Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment

Draft Environmental Impact Statement (EIS)

Section 7.6 - Community and Economy

Prepared pursuant to the Environment Protection Act 2019

October 2021

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Key Project Terms

Term	Definition
Adaptive Management	Systematic process for incrementally improving management practices by learning from the outcomes of past and current practices.
Carbon in Leach	This process uses a dilute alkaline cyanide solution to leach (dissolve) gold from the ore material. Activated carbon removes gold out of dilute cyanide solution by adsorption (sticking). The leaching agent and activated carbon are added together in a slurry of ore and water.
Development Envelope	Defined as the maximum area within which the Project footprint could occur. The development envelope for the Project encompasses 790 ha, inclusive of Rustlers Roost, Quest 29, the accommodation camp and haul road.
Environmental Aspect	An element of the Primary Gold's activities, products or services that can interact with the environment.
Environmental Impact	Change to the environment whether adverse or beneficial, wholly or partially resulting from the Primary Gold's environmental aspects. Environmental impacts can be caused directly or indirectly from a Project activity or cumulatively with other non-Project related activities in a set area.
Environmental Factor	The NT EPA listed environmental objectives to identify environmental matters that have value to the Northern Territory and that need to be protected; and to state the objective to be achieved for each matter. The NT EPA has prepared these environmental objectives and organised these in structured divisions of the environment, called environmental factors.
Existing Disturbance Footprint	Defined as the direct disturbance area from known historical activities associated with the Rustlers Roost, Quest 29, accommodation camp and haul road areas. For Rustlers Roost and Quest 29 this is taken from the existing Mine Management Plans. The existing direct disturbance footprint encompasses 169.4ha within the development envelope.
Heap Leach Pad	Existing areas where historic mining placed ore for processing via a leaching solution to dissolve and capture the mineral. The pads contain the remaining material.
Maximum Vegetation Clearing Extent	The maximum extent of native vegetation clearing proposed for the Project based on mapped vegetation extent layers which account for historic anthropogenic disturbances to the development envelope (e.g. historic mining and pastoral activities). This area constitutes a total of 368.86 ha.
Project	The Project includes the expansion of existing pits, waste rock landforms, water storage dams and internal roads in both the Rustlers Roost and Quest 29 MLs. Two new pits will be constructed at Rustlers Roost and new infrastructure includes an onsite processing plant, a tailings storage facility, a landfill, laydown area, magazine, administration office, accommodation camp and groundwater bores for water supply. The Project is inclusive of an expanded connecting haul road between the non-contiguous extraction areas and an accommodation camp.
Project Area	The Project area is defined as wholly including ML1083 (Rustlers Roost), ML 29783 (Quest 29), ML 29814 (accommodation camp) and the connecting haul road. The entire Project area covers 1,143.25 ha.
Direct Disturbance Footprint	Defined as the direct disturbance area based on the current proposed infrastructure and material placement inclusive of Rustlers Roost, Quest 29, the accommodation camp and haul road. This area covers both historically disturbed and undisturbed areas. The disturbance footprint encompasses 532.84 ha within the Project area.
Significant Impact	A significant impact of an action is an impact of major consequence having regard to: (a) the context and intensity of the impact; and (b) the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact.
Study Area	Refers to the area of survey or investigation for a specific study. This area may be beyond the Project area or development envelope.
Tailings Storage Facility	A specially engineered and constructed impoundment into which tailings (residue) from the ore processing plant is deposited for placement in perpetuity. The storage facility is constructed with confining embankments consisting of earthen material (e.g. rock and soil) and capped following closure.
Waste Rock Dump	An engineered and constructed impoundment into which overburden from the mining process is placed for safe storage in perpetuity.

Acronyms, Abbreviations and Units

Abbreviation, Acronym or Unit	Definition
$m	Million dollars
%	Percentage
+ve	Assessment of positive
µS	Microsiemens
4WD	Four-wheel drive
AADT	Average Annual Daily Traffic
AAS	Atomic Absorption Spectrophotometer
AAPA	Aboriginal Areas Protection Authority
AARL	Anglo American Research Laboratory
ABS	Australian Bureau of Statistics
AE	Aquatic Ecosystems
AEP	Annual Exceedance Probability
AFANT	Amateur Fishermen's Association of the Northern Territory
AHD	Australian Height Datum
ALA	Atlas of Living Australia
ALARP	As Low As Reasonably Practicable
AMD	Acid and Metalliferous Drainage
ANC	Acid Neutralising Capacity
ANCOLD	Australian National Committee on Large Dams
ANFO	Ammonium Nitrate
ANZG	Australia and New Zealand Government
ARI	Average Recurrence Interval
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
ASX	Australian Stock Exchange
AS/NZS	Australian/New Zealand Standards
AUSRIVAS	Australian River Assessment System
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
Bq	Becquerel
BUD	Beneficial Use Declaration
CAD	Computer-Aided Design
CAPEX	Capital Expenditure
CCTV	Closed Circuit Television
CE	Community and Economy
CEO	Chief Operating Officer
CH_4	Methane

Abbreviation, Acronym or Unit	Definition
CIL	Carbon in Leach
CO_2	Carbon Dioxide
CO_2-e	Carbon Dioxide Equivalent
COPC	Contaminant of Potential Concern
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSL	Compact Soil Liner
CSM	Conceptual Site Model
C&D	Construction and Demolition
C&I	Commercial and Industrial
DAWE	Department of Agriculture, Water and Environment (Cth) (current)
DEPWS	Department of Environment, Parks and Water Security (NT) (current)
DGV	Default Guideline Value
DIDO	Drive-in Drive-out
DITT	Department of Industry, Tourism and Trade (NT) (current)
DIWA	Directory of Important Wetlands of Australia
DO	Dissolved Oxygen
DotE	Department of the Environment (Cth) (former)
DotEE	Department of the Environment and Energy (Cth) (former)
EC	Electrical Conductivity
EH&S	Environment, Health and Safety
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
EP Act	*Environment Protection Act 2019*
ERA	Energy Resources of Australia
ERP	Emergency Response Plan
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
GDE	Groundwater Dependent Ecosystem
GGAP	Greenhouse Gas Abatement Plan
GHG	Greenhouse Gas
GJ	Gigajoule
GL	Gigalitre (1,000 Megalitres)
GPS	Global Positioning System
GRP	Gross Regional Product
GST	Goods and Services Tax
g/t	Grams Per Tonne
GV	Guideline Value
GWP	Global Warming Potential
ha	Hectare

Abbreviation, Acronym or Unit	Definition
HDPE	High Density Polyethylene
HEC-HMS	Hydrologic Modelling System
HFC	Hydrofluorocarbons
HP	Hydrological Processes
HSE	Health, Safety and Environment
IAP2	International Association for Public Participation
IBC	Intermediate Bulk Container
ID	Identification
IECA	International Erosion Control Association
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Provider
ISO	International Organisation for Standardisation
IWEQ	Inland Water Environmental Quality
JORC	Joint Ore Reserve Committee
kL	Kilolitre
km	Kilometre
km^2	Square Kilometre
kV	Kilovolt
L	Litre
L/s	Litre Per Second
LED	Light Emitting Diode
LiDAR	Light Detection and Ranging
LNG	Liquefied Natural Gas
LOM	Life-of-Mine
LPG	Liquefied Petroleum Gas
M	Million
m	Metre
m^2	Metre squared
m^3	Cubic metre
mAHD	Metres Australian Height Datum
mBGL	Metres Below Ground Level
MCP	Mine Closure Plan
MEDLI	Model for Effluent Disposal Using Land
mg	Milligram
ML	Mining Lease (Granted)
MLA	Mining Lease Application
mm	Millimetre
MMP	Mining Management Plan
MNES	Matter of National Environmental Significance
MP	Management Plan
mRL	Metres Reduced Level
Mt	Million Tonnes

Abbreviation, Acronym or Unit	Definition
Mtpa	Million Tonnes Per Annum
MW	Megawatt
N_2O	Nitrous Oxide
NAF	Non-Acid Forming
NAPP	Net Acid Producing Potential
N/A	Not Applicable
NGER Act	*National Greenhouse Energy Reporting Act 2007*
NLC	Northern Land Council
NMD	Neutral Mine Drainage
NORM	Naturally Occurring Radioactive Material
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NSESD	National Strategy for Ecologically Sustainable Development
NT	Northern Territory
NTG	Northern Territory Government
NTU	Nephelometric Turbidity Unit
NT Act	*Native Title Act 1993*
NVIS	National Vegetation Information System
OPEX	Operational Expenditure
PAF	Potentially Acid Forming
PASS	Potential Acid Sulfate Soil
PER	Public Environmental Report
PET	Plecoptera, Ephemeroptera and Trichoptera
PFC	Perfluorocarbon
PGO	Primary Gold Limited, a wholly owned subsidiary of Hanking Australia Investment Pty Ltd
PMF	Probable Maximum Flood
PMLU	Post Mining Land Use
PMST	Protected Matter Search Tool
PPL	Perpetual Pastoral Lease
Q	Quarter
RL	Reduced Level
RMP	Risk Management Plan
RO	Reverse Osmosis
ROM	Run of Mine
RRMPL	Rustlers Roost Mining Pty Ltd
RSWL	Reduced Standing Water Level
SA	Statistical Area
SD	Saline Drainage
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SEIFA	Socio-Economic Indexes for Areas
SF_6	Sulfur Hexafluoride
SGV	Site-Specific Guideline Value

Abbreviation, Acronym or Unit	Definition
SIGNAL	Stream Invertebrate Grade Number – Average Level
SoBS	Site of Botanical Significance
SoCS	Site of Conservation Significance
SSAN	Security Sensitive Ammonium Nitrate
SSC	State Suburb Code
SSTV	Site-Specific Trigger Values
STP	Sewage Treatment Plant
SWGs	Stock Water Drinking Guidelines
SWL	Standing Water Level
t	Tonne
TAMS	Territory Asset Management Services
TARP	Trigger Action Response Plan
TBD	To Be Determined
TE	Terrestrial Ecosystems
TEC	Threatened Ecological Community
TEQ	Terrestrial Environmental Quality
Th	Thorium
TN	Total Nitrogen
ToR	Terms of Reference
TP	Total Phosphorus
TPWC Act	*Territory Parks and Wildlife Conservation Act 1976*
TSF	Tailings Storage Facility
TSS	Total Suspended Solids
TSSC	Threatened Species Scientific Committee
U	Uranium
UC	Uncertain
V	Volt
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
WCD	Water Control District
WDL	Waste Discharge Licence
WMP	Water Management Plan
WONS	Weed of National Significance
WRD	Waste Rock Dump
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

7.6 Community and Economy

NT EPA Environmental Factor	Community and Economy
NT EPA Environmental Objective	*Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians.*
Relevant Policy and Guidance	▪ Guidelines for the Preparation of an Economic and Social Impact Assessment (NT EPA 2013); ▪ Matters of National Environmental Significance, Significant Impact Guidelines 1.1 (DotE 2013); ▪ NT EPA Environmental factors and objectives - Environmental impact assessment: General technical guidance (NT EPA 2021a); ▪ Opportunities and timeframes for community engagement in the environmental impact assessment process: Information for proponents and the public. Northern Territory Environment Protection Authority (NT EPA 2018); ▪ Preparing an Environmental Impact Statement: Environmental impact assessment guidance for proponents (NT EPA 2021b); ▪ Recommendations on the Environmental Assessment and Regulation of Mine Sites (NT EPA 2014); and ▪ Stakeholder Engagement and Consultation. Environmental impact assessment guidance for proponents (NT EPA 2021c).

This section identifies the community and economic factors relevant to the Project and the region in which it is placed. This section has utilised existing desktop information (e.g. Australian Bureau of Statistics (ABS) data and other Project reports) and stakeholder consultation feedback to establish a community profile overview and general social baseline. Potential impacts of the Project on community and economy aspects have been identified and assessed in accordance with the risk assessment framework identified in Section 6. Actions to avoid or minimise potential impacts have subsequently been identified in accordance with the environmental decision-making framework.

7.6.1 Environmental Values

Environmental values associated with community and economy of the region relate predominantly to use of the surrounding and downstream Mary River catchment for recreational activities (principally fishing), grasslands for pastoral land use, extractive resource operations, use of the region for military training and traditional land uses associated with cultural activities. The existing environment as it relates to community and economy is further detailed in the sections below.

7.6.1.1 Land Use and Setting

The Project area is located in the Mount Bundey region and is remote from any communities. The closest major town is Humpty Doo, which is approximately 46 km north-west of the Project with Darwin located approximately 85 km north-west. The Marrakai residential subdivision is located 14 km north-west (Figure 1-1). The Australian Census for the nearest community, the Marrakai community, indicates a population of 517 people with a median age of 39 (ABS 2016).

The economic input of the region is predominantly based on extracting civil and building material and pastoral properties utilised for cattle farming. Ranging from 3 km to 9 km from Quest 29 are a number of quarries which provide construction material for civil and residential buildings around the Northern Territory (Figure 7-53).

The broader Mount Bundey locality includes the Mary River, the portion of the Mary River National Park south of the Arnhem Highway, the Mary River Wilderness Retreat and the Mount Bundey Military Training Area in the east (Figure 7-47). The Mary River National Park is utilised for environmental conservation, tourism and recreational purposes. The Mary River Wilderness Retreat is located 8.5 km north-east of the Project. The Mount Bundey Military Training area encompasses 117,300 ha east of the Mary River and is operated by the Commonwealth of Australia (Figure 7-47).

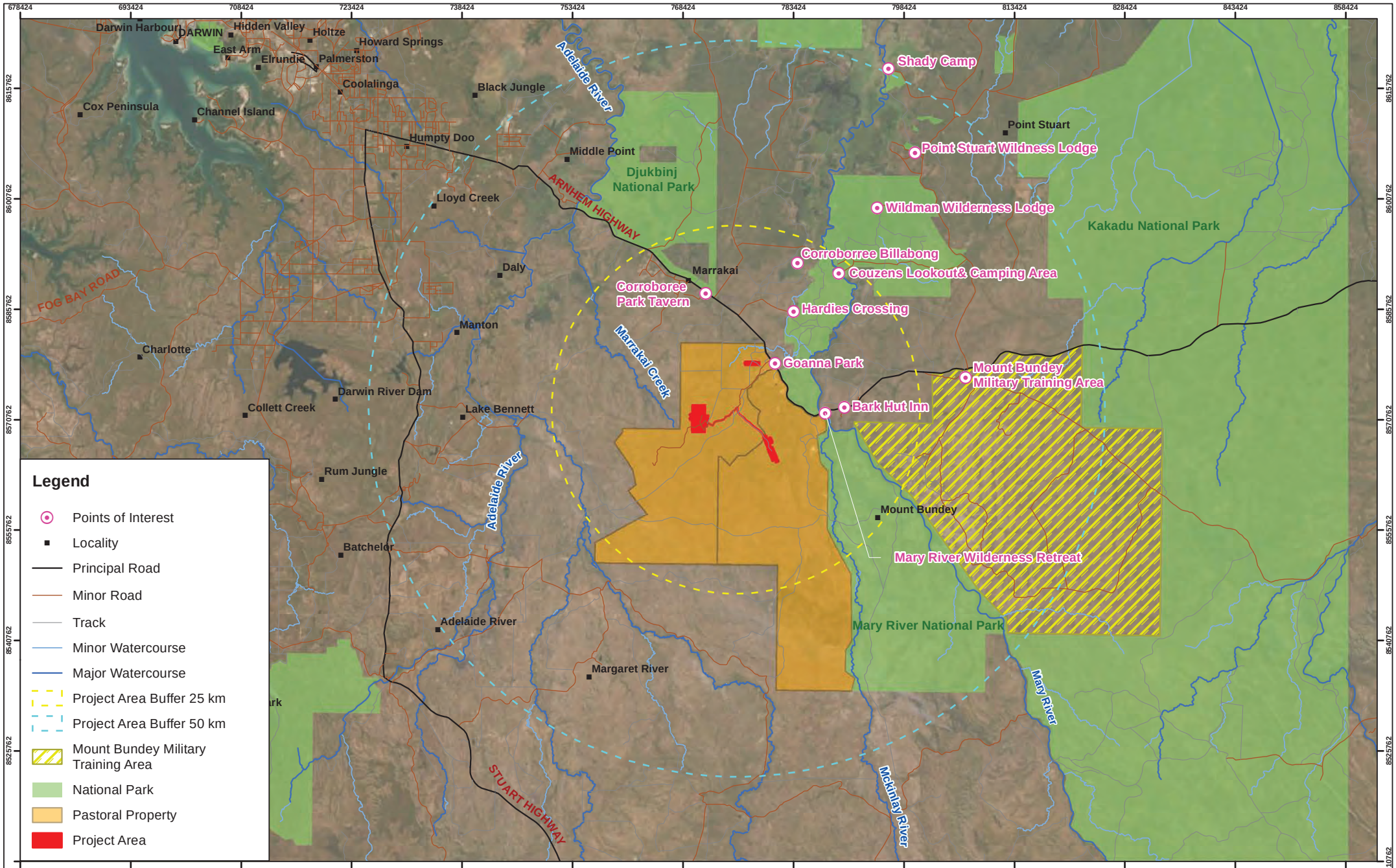
The most extensive land use in the vicinity of the Project area is pastoral, involving the grazing of beef cattle over the woodland terrain. There has been some improvement to pasture on Old Mount Bundey station.

Land use in the region includes agriculture (orchards and pastoral operations) and mining, with historic iron ore mining at Mount Bundey and gold mining at Toms Gully, Quest 29 and Rustlers Roost mines.

Tourism, including recreational fishing, is growing in the region. A number of conservation reserves and parks managed by the Parks and Wildlife Commission of the Northern Territory occur within a 50 km radius of the Project area. These include:

- Mary River Crossing Reserve (15 km);
- Mary River National Park (15 km);
- Leaning Tree Lagoon Nature Park (25 km);
- Wildman Reserve (40 km); and
- Fogg Dam Conservation Reserve (45 km).

The boundary of the Kakadu National Park, managed by the Australian National Parks and Wildlife Service, lies 60 km east of the Project area along the lowlands of the Wildman River. The park currently covers 1.3 million ha, encompassing the drainage systems associated with the Wildman, West Alligator and South Alligator Rivers.



Legend

- Points of Interest
- Locality
- Principal Road
- Minor Road
- Track
- Minor Watercourse
- Major Watercourse
- Project Area Buffer 25 km
- Project Area Buffer 50 km
- Mount Bundey Military Training Area
- National Park
- Pastoral Property
- Project Area

R	Details	Date
1	First Draft	12/08/21
-	-	-
-	-	
-	-	
-	-	
-	-	
-	-	

DESIGNED	SS	CHECKED	TK
DRAWN	SS	CHECKED	TK
APPROVED	TK	DATE	12/08/21

Notes:

N

0 5,000 10,000 20,000

Meters

1 cm = 4,703 meters

GCS GDA 1994 MGA Zone 52

DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
NT Government Open Source Data

DESIGNER

CDM Smith

CLIENT

PRIMARY GOLD

FIGURE 7-47

Project Setting and Surrounding Activities

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7.6.1.2 Community

The nearest regional population centre to the Project is Humpty Doo (population 8,395) which falls within the Litchfield Statistical Area (SA3) and makes up part of the greater Darwin Statistical Area (SA) (ABS 2016). The nearest community to the Project is the rural subdivision of Marrakai 14 km north-west of the Project area. Marrakai is predominantly comprised of small dwellings occupied mostly by recreational fishers and holiday makers on weekends and during holiday periods. Any direct or indirect economic and social impacts resulting from the development of the proposed Project are likely to be most observable within their statistical areas.

The social opportunities presented by the Project are generally local in nature and will contribute to the economic stability of the region and encourage a strengthening of the local community through:

- Training and skill development for local employees and contractors associated with the Project;
- Social benefits associated with employment;
- Opportunities for contractors to develop their businesses, skills and workforce requirements through the provision of services to the Project;
- Contribution of royalties to the Northern Territory Government and subsequent allocation to community infrastructure and services;
- Contribution to the Northern Territory legacy mines fund and subsequent allocation to legacy environmental and human health issues (refer to Section 7.6.2.2 for further details); and
- Although the philosophy of PGO, in alignment with the Northern Territory Government, is to predominantly engage a local workforce, a proportion will include specialist or other workers from interstate who will contribute to the local economy.

The following provides details of the existing community for which the Project is being developed.

Stakeholders

Stakeholders relevant to the Project are individuals, communities, non-government organisations, private organisations, government departments, businesses and others who have an interest or a 'stake' in the Project and its outcome. Stakeholders may be impacted by or conversely influence the planning and operations of a project in varying degrees of significance. Engagement with stakeholders prior to Project development is important to optimise the opportunities to address concerns and generate positive outcomes. For the Project, a Stakeholder Engagement Plan (SEP) has been prepared to guide the engagement process (Appendix A). The SEP has been prepared in accordance with the industry leading standards and practice including the Northern Territory Stakeholder Engagement and Consultation guidance (NT EPA 2021c), Northern Territory guidance for preparing an environmental impact statement (NT EPA, 2021b), the International Association for Public Participation's (IAP2) Quality Assurance Standard For Community and Stakeholder Engagement (IAP2 2015) and relevant International Finance Corporation guides (IFC 2007). The analysis of stakeholders has been undertaken with a focus on understanding stakeholder values, understanding concerns and opportunities arising from the Project, and understanding potential impacts, risks, and levels of interest and influence for each stakeholder.

During development of the Draft EIS the following stakeholders were directly contacted, either by phone, email or mail, to seek input on the Project:

- Neighbouring commercial business and local operators;

- Indigenous stakeholders and Traditional Owners;
- Pastoral station leaseholders;
- AFANT; and
- Department of Environment, Parks and Water Security and the NT EPA.

In accordance with the SEP, an appropriate level of information has been made available to the following stakeholder groups to facilitate a clear understanding of the Project (e.g. Project website, public email and phone) and an avenue to raise concerns or questions:

- Interest groups;
- Local Government (note – Project located in an unincorporated area);
- Local and regional community;
- Local and regional supplier and business organisation;
- Territory and Federal Politicians;
- The general public; and
- Northern Territory and Federal Government agencies.

Input received has been utilised to detail the existing social values of the Project area and locality.

Existing Community Profile

Identifying community profiles provides an overview of social characteristics and conditions in the study area, including population and demographics, social infrastructure and community values. Particular consideration has been given to the communities of Humpty Doo and Marrakai as these are the closest residential areas and most likely to experience any impacts from the Project. Further afield, Darwin will be the primary source or transit centre for employees, goods and services for the Project.

Community Statistics

At the time of the 2016 census, the combined population of Marrakai geographic area (SSC)[15] was 517 and 8,711 for the Humpty Doo (SA2). With a total Northern Territory population of 228,833, the combined population of two areas analysed (Marrakai and Humpty Doo) constitutes 4.03% of the Territory population. The median age of Marrakai and Humpty Doo residents is higher than the Northern Territory (39 and 36 years respectively). The median income for Marrakai is significantly less than both Humpty Doo and the Northern Territory average; however, the cost of housing is also significantly less (Table 7-63).

[15] State Suburbs (SSC) are an Australian Bureau of Statistics approximation of localities gazetted by the Geographical Place Name authority in each State and Territory. Gazetted Localities are the officially recognised boundaries of suburbs (in cities and larger towns) and localities (outside cities and larger towns). This is a standard term also used in Territories.

Table 7-63 Population Statistics

Aspect	Marrakai SSC	Humpty Doo (SA2)	Northern Territory
Population	517	8,711	228,836
Male	301 (58.2%)	4,583 (52.6%)	118,570 (51.8%)
Female	216 (41.8%)	4,125 (47.4%)	110,266 (48.2%)
Median Age	39	36	32
Families	107	2,222	51,525
Private Dwellings	240	2,836	75,770
Average People Per Household	2.5	3	2.9
Median Weekly Household Income	$1,387	$2,396	$1,983
Median Monthly Mortgage Repayments	$1,498	$2,546	$2,167
Median Weekly Rent	$191	$450	$315
Average Motor Vehicles Per Dwelling	1.7	2.5	1.8

* ABS State Suburb Level

Source: ABS 2016

Indigenous Population Profile

The 2016 Census recorded 42 Indigenous persons, including Torres Strait Islanders, living in the Marrakai geographic area (SSC) and 598 within the Humpty Doo SA2. The percentage of Indigenous people compared to the total population of analysis area is displayed in Table 7-64. Notably, both the Marrakai SSC and Humpty Doo SA2 exhibit a much lower proportion of people identifying as Indigenous than the Northern Territory average.

Table 7-64 Indigenous Population

Aspect	Marrakai (SSC)	Humpty Doo (SA2)	Northern Territory
Population and Percentage of Total Population	42 (8.12%)	598 (6.87%)	58,247 (25.45% indigenous in all NT)
Male	19 (45.2%)	310 (51.8%)	29,129 (50.0% of male indigenous)
Female	23 (54.8%)	288 (48.2%)	29,118 (50.0% of female indigenous)
Median Age	24	23	25

Source: ABS 2016

Employment

The Northern Territory economy experiences fluctuations due to the mining and manufacturing sectors being significant drivers. This process is exacerbated in regional areas, where many of the mining jobs are located. In 2019-2020, there was a 32.5% decrease in mining employment which can be correlated with large number of fly-in-fly-out workers. Mining economic contribution increased 39.7% in 2020 reaching a record of $7.5 billion which represents approximately 27% of NT economic output in 2019-2020 (DTF 2021). The development of the Project will have a direct benefit to local

employment through engagement during construction, operations and closure as well as indirect benefits through supporting local suppliers and spend from interstate workers.

The 2016 census identified Marrakai as having the highest unemployment rate for the areas analysed. The 9.6% unemployment rate was 2.6% above the Northern Territory average and 2.7% above the Australian average of 6.9% at the time of survey (Table 7-65).

Table 7-65 Labour Force Participation

Aspect	Marrakai SSC	Humpty Doo (SA2)	Northern Territory
Full-time Employment	139 (60.7%)	3,216 (67.8%)	74,100 (67%.1)
Part-time Employment	54 (23.6%)	998 (21.1%)	21,493 (19.5%)
Away from Work	14 (6.1%)	337 (7.1%)	7,112 (6.4%)
Unemployed	22 (9.6%)	190 (4.0%)	7,685 (7.0%)

Source: ABS 2016

Of the occupation types for those employed the greatest number of workers; in Marrakai these were managers, labourers and machinery operators/driver totalling 118 or 59.6%; whereas for Humpty Doo, these were technicians and trades, clerical and administrative and professionals totalling 2,320 or 51%. The statistics provide an indication that given Humpty Doo's proximity to Darwin, it acts as a residential area for the greater Darwin region, whereas Marrakai's distance likely prevents residents from taking jobs in Darwin.

Table 7-66 presents the five top industries of employment for each of the three areas considered. Of the employed people in Marrakai (SSC), 15.3% worked in Vegetable Growing (Outdoors). Other major industries of employment included Other Construction Material Mining (3.8%), Fruit and Vegetable Retailing (3.8%), Road Freight Transport (3.8%) and Accommodation (3.2%). Of the employed people in Humpty Doo (SA2), 6.8% worked in State Government Administration. Other major industries of employment included Primary Education (2.7%), Other Heavy and Civil Engineering Construction (2.3%), Road Freight Transport (2.0%) and Supermarket and Grocery Stores (1.8%).

Table 7-66 Top Industries of Employment

Marrakai (SSC)	Humpty Doo (SA2)	Northern Territory
Vegetable Growing (Outdoors) (15.3%)	State Government Administration (6.8%)	State Government Administration (6.2%)
Other Construction Material Mining (3.8%)	Primary Education (2.7%)	Defence (4.7%)
Fruit and Vegetable Retailing (3.8%)	Other Heavy and Civil Engineering Construction (2.3%)	Hospitals (3.3%)
Road Freight Transport (3.8%)	Road Freight Transport (2.0%)	Primary Education (2.8%)
Accommodation (3.2%)	Supermarket and Grocery Stores (1.8%)	Accommodation (2.3%)

Source: ABS 2016

The industry of employment statistics shows a clear distinction between the main employing industries of Marrakai (i.e. those nearby the Project area) and those of the Northern Territory. The data largely corresponds with the surrounding land uses for the Project which are largely agricultural, quarrying and National Park (i.e. accommodation associated with recreation).

Community Values

Community values relate to factors such as community wellbeing and cohesion, recreational such as fishing, use of culturally important areas, community safety, access and connectivity. The identification of community values has been informed by:

- Government social policies;
- Understanding of uses in the surrounding area; and
- Outcomes of community consultation undertaken for the Project.

The Project has been identified as having the potential to impact the community values of a number of local and regional communities including Marrakai (SSC) and Humpty Doo (SA2) both positively and negatively.

Transportation

The Arnhem Highway will be the primary route for transportation to and from the Project. The Arnhem Highway is a 220 km rural highway that links Jabiru, to the Stuart Highway, approximately 35 km south of Darwin. The highway is classified as an 'A' standard road within the Department of Infrastructure, Planning and Logistics (DIPL) road hierarchy, which should provide a high standard of driving conditions with two 3.5 m wide traffic lanes on a single carriageway, sealed shoulders and signage and line marking visible in all weather conditions (GHD 2014).

Generally running east-west from the Stuart Highway to Jabiru, in the Kakadu National Park, the topography is flat with long sections and broad curves that provide good sight lines (GHD 2014). A high proportion of traffic is recreational and freight due to the many tourist attractions in the region and supplying Jabiru Township (GHD 2014). Traffic from heavy and light vehicles is also experienced due to mining and extractives within the region (e.g. Ranger Uranium Mine and numerous quarries). The posted speed limit is 130 km/h, with short sections of 100 km/h and 80 km/h in the vicinity of Humpty Doo. Traffic flows along the Arnhem Highway may be affected by road restrictions and closures during the wet season due to flooding of low areas near the Adelaide River and Mary River (GHD 2014).

An increase in traffic on the Arnhem Highway of 2,190 heavy vehicle movements and 5,475 light vehicle movements per year[16]. In addition, there is anticipated to be approximately 10 dedicated oversize escorts within the 6 month construction period in the dry season. While this oversize vehicle mix may be noticeably different during this time, the short period of usage is not expected to directly impact the level of service for the traffic route. Once production recommences, highway usage will return to levels similar to those currently experienced. Nevertheless, increased vehicle movements increase risks associated with vehicle interactions and crashes.

In Marrakai (SSC), the most common methods of travel to work for employed people was either by car, as driver or passenger (combined 62.1%). This proportion is slightly less than the percentage driving in the Humpty Doo SA2 and the Northern Territory as a whole (Table 7-67).

Table 7-67 Transport Related Community Data

Aspect	Marrakai SSC	Humpty Doo (SA2)	Northern Territory
Main Travel to Work Method	Car as driver or passenger (62.1%)	Car as driver or passenger (75.7%)	Car as driver or passenger (67.1%)
Average Motor Vehicles Per Dwelling	1.7	2.5	1.8

[16] Project traffic assumption is six heavy vehicle movements per day and 15 light vehicle movements per day.

Annual traffic data for counter RDVDP007 and RDVDP018 published by the Department of Transport in conjunction with Territory Asset Management Services (TAMS) Pty Ltd is provided in Table 7-68 to provide an indication of the level of traffic flow on Arnhem Highway in the vicinity of the Project. Counter RDVDP007 is located on Arnhem Highway, 35 km north-west of the Project site entrance and counter RDVDP018 is located approximately 40 km directly east. The average annual daily traffic count (AADT) data indicates there is a significant drop in the AADT movements to the east and west of the Mary River. A significant volume of traffic recorded at RCVCP007 does not transit past RCVCP018 to the east of the Mary River. Many trips are likely to terminate at Marrakai, the neighbouring quarries, Mount Bundey Military Training Area and the Mary River National Park.

Table 7-68 Arnhem Highway Traffic Data

Traffic Counter	Direction	Annual Average Daily Traffic Movements									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Arnhem Highway – 2 km west of Adelaide River Bridge (RCVCP007)	Inbound	485	620	577	694	628	630	629	599	588	567
	Outbound	584	629	689	702	639	634	657	621	613	559
	Both	1069	1249	1266	1396	1267	1264	1286	1220	1201	1126
Arnhem Highway – 9.5 km east of Point Stuart Road (RCVCP018)	Inbound	180	177	167	164	155	165	165	166	168	119
	Outbound	196	192	186	183	177	189	182	180	194	127
	Both	376	369	353	347	332	354	347	346	362	246

Source: DIPL and TAM 2021.

Based on the AADT volume for RCVCP007, which is considered more representative[17], the Project traffic movements constitute roughly 4.0% of the 2020 AADT. This assumes two-way movements for the six heavy vehicles and 15 light vehicles attending site each day. Given the impact of lockdowns on traffic movements in 2020, 2019 may be a more appropriate representation, in which case the Project would constitute up to 3.74% of AADT.

The Arnhem Highway is one of three main routes for the transport of quarry products by road trains to Darwin (DRHVTF 2011). Road train traffic on the key arterial roads in the greater Darwin area indicates that there are, on average, 90 road trains using the Arnhem Highway (near the Stuart Highway intersection) each day (DRHVTF 2011).

The Northern Territory Government records vehicle incident and injury data. The data is presented as per local government or unincorporated area. The Project is located in the Marrakai-Douglas Daly unincorporated area and Table 7-69 provides the yearly serious injury and fatality statistics.

Table 7-69 Vehicle Serious Injury and Fatality Statistics

Statistic	Record of Vehicle Injury Data									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Serious Injury	4	17	10	5	21	9	14	13	7	7
Fatality	4	1	1	0	1	3	0	0	0	0

Source: NTG 2021.

[17] Data from RCVCP007 is considered more representative as the majority of Project traffic movements will be north-west towards Darwin.

During peak operation the Project is anticipated to result in a negligible increase (3.74%-4.0%) to current traffic volumes along the Arnhem Highway. Traffic associated with the Project is characterised according to the stage in mine life:

- Construction phase (approximately 12 months): Three trucks and ten light vehicles per day during daylight with peak times 5 am to 10 am and 3 pm to 7 pm (inclusive of 10 oversize movements).
- Operations: Project traffic flow on and off-site is estimated at an average of 42 heavy vehicle movements per week and 15 light vehicles daily. Operating during daylight hours with peak times 5 am to 10 am and 3 pm to 7 pm.
- Closure: Daily traffic negligible.

Amenity

As mining is not a new industry in the region, nor is mining in the Project area new (as the sites consists of un-remediated legacy mine workings), and the site is on private land, there are no predicted adverse impacts on the visual amenity of the surrounding area as a result of the Project. As the Project moves into the closure and remediation phase, the land will be reshaped and rehabilitated in consultation with the landowner and Northern Territory Government, improving the visual amenity of the Project area.

7.6.1.3 Economy

Australia's gross domestic product is estimated at $1.985 trillion and $26.31 billion of that is attributed by the Northern Territory (1.3%) (EDA 2021). In the year ending June 2020 the Northern Territory's gross regional product (GRP) grew 5.6%. As per Figure 7-48 Northern Territory GRP has steadily grown for the past 19 years.

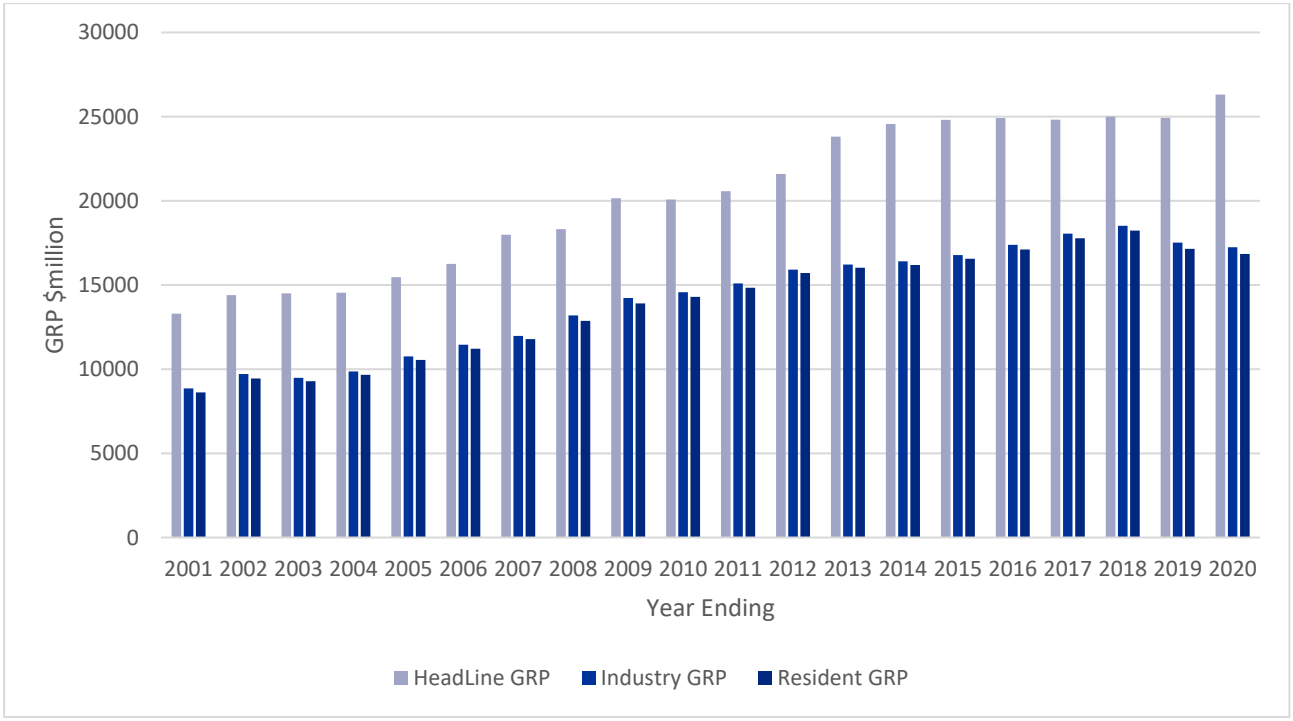


Figure 7-48 Northern Territory Gross Regional Product

Mining and manufacturing contribute to the NT economy through international trade, private investment and employment as well as investment in infrastructure such as road networks. The mining and manufacturing industries also have a significant impact on the NT's construction industry as mining and manufacturing projects generally require significant levels of construction activity (DTF 2021).

Mining employs 4.38% of workers in the Northern Territory but has experienced a decline of 362 workers between the 2014-15 and 2019-20 financial years (id n.d.). In 2020 the total value of mining production in the Northern Territory was $4.4 billion, with gold alone contributing $1.189 billion and is only second in overall value to manganese ($1.609 billion) (DITT 2020). Economic contribution of mining to the Northern Territory rose 39.7% in the 2019-20 year to $7.5 billion and in combination with manufacturing accounts for 31.6% of the Territory's economic output (DTF 2021).

Mining has underpinned long-term jobs and economic activity including royalty revenue paid to the government over many decades. The *Mineral Royalty Act 1982* imposes a royalty on all minerals extracted 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.

The Project will contribute to the regional and local economies primarily through the provision of local employment opportunities 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 economic opportunities presented by the Project are localised in nature. These comprise of:

- Opportunities for local employment with PGO or local contractors (particularly relevant with other projects in the region completing construction and in the current economic climate);
- The opportunity to use the revenue stream from the Project to extinguish existing environmental liability associated with historic activities and to complete investigations and planning for contaminant management associated with the existing WRDs;
- Support for local initiatives and businesses; and
- Provision of tax (income tax, GST) and royalties to the government.

Existing Economic Environment

The assessment of the economic environment of the region identified a number of underlying future or cross-sectional trends. These trends are summarised in Table 7-70.

Table 7-70 Underlying Regional Economic Trends

Aspect	Identified Economic Condition or Trend
Household Income	The median weekly household income for residents of Marrakai (SSC) was significantly less than the Northern Territory median ($1,387 compared to $1,983). However, this was only $51 less than the Australian average. Numerous energy related projects were being constructed in the Darwin area at the time of the survey and these are likely to have contributed to higher Territory-wide income values.
Labour Market Trends	The Marrakai (SSC) unemployment rate of 9.6% was 2.6% above the Northern Territory average and 2.7% above the Australian average of 6.9% at the time of the census.
Employment by Industry	Manual labour industries are the top employers for the Marrakai area (SSC). Whereas, top employing industries in Humpty Doo and the Northern Territory are dominated by Territory and Federal Government (e.g. education, health, government administration and defence), Marrakai's top industry is horticultural (vegetation growing).
Occupation Type	Out of the top 8 occupations listed by the ABS, Marrakai had a slightly higher proportion of blue collar manual occupations (40.9%) than Humpty Doo (40.5%) and the Northern Territory as a whole (30.9%).

Qualifications	Marrakai (SSC) had a lower proportion of residents with a university or tertiary education (6.3%) than both Humpty Doo (7.4%) and the Northern Territory (9.9%).
Enterprise Activity	There were 466 registered businesses in the Marrakai-Douglas Daly unincorporated area at the start of 2019. This increased by 18 businesses to 484 (3.9% increase) in 2020. The main registered industry in the region is construction (ABS 2020).
Development Pipeline*	Two major government projects were identified in a 50 km radius from the Project area: (1) Arnhem Highway Adelaide River Floodplain Upgrade ($77.88 M); and (2) Corroboree Access Road Upgrade ($11 M).
Gross State Product	In 2019-20, the Northern Territory economy increased by 5.3% to $26.2 billion.
Industry and Agriculture	Of the employed people in Marrakai (State Suburbs), 15.3% worked in Vegetable Growing Outdoors). Other major industries of employment included Other Construction Material Mining 3.8%, Fruit and Vegetable Retailing 3.8%, Road Freight Transport 3.8% and Accommodation 3.2%.

***** Refer to the discussion on surrounding major employing activities for further information on projects beyond the Marrakai and Humpty Doo areas.

Socio-Economic Indexes

Socio-Economic Indexes for Areas (SEIFA) is a product developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage. Area level disadvantage depends on the socioeconomic conditions of a community or neighbourhood as a whole. The indexes are based on information from the five-yearly Census.

2016 is the latest version of this product and consists of four indexes:

- The Index of Relative Socio-Economic Disadvantage;
- The Index of Relative Socio-Economic Advantage and Disadvantage;
- The Index of Education and Occupation; and
- The Index of Economic Resources.

Each index is a summary of a different subset of Census variables and focuses on a different aspect of socio-economic advantage and disadvantage. The ABS broadly defines relative socio-economic advantage and disadvantage in terms of people's access to material and social resources, and their ability to participate in society. Sections below provide the details of the four indexes for the Marrakai SSC.

Index of Relative Socio-Economic Disadvantage

The Index of Relative Socio-Economic Disadvantage summarises variables that indicate relative disadvantage. This index ranks areas on a continuum from most disadvantaged to least disadvantaged. A low score on this index indicates a high proportion of relatively disadvantaged people in an area. Values from this index for the Marrakai SSC is below and graphically represented using the deciles in Figure 7-49:

- Score: 870;
- Rank: 827;
- Decile: 1; and
- Percentile: 7.

Socio-Economic Advantage and Disadvantage

The index of socio-economic advantage and disadvantage summarises variables that indicate either relative advantage or disadvantage. An area with a high score on this index has a relatively high incidence of advantage and a relatively low incidence of disadvantage. Values from this index for Marrakai SSC is below and graphically represented using the deciles in Figure 7-50.

- Score: 889;
- Rank within Australia: 1,218;
- Decile: 1; and
- Percentile: 9

Economic Resources

The index of economic resources summarises variables relating to the financial aspects of relative socio-economic advantage and disadvantage. These include indicators of high and low income, as well as variables that correlate with high or low wealth. Areas with higher scores have relatively greater access to economic resources than areas with lower scores. Values from this index for Marrakai SSC are below and graphically represented using the deciles in Figure 7-51.

- Score: 957;
- Rank within Australia: 2,282;
- Decile: 2; and
- Percentile: 17.

Education and Occupation

The index of education and occupation summarises variables relating to the educational and occupational aspects of relative socio-economic advantage and disadvantage. This index focuses on the skills of the people in an area, both formal qualifications and the skills required to perform different occupations. A low score indicates that an area has a high proportion of people without qualifications, without jobs, and/or with low skilled jobs. A high score indicates many people with high qualifications and/or highly skilled jobs. Values from this index for Marrakai SSC is below and graphically represented using the deciles in Figure 7-52.

- Score: 882;
- Rank within Australia: 975;
- Decile: 1; and
- Percentile: 8.

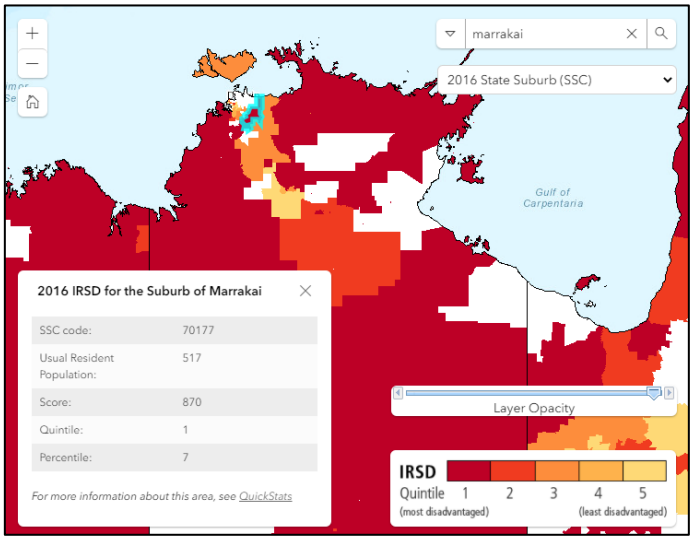


Figure 7-49 Relative socio-economic disadvantage

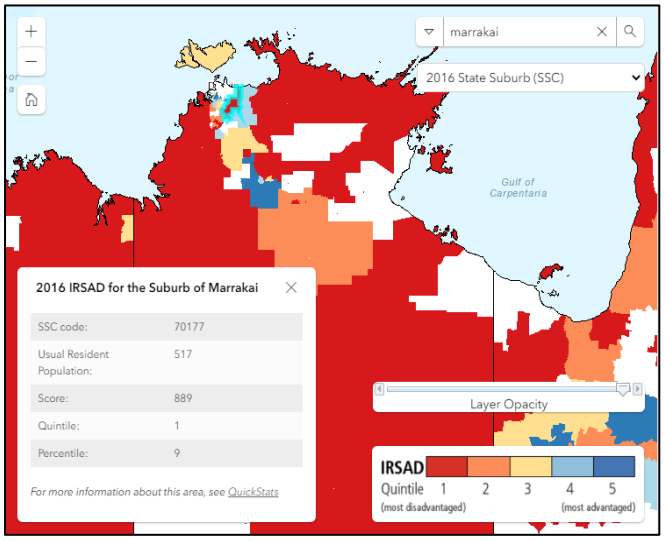


Figure 7-50 Relative socio-economic advantage and disadvantage

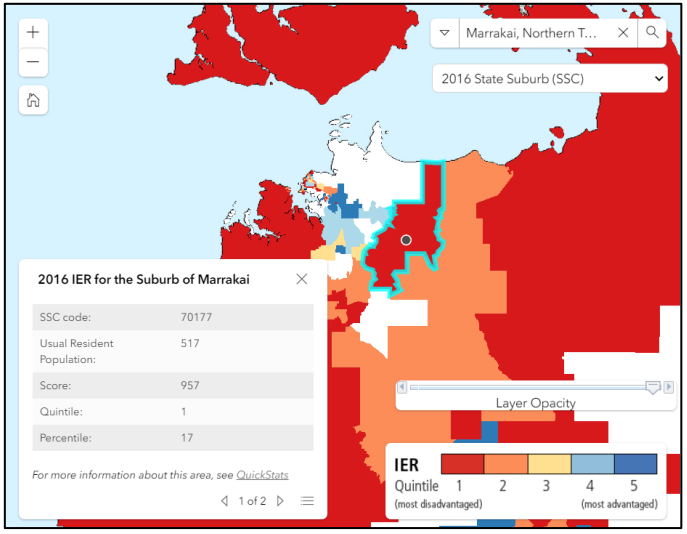


Figure 7-51 Economic resources

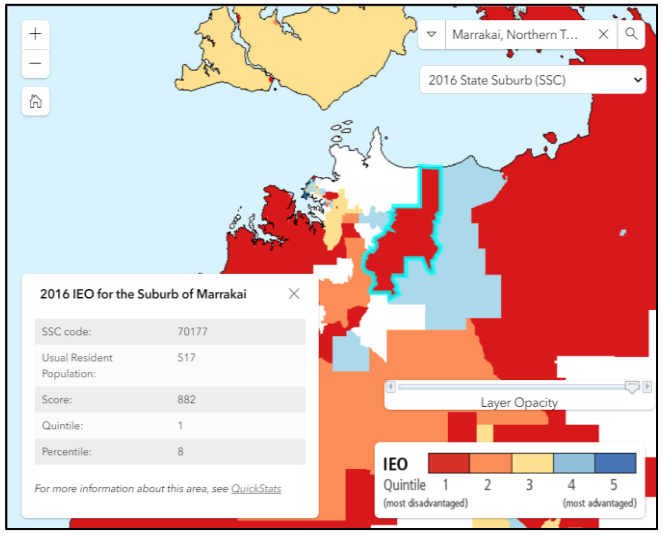


Figure 7-52 Education and occupation

Source: ABS 2016

Surrounding Major Employing Activities

Mining

While there are numerous authorised mines in the Northern Territory, and projects in development (Figure 7-53), the industry has experienced two large mine cessations in the past 18 months. The Ranger Uranium Mine located 150 km directly east of the Project entered closure in January 2021 and the Union Reefs Gold Mine location approximately 60 km south-west entered care and maintenance in March 2020. These two projects are estimated to have resulted in over 500 direct mining job losses.

There are several abandoned, prospective and operational mines within 100 km of the Project. Finniss Lithium Project located just south of Darwin Port received approval of their MMP in early 2020. The project team are forecasting operations for the Finniss Lithium Project to commence before the end of 2021, with first production anticipated before the end of 2022.

Located approximately 60 km to the west of the Rustlers Roost and Quest 29 Project is the legacy Rum Jungle site currently under rehabilitation by the Northern Territory and Commonwealth Governments. Nearby is also located the Brown's Oxide Project that is under care and maintenance but anticipated to be recommissioned for operation in the near future.

The Fountain Head Gold Project is working through the pre-feasibility and environmental approvals assessments. The project is located approximately 90 km south-west of the Project. First production is anticipated to be in 2022.

Bacchus Resources have been undertaking exploration activity at the Woolwonga project site, located approximately 47 km south 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.

The Toms Gully Mine, adjacent to the accommodation camp, is the closest mining development to the Project. The Toms Gully Mine is an underground gold mining project also proposed by PGO. The Toms Gully Mine will involve the extraction of approximately 0.9 Mt of ore and processing this through CIL process onsite. The Toms Gully Mine will employ approximately 104 personnel and it is possible both the Toms Gully Mine and current Project could be constructed and operated simultaneously.

Extractive Resources

The region supports a number of extractive resources enterprises, such as the following:

- HB Quarry (Marrakai);
- Ostojic Quarry;
- McKinlay Quarry (McKinlay River Station); and
- Boral quarries (Mount Bundey).

Tourism

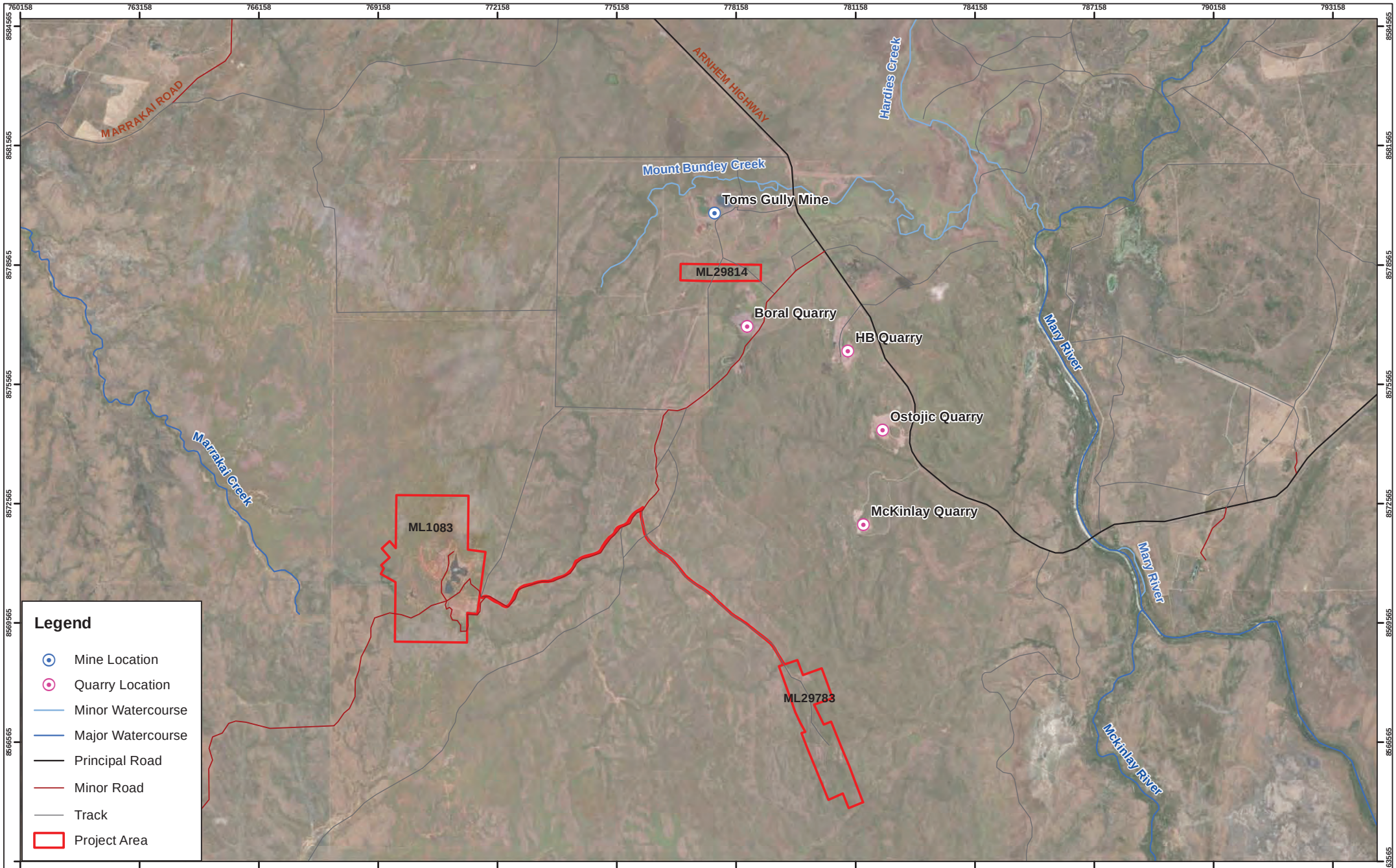
Tourism is an important economic driver for the Northern Territory, contributing approximately 5.5% of NT employment and is a significant industry in regional areas (DTF 2021). Tourism's contribution to the Northern Territory economy is captured in a range of industries which include accommodation and food services, retail trade, culture and recreation, and transport. In 2019-20 the tourism industry in the Northern Territory is estimated to have contributed 3.3% to the Gross State Product (DTF 2021).

The closest tourist destination to the Project is the Mary River National Park and its environs and nearby facilities which are popular with recreational fisherman, campers and hikers. Given the modest increases in traffic associated with the Project, holiday and tourist traffic visiting the Mary River National Park and areas beyond (e.g. Kakadu National Park) are not expected to be impacted by the Project.

Agriculture

The region supports a number of agriculture industries and enterprises, such as the following:

- Pastoral properties utilised for cattle farming;
- The Humpty Doo Barramundi aquaculture farm; and
- Other smaller agricultural enterprises.



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APPROVED	TK	DATE	06/08/21

Notes:

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Meters

1 cm = 872 meters

GCS GDA 1994 MGA Zone 52

DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
NT Government Open Source Data

DESIGNER

CDM Smith

CLIENT

PRIMARY GOLD

FIGURE 7-53

Surrounding Mining and Extractive Industry Projects

DRG Ref: 1001087-EIS-07-7.19

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7.6.2 Potential Impacts and Risks

The identified impacts and risks have been assessed and are presented together with mitigations (where appropriate) in Section 7.6.6. The risks identified include economic, social, health and safety risks relevant to the general public.

This section identifies, describes and assesses the potential social and economic impacts arising from the Project construction, operation and closure on the region, with particular focus on stakeholders that may be directly affected by the impact. The environmental risk assessment discussed in Section 6 and presented in Appendix B identified and considered 11 potential sources of impact to the community and economic aspects (Table 7-71). These were considered with regard to the potential to cause significant impacts and residual consequences.

Table 7-71 Potential Sources of Impact to Community and Economy

Risk No.	Source of Impact	Project Phase(s)	Summary of Potential Impacts
CE-1	Inappropriate management of the decommissioned site, post closure landform.	Closure	**Direct** - Unauthorised access to the site by externals (including public, leaseholders and livestock) negatively affecting rehabilitation potential, contributing to rehabilitation failure and causing risk of injury or death. Potential scouring, soil erosion, loss of topsoil and sedimentation resulting in the alteration of water quality on and off site drainage features impacting the downstream receptors and use of the downstream environment by the community (e.g. recreational fishing and cultural activities). **Indirect or Cumulative** - Increased disturbance of water features in the wider Mount Bundey locality coupled with disturbance at Toms Gully Mine and the nearby Mount Bundey Training Area, resulting in reduced local capacity of water to perform ecological functions and a cumulative increase in erosion contributing to waterway sedimentation. Impacting the downstream receptors and use of the downstream environment by the community (e.g. recreational fishing and cultural activities).
CE-2	Emissions from clearing, dust, noise, artificial light associated with construction and/or operation of the mine site.	Construction, Operation	**Direct -** Potential impact to visual amenity due to dust emissions, cleared areas or infrastructure visible from publicly accessible areas. Potential artificial light impact on nearby landholders. Negative impact on tourism. **Indirect and Cumulative** - Potential cumulative impact from the abovementioned risks in the wider area in conjunction with Toms Gully, nearby quarries and the Mount Bundey Training Area.
CE-3	Financial capacity or feasibility to implement Project becomes unviable due to Au price change, fuel cost increases or change in metallurgical recoveries of ore.	Construction, Operation, Decommissioning and Closure	**Direct** - Loss of job opportunities and unemployment. Site not rehabilitated to required standards and potentially affecting downstream receptors. Visual amenity of the area not meeting desired completion criteria. **Indirect or Cumulative** - Impact on local services and employment. Given PGO is the proponent for the nearby Toms Gully Mine project it would likely result in cumulative impact on the abovementioned risks.

Risk No.	Source of Impact	Project Phase(s)	Summary of Potential Impacts
CE-4	Major mechanical failure of processing plant	Operation	**Direct -** Potential injury or death of site personnel. Major operational delays and unexpected expenses to fix damages. **Indirect or Cumulative** - Potential transportation of contaminated sediments and material throughout the Project area and external. Biological and human health implications (primary contaminate of concern being cyanide). Contamination of downstream environments resulting in human health risks that would necessitate the closure of watercourse to extraction of drinking water, recreation and fishing. Agreed PMLU cannot be achieved due to significant environmental incidents resulting in widespread ongoing contamination of water features.
CE-5	Ore Reserve modelling estimation error	Operation, Decommissioning and Closure	**Direct** - Early closure resulting in long term loss of job opportunities and increased unemployment. No funding to undertake rehabilitation to required standards and potentially affecting downstream receptors. Visual amenity of the area not meeting desired completion criteria. **Indirect or Cumulative** - Impact on local services and employment.
CE-6	Skilled labour shortages	Construction, Operation, Decommissioning and Closure	**Direct -** Potential draw of existing workers from other industries into better paying resource jobs leading to shortfalls in skilled labour. **Indirect and Cumulative** - Potential cumulative skilled labour shortage impact in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area.
CE-7	Additional highway commuter traffic and associated road safety concerns.	Construction, Operation, Decommissioning and Closure	**Direct** - Increase in road vehicle traffic and accidents. Increased maintenance of highway and access roads. **Indirect and Cumulative** - Potential cumulative traffic impact in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area.
CE-8	Influx of workers to the local community seeking housing	Construction, Operation, Decommissioning and Closure	**Direct -** Increase in demand for accommodation, and reduction in affordability of rental housing leading to rent escalation and housing price inflation. Negative impact on housing availability. Impact on local community. **Indirect and Cumulative** - Potential cumulative economic and social impact to local community in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area.
CE-9	Influx of workers to the local community in general	Construction, Operation, Decommissioning and Closure	**Direct** - Decline in community health, safety and wellbeing. Increase in incidence of anti-social behaviour. Impacts on vulnerable groups such as women and Indigenous groups. Negative impact on community cohesion and inclusion. **Indirect and Cumulative** - Potential cumulative economic and social impact to local community in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area.

Risk No.	Source of Impact	Project Phase(s)	Summary of Potential Impacts
CE-10	Increased demand for local services and supplies	Construction, Operation, Decommissioning and Closure	**Direct** - Positive impact on local business and local economy with the injection of capital from the Project. Increased local employment rate. **Indirect and Cumulative** - Potential cumulative economic and social impact to local community in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area.
CE-11	Disturbance of sites/objects of heritage significance heritage items or places and sacred sites.	Construction, Operation, Decommissioning and Closure	**Direct** - Damage, destruction or removal of heritage item, place or sacred site. **Indirect and Cumulative** - Potential cumulative disturbance to cultural heritage in conjunction with Toms Gully Mine, nearby quarries and the Mount Bundey Training Area. Also, potential cumulative impact due to previous activities onsite.

Each of the above potential impacts are discussed in further detail in the subsequent sections, with some being grouped. Appendix B provides the comprehensive risk assessment, while Table 7-76 provides a summary of assessed inherent and residual impacts with consideration of measures applied in accordance with the environmental decision-making hierarchy.

7.6.2.1 Community

The Project area is located well away from the areas predominantly visited by tourists and will not materially impact the holiday and tourist traffic visiting for cultural and aesthetic reasons. It is likely that groups with interests in recreational fishing and other riparian activities will have an interest in the Project. PGO has held discussions with the Amateur Fishers Association of NT and relevant regulatory agencies regarding the Project. These discussions have resulted in concerns being raised about water management and water quality. A full summary of the items raised and how these have been addressed in the Draft EIS is provided in the following sections.

Alteration of Water Quality Impacting Community Uses

Alteration of water quality could occur as a result of construction and operational activities. Water quality in minor streams discharging to the Mount Bundey Creek, McKinlay River and Marrakai Creek catchments could be impacted by poor quality mine drainage. Groundwater underlying the area could also be impacted by poor quality seepage from the WRD expansion and TSF, and historic heap leach infrastructure. Hydrocarbon contamination of surface water or groundwater could be caused by leaks and spills from bulk diesel fuel storages or run-off from workshop/parking areas. There is potential for minor exceedances of water quality criteria caused by leaks from the wastewater management systems into groundwater. Potential users of surface water and groundwater may potentially be affected by such impacts.

Given the Project's position upstream of the northern section of the Mary River National Park, and known use of the downstream area for fishing, the primary risk to the community from such releases is closure to fishing and consumption of catch due to contaminants. There are also known areas of cultural heritage significance downstream of the Project (Figure 7-29). Any discharge from the site resulting in altered water quality has the potential to adversely impact access and use of the culturally significant site and, in an extreme scenario, could result in deterioration of the ecological environment (e.g. flora or fauna mortality) affecting the significance of the site.

Early Closure Resulting in Legacy Site Issues

Risks associated with rehabilitation and closure are also relevant in a community and economic sense. The prevalence of historic mine sites with legacy issues in the NT demonstrates the implications of proponents either not being able to meet commitments, of projects not being soundly planned and of the absence of a regulatory system to prevent and rectify abandoned sites with ongoing environmental legacies (NT EPA 2014). For the Project, the resumption of mining enables the site existing environmental risks to be significantly reduced. However, without implementation of progressive actions through the operational period, there remains a risk that a sudden unplanned closure (e.g. due to gold price reduction) would result in inappropriately managed disturbance areas with the potential to cause offsite impacts to the community (e.g. downstream contamination and inability of the community to utilise areas for recreation and cultural activities).

Decreased Visual Amenity

Given the limited access, distance from the closest sensitive receptors and the relatively small size of the operations, minimal significant visual amenity impacts are predicted from the mining operations. No new infrastructure is anticipated to be visible from publicly accessible locations. Decreased visual amenity may occur as a result of transient visitors and dust lift off from vehicle movements on the unsealed access road connecting to the Arnhem Highway.

Artificial Light and Noise Emissions Impacting Neighbouring Landholders

The Project is located in a remote area, where the nearest residences are the Old Mount Bundey homestead is located approximately 8.7 km north-northeast and McKinlay River homestead – 6 km east of the Project. Permanent lighting associated with the Project is unlikely to result in noticeable impacts, in the form of a light halo and/or direct light spill, to these residences and associated landholders.

Employment Opportunities

As noted above, unemployment within the Marrakai SSC is higher than the Northern Territory average. The region benefited in the past from previous mining operations which provided employment opportunities. With exception of the tourism industry, there are very few emerging employment opportunities in the region and the Mount Bundey locality is the only progressed mining project in the north-west region of Darwin. It is also noted that extractive resource activities at the quarries located to the east of the Project area are linked to project development in the greater Darwin region. Overall utilisation of the quarries has decreased with completion of the Ichthys gas project.

Further afield, the Energy Resources Australia Ltd (ERA) Ranger Uranium Mine approximately 150 km east of the Project, entered a closure phase from 8 January 2021. Analysis of the closure estimated the total employment impacts to be roughly 298 jobs lost, worth approximately $28 million in employment income, representing a 49% reduction on current employment levels and a 61% reduction in employment income (Blackwell et al, 2017). Mining activities have significant non-direct employment benefits and the closure has been predicted to impact the building, trade and accommodation, public and personal services industries (Blackwell *et al*. 2017).

The Project provides an opportunity to re-hire Ranger Uranium Mine personnel in the region and throughout the Northern Territory, noting that the accommodation camp provides the ability to Drive-in Drive-out (DIDO) from the place of residence. The Project is 1.5 hours drive from Jabiru would enable personnel to maintain residence in the township. This would support the Northern Territory Government's intention of maintaining Jabiru as a key regional services hub and supporting a stable resident population.

The Project will employ up to 210 personnel at peak and PGO has committed to maximising opportunities for local community members, in particular local Indigenous persons, women and people with disabilities. Employment from the local community is likely to directly benefit household income and provide indirect community benefits through higher

wages. While the Project will provide direct and indirect employment opportunities (through suppliers and service providers) and new business opportunities, there is also the potential for community expectations for local content not to be met.

The influx of employees to an area as a result of a new development has the potential to change the demographics and social status of the area. Given the compatible employment demographics documented by Bradley (2015), PGO will seek to employ locally and provide transport for employees to and from work, where necessary. As the majority of employees will already be residents within established communities it is expected that their employment at the Project site will not negatively distort the prevalent social or economic balance of the communities in which they currently live. The decision to recruit locally from within the area and transport employees to site from residential hubs contributes greatly to minimising the risk for negative social impact by minimising the chances of pressures on accommodation and services and risks of road accidents arising from the Project.

The greater Darwin area has a diverse and comparatively large economy. Wages inflow from the Project into the large and diversified economy of greater Darwin is unlikely to create any negative distortion to the economic fabric of Darwin or the Northern Territory (Bradley 2015). As the Project is consistent with the major industry of employment within the surrounding Alligator River and Humpty Doo areas, any wages that flow from the Project into the area will be consistent with the current income profile of the areas.

The positions available to the local community are predominately operational roles including 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. With exception of some highly skilled or in demand roles, a majority of the positions could be serviced by workers from the wider region. PGO will also offer training and development opportunities to improve placement of local residents in Project positions.

Transportation and Site Access Issues

The Project would result in a negligible increase of up to 4.0% to current traffic volumes along the Arnhem Highway. Traffic associated with the Project is characterised according to the stage in mine life:

- Construction phase (6 months): Three trucks and ten light vehicles per day during daylight with peak times 5 am to 10 am and 3 pm to 7 pm;
- Operations: Project traffic flow on and off-site is estimated at an average of 42 delivery trucks per week, up to ten light vehicles daily. Operating during daylight hours with peak times 5 am to 10 am and 3 pm to 7 pm; and
- Closure: Daily traffic negligible.

The Project will result in a small increase in general freight haulage. The Arnhem Highway is the major service corridor for the mining projects in the region. The general freight logistics needs of the Project will be similar to and at the smaller end of other mine projects in the Northern Territory. It is envisaged that local general freight logistics companies will compete for contracts to provide services to the Project. Demand for general freight transport arising from the Project will be accommodated by increased utilisation of current services by operators on the Arnhem Highway freight routes. This will minimise the need for additional trucks along the delivery route. Licenced carriers will be used and shall ensure that freight loads are restrained as per current industry best practice.

The Project will utilise Darwin airports as the primary location to transfer any specialist workers. The air movements associated will be minimal and are within existing capacity of the airports and as such the Project is anticipated to have a negligible socio-economic impact on the community.

Disruption of Community Cohesion

Law and order and alcohol control are issues often associated with large infrastructure activities and associated accommodation camps. These issues have the potential to cause deterioration in community cohesion and are interrelated with other issues raised such as domestic violence, child safety, health and youth crime.

The usual issues of interaction between workers and the community, and alcohol consumption at the accommodation camp leading to community impacts are made largely irrelevant for the Project considering the remote location of the site and the limited site access.

Another issue raised as part of community cohesion was the impact of DIDO rosters on both the employees, and their families located in the chosen base/s. Alternating work rosters may cause negative impacts on employees, with anecdotal evidence suggesting an elevated risk of high stress levels, depression, binge drinking, recreational drug use and relationship break-ups. These would potentially decrease the community values and cohesion.

Given the limited opportunity for interaction between the mining operations and the surrounding communities, the potential to negatively impact on community cohesion is considered to be low.

While the remote location of the operation necessitates DIDO operations, PGO understands that the DIDO roster will be a significant factor in employee satisfaction and will look for opportunities to develop a roster that will be sustainable for the majority of employees.

Increased Demand on Community and Essential Services

The Project workforce will be provided with accommodation, transport (to and from Darwin and to and from the camp), food and medical and emergency services. Workers will be DIDO 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. The accommodation camp will be designed to house 100% of the personnel required for Project construction and operations at any one time. Therefore, the potential for the Project workforce to negatively impact on accommodation and schools is negligible; however, these are further discussed below.

Health Services

The Project workforce will likely be a combination of local residents who can access the site and DIDO personnel, that will reside onsite during the construction and operational phases. The use of local residents will not change the current demand for community health services in the region. There may; however, be a minor increase to the demand for community services including medical health services. Typically minor illnesses and injuries will be treated onsite at the Project's first aid facility and will not increase demand on health services. In some cases; however, emergency evacuation of patients may be required from the Project to Darwin for more specialist healthcare provision. This increased demand will draw on the existing supply of such services for each hospital but is expected to be infrequent. Therefore, the increased demand on health services is assessed as being of low socio-economic significance and no mitigation is proposed. Furthermore, with the recent closures of Union Reef Mine and the Ranger Uranium Mine there is likely to be reduced demand on such services from the mining industry.

Given the continuing Covid-19 pandemic and the indefinite nature of interstate border restrictions associated with outbreaks, PGO's priority for a local workforce reduces Project and community risks associated with movement of personnel and spread of the virus. However, for discrete specialist roles there may be a requirement to utilise out of state technicians. For use of out of state personnel, PGO will follow national, state and territory health requirements, complete appropriate health declarations, mandatory quarantine periods and apply management protocols on re-commencement a staff members swing.

Education Services

It is not expected that there will be any significant in-migration of permanent residents to any of the communities within the study area as a result of the Project as the majority of the workforce is anticipated to be either sourced from the existing local communities, or be DIDO from Humpty Doo, Darwin and surrounding populous areas. Consequently, there is likely to be only limited additional demand placed on the local/regional educational infrastructure in the communities from where workers operate. There is only expected to be additional demand where workers and their families migrate into the communities for employment and this is expected to be limited. The Project is therefore not expected to have a significant impact on the existing educational services.

Emergency Services

There is unlikely to be an increased demand on ambulance and paramedic services within the study area during the construction and operations phases of the Project. The distance and relative inaccessibility of the Project area to vehicular traffic, limits the extent to which ambulance and paramedic services would be utilised. Any major medical emergencies are expected to call on local or regional road and air rescue services such as the Fire and Rescue Darwin and Humpty Doo based service.

In terms of police and fire and rescue response, it is estimated that vehicle access to the site would take in the vicinity of 55 minutes (assuming a 10 minute response time and 45 minute transit). Onsite emergencies such as fires, chemical spills and onsite security matters will in the first instance be managed by appropriately trained Project staff. Onsite emergency services mitigation measures will be managed through a Project Emergency Response Plan. In the unlikely situation that police or fire and rescue services are required to attend the Project area it is anticipated that the demand on existing services would be of short duration. It is expected; however, that the onsite response capabilities will help to minimise any burden on the police and fire and rescue services.

Essential Services

No impacts to essential services are anticipated from the Project. Essential services such as water supply (via groundwater sources that are not connected to community supplies) and sewage (treated and managed onsite) and electricity (supplied by Liquefied Natural Gas (LNG) for the plant and Liquid Petroleum Gas (LPG) for the elusion circuit via a dedicated gas pipeline and diesel generators) will be contained to the Project site and will not draw on public infrastructure or supply. The accommodation camp is the only infrastructure proposed to be connected to the grid and capacity of the network has been confirmed through consultation with the Power and Water Corporation.

Any additional load placed on essential services is not expected to significantly affect the existing supply of these services at any of the communities within the study area, as the load will be borne at the Project site. The increased demand on essential services outside the Project area associated with the Project construction and operation is therefore likely to be of negligible socio-economic significance.

Community and Recreational Facilities and Services

There are no community or recreational facilities or services in the local Project area.

The remoteness of the site significantly limits the extent to which existing facilities in the Marrakai and Humpty Doo communities will be used by Project employees. As identified within the Education Services section above, increases in the populations of the anticipated employee source communities (as a result of the Project) will only occur if people move to the areas specifically for this work (i.e. not through utilising existing residents). Potential population increases are considered minor and therefore impacts to community and recreational facilities are unlikely. Should workers use existing recreational facilities within the study area, it is expected that any increase in demand will be infrequent and of short duration. As such the Project is anticipated to have a negligible socio-economic impact on the community due to

increased usage of recreational facilities and services and depending on the government's spending of royalties from the Project, it could result in a beneficial outcome.

The closest tourist destination to the Project site is the Mary River National Park and its environs and nearby facilities which are popular with recreational fisherman, campers and hikers. The Project site is located adjacent to the Arnhem Highway. Potential visual impacts are considered above. The Project is not expected to have any impact on current cultural, recreational or aesthetic use of the area.

Demographic Changes

The Project is not predicted to cause any significant increase in local community populations as the aim is to employ as many local people as possible (that is those that already live in the towns). Where local employees are not possible, people will reside in one of the larger regional communities, for example Darwin, Humpty Doo or Jabiru.

The use of local residents may encourage a higher proportion of the working aged population to maintain residence in the local area rather than look elsewhere for work. This could result in decreased mobility of the local population.

Impacts to Cultural Heritage Values

Historically, there have been a number of AAPA Certificates issued over the Project area. Most recently, PGO was issued an Authority Certificate in 2016, for the purpose of exploration activities and ongoing maintenance of the Rustlers Roost and Quest 29 mines (C2016/168). No recorded or registered sacred sites were identified. Prior to the commencement of the Project, PGO will seek a new Authority Certificate.

Access to the site for Traditional Owners will be established and implemented through relevant agreements. Regular stakeholder communications, covering updates on the Project, will be undertaken as part of the stakeholder engagement. While an influx of workers could result in access and damage to areas of cultural heritage significance, the Project will employ strict operational boundaries as necessitated by internal policies and legislation for protection of these sites and as part of managing interactions with the neighbouring pastoral activities.

7.6.2.2 Economy

Reduction in commodity prices, exchange rate fluctuations and increase in fuel prices tend to be global and systemic risks for which there are a limited number of diversification strategies to manage risks to project viability (Bradley 2015). Risks such as ore reserve estimation error, changes in the metallurgical recovery characteristics, adverse ground conditions, adverse climatic risks (high rainfall events) and major mechanical failure tend to be partially diversifiable and mitigation strategies have been included in the risk register to minimise the likelihood or potential consequences of such risks.

Regional Labour Shortage

The Project is likely to have only a modest demand for labour, although this demand is likely to be for relatively skilled labour. The region has had a long standing and mature mining sector. While the Project is likely to have a demand for skilled labour, there remains significant capacity within the local and regional labour markets to accommodate this demand, and there is also a well-established pool of workers experienced in the mining sector already within the region.

Increased Demand and Reduced Housing Affordability

With a peak workforce of 210 personnel and an ongoing operational employment demand within the region, the potential for the Project to have a material impact on the regional housing market is limited. The mine is isolated from existing major settlements, but any locally domiciled workforce will DIDO from major population centres such as Darwin, Humpty Doo, Jabiru and surrounds.

Economic Contribution

The economic contribution within the Northern Territory is anticipated to be highest within the mining, transport, postal and warehousing sectors. The following section provides details of the Project capital and operational expenditures.

Engagement undertaken to date indicates that stakeholders are largely aware of the workforce requirements for the Project. Many stakeholders have identified that the key economic opportunities of the Project may be more indirect, specifically through business and procurement opportunities, and indirect (sub-contractor) employment.

The Project would also be subject to the Northern Territory Government legacy mines levy. Changes to the *Mining Management Act 2001* in 2013 introduced an annual levy on mining securities to fund addressing the Territory's legacy mining liabilities. This is a non-refundable annual levy of 1% on the total calculated rehabilitation cost applied to each mining operation authorised under the *Mining Management Act 2001*. This levy is in addition to the financial security applicable to the Project and based on the size of the proposed operation is expected to be in the tens of thousands of dollars per year.

The primary objective of the levy is to generate necessary funds to address historical mining impacts (not associated with the Project). It is also used to ensure current and future exploration, mining and extractive activities are appropriately regulated to minimise environmental damage. A statutory Mining Remediation Fund has been created with at least 33% of levy funds being held to undertake works to reduce the level of impact legacy sites have on the environment and public safety. The Project will therefore contribute a significant amount of money to the fund over the 10 year operational period. This will result in a direct economic benefit to the Northern Territory Government and communities in which legacy mines are located.

The business development potential arising from the proposed Project is consistent with services that are already available in the region and as such will provide positive stimulus for positive business growth over the ten year operational period. It is expected that Northern Territory domiciled business will gain more than 80% of the available opportunities (Bradley 2015). While measures will be employed to prioritise local or Northern Territory-based expenditure (e.g. development and implementation of a procurement policy), no specific mitigation measures are considered to be required.

Capital Expenditure

The bulk of the main operating fleet has the capital cost of the equipment purchased at the beginning of mine operations. The current open pit is filled with water and will need pumping prior to operations commencing. The cost associated with this is approximately $900,000 which allows for purchasing a number of high flow pumps, piping, fuel and labour prior to operations. Hence, this cost has been included as capital.

The total capital expenditure associated with mining is summarised in Table 7-72 and is based on the miscellaneous items including pit dewatering, computing software, haul road construction, clearing, topsoil management and mobilisation and site establishment. Demobilisation is estimated at $500,000.

Table 7-72 Mining Capital Expenditure

Area	$ M
Initial Capital	
Mining Fleet 1 Initial	$8.38
Ancillary and Minor	$0.18
Initial Pit Dewatering	$0.90
Clearing	$0.51

Area	$ M
Road Building	$0.25
Tailing Storage Facility	$61.36
Processing Plant	$164.17
Sub-total	**$235.75**
Sustaining Capital	
Sustaining Mining Fleet 2	$42.05
Sustaining – Replacement	$1.84
Sustaining – Clearing	$1.27
Sustaining – Rehabilitation	$0.46
Sustaining – Demobilisation	$0.50
Sub-total	**$46.13**
TOTAL	**$281.88**

Operational (Opex)

Operational expenditure is based on a fixed and variable rate which is rolled up to a $/t mined by oxide, transition and fresh basis for both ore and waste. Overall operating costs are $3.59/t mined (including margin) as a LOM cost for the Project.

Table 7-73 breaks down the unit operating costs by cost centre and Table 7-74 breaks down the operating and capital cost by year in detail. Overall, the total cost per tonne mined is $4.08 /t mined which includes capital.

Table 7-73 Unit Mining Costs by Cost Centre

Cost Centre	Ore $/t	Waste $/T
Loading	$0.10	$0.10
Hauling	$0.51	$0.37
Support	$0.16	$0.15
Drilling	$0.17	$0.13
Blasting	$0.33	$0.28
All Personnel	$1.69	$1.42
Clearing/Rehab	Included in capital	
Dewatering	Included in capital	
Grade Control	$0.19	
Rehandle	$0.18	
Fixed Overheads	$0.50	
Margin (20%)	$0.59	$0.59
Capital	$0.49	$0.49
Total	**$4.93**	**$3.54**

Table 7-74 Total Operating Cost by Year ($M)

Period	Cost Centre	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Ore	Loading	$4.35	$0.0	$0.7	$0.6	$0.4	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	
	Hauling	$23.00	$0.1	$3.3	$3.1	$1.9	$1.9	$1.8	$2.2	$2.3	$3.1	$3.3	
	Support	$7.41	$0.1	$0.8	$0.7	$0.5	$0.5	$0.9	$0.9	$0.9	$1.2	$1.0	
	Drilling	$7.69	$0.0	$0.9	$0.8	$0.6	$0.6	$0.6	$0.8	$0.9	$1.2	$1.2	
	Blasting	$14.99	$0.1	$2.2	$2.0	$1.4	$1.3	$1.3	$1.4	$1.5	$1.9	$1.9	
	Total Personnel Cost	$75.82	$0.5	$8.8	$7.5	$4.9	$4.7	$7.5	$7.7	$8.5	$11.1	$10.8	$3.7
	Grade Control	$8.74	$0.0	$1.5	$1.3	$0.8	$0.8	$0.8	$0.7	$0.8	$1.0	$1.0	
	Ore Rehandle	$8.10	$0.0	$1.4	$1.2	$0.8	$0.7	$0.7	$0.7	$0.7	$0.9	$0.9	
	Fixed Overheads (Incl. Ancillary Opex)	$22.61	$0.6	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	
	Total	**$172.72**	**$1.4**	**$22.1**	**$19.7**	**$13.8**	**$13.3**	**$16.4**	**$17.3**	**$18.5**	**$23.4**	**$23.2**	**$3.7**
Waste	Loading	$6.77	$0.2	$1.0	$1.1	$1.3	$1.3	$0.5	$0.5	$0.4	$0.3	$0.2	
	Hauling	$26.14	$0.5	$4.0	$4.0	$4.5	$4.5	$1.8	$1.6	$2.1	$1.8	$1.2	
	Support	$10.20	$0.4	$1.1	$1.3	$1.5	$1.5	$1.1	$1.1	$1.0	$0.8	$0.4	
	Drilling	$9.16	$0.1	$0.9	$1.0	$1.7	$1.5	$0.7	$1.0	$0.9	$0.8	$0.5	
	Blasting	$19.90	$0.4	$2.5	$2.8	$3.8	$3.7	$1.5	$1.7	$1.6	$1.3	$0.8	
	Total Personnel Cost	$99.41	$3.3	$11.8	$13.4	$15.5	$15.6	$9.1	$9.5	$9.4	$7.5	$4.2	
	Total	**$171.58**	**$4.9**	**$21.4**	**$23.6**	**$28.2**	**$28.1**	**$14.7**	**$15.3**	**$15.5**	**$12.6**	**$7.3**	
Total	Loading	$11.12	$0.2	$1.7	$1.8	$1.7	$1.7	$0.8	$0.8	$0.8	$0.8	$0.7	
	Hauling	$49.14	$0.6	$7.3	$7.1	$6.4	$6.4	$3.7	$3.8	$4.4	$4.9	$4.6	
	Support	$17.61	$0.5	$2.0	$2.0	$2.0	$2.0	$2.0	$2.0	$2.0	$2.0	$1.4	
	Drilling	$16.86	$0.1	$1.8	$1.9	$2.3	$2.1	$1.4	$1.8	$1.8	$2.0	$1.7	
	Blasting	$34.89	$0.4	$4.7	$4.8	$5.2	$4.9	$2.8	$3.1	$3.1	$3.2	$2.7	
	Total Personnel Cost	$175.24	$3.8	$20.6	$20.9	$20.4	$20.4	$16.6	$17.3	$17.9	$18.6	$15.0	$3.7
	Grade Control	$8.74	$0.0	$1.5	$1.3	$0.8	$0.8	$0.8	$0.7	$0.8	$1.0	$1.0	
	Ore Rehandle	$8.10	$0.0	$1.4	$1.2	$0.8	$0.7	$0.7	$0.7	$0.7	$0.9	$0.9	
	Fixed Overheads (Incl. Ancillary Opex)	$22.61	$0.6	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	$2.4	
	Total	**$344.30**	**$6.3**	**$43.5**	**$43.3**	**$42.0**	**$41.5**	**$31.1**	**$32.6**	**$33.9**	**$36.0**	**$30.4**	**$3.7**

7.6.2.3 Cumulative Impacts

Identification of nearby existing operations, surrounding major projects and mining development proposals has been completed (refer to Section 7.6.1). There is a single advanced mining proposal in a 50 km radius of the Project area (Toms Gully Mine) and two major government infrastructure projects being the Arnhem Highway Adelaide River Floodplain Upgrade ($77.88 M) and the Corroboree Access Road Upgrade ($11 M). Construction on the Arnhem Highway project commenced in October 2020 and is due for completion in late 2021 while works on Corroboree Access Road began in April 2021 and were due to be completed in July 2021.

While each of the identified major government projects will be complete prior to construction of the Project, there are several existing operational quarries located to the east. Extractions, activities and related vehicle movements at the quarries are highly dependent on largescale Project development and activity has significantly decreased since practical completion of the Ichthys development in Darwin. Nevertheless, there are several largescale projects in the assessment or post-assessment phase in the greater Darwin region that could result in increased vehicle movements on the Arnhem Highway related to the quarries. Should this occur, there is a risk that cumulative traffic movements from the Project and these quarries (particularly heavy vehicle movements) could decrease traffic safety and increase community disruption, especially through the townships of Marrakai and Humpty Doo.

Based on traffic count data, the peak year for movements along the Arnhem Highway north-west of the Project (between the Project area and Darwin) was 2014 (refer to Table 7-68). The Arnhem Highway is understood to have been well within capacity during this period. Annual average daily movements (two-way) in 2019 were 195 less than 2014[18].

The anticipated Project traffic movements is six heavy vehicle movements and 15 light vehicle two-way movements per day. The Project would constitute up to 3.74% of 2019 AADT which coupled with the estimated 16 two-way movements per day for Toms Gully Mine would constitute up to 6.16% of the 2019 AADT. This is still 121 movements below the 2014 peak. Therefore, cumulative movements from the Project and surrounding operations are unlikely to result in detrimental community impacts.

A range of other potential cumulative impacts have been identified in the risk assessment and are listed in Table . These are:

- Combined impacts on water quality from surrounding activities (e.g., Toms Gully Mine and quarries) exacerbating conditions and impacting on recreation and cultural use of the downstream area (further addressed in Section 7.4);
- Impacts on local services and employment should financial feasibility of the Project change and result in early/unplanned closure. Given PGO is the same proponent for the nearby Toms Gully Mine project it would likely result in cumulative impact to service suppliers and mining employment; and
- Skilled labour shortage that is amplified by operational personnel demand from Toms Gully Mine.

7.6.3 Avoidance, Mitigation and Management

This section presents the strategy of a hierarchical approach of avoidance, mitigation and management to minimise potential impacts to the values of community and economy (Table 7-75).

Table 7-75 Avoidance, Mitigation and Management Measures

Potential Impacts	Measures
Alteration of water quality impacting community uses (recreation and cultural site and activities)	**Avoid** ▪ Adhere to buffer widths recommended by the Northern Territory Land Clearing; Guidelines with regard to riparian vegetation in drainage lines; ▪ Avoid land clearing during the December to March portion of the wet season; ▪ Identification and protection of 'No-Go Areas' in accordance with a Project Environmental Management plan; ▪ Implementation of AMDMP and WMP; ▪ All water storage facilities geotechnically stable and engineered to ANCOLD guidelines;

[18] 2020 discounted due to covid related restrictions that are likely to have reduced movements.

	▪ Design, storage and handling of hazardous materials to Australian Standards and regulations; ▪ Specific adherence of the ANFO storage to *Dangerous Goods Act 1998* and the *Work Health and Safety (National Uniform Legislation) Act 2011*; ▪ Regular maintenance of storage facilities; ▪ Bunding of the process plant; ▪ Diesel in bunded storage tanks, waste oil in stored bunded tanks; ▪ Weekly inspections of storage areas, tanks, containers; ▪ Cyanide management and storage will be aligned to the Commonwealth of Australia Leading Practice Handbook for Sustainable Mining - Cyanide Management (Australian Government 2008); and ▪ Chemical storage will be located a minimum 30m from any drainage line or watercourse. **Mitigation and Management** ▪ Only clearing what is absolutely necessary for the portion of the Project to be implemented; ▪ Adherence to Ground Disturbance Procedures; ▪ Implement erosion and sediment controls in accordance with an ESCP; ▪ Spill kits available around the site and procedures and training for the cleaning up of hazardous spills; ▪ Develop Emergency Response Plan and include in inductions; and ▪ Implementation of hazardous materials management plan training for emergency response. **Rehabilitation** ▪ Progressive rehabilitation will be undertaken on those areas that are no longer required to service the operation of the Project; and ▪ Rehabilitation activities will be undertaken in accordance with internal rehabilitation procedures.
Decreased visual amenity	**Avoid** ▪ Retain native vegetation for screening around the accommodation camp and on the boundary of the Project area; ▪ With exception of signage, no storage of plant and equipment in sight of the Arnhem Highway; ▪ Implement a dust management plan; ▪ Implement speed limits of 40 km/hr on internal Project roads and the 60 km/hr on the haul road to limit the potential to create excessive dust lift off; ▪ Avoid clearing in high wind weather conditions where dust lift off is more likely to occur; ▪ Progressive clearing and rehabilitation; ▪ Proactive use of dust suppressants (e.g. watering of high traffic areas). **Mitigation and Management** ▪ Implementation of dust suppression proactively and when dust lift off is identified; and ▪ Monitor and actively address complaints. **Rehabilitation** ▪ Progressive rehabilitation will be undertaken on those areas that are no longer required to service the operation of the Project; and ▪ Rehabilitation activities will be undertaken in accordance with internal rehabilitation procedures.

Artificial light and noise emissions impacting neighbouring landholders	**Avoid** ▪ Retain native vegetation for screening around the accommodation camp and on the boundary of the Project area; ▪ Lighting to only be installed and used in operational areas; ▪ All light sources will be aimed towards specific work areas requiring light for safe construction and/or operation; ▪ All lighting is to be of low vertical angle to minimise light spill over; ▪ Where possible, lighting will be the minimum wattage, whilst not compromising safety or OH&S requirements; and ▪ All vehicles, plant and equipment will be maintained in good working order (e.g. regular servicing) and operated as intended. **Mitigation and Management** ▪ Implementation of dust suppression proactively and when dust lift off is identified; and ▪ Monitor and actively address complaints. **Rehabilitation** ▪ Progressive rehabilitation will be undertaken on those areas that are no longer required to service the operation of the Project; and ▪ Rehabilitation activities will be undertaken in accordance with internal rehabilitation procedures.
Employment opportunities	**Avoid** ▪ Prioritise employment from the local area and region (aimed at directing positive economic impacts locally); ▪ Ongoing Project updates and information to the public detailing recruitment (aimed at avoiding missed community expectations); and ▪ PGO to provide training and development to local residents for placement (aimed at maximising local benefit). **Mitigation and Management** ▪ Establish a complaints and feedback register. ▪ Undertake ongoing stakeholder engagement in accordance with the SEP.
Transportation and site access issues	**Avoid** ▪ Maintain existing access controls; ▪ Combine freight transports and limit vehicle movements for all Project phases; ▪ Provide worker education and company policy expectations through induction material to include traffic safety requirements (e.g. no commuting after long shifts, adherence to road rules etc.); and ▪ Transport of hazardous goods is in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission Australia 2018) and the following mitigation measures: – Ensure supply of hazardous goods is by recognised and approved suppliers – Ensure transport of Hazards goods is as per directions of the SDS. **Mitigation and Management** ▪ Implement more stringent controls, where required to limit access to operations to reduce access concerns to sensitive environmental and cultural areas.
Disruption of community cohesion	**Avoid** ▪ Develop and maintain a positive organisation culture that benefits all employees; ▪ Develop a roster that will be sustainable for the majority of employees; and

	▪ Regularly update stakeholders regarding Project status. **Mitigation and Management** ▪ Establish a complaints and feedback register; and ▪ Undertake ongoing stakeholder engagement in accordance with the SEP.
Increased demand on community and essential services	**Mitigation and Management** ▪ Acquire any additional services on commercial terms; ▪ Provide in-house first aid treatment to staff (aimed at avoiding the need to utilise external services for minor health issues); and ▪ Undertake ongoing stakeholder engagement in accordance with the SEP.
Demographic changes	**Avoid** ▪ Prioritise employment from the local area and region. **Mitigation and Management** ▪ Establish a complaints and feedback register; and ▪ Undertake ongoing stakeholder engagement in accordance with the SEP.
Impacts to cultural heritage values	**Avoid** ▪ Survey over the Project area with the AAPA regarding Aboriginal Sacred Sites; ▪ Undertake consultation with the NT Government Heritage Branch with regards to potential heritage sites in the area; and ▪ Implement all avoidance, mitigation and management measures identified to address the potential impact of altered water quality; and ▪ Identification and protection of 'No-Go Areas' in accordance with a Project Environmental Management plan. **Mitigation and Management** ▪ Adherence to ground disturbance/clearing procedures; and ▪ In the event that potential archaeological sites are discovered, all works in the immediate area should cease and the Heritage Branch will be contacted for comment.
Regional labour shortage	**Avoid** ▪ Work with local training providers to develop local training programs to provide unskilled people with opportunities to gain employment; ▪ Actively work with the Northern Territory Government on placement of redundant mining industry personnel (e.g. from the Ranger Uranium Mine and Union Reef Mine closures); and ▪ Adoption of recruitment policies that allow for appropriate notice periods to be served for new employees. **Mitigation and Management** ▪ Develop programs to assist local businesses retain workers where it is identified the Project is directly impacting labour availability.
Increased demand and reduced housing affordability	**Avoid** ▪ Prioritise employment from the local area and region; and ▪ Accommodate workers in a purpose-built camp for those personnel travelling in to work on the Project.
Economic contribution	**Avoid** ▪ Develop and implement a procurement policy that prioritises local and Northern Territory procurement; and

	▪ All costs associated with the Project have to be analysed by a financial model (aimed at minimising the risk associated with insufficient funds being available to fully implement the Project (including closure and rehabilitation costs)).

7.6.4 Monitoring and Reporting

The identified economic and community risks are part of the Project Risk Register. The Risk Register and risk assessment have been initially reviewed by the on-site management team and then will be regularly reviewed. The overall responsibility for risk management will reside with the CEO in the construction phase, the General Manager Operations in the operational phase and be incorporated into day to day management of the operation.

PGO will be required to produce annual reports as part of its obligations as a corporate entity. The annual report will cover many of the mitigation measures identified for the community and economic risks.

PGO will be required to report annually to the Department of Industry, Tourism and Trade (DITT) on the implementation of the Project. These annual reports will also enable reporting of any significant changes in community or economic circumstances, or the Project implementation that may result in altered risk settings.

7.6.5 Residual Impact

The significance of the residual impacts of the Project, assuming the successful implementation of recommended avoidance, mitigation and management measures, was assessed in accordance with the risk assessment framework presented in Section 6 against the following socio-economic receptors. The assessment considered potential impacts to:

- Territory, regional and local economies;
- Local communities;
- Local industry and other land users; and
- Local infrastructure and services.

All potential residual impacts were assessed as low or moderate. Several sources of impact will also result in positive impacts (e.g. increased employment opportunities and investment).

The community and economic risks identified for the Project are presented in the Project Risk Register. The inherent risks are categorised as ranging from low to extreme. The application of mitigation measures reduces the risk profile such that there are no residual high or extreme risks. The identified residual community and economic risks associated with the Project generally have a low probability of occurrence and in the unlikely event that they do occur, are likely to have negligible impact on the community and economic fabric of the Northern Territory. Of the 11 sources of potential significant community and economic impact, the potential residual impacts were classified as low for all but two (financial capacity or feasibility to implement Project, and additional highway commuter traffic and associated road safety concerns) (refer to Table 7-76). For these two sources of risk the consequence of the occurrence is still high enough following application of controls to warrant a residual moderate risk classification.

The economic and social impact risks associated with the Project are generally able to be managed through mitigation measures that make good business sense and hence are considered unlikely to require any statutory process to mandate implementation. PGO considers that there is no further requirement to prepare a management plan to deal with economic or community risks as the mitigation measures identified herein are consistent with sound business practices and existing legislation.

7.6.6 Predicted Outcome and Conclusions

The potential economic and community risks associated with the Project have been identified, approaches to avoid or mitigations considered and residual impacts assessed. The Project presents economic and community opportunities at a scale that is not problematic for services, existing infrastructure or social fabric and are expected to have on balance an overall positive socio-economic impact. Risks to the community from transport related interactions, altered water quality (affecting downstream recreational and cultural uses) and the risk of unexpected closure resulting in legacy issues that affect the community will remain. However, both the likelihood and consequence of such risks are considered to be sufficiently low through the application of controls applied in accordance with the environmental decision-making framework.

The environmental objective identified in the ToR (NT EPA 2021d) for community and economy risk was to enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians. The Project provides an opportunity to enable further mining increment to generate local economic opportunities with minimal environmental risk and creates the opportunity to manage the unrehabilitated historic disturbance area, waste rock and water management according to international best practice for mine closure such that the ToR objective for this factor is able to be met.

Table 7-76 Community and Economy Residual Impact Assessment Summary

Risk No.	Source of Impact	Project Phase(s)	Inherent Risk	Summary of Controls	Residual Risk
CE-1	Inappropriate management of the decommissioned site, post closure landform.	Closure	Moderate	> Implement fencing and access restriction to prevent vehicle and livestock accessing rehabilitation areas. > Ongoing monitoring of rehabilitation. > Progressive rehabilitation during mining to enable more established areas upon closure	Low
CE-2	Emissions from clearing, dust, noise, artificial light associated with construction and/or operation of the mine site.	Construction, Operation	Low	> If necessary, vegetation for screening > Detailed engineering design of infrastructure > Monitor complaints register > Implementation of dust suppression proactively and when dust lift off is identified. > Implementation of Dust Management Plan. > Progressive clearing and progressive rehabilitation. > Avoid clearing on windy days.	Low
CE-3	Financial capacity or feasibility to implement Project becomes unviable due to gold price change, fuel cost increases or change in metallurgical recoveries of ore.	Construction, Operation, Decommissioning and Closure	Extreme	> Target Opex costs in lower quartile of Australian production costs combined with a forward gold price hedging strategy. > Target Opex costs in lower quartile of Australian production costs. Consider FX hedge. > Progressive rehabilitation of unused areas. > Implementation of detailed mine closure plan. > Early planning and financial provision for closure works. > Infrastructure design to withstand extreme events. > Ongoing management of levels in water infrastructure. > Improve site drainage controls.	Moderate
CE-4	Major mechanical failure of processing plant	Operation	High	> Ensure appropriate warranties in place and maintain appropriate critical mechanical spares inventory. > Regular maintenance and inspections of plant. > Engineer sign off before recommencement of plant. > Construction of abandonment bund around the processing plant. > Provide training to all personnel accessing the processing plant area.	Low
CE-5	Ore Reserve modelling estimation error	Operation, Decommissioning and Closure	Extreme	> Grade control and mapping programmes combined with effective production reconciliation studies both present and historical. > Progressive rehabilitation of unused areas. > Implementation of detailed mine closure plan. > Early planning and financial provision for closure works.	Low

Risk No.	Source of Impact	Project Phase(s)	Inherent Risk	Summary of Controls	Residual Risk
CE-6	Skilled labour shortages	Construction, Operation, Decommissioning and Closure	Moderate	> Work with local training providers to develop local training programs to provide unskilled people with opportunities to gain employment. > Adoption of recruitment policies that allow for appropriate notice periods to be served for new employees.	Low
CE-7	Additional highway commuter traffic and associated road safety concerns.	Construction, Operation, Decommissioning and Closure	High	> Schedule delivery's at staged times so road is not inundated with trucks. > Increase road safety signage.	Moderate
CE-8	Influx of workers to the local community seeking housing	Construction, Operation, Decommissioning and Closure	Low	> Recruit locally from within existing labour pool. > Provision of a Project specific accommodation camp.	Low
CE-9	Influx of workers to the local community in general	Construction, Operation, Decommissioning and Closure	Low	> Recruit locally from a demographic where mining is already significant proportion of industry of employment. > Establish a complaints and feedback register. > Establish clear mechanisms for ongoing stakeholder engagement.	Low
CE-10	Increased demand for local services and supplies	Construction, Operation, Decommissioning and Closure	Low	> Acquire any additional services on commercial terms. > Local services providers will be used where required.	Low
CE-11	Disturbance of sites/objects of heritage significance heritage items or places and sacred sites.	Construction, Operation, Decommissioning and Closure	Low	> Survey over the Project area with the AAPA regarding Aboriginal Sacred Sites. > Undertake consultation with the NT Government Heritage Branch with regards to potential heritage sites in the area. > Project EMP. > Adherence to ground disturbance/clearing procedures. > In the event that potential archaeological sites are discovered, all works in the immediate area should cease and the Heritage Branch will be contacted for comment.	Low

7.6.7 Assumptions

The key assumptions made in assessing potential impacts on community and economy are:

- The cumulative impact considerations have assumed Toms Gully Mine progresses into construction and operation simultaneously with the Project;
- The analysis assumes that the Project will largely align with the anticipated construction and operational schedule;
- Available documentation reviewed indicates sufficient capacity of the Arnhem Highway to accommodate the minor increase in traffic movements from the Project. There are assumed to be no non-public major projects in the region that would exacerbate capacity of the Arnhem Highway or contribute to a decrease in aesthetics;
- The analysis assumes that workers not sourced from the local area will DIDO to the Project site and thus not result in a significant relocation to the local area; and
- The analysis assumes the majority of services and supplies for the Project (80%) can be obtained from the wider region or the Northern Territory. Should limitations on services and supplies within the Northern Territory result in a lower value the economic benefit of the Project to the region and Northern Territory would be commensurate.

7.6.8 Consultation

During development of the Draft EIS the following stakeholders were directly contacted to seek input on the Project:

- Neighboring commercial business and local operators;
- Indigenous stakeholders and Traditional Owners;
- Pastoral station leaseholders;
- AFANT; and
- NT EPA.

In accordance with the SEP, avenues were made available to all other stakeholder groups to enable Project understanding and consultation. A total of 5 responses were received from stakeholders during preparation of the Draft EIS. Section 3 provides a summary of the feedback received. The input received has been accounted for in the respective technical components of the Draft EIS and has informed identification of community values.

PGO will continue to consult with key stakeholders to determine their preferred methods of communication. PGO will then updated the communications strategy identified in the SEP based on the preferences. In the interim, communication with the community will be managed through direct correspondence and one-on-one meetings where face to face discussions will be held. A web page, telephone number and email address has been provided for the purpose of community engagement.