including a go-kart track, and tourist accommodation.

The town holds annual events including the NT Gold Panning Championships, Didgeridoo Jam, and horse races.

2.5.2 Housing and Accommodation

Fifteen percent of NT residents and 31% of Australians owned their own home outright, 29.6% and 34.5% (respectively) owned their home with a mortgage and 50.3% and 30.9% (respectively) rented at the time of the 2016 census (ABS, 2016a). The average number of people per household was 2.9 in the NT, and 2.6 Australia-wide.

According to the latest census data, in 2016 there were 139 households (120 occupied households – 86.3%) recorded in Adelaide River, with an average of 2.4 people per household. Forty-six (38%) properties were owned outright, and 20 (16.5%) properties were held under mortgage with an average monthly mortgage repayment of $1,300. All households reported mortgage repayments that are less than 30% of the household income. Median weekly rent was reported as $200 per week and 95% of rented households have rental payments that are less than 30% of the household income. In 2016 there were 19 (13.7%) unoccupied dwellings (ABS, 2016c).

Census data for Pine Creek reported 146 households, of which 106 (72.6%) were occupied and which have average of 2.3 people per household. Thirty-one (26.3%) properties were owned outright and 13 (11%) were held under mortgage with an average mortgage repayment of $1,560 per month. Similar to Adelaide River, 100% of household mortgage repayments are less than 30% of household income. Median weekly rent was $82 per week (ABS, 2016b).

The dwelling structure of occupied private dwellings in Adelaide River and Pine Creek is presented in Table 2.7. At the time of the 2016 census, Adelaide River had 120 occupied and 19 unoccupied dwellings, and Pine Creek had 106 occupied and 40 unoccupied dwellings.

Table 2.7 – Occupied Private Dwelling Structure – Adelaide River and Pine Creek

Dwelling Type	Adelaide River	Pine Creek
Separate house	93 (77.5%)	83 (78.3%)
Semi-detached, row or terrace house, townhouse, etc.	11 (9.2%)	7 (6.6%)
Flat or apartment	0	5 (4.7%)
Other dwelling	12 (10.0%)	11 (10.4%)
Total occupied private dwellings	120	106

Source: ABS 2016b and 2016c. Data is taken from State Suburbs (code SSC).

2.6 Social Cohesion

Social cohesion refers to the social relationships that bind people together, and can be described (and measured) using five domains, (known as the Scanlon-Monash Index (SMI) of Social Cohesion):

- Sense of belonging.
- Sense of worth.
- Social justice and equity.
- Participation.
- Acceptance.

Strong social cohesion depends on economic wellbeing (including income levels and distribution, health, sense of security and government responses to issues of poverty and disadvantage), political participation and socio-cultural agreement (AHRC, 2015). Factors that negatively impact social cohesion include racism, a lack of recognition of Aboriginal and Torres Strait Islander peoples' cultures and history, inequality, lack of frequent, positive intercultural contact, and the lack of the spaces that facilitate these interactions (AHRC, 2015).

There have been no known studies in or relevant to the Project area that assess the baseline social cohesion using this framework. However, the communities closest to the Project area are small and remote, lacking many of the government services available in larger towns (Section 2.5). These communities therefore must be highly self-sufficient and reliant. The large Aboriginal community and the Victoria-Daly council's focus on respect for culture and heritage, the opportunities for recreational activities (and supporting infrastructure), regular community events and support for local employment and housing all support strong social cohesion.

Conversely, a transient workforce can negatively affect community cohesion, as it reduces participation and a sense of belonging, and the workforce in the Project area tied to mining and construction, freight and transport is transient (SIHFNT, 2018). Crime is another factor that can erode community cohesion, often fuelled by alcohol abuse (Section 2.7).

These communities were established due to the discovery of gold in the region in the late 1800s and gold mining activities have played a part in the local economy ever since. Pine Creek in particular has a town identity tied to mining.

2.7 Community Health and Safety

The NT Health Strategic Plan 2018-2022 (NT Government, 2018) outlines the key health-related issues for the territory. Like other Australian jurisdictions, the NT faces a growing prevalence of chronic conditions, ageing infrastructure that does not align well to population health needs, and systems that do not always meet demand and therefore do not support safety and quality.

The NT has the highest premature death rates in Australia, and significant geographical and cultural barriers. It is a constant challenge to provide equity of access to health services to residents, with many living regionally and remotely. The NT population also has high rates of social disadvantage such as poverty, which leads to higher rates of poor health.

Crime rates in the broader Katherine region are high (per 100,000 population) compared to larger towns such as Darwin and the NT more broadly (NT PFES, 2020). Crimes predominantly comprise assault, (26%) property damage (20%) and domestic violence (18%) (NT PFES, 2020).

2.8 Cultural Heritage

2.8.1 Archaeology of the Project Area

A cultural heritage survey was carried out over the Project area between 18-23 October 2019 with representatives from the Warai and Wagiman traditional owner groups. Previous surveys in the region have uncovered and documented flakes, cores, retouched flakes, flaked pieces, unifacial points, bifacial points, Kimberley points, ground-edged axes, flaked axes, axe blanks, blades, bipolar-percussed blades, hammer stones, grindstones, and debitage (tiny waste flakes from the knapping process) (Martin-Stone, 2020).

The archaeological survey recorded six Aboriginal places (or sites) and five archaeological objects (or artefacts), as defined under the *NT Heritage Act 2011*. Seven sites (comprising three Aboriginal places and four historic sites), were recorded during previous surveys (Crassweller, 2006).

A heritage place or object is:

- A place or object declared to be a heritage place or object under the Act; or
- An Aboriginal or Macassan archaeological place or object; or
- A place or object of a protected class of heritage places or objects.

The Aboriginal places and objects documented during the 2019 survey demonstrate key aspects of pre-contact culture and are protected by the *NT Heritage Act*. Table 2.8 and Figure 2.11 show

the places and objects recorded during the 2019 cultural heritage survey and 2006 survey by Crassweller (2006) over the Project area.

The AAPA (2021) has advised that there are two recorded sacred sites just north of the Project area. The closest recorded sacred site is approximately 2 km to the north. Figure 2.11 also shows the previously recorded sites and the closest sacred site recorded near the Project.

Martin-Stone, (2020) describes the significance assessment criteria used to determine the significance of each place or object. All places and objects recorded were determined as culturally significant in consultation with the Traditional Owners. All Aboriginal places are archaeologically significant and objects are of low archaeological significance. For the places and objects where condition was recorded (201910220850, 201910221030, 201910221515, 201910220900, 201910220945, 21910221545), condition was generally good, with in-situ disturbance by grazing livestock.

Table 2.8 – Summary of Archaeological Survey Findings

Site Name	Site Type	Description	Significance (Cultural/archaeological)
201910220850	Aboriginal object	3 artefacts (2 x unifacial points, 1 x blade) within 5 m^2, on low ridge.	Significant/low significance
201910221030	Aboriginal object	Feldspathic metagreywacke (FMG) retouched blade, 50 m from ridge site.	Significant/low significance
201910221040	Aboriginal object	Broken FMG bifacial point. Distal break.	Significant/low significance
201910221045	Aboriginal object	Quartz cobble core with 2 negative flake scars from 2 platforms.	Significant/low significance
201910221220	Aboriginal object	FMG flaked piece.	Significant/low significance
201910221500	Aboriginal place	Low density stone artefact scatter (max 2 per m^2). Includes stone, green bottle glass, metal. Approximately 50+ artefacts - flake, broken flake, flaked piece. 100% tuff.	Significant/significant
201910221510	Aboriginal place	Low density artefact scatter, stone artefacts only. Approximately 15 artefacts in 20 m^2 area. Flake, broken flake, bifacial point.	Significant/significant
201910221515	Aboriginal place	500+ artefacts - quartz 50%, tuff 45%, greywacke 5%. Stone artefacts only. Whole flake, broken flake, flaked piece, blade, unifacial point, bifacial point.	Significant/significant
201910220900	Aboriginal place	Stone artefact scatter, 150+ artefacts. One chert flaked piece, small quartz quarry. Broken hammerstone. Low density of artefacts across whole ridge, with clumps of higher density. FMG. Whole flake, broken flake, flaked piece, core, hammerstone, blade, unifacial point, bifacial point	Significant/significant

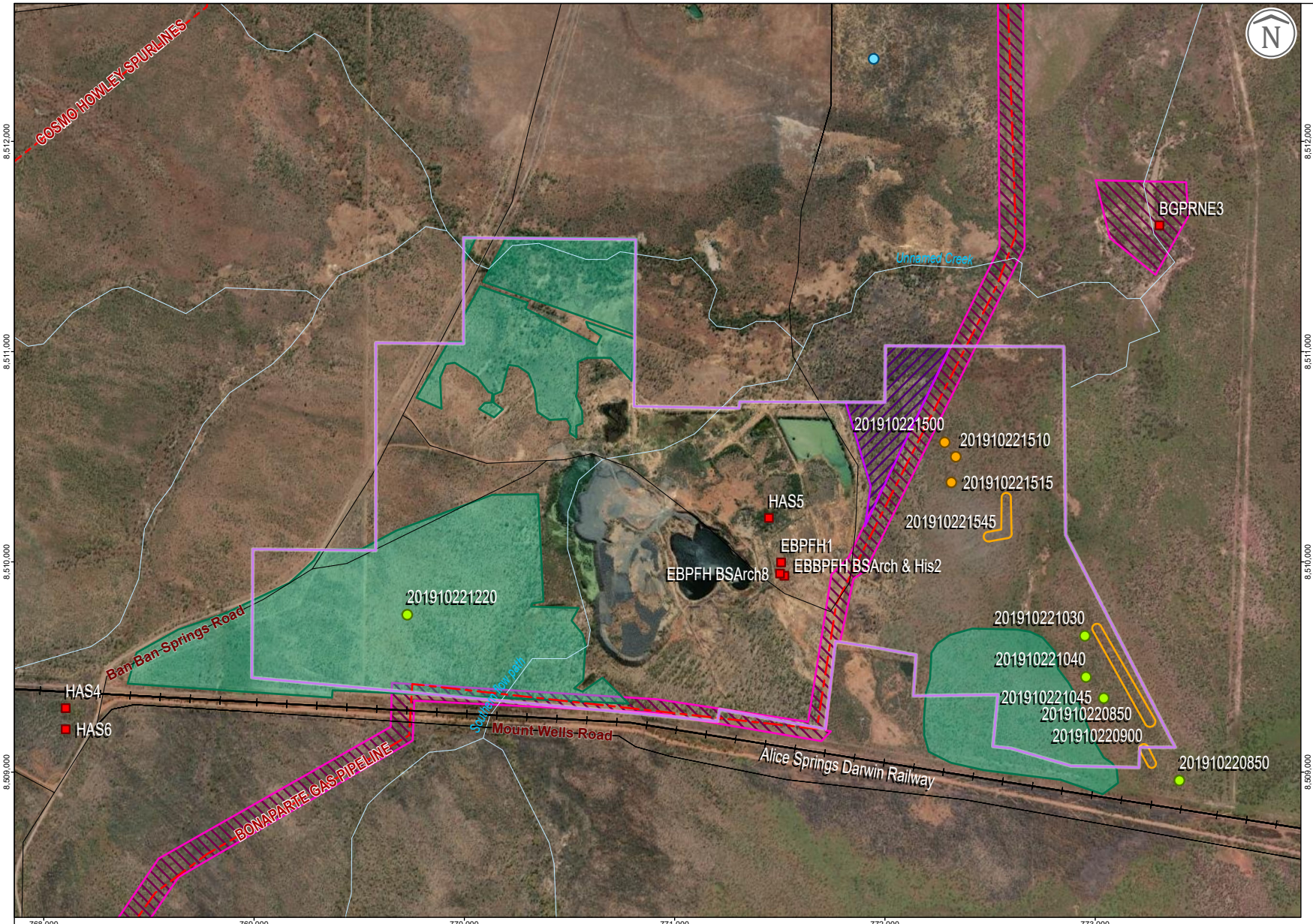
Site Name	Site Type	Description	Significance (Cultural/archaeological)
201910220945	Aboriginal place	2500+ artefacts. Artefact scatter continues across entire ridge, at varying levels of density. High density artefact scatter at highest point ridge. Knapping floors, manuports, diverse raw materials (FMG 50%, quartz 49%, chert, silcrete n=1). Site faces N/NE, towards Yam Creek. Whole flake, retouched flake, broken flake, flaked piece, core, grindstone, hammerstone, blade, unifacial point, bifacial point, debitage, unifacial point blanks / preforms. Maximum density= 50 per m^2 (at 773198E, 8509327N). Interesting artefacts include a cobble core and grindstone.	Significant/significant
21910221545	Aboriginal place	1,000+ artefacts. Hilltop stone artefact scatter with knapping floors. 90% tuff/greywacke, 9% quartz, 1% dolerite. Site contents are clustered and scattered. Whole flake, broken flake, flaked piece, hammerstone, blade, unifacial point, bifacial point, debitage. Site continues in varying degrees of density along the ridgeline, including lower areas of gravel exposure. It was recorded in conditions of 50% visibility.	Significant/significant
HAS4	Historical place	Fountain Head cattle yards	Unrecorded
HAS5	Historical place	Fountain Head mine	Unrecorded
HAS6	Historical place	Fountain Head railway siding	Unrecorded
BGPRNE3	Historical place	Glencoe Head Station	Unrecorded
EBPFH BSArch & His2	Aboriginal place	Artefact scatter	Unrecorded
EBPFH BSArch8	Aboriginal place	Background scatter	Unrecorded
EBPFH 1	Aboriginal place	Artefact scatter	Unrecorded

Custodians consulted in preparing the Authority Certificate identified that tall termite mounds (greater than 3 m tall) are of cultural significance (AAPA, 2021). These mounds are not mapped nor formally documented, as they were not identified during the cultural heritage surveys. Nevertheless, their cultural significance is recognised in this report.

CULTURAL HERITAGE SITES RECORDED IN AND AROUND THE PROJECT AREA

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 2.11



- Aboriginal object
- Aboriginal place
- Previously recorded archaeological site
- Recorded sacred site
- Road
- Railway
- Gas pipeline
- Watercourse
- Project area
- Low probability area
- Area not surveyed
- Restricted work area
- Extensive Aboriginal place

Issue Date: 2021.04.08

Map ID: 01238D_SIA_GIS004_v0-b

Figure Number: 01238D_SIA_F02.11_GIS_v0-b

ERIAS

ERIAS, 13-25 Church Street
Hawthorn VIC 3122, Australia

DATA SOURCES:
Project data from PNX Metals, 2021.
Imagery © ESRI, DigitalGlobe and Partners, 2021.

Figure 2.11 shows that the archaeological sites recorded are concentrated in the eastern portion of the Project area. This is primarily due to the nature of the landscape in this area, comprising low hills with preferred stone resources, near watercourses. The consultant and Traditional Owners surveyed the area in the west and found only one isolated artefact. Due to the nature of the land system in this western area, there is a low probability of finding more archaeological places and objects in the area. Due to time constraints and extreme weather conditions, the survey team could not complete the survey in the central northern part of the survey area (Figure 2.11), however this area is not within the proposed Project expansion footprint[2].

2.8.2 European and Chinese Heritage

In 1862 the explorer John McDouall Stuart passed nearby the Project area while traversing the Australian mainland from south to north, through the centre of the continent. It was during this expedition that Stuart noted the region's potential for gold.

In 1870 the overland telegraph line, which runs between Darwin and Port Augusta in South Australia was being installed near the Pine Creek area when traces of alluvial gold were noted. This discovery initiated a gold rush to the area from 1872 to 1874. Other metals including silver, copper and tin were also extracted.

The area has subsequently experienced a 'boom and bust' economy (Jones, 1987), with the most recent peak in the early 21st Century. In addition to the township of Pine Creek, smaller settlements appeared, including Hayes Creek, Burrundie, Mount Wells, Grove Hill and Union Reef.

Construction of the Adelaide to Darwin railway began in 1878 and continued in stages into the 20th century. The line reached the small town of Oodnadatta in southern Australia by 1911 and was continued onto Alice Springs in 1929. The railway was completed in 2003 with the opening of the 1,420 km section from Alice Springs to Darwin (ICE, 2018).

The goldfields and the construction of the railway brought thousands of Chinese miners to the area around Pine Creek. The Chinese workforce was essential to the operations of the mines, and concessions to the White Australia Policy were made by the NT administration in order to maintain the viability of the broader NT economy (Powell, 2000). The Chinese community outnumbered Europeans in the NT in the 1880s and went on to become a well-established community in both Darwin and Pine Creek, and surrounding settlements, remaining even in times of bust.

Around the same period (between the mid-1860s to 1895) was a time of large-scale pastoral settlement and development in the NT. Large pastoral runs were taken up, large sums of money invested, and hundreds and thousands of sheep, cattle and horses were overlanded to stock the new properties (DTSC, 2020b).

Alluvial mining at Fountain Head was undertaken intermittently between 1883 and 1951 (GBS Gold Australia, 2007). From 1985, extensive alluvial mining was undertaken, which was followed by Dominion Mining establishing a small open pit in the 1990s. Further exploration continued

2 Should the footprint be expanded into this area, a survey will occur prior to any works.

which culminated in GBS Gold recommencing mining at Fountain Head in 2007 which ceased in 2009.

2.9 Attitudes to the Project

Community attitudes to the proposed Project have been canvassed as part of the Project's stakeholder engagement program. To-date, there is no known opposition to the Project commencing, and given the Project is located in a historical mining area, the recommencement of mining is in keeping with historical and current land uses and will contribute to the local and regional economy through the provision of jobs and associated business opportunities.

PNX will continue to monitor stakeholder views and concerns as part of their stakeholder management system. See Section 1.5.6 for further details on the Project stakeholder engagement program.

3. Social and Economic Impact Assessment

3.1 The Development Proposal

The Project will be completed over 3.5 years, incorporating the dewatering of the existing mine pit, expansion (and mining) of the open pit and expansion of the existing WRS to form the IWL, and the addition of processing facilities and supporting infrastructure. The gold will be sold to Australian and international buyers.

The personnel required for the mining and heap leach operations will be in the first instance sourced from the local areas of Pine Creek and Darwin. PNX are an equal opportunity employer and encourage the employment of Aboriginal locals and persons of any gender.

There will be no camp facilities constructed on site and options are being investigated including utilising and expanding existing accommodation facilities near Fountain Head. The workforce will be transported in daily, by bus from the selected camp with the daily commute to and from work to be less than 1 hour per journey. There will be approximately 80 persons housed at the camp at any one time (day and night shift).

The site will be a bus-in bus-out (BIBO) site from Darwin with any FIFO workforce required to make their own way to Darwin, in this way the local communities will have greater accessibility to employment on site. Only local personnel not on the bus route will be able to drive to the camp to commence their swing on shift change days.

The mining and heap leaching process will operate 24 hours per day, 365 days per annum. It is expected most employees will be engaged on 12-hour shifts and rosters approximating 2 weeks on and 1 week off. It is envisaged that management staff and administrative positions will be on a one week on and one week off roster. The workforce required for the early construction phases for the heap leach and processing plant will peak at around 50 persons at any one time.

It is proposed that power requirements will be provided by an on-site diesel-fired power station. Water for processing will be sourced on site whilst potable water will initially be trucked to site from Pine Creek or Adelaide River, and will later be sourced from on-site sources (if viable). The Project will use public roads (i.e., the Stuart Highway and Ban Ban Springs Road) to transport equipment and supplies to and from the Project site from Darwin, and the Project workforce between site and their accommodation. An assessment of traffic-related impacts is provided in the TIA and TMP.

3.2 Economy and Regional Development

3.2.1 Potential Impacts

This section describes the potential contributions of the Project to the federal, NT and local economies. The predicted economic impacts of the Project include:

- Economic benefits (royalties and mining levy payments) to the NT government.

- Stimulation of the regional and local economy via payments made to workers and support for local business.

The NT *Mineral Royalty Act 1982* imposes a royalty on all minerals extracted in the NT except for uranium, petroleum and some extractive minerals. Payment of royalties is a condition of a mining tenement. From July 2019, royalties are calculated on the gross production value of mineral commodities obtained from a production unit and is equal to either (whichever is greater) 20% of the net value, less $10,000, or a sliding scale of 1% (Yr 1), 2% (Yr 2) and 2.5% (Yr 3 and following years). PNX will pay all applicable royalties and taxes in accordance with legislation applicable at the time.

As discussed in Section 2.3, the largest industry (by employment) in the Victoria Daly LGA is mining (id, Undated(h)), demonstrating the importance of the mining industry to the regional and local economies. The Project will contribute to the regional and local economies primarily through the provision of local employment opportunities (Section 3.3) and operating and capital expenditure which includes the purchase of the plant, infrastructure, materials, equipment and services, particularly during the Project construction phase. Businesses within NT (and local business where practicable) are likely to provide a significant proportion of these products and services.

The NT economy experiences fluctuations due to the mining and construction sectors being significant drivers (Section 2.3). This process is exacerbated in regional areas, where many of the mining and construction jobs are located. Pine Creek in particular has experienced growth and decline since gold was first discovered due to the fluctuations in mining (Section 2.8.2). While the Project is likely to contribute in the short-term to the local economy, due to the small size and duration of the Project, the increase in employment and income will invariably end at the completion of mine operations. Further, a sufficiently sized and appropriately skilled labour pool is often not available in regional towns to meet Project construction needs, creating the need for non-resident workers to be sought from elsewhere. As these workers do not tend to become permanent residents of the area, they do not contribute to the longer-term economic prosperity of the town or region, and in some cases can inflate local prices of housing, goods and services.

Activities, Project components and impacts are summarised in Table 3.1.

Table 3.1 – Potential Impacts to the Economy

Activity/Aspect	Project Component	Potential Impact
Royalties and mining levy payments, employment and contracts with local businesses	Whole of Project	Economic benefits (royalties and mining levy payments) to the NT government
		Stimulation of the regional and local economy via payments made to workers and support for local business

3.2.2 Mitigation and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.2 below.

Table 3.2 – Economy Management Measures

Potential Impact	Mitigation and Management Measures
Economic benefits (royalties and mining levy payments) to the NT government	• PNX will pay royalties and levies in accordance with legislative requirements (SEM01). • PNX will ensure transparency in reporting surrounding the payment of royalties and levies (SEM02).
Stimulation of the regional and local economy via payments made to workers and support for local business	• Package tenders in a way that suits local businesses, where this is commercially feasible (SEM03). • Raise awareness and manage local business and community expectations surrounding increased business activity through regular communications and engagement on Project activities and upcoming opportunities (SEM04). • Where possible, maximise work opportunities for local community members, including through specifying preference for local service and supply requirements in agreements with contractors (SEM05). • Where possible, maximise work opportunities for local Aboriginal people, including through contractor agreements (SEM06). • Work in partnership with industry and government groups on business growth and work readiness programs (SEM07).

3.2.3 Residual Impact Assessment

The residual impact assessment uses the significance assessment method (Section 1.5.4.2), considering the implementation of mitigation and management measures outlined in Table 3.5 and following sections.

The history of the NT's economic development has largely been driven by the resources sector and the mining, energy and manufacturing sector is one of several significant contributors to the overall NT economy (Section 2.3). Due to the size of the NT economy and the reliance on mining, the sensitivity of the NT economy to an increase in revenue derived from mining royalties is rated as ***Medium.*** The impact magnitude of the Project's modest contribution to NT royalties is rated as ***Positive***. This results in a residual impact assessment of ***Positive***.

The sensitivity of regional and local economies to increased income is rated as ***Medium***, as mining is an important sector for both employment (particularly in Pine Creek) and businesses providing related products and services. This is coupled with the fact that Cosmo Gold has recently reduced operations (and therefore spend) in the local area. While an estimate of capital and operating expenditure that will be spent with local businesses is not possible, PNX will endeavour to procure goods and services locally, and employ workers from local communities, which will contribute further to local spend (e.g., through food, beverages and entertainment etc). Therefore, the impact magnitude of increased income associated with indirect increased business

activity stimulating the regional and local economy is rated as ***Positive***, acknowledging that the stimulus will be short term. This results in a residual impact assessment of ***Positive***.

Table 3.3 provides a summary of the assessment of residual impacts to the NT and Australian economy. The table should be read in conjunction with the specific management measures provided in Table 3.2. Residual impacts are assessed as ***Positive***.

Table 3.3 – Economy Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation Measures	Sensitivity/ Magnitude	Residual Impact Significance
Economic benefits (royalties and mining levy payments) to the NT government	Whole of Project	• SEM01 • SEM02	Medium/ Positive	Positive
Stimulation of the regional and local economy via payments made to workers and support for local business	Whole of Project	• SEM03 • SEM04 • SEM05 • SEM06 • SEM07	Medium/ Positive	Positive

3.2.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project economic impacts will include:

- Legislative requirements surrounding payment of royalties and levies are met.
- Capital and operating expenditure.
- Stakeholder engagement activities and Project updates.
- Community grievances and the time taken to address concerns and close them out.

PNX will report on payment of taxes, royalties and levies publicly through the Company annual report.

Internal reporting on community grievances will be undertaken monthly (throughout all Project phases) and corrective actions taken where required. Results of stakeholder engagement and community grievances will be recorded in the Company stakeholder management system.

3.3 Employment and Training

3.3.1 Potential Impacts

This section describes the potential impacts of the Project on local employment and training, which includes:

- Increased employment and training opportunities for local communities.
- Community expectations regarding employment (and Project benefits in general) are not met.

PNX expects to employ up to 50 workers during construction and an estimated 134 employed during the 3.5-year Project life. It is expected that a proportion of this workforce will be sourced from local communities and/or within the NT, particularly as there are likely to be skilled workers available who have recently been made redundant from the Cosmo Gold Mine.

Many of the roles required for the Project are well-suited to the skills present in Pine Creek and Adelaide River reported during the 2016 census, with the most common occupations including labourers, technicians and trade workers (Section 2.4).

The roles required include excavator, loader, dozer, grader and dump truck operators, as well as drillers, workshop trades, fitters, electricians and process plant operators. In addition, there will be secondary staff requirements for servicing of the accommodation camp, such as cleaners, cooks and maintenance crews. A full list of the estimated roles and number of positions required is provided in Table 3.4.

Table 3.4 – Estimated Workforce Requirements

Area	Position	No. Required
Mining – Staff	Project Manager	1
	Maintenance Superintendent	1
	Senior Mining Engineer	2
	Mine Geologist	2
	Pit Technicians	2
	Mining Operations Supervisor	3
	Maintenance Supervisor	3
	Surveyor	2
	Site Admin	2
	Safety Coordinator	2
	HSET – Paramedic / ERT	2
Mining – Wages	Excavator Operators	3
	Loader Operators	3
	Dump Truck Operators	18
	Dozer Operators	6
	Grader Operators	3
	Watercart Operators	3
	Dewatering Crew	2
	Drill & Blast Shotfirer	2
	Brill & Blast Crew	8
	Drillers	6
	Workshop Trades	16
CIP Plant	Manager Processing	1

	Senior Metallurgist/ Relief Mill Manager	1
	Plant Metallurgist	1
	Laboratory Technician	4
	Shift Supervisor	4
	Crusher Operator	4
	Mill Operator	4
	CIP Operator	4
	Elution/Au Room Operator	4
	General/Daycrew/Relief Operators	2
	Maintenance Supervisor	1
	E & I Technicians	4
	Boilermaker and Fitter	4
	Trade Assistant	2
	Storeman	2
Total Workforce		134

The recent retrenchment of 250 workers from the Cosmo Gold Mine and the resulting impacts to local businesses in Pine Creek has meant that the employment benefits associated with the Project are likely to be eagerly anticipated.

While the Project will provide direct and indirect employment opportunities (with the company, suppliers and service providers) and new business opportunities, there is also the potential for community expectations about local content not to be met, particularly given the modest number of jobs that will be required and the short Project duration.

The Project will also offer training and development opportunities to workers, including on-job skills development and health, safety and environment training (e.g., weed identification, blasting near sensitive receptors, 4WD driver training, personnel development for professionals in mine planning, scheduling and geology).

Activities, Project components and potential impacts are summarised in Table 3.5.

Table 3.5 – Potential Impacts to Employment and Training

Activity/Aspect	Project Component	Potential Impact
Project employment and training	Project workforce	Increased employment and training opportunities for local communities
		Community expectations regarding employment (and Project benefits in general) are not met

3.3.2 Mitigations and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.6 below.

Table 3.6 – Employment and Training Management Measures

Potential Impact	Mitigation and Management Measures
Increased employment and training opportunities for local communities	• Where possible, maximise work opportunities for local community members, including through specifying preference for local service and supply requirements in agreements with contractors (SEM05). • Where possible, maximise work opportunities for local Aboriginal people, including through contractor agreements (SEM06). • Continue to engage with local communities about the types of employment opportunities available, including timing, recruitment policies and training and development (SEM08). • Engage with local Aboriginal organisations as appropriate to support, enhance and facilitate Aboriginal employment and training opportunities (SEM09). • Enhance employee's skills base through on-job training and development programs (SEM10). • Implement culturally appropriate work practices, including leave, rosters and flexible recruitment (SEM11).
Community expectations regarding employment (and Project benefits in general) are not met	• Where possible, maximise work opportunities for local community members, including through specifying preference for local service and supply requirements in agreements with contractors (SEM05). • Continue to engage with local communities about the types of employment opportunities available, including timing, recruitment policies and training and development (SEM08). • Implement a grievance mechanism to capture community issues and concerns and facilitate timely and appropriate action to address (SEM12). • Continually update and implement the stakeholder engagement plan to support the management of community issues or concerns (SEM13).

3.3.3 Residual Impact Assessment

Communities around the Project area have unemployment figures higher than the NT average, particularly in Pine Creek where unemployment is more than double the NT. There may also be increased availability of some skilled workers around the Project area due to the recent closure of the Cosmo Mine. In Adelaide River, the levels of attainment is comparable with the NT, however, Pine Creek residents have lower training attainment levels as reported during the 2016 census, so on-job training and professional development could benefit Pine Creek residents in particular. Therefore, the sensitivity of local communities to changes in employment or training opportunities is rated as ***Medium***.

PNX will endeavour to source workers from local communities wherever possible and will support contractors to source and train locals. Organisations (e.g., Kybrook Farm) could also be engaged to help identify employment and training opportunities for Aboriginal people around Pine Creek. The Project is likely to bring ***Positive*** impacts to local communities through the increased opportunity for employment, supporting businesses and training and development over the 3.5-year life of the mine. Therefore, the residual assessment for increased employment and training opportunities is ***Positive***.

PNX will continue to engage with local communities about the types of employment opportunities available, including timing, recruitment policies and training and development, supported by the stakeholder engagement plan. This will facilitate community understanding of what is available and how to access those opportunities. Further, where possible, PNX and its contractors will maximise work opportunities for local community members, particularly in Pine Creek. With these management measures, the magnitude of the potential impact is assessed as ***Negligible***, providing a residual assessment of ***Negligible.***

Table 3.7 provides a summary of the assessment of residual impacts and benefits to employment and training. The table should be read in conjunction with the specific management measures provided in Table 3.6. Residual impacts are assessed as ***Negligible*** or ***Positive.***

Table 3.7 – Employment and Training Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Increased employment and training opportunities for local communities	Project employment and training	• SEM05 • SEM06 • SEM08 • SEM09 • SEM10 • SEM11	Medium/ Positive	Positive
Community expectations regarding employment (and Project benefits in general) are not met	Project employment and training	• SEM05 • SEM08 • SEM12 • SEM13	Medium/ Negligible	Negligible

3.3.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on employment and training will include:

- The percentage of the workforce that is hired from local communities and from within the NT.
- The percentage of the workforce who identify as Aboriginal or Torres Strait Islander.
- Community grievances and the time taken to address concerns and close them out.
- Workforce (directly employed and contractors) training records including the number of workers who have received training and/or professional development per year.

Internal reporting on community grievances and workforce training records will be undertaken monthly and corrective actions taken where required. Results of stakeholder engagement and community grievances will be recorded in the Company stakeholder management system.

3.4 Local Industry and Land Users

3.4.1 Potential Impacts

This section describes the potential impacts of the Project on local industry sectors and other land users, which includes:

- Disruption to operations of the Bonaparte Gas Pipeline (BGP) and the Adelaide to Darwin rail line.
- Reduction in land suitability for pastoral activities.
- Noise and vibration disturbance to nearby residents or landholders.

There are several industry sectors operating in the region, including mining and energy projects, agriculture and service industries, such as tourism and accommodation (Section 2.3). The Project activities that could potentially negatively impact on other industry sectors are Project transport (which is covered in the TIA and TMP), hazardous material use, blasting, and an expansion of the mining footprint.

Blasting will be required to mine most of the material from the pit. Within close proximity to the pit crest is the buried high-pressure BGP, which is owned and operated by Australian Pipeline Group (APA). At the closest point, the pipeline is 370 m from the pit crest to the east and 480 m to the south. Approximately 540 m to the south of the operation is the Adelaide to Darwin railway line, which has intermittent passenger (the Ghan) and freight services passing by day and night.

The Project is located on an operating cattle station on pastoral lease (PL 1111). The Project footprint area has previously been used for mining activities, reducing its suitability for livestock, which are currently excluded from the mine area. The Project will involve the expansion of the existing mine footprint (164.7 ha) through the expansion and mining of the existing open pit, the expansion of the waste rock storage (WRS), (which will become an integrated waste landform (IWL) within which filtered dry tailings will be stored within a dedicated cell), processing plant and supporting infrastructure. The new land clearance for the expanded footprint is 80.6 ha. The total footprint comprises just 0.12% of the Ban Ban Springs pastoral lease. Therefore, the potential for an expansion of the existing mining footprint to result in a reduction in the land available for pastoral use is considered negligible and not assessed.

There is some potential for Project activities to contaminate soil and surface water resources on site. If localised soil or water contamination were to occur, there is the potential for this to reduce the productivity of the land used for pastoral activities (i.e., producing beef cattle for domestic and international markets), with potential for reduced income for the landowner. The potential for localised contamination of surface soils and water through the accidental release of hydrocarbons and chemicals or from waste rock, ore or tailings runoff is low, given infrastructure design, the management controls proposed (ERIAS, 2021) and the hydrology of the Project area (i.e., flow paths at the Project site are ephemeral and experience surface runoff only after high rainfall events). Therefore, while there is some potential for soil and surface water contamination localised within the Ban Ban Springs Station to the north of the Project area in the event of runoff during a storm event, the potential for the Project to indirectly impact Ban Ban Springs Station's pastoral activities, neighbouring pastoral properties or other land users is considered negligible,

given the lack of surface water licenses (Section 2.5.1.3) and dispersal and dilution that would occur. This the potential for soil or surface water contamination to affect pastoral activities is considered negligible and not assessed.

The Project will primarily use the water currently stored in the open pit for dust suppression and ore processing. Modelling of groundwater drawdown resulting from dewatering of the pit lake to allow mining shows drawdown of greater than 100 m is predicted at the end of mining but is relatively steep, with the cone of depression largely restricted to the near vicinity of the pit. Groundwater levels are predicted to be drawn down less than 0.1 m within 2 km of the pit (CDM Smith, 2019). The groundwater drawdown cone is not expected to extend to bore RN024290, which is periodically used for stock watering by Ban Ban Station. Due to the restricted drawdown cone, the potential for impacts to nearby water users resulting from Project water use or dewatering is considered negligible and not assessed.

The Project Water Management Plan (ERIAS, 2021) describes the primary pathway for impacts to groundwater quality as from surface water seepage, interactions with final pit water and mobilised contaminants infiltrating soils and reporting to groundwater. Potential sources of contaminants include waste rock, ore, tailings, process solutions, hydrocarbons and chemicals, seepage from the proposed evaporation pond and wastewater from septic systems. Potential impacts to groundwater quality are all assessed as ***Negligible***, except the potential for a reduction in groundwater quality as a result of seepage from the evaporation pond which could contaminant (dissolved salt and metal concentrations) in underlying groundwater. This impact is assessed as ***Minor***, and is predicted to be highly localised because groundwater below the evaporation pond is expected to be drawn back to the pit rather than migrating away from the site during dewatering and operations (ERIAS, 2021). Any deterioration of groundwater quality could potentially affect landowner extraction from bore RN024290 which is periodically used by Ban Ban Station for periodic stock watering.

Station owners have also reported using the Fountain Head lake as a water source, which will not be available during mining. Therefore, the loss of access of water for stock watering is a potential impact associated with the recommencement of mining.

Noise and vibration modelling for construction and operational activities was undertaken to determine whether Project activities could potentially impact on any nearby sensitive receptors. The Grove Hill Hotel is the closest receptor, which is approximately 5.5 km away from the Project location. The modelling determined that under the worst-case model, noise criteria outlined in the NT Noise Management Framework Guideline (NT EPA, 2018b) will be met under both construction and operations, and that predicted levels of airblast overpressure and ground vibration will also comply with the relevant criteria at the sensitive receptors. Therefore, noise and vibration impacts on nearby residents are not required to be assessed.

Activities, Project components and potential impacts are summarised in Table 3.8.

Table 3.8 – Potential Impacts on Local Industry and Land Users

Activity/Aspect	Project Component	Potential Impact
Blasting (Vibration)	Mining	Disruption to operations of the Bonaparte Gas pipeline (BGP)

		and the Adelaide to Darwin railway line
Pit dewatering, exclusion of cattle from mine operations area	Evaporation pond, mining	Reduction in land suitability for pastoral activities due to: • Loss of access to the Fountain Head lake for stock watering. • Reduction in groundwater quality.

3.4.2 Mitigations and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.9 below.

Table 3.9 – Local Industry and Land Users Management Measures

Potential Impact	Mitigation and Management Measures
Disruption to operations of the Bonaparte Gas pipeline (BGP) and the Adelaide to Darwin railway line	• Blasting activities will be restricted to daylight hours only, all days of the week (NO13). • A site based trained blasting professional will design each blast (NO07). • Blasting professional to ensure ground vibration will not exceed 20 mm/sec at any time at the BGP (NO12). • Undertake a SMS involving a risk assessment to determine allowable ground vibration limits that will be enforced on the blasting operation to ensure that no disruption is caused to the flow of gas through the BGP. Ground vibration levels to comply with "Standard conditions for works near APA Gas Transmission Pipelines" document. Blasting operations will adhere to the outcome of the SMS (MH11). • Continue to engage with APA to develop a joint Safety Management Study (SMS) to determine allowable ground vibration limits that will be enforced on the blasting operation to ensure that no disruption is caused to the BGP (SEM14). • Continue to engage with APA to conduct a risk assessment for blasting near the gas pipeline, and negotiate an access agreement for the pipeline corridor (SEM15). • Design blasting operations in accordance with good industry practice (e.g., APA, 2018), including ensuring that workers are appropriately trained (SEM16). • Communicate the blasting schedule to local land users (including local traffic) to help maximise awareness and minimise disturbance (SEM17). • Continue to work with AustralAsia Railways to develop a blasting procedure and notification regime that results in no impact to the railway network (SEM18).
Reduction in land suitability for pastoral activities	• Negotiate agreements (under the *Mineral Titles Act*) with pastoral landowner(s) who are impacted by the Project (SEM19). • Continue to engage with pastoral landowners to identify potential impacts and appropriate management approaches (such as the provision of alternative water sources if required) over the life of the Project (SEM20).

Potential Impact	Mitigation and Management Measures
	• Fencing will exclude cattle from operational areas (SEM21). • Comply with the *Mineral Titles Act* regarding any landowner grievances relating to loss of income and compensation (SEM22). • Monitoring of groundwater quality will be undertaken to detect potential contamination and to initiate remedial action (GW01). • Site contamination assessment and clean-up to be conducted at closure (MH10).

3.4.3 Residual Impact Assessment

The sensitivity of other identified land uses (i.e., the gas pipeline and railway line) close to the Project's proposed blasting operations is rated as ***Medium*** as blasting has occurred in the past at this mine site, demonstrating some level of exposure to this impact being experienced prior to the Project commencing. The impact magnitude of blasting disrupting operations of the gas pipeline and/or the railway line adjacent to mining activities is rated as ***Low***, assuming that blasting will be conducted in accordance with the outcomes of the planned risk assessment and safety management study (SMS). Therefore, the residual impact assessment for disruption of identified land uses is ***Low***.

The pastoral land proposed to be used for the Project has previously been used for mining activities, reducing its suitability for livestock (noting however that in general the water in the Fountain Head lake meets relevant Livestock Drinking Water Guidelines (ERIAS, 2021). Therefore, the sensitivity of the value (land suitability of pastoral activities) is rated as ***Low***.

Ban Ban Springs Station owners have identified that the recommencement of mining activities will remove this source of water used periodically for stock watering. The Fountain Head lake is not the only water source available or in use, and the mine footprint comprises less than 1% of the station's area. The Project proposes to work with the landholder to determine stock water needs and identify and provide, if necessary, an alternative water source to the Fountain Head lake, therefore the magnitude of the impact is assessed as ***Low***. Therefore, the residual assessment for a loss of access to the Fountain Head lake for stock watering causing a reduction in land suitability for pastoral activities is ***Negligible.***

Monitoring bores on the Project site indicate that groundwater has aluminium concentrations elevated above livestock drinking water guidelines (ERIAS, 2021). Arsenic, aluminium, chromium and copper concentrations have also been above ecological guideline values for slightly to moderately disturbed surface waters, and groundwater sensitivity is assessed as ***Low***. ERIAS (2021) assesses the residual impact of groundwater contamination resulting from pit dewatering as ***Minor***. Given the current uncertainties of the potential change in groundwater quality, the unknown extent of use of the bore by Ban Ban Station, the high availability of groundwater more broadly, and proposed mitigation measures (i.e., supply of alternatives if water quality is found to be impacted), the magnitude of the impact is assessed as ***Low***. Therefore, the residual assessment for a reduction in groundwater quality from pit dewatering to cause a reduction in land suitability for pastoral activities is ***Negligible***.

Table 3.10 provides a summary of the assessment of residual impacts to local industry and land users. The table should be read in conjunction with the specific management measures provided in Table 3.9. Residual impacts are assessed as ***Negligible*** or ***Low.***

Table 3.10 – Local Industry and Land Users Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Disruption to operations of the Bonaparte Gas pipeline (BGP) and the Adelaide to Darwin railway line	Blasting (Vibration)	• NO13 • NO07 • NO12 • MH11 • SEM14 • SEM15 • SEM16 • SEM17 • SEM18	Medium/ Low	Low
Reduction in land suitability for pastoral activities from the loss of access to the Fountain Head lake for stock watering	Exclusion of cattle from mine operations area	• SEM19 • SEM20 • SEM21 • SEM22 • GW01 • MH10	Low/Low	Negligible
Reduction in land suitability for pastoral activities from a reduction in groundwater quality	Pit dewatering		Low/Low	Negligible

3.4.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on local industry and land uses will include:

- Compliance with land use and landowner agreements.
- Monitor bores in use by groundwater users in close proximity to the Project.
- Timely consultation and notification of blasting and other activities that may impact local industry and other land users.
- Community grievances and the time taken to address concerns and close them out.
- Workforce training records including the number of workers who are trained in safe blasting practices.

Internal reporting on blasting incidents, community grievances and workforce training records will be undertaken monthly and corrective actions taken where required. Results of stakeholder engagement and community grievances will be recorded in the Company stakeholder management system.

A condition of the Authority Certificate AAPA (2021) is that any contaminants of potential concern detected in a waterway or bore be reported to the AAPA within 14 days of detection.

3.5 Infrastructure and Services

3.5.1 Potential Impacts

This section describes the potential impacts and benefits of the Project on community infrastructure and social services, which includes:

- Additional pressure on accommodation and housing with the potential to decrease housing affordability.
- Additional pressure on schools and teaching services.
- Additional pressure on local health and emergency services.

The TIA and TMP considers the potential for impacts to the road network and road users, therefore impacts to roads are not assessed in this report.

The Project workforce will be provided with accommodation, transport (to and from Darwin and the camp), food and medical and emergency services (two paramedics). Workers will be BIBO unless they already live locally, so there is unlikely to be additional pressure placed on local schools, nor on local housing (due to provision of camp accommodation), with no predicted flow-on effects to housing availability or affordability. Therefore, the potential for the Project workforce to negatively impact on accommodation and schools is negligible, and not assessed.

Limited impact is expected on other emergency services except in the event of a major incident that needs to be attended by the NT PFES or by Bushfires NT. As there are no planned activities expected to increase bushfire frequency, the potential for increased pressure on local fire services is considered negligible and not assessed further. However, any increase in accidents and injuries due to Project activities could place pressure on local police, ambulance and medical services, which are already limited in and around the Project area.

Activities, Project components and impacts are summarised in Table 3.11.

Table 3.11 – Potential Impacts on Infrastructure and Services

Activity/Aspect	Project Component	Potential Impact
An increase in workers on site and localised traffic movements	Project workforce, logistics and transport	Increased pressure on local health and emergency services

3.5.2 Mitigation and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.12 below.

Table 3.12 – Infrastructure and Services Management Measures

Potential Impact	Mitigation and Management Measures
Increased pressure on local health and emergency services	• Prepare (and implement as required) an Emergency Response Plan in collaboration with local emergency services (SEM24). • Ensure that workers on site have emergency response capabilities and that there are first aid facilities available on site (SEM25). • Implement the management measures in the TIA and TMP to minimise traffic-related accidents (SEM26). • Encourage BIBO workers to access health services in Darwin or their place of origin (SEM27).

3.5.3 Residual Impact Assessment

The sensitivity of local infrastructure and services is rated as ***Medium***, as emergency services are limited due to the rural nature of the region and small size of local towns along with the level of 'exposure' to mining operations (there are or have been several operating in the area in recent years). The impact magnitude of increased accidents increasing pressure on local emergency services is rated as ***Low*** given the mitigation measures proposed. This results in a residual impact assessment of ***Low***.

Table 3.13 provides a summary of the assessment of residual impacts to infrastructure and services. The table should be read in conjunction with the specific management measures provided in Table 3.12. The residual impact is assessed to be ***Low.***

Table 3.13 – Infrastructure and Services Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Increased pressure on local health and emergency services	An increase in workers on site and traffic movements	• SEM24 • SEM25 • SEM26 • SEM27	Medium/Low	Low

3.5.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on local emergency services will include:

- Compliance with the Emergency Response Plan.

Testing of the Emergency Response Plan will be undertaken at least every six months, or as per agreement with emergency authorities in the plan.

3.6 Social Cohesion and Amenity

3.6.1 Potential Impacts

This section describes the potential impacts of the Project on social cohesion and amenity, which includes:

- A reduction in social cohesion and general 'way of life' due to a BIBO workforce.
- Strengthened social cohesion associated with increased economic activity.
- A change in amenity resulting from the expansion of mining activities.

Potential traffic-related impacts on amenity are considered in the TIA and TMP and are not discussed further in this report.

Transient workforces can negatively impact on the social cohesion and general 'way of life' of small and regional towns, particularly where they are accommodated in, or spend significant time in these towns (SIHFNT, 2018). Further, transient workforces are often male-dominated, and can result in an increase in assault and alcohol abuse, which can make residents feel less safe. The Project workforce is BIBO from Darwin (returning to Darwin once a shift is complete) and will be accommodated in a camp, unless they already live locally. Therefore, interaction with local communities will be negligible and this impact is not assessed.

The re-opening of the mine site and associated local employment opportunities could produce positive changes to economic and social activity in Pine Creek and Adelaide River, including more income to spend on social events and entertainment, which could in turn help strengthen social cohesion.

As mining is not a new industry in the region, nor is mining in the Project area new (as it is already a mine site), and the site is on private land, there are no predicted adverse impacts on the visual amenity of the surrounding area due to the Project. As the Project moves into the closure and remediation phase, the existing unrehabilitated IWL will be reshaped and rehabilitated, potentially improving the visual amenity of the Project area.

Dust emissions due to clearing and earthworks and later operations (e.g., crushing and grinding, haulage of ore and overburden) is predicted to comply with relevant criteria for ground-level concentrations of total suspended particulates, particulate matter $(PM)_{10}$ (annual averaging period) with the dust deposited within 5.5 km (the nearest sensitive receptor). The predicted

concentrations of $PM_{2.5}$ (annual averaging period) is expected to exceed the relevant air quality criteria, at the nearest sensitive receptor (the Grove Hill Hotel), however existing natural background levels already exceed these criteria (Katestone, 2020), and PNX will have water suppression on roads and transfer points as part of their standard operating practices. Therefore, the impact of dust on amenity is considered negligible and not assessed.

Activities, Project components and impacts are summarised in Table 3.14.

Table 3.14 – Potential Impacts on Social Cohesion and Amenity

Activity/Aspect	Project Component	Potential Impact
Project employment and procurement	Project workforce	Strengthened social cohesion
Reshaping and rehabilitation of the WRS/IWL	Mine site rehabilitation	Improved visual amenity

3.6.2 Mitigation and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.15 below.

Table 3.15 – Social Cohesion and Amenity Management Measures

Potential Impact	Mitigation and Management Measures
Strengthened social cohesion	• Where possible, maximise work opportunities for local community members, including through specifying preference for local service and supply requirements in agreements with contractors (SEM05). • Where possible, maximise work opportunities for local Aboriginal people, including through contractor agreements (SEM06). • Continue to engage with local communities about the types of employment opportunities available, including timing, recruitment policies and training and development (SEM08).
Improved visual amenity	• Implement the Mine Closure Plan (SEM28).

3.6.3 Residual Impact Assessment

The sensitivity of the of the visual amenity of the area surrounding the Project is rated as ***Low***, as the landscape has been affected by mining for the past 150 years. The magnitude of the potential for improved amenity due to mine site rehabilitation is assessed as Positive, therefore the residual impact assessment is ***Positive***.

The sensitivity of the local communities of Pine Creek and Adelaide River to changes in economic and social activity is rated as ***Low***. This is because the local economies (particularly of Pine Creek) are closely tied with mining and construction projects, and local communities are accustomed to the 'boom and bust' of employment opportunities. The magnitude of the potential for an increase in economic and social activity and social cohesion is rated as ***Positive***, therefore the residual impact assessment is ***Positive***.

Table 3.16 provides a summary of the assessment of residual impacts to social cohesion and amenity. The table should be read in conjunction with the specific management measures provided in Table 3.15. The residual impact is assessed as ***Positive.***

Table 3.16 – Social Cohesion and Amenity Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Strengthened social cohesion	Project employment and procurement	• SEM05 • SEM06 • SEM08	Low/Positive	Positive
Improved visual amenity	Mine site rehabilitation	• SEM28	Low/Positive	Positive

3.6.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on social cohesion and amenity will include:

- Community grievances and the time taken to address concerns and close them out.

Internal reporting on incidents and community grievances will be undertaken monthly and corrective actions taken where required. Results of stakeholder engagement and community grievances will be recorded in the Company stakeholder management system.

3.7 Community Health and Safety

3.7.1 Potential Impacts

This section describes the potential impacts of the Project on community health and safety, which excludes workforce occupational health and safety, unless it has been identified that the Project workforce may contribute to or cause community health and safety impacts. Potential impacts related to increased traffic and/or changed road conditions due to Project activities are considered in the TIA and TMP and are not assessed in this report. The potential impacts of the Project to community health and safety includes:

- Reduced safety of freight trains and passengers travelling the Adelaide to Darwin railway line.
- Increased risks to public health and safety and/or exacerbation of existing health concerns.

Blasting will be required to mine most of the material from the pit, which is approximately 540 m from the Adelaide to Darwin railway line, which has intermittent passenger (the Ghan) and freight services passing by day and night. If blasting practices were not well-managed, there could be some potential for blasting to cause fly rock to be ejected from the pit following blasting and

collide with passing freight and passenger trains, adversely impacting on their operation or passenger and staff safety.

There are minimal risks to public health and safety due to Project activities (due to the lack of interaction between the workforce and community, particularly due to BIBO and camp accommodation, and small-scale nature of the Project). However, there is some potential for any increase in local income to indirectly exacerbate existing health concerns in local communities, such as drug and alcohol abuse. While alcohol and drug use are known issues in many remote regional communities throughout Australia, the potential impact of additional income sustaining or encouraging this issue, coupled with PNX's zero drug and alcohol tolerance policy, is considered negligible and not assessed.

Activities, Project components and impacts are summarised in Table 3.17.

Table 3.17 – Potential Impacts on Infrastructure and Services

Activity/Aspect	Project Component	Potential Impact
Blasting (fly rock)	Mining	Reduced safety of freight trains and passengers travelling the Adelaide to Darwin railway line

3.7.2 Mitigations and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.18 below.

Table 3.18 – Community Health and Safety Management Measures

Potential Impact	Mitigation and Management Measures
Reduced safety of freight trains and passengers travelling the Adelaide to Darwin railway line	• Blasting operations will have a zero-ejection policy for fly rock leaving the pit area to avoid any incidents with trains or other site infrastructure (SEM29). • Consult with railway users about the timing of blasting and train passage to avoid coinciding the two activities if practicable (SEM30).

3.7.3 Residual Impact Assessment

In respect to safety, the sensitivity of freight trains and the Ghan railway passengers and staff is rated as ***High***. The potential for fly rock to collide with a passing passenger train during blasting activities, causing delays or injuries, is rated as ***Negligible*** as the potential for fly rock leaving the pit area will be minimised by good blasting practices to avoid incidents with passing trains. Therefore, the residual impact assessment of blasting adversely impacting railway passenger or staff safety is ***Negligible***.

Table 3.19 provides a summary of the assessment of residual impacts to community health and safety. The table should be read in conjunction with the specific management measures provided in Table 3.18. The residual impact is assessed as ***Negligible.***

Table 3.19 – Community Health and Safety Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Reduced safety of freight trains and passengers travelling the Adelaide to Darwin railway line	Blasting (fly rock)	• SEM29 • SEM30	High/ Negligible	Negligible

3.7.4 Monitoring and Reporting

Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on community health and safety will include:

- Incidents/events involving blasting and fly-rock leaving the pit area.
- Community grievances and the time taken to address concerns and close them out.

3.8 Cultural Heritage

3.8.1 Potential Impacts

This section describes the potential impacts of the Project on cultural heritage, which includes:

- Loss or damage to known cultural heritage places or objects/artefacts or Aboriginal places.
- Loss or damage to unknown cultural heritage objects/artefacts.
- Reduction in traditional access.

As discussed in Section 2.8.1, there are no sacred sites in the mining tenement; the closest recorded site being 2 km from the tenement boundary, therefore there will be no direct impacts on sacred sites due to Project activities.

The cultural heritage survey found no non-Aboriginal heritage sites or objects within the Project area and recorded six archaeological places (or sites) and five archaeological objects (or artefacts), as defined under the NT *Heritage Act 2011*. Seven sites (comprising three Aboriginal places and four historic sites), were recorded during previous surveys (Crassweller, 2006) (Figure 2.11).

Correspondence with the AAPA (2021) notes that custodians consulted for the Project Authority Certificate indicated that there are many tall termite mounds in the Project area (un-mapped) that are of cultural significance[3].

Of the known sites and objects within the Project area, only one object (201910221220; a flaked piece of FMG) will be impacted by the expanded Project footprint. The three Aboriginal places that are in the centre of existing operations (i.e., EBPFH BSArch & His2, EBPFH BSArch8 and EBPFH 1) may also need to be salvaged, as they are located within the mine operations area[4]. All other places and objects will not be impacted by Project activities, including the one sacred site recorded in the vicinity. Figure 3.1 highlights the known sites and objects overlaid with the proposed Project footprint expansion.

There is also the potential for chance finds of archaeological objects in the expanded footprint area (e.g., where the CIP plant site, ROM/Crusher and associated infrastructure will be developed), although as described in Figure 2.2, this area is described as a 'low probability area' due to the nature of the landscape, comprising low hills with preferred stone resources, close to the Yam Creek seasonal watercourses (Martin-Stone, 2020).

As the Project area is on pastoral land and has been used for mining activities, the land is unlikely to currently be used for traditional access or practices. Further, consultation with Traditional Owners during the archaeological survey did not identify any contemporary use of the land. Therefore, the potential for the Project to cause a reduction in traditional access is considered negligible and is not assessed.

Activities, Project components and impacts are summarised in Table 3.19.

Table 3.20 – Potential Impacts on Cultural Heritage

Activity/Aspect	Project Component	Potential Impact
Expansion of the mine footprint	CIP plant site, PAF stockpile	Loss or damage to known cultural heritage objects/artefacts or Aboriginal places
		Loss or damage to unknown cultural heritage objects/artefacts

3.8.2 Mitigation and Management Measures

Mitigation and management measures (including avoidance) that will be implemented as part of the Project development are outlined in Table 3.21 below.

3 Custodians requested that where possible, mounds 3 meters or higher are not disturbed (AAPA, 2021).
4 Note: HAS5 represents the centre point for the Fountain Head mine site.

Table 3.21 – Cultural Heritage Management Measures

Potential Impact	Mitigation and Management Measures
Loss or damage to known cultural heritage objects/artefacts or Aboriginal places	• Implement a 100m buffer around known places and a 50 m buffer around objects that are not to be disturbed, and clearly identify locations (SEM31). • Implement cultural heritage awareness training for all site staff, including the locations of known sites, legislative requirements and chance finds procedures (SEM32). • Salvage 201910221220 with an appropriate permit under the *NT Heritage Act 2011*, and with agreement from Traditional Owners regarding ongoing care of the object (SEM33). • If Aboriginal places require salvage, conduct a cultural heritage assessment in consultation with Traditional Owner representatives to determine significance, condition and management (SEM35). • Where possible, do not disturb termite mounds 3 meters or greater (SEM40).
Loss or damage to unknown cultural heritage objects/artefacts	• Develop a chance finds procedure to manage any unknown objects uncovered during disturbance activities (SEM36). • Develop a salvage protocol in consultation with Traditional Owners to manage the salvage of chance finds (SEM37). • Notify the DTSC of any chance finds, and record of all new finds in a cultural heritage database. Manage according to SEM36 and SEM37 (SEM38). • Cultural heritage surveys will be conducted prior to any change in the proposed Project footprint that may impact on previously unsurveyed areas (SEM39).

3.8.3 Residual Impact Assessment

The sensitivity of the Aboriginal places and objects identified in 2019 and in previous surveys is rated as ***High*** for the six Aboriginal places recorded in the Project area, as they are significant both culturally and archaeologically (Table 2.8) and are protected under NT legislation. While the three Aboriginal places recorded in Crassweller (2006) are not assigned a significance value, as a precautionary measure, they are assumed to have the same significance as the other places recorded on site (i.e., ***High***).

The sensitivity of the five objects are rated as ***Low***, as they are archaeologically of low significance, but culturally of high significance; however can be readily salvaged if necessary (i.e., they are movable).

The Project may require the salvage of the three Aboriginal places located in the centre of mine operations (i.e., EBPFH BSArch & His2, EBPFH BSArch8 and EBPFH 1). If this were to be required, a cultural heritage survey would be conducted with Traditional Owner representatives and appropriate salvage/management measures developed. Therefore, the impact magnitude of the expansion of the Project footprint on these places is rated as ***Low***, and the residual impact assessment to these places is ***Moderate***.

The expanded footprint does impact one object, requiring it's salvage. The impact magnitude of an expansion of the Project footprint on (201910221220; a flaked piece of FMG) is rated as ***Low***,

as a permit for the salvage and ongoing care of the object will be applied for in consultation with Traditional Owners. Therefore, the residual impact assessment to this object is ***Low***.

There is the possibility that during construction or operations, Project personnel will come across unrecorded objects (or chance finds). However, Figure 3.1 shows that the archaeological sites recorded are concentrated in the eastern portion of the Project area. This is primarily due to the nature of the landscape in this area, comprising low hills with preferred stone resources, close to watercourses. Due to the nature of the land system in this western area, there is a low probability of finding more archaeological places and objects in the area.

Objects are rated as ***Low*** sensitivity, given their low archaeological significance and movability. Given the disturbed nature of the site, the survey effort to-date, the low likelihood that objects will be found in the west of the Project area and the chance find procedure proposed to avoid impacting objects if found during Project construction or operations, the impact magnitude of loss or damage to unknown objects is rated as ***Low***. The NT Heritage Branch will be notified of any chance finds uncovered during Project activities. Therefore, the potential residual impact on unknown objects is ***Low***.

Table 3.22 provides a summary of the assessment of residual impacts to cultural heritage. The table should be read in conjunction with the specific management measures provided in Table 3.21. Residual impacts are assessed as ***Low*** to ***Moderate.***

Table 3.22 – Cultural Heritage Residual Impact Assessment Summary

Potential Impact	Activity/ Aspect	Mitigation and Management Measures	Sensitivity/ Magnitude	Residual Impact Significance
Loss or damage to known cultural heritage objects/artefacts	Expansion of the mining footprint	• SEM31 • SEM32 • SEM33 • SEM35	Low/Low	Low
Loss or damage to known Aboriginal places			High/Low	Moderate
Loss or damage to unknown cultural heritage objects/ artefacts		• SEM36 • SEM37 • SEM38 • SEM39	Low/Low	Low

3.8.4 Monitoring and Reporting

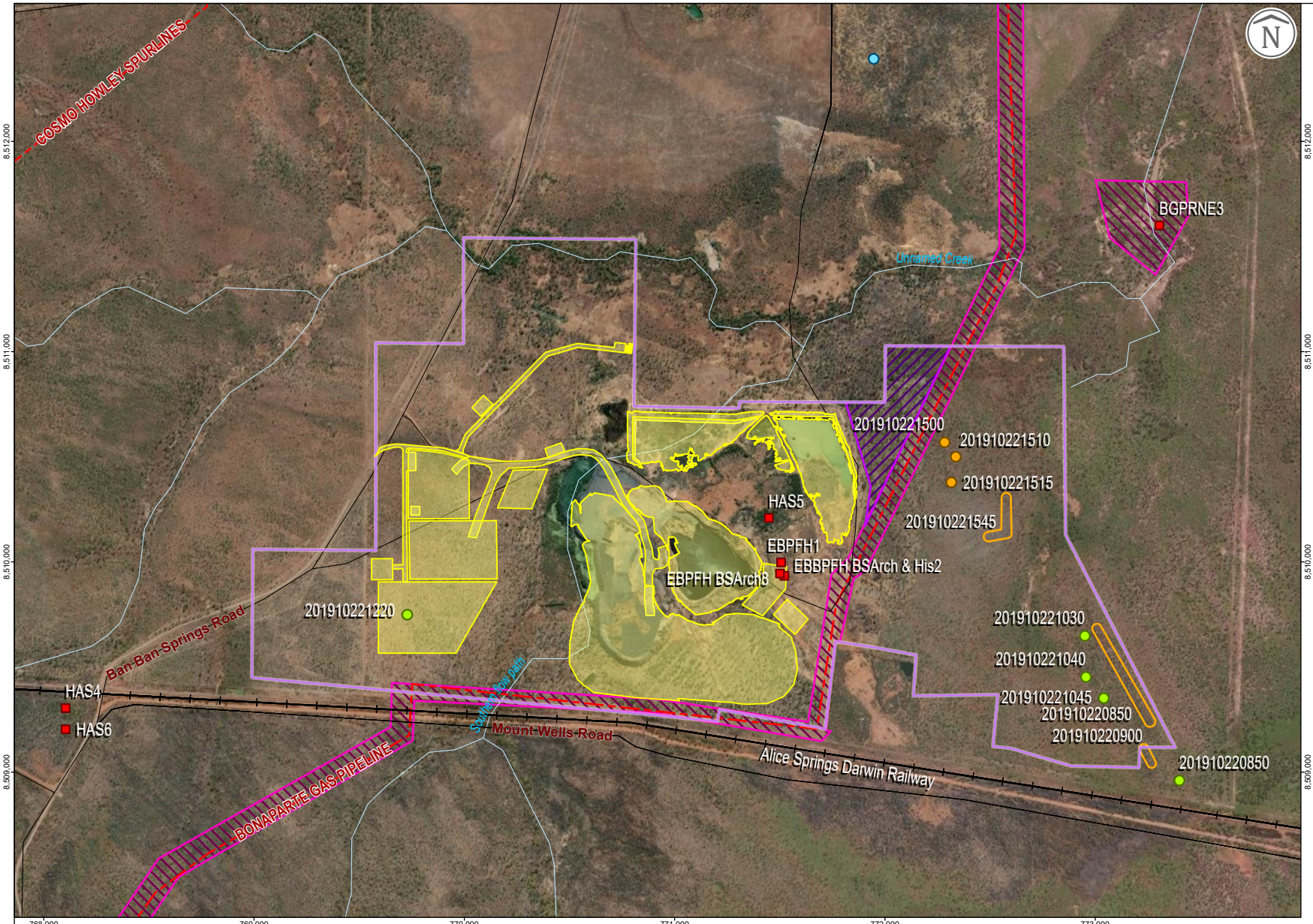
Monitoring will be conducted to determine the effectiveness of the mitigation and management measures outlined in this section, and results reported both internally and where required, externally. Monitoring and reporting of Project impacts on cultural heritage will include:

- Known sites (i.e., objects and places) that are appropriately managed (i.e., undisturbed, buffer maintained or disturbed with a permit).

CULTURAL HERITAGE SITES AND THE PROPOSED PROJECT FOOTPRINT

Fountain Head Gold Project | Socio-economic Impact Assessment

FIGURE 3.1



- Aboriginal object
- Aboriginal place
- Previously recorded archaeological site
- Recorded sacred site
- Road
- Railway
- Gas pipeline
- Watercourse
- Project area
- Infrastructure layout
- Area not surveyed
- Restricted work area
- Extensive Aboriginal place

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DATA SOURCES:
Project data from PNX Metals, 2021.

- Workforce training records including the number of workers who have received training on cultural heritage.
- Compliance with the chance finds procedure.
- Condition of cultural heritage sites inside the mining tenement.

Internal reporting on unpermitted disturbance will be undertaken monthly and corrective actions taken where required.

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